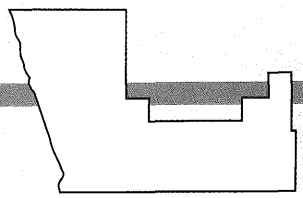
MINNESOTA COUNTY BIOLOGICAL SURVEY

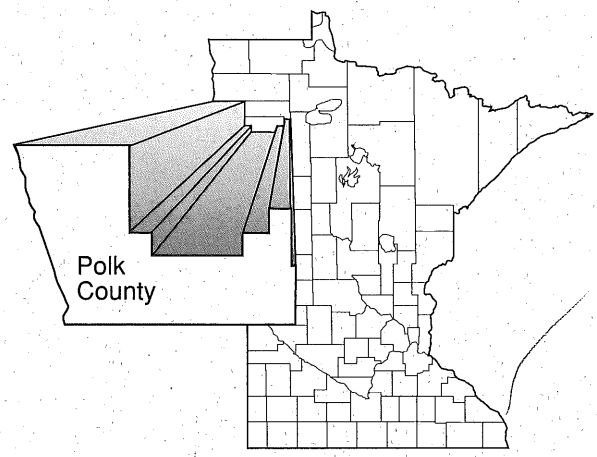
POLK COUNTY: SUMMARY OF THE 1993 FIELD SEASON



MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Minnesota County Biological Survey
Polk County: Summary of the 1993 Field Season

The Minnesota County Biological Survey (MCBS) is a systematic, county-by-county inventory of Minnesota's rare biological features. MCBS identifies significant natural areas and collects and interprets data on the distribution and ecology of rare plants, rare animals, and natural communities. The information gathered by MCBS serves as a foundation for the conservation of critical components of Minnesota's biological diversity.



MCBS Procedures

The 1993 Survey in Polk County consisted of:

- The development of a map of Polk County showing the locations of bearing trees recorded during the Public Land Survey of the late 1800s. This map provides a record of the vegetation present in Polk County at the time of white settlement and is used by MCBS to determine if vegetation now on the landscape is truly representative of the presettlement vegetation and what changes may have occurred over the last 100 years.

- Aerial photo interpretation to identify potential areas of native vegetation. These are places where the land and native vegetation have not been altered significantly by activities such as cultivation, grazing, and logging, and are referred to as "sites" by MCBS ecologists. One hundred twenty-eight sites were delineated from photography or as a result of recommendations from public land managers, private landowners, and other knowledgeable local individuals.

- Prioritization of sites for field survey based on vegetation type; guidance from local naturalists, resource managers, and knowledgeable individuals; and information from other surveys such as wildlife habitat inventories, forest type maps, and soil surveys.

- Landowner contact followed by intensive field survey at high priority sites and less intensive surveys or reconnaissance from the road for medium and low priority sites.

- Sampling of vegetation in "relevé" plots within a variety of natural communities. These samples include a description of the structure of the community and a list of all plant species found within a 10m x 10m plot (for prairies) or a 20m x 20m plot (for forests). Information obtained from relevés is used to gain an understanding of the present vegetation of the county and to evaluate the quality of the sites. (For example, if a relevé indicates that a site has many invasive weedy species the site would be considered of lower quality than sites with a variety of species all of native origin).

- Specialized surveys for selected rare plant species and for other plant species not previously documented in the county.

- Supplemental surveys through a contract with Agassiz Environmental Learning Center to gather data on the presence or absence of the western prairie fringed orchid and other rare plants in over 1,400 miles of road rights-of-way. These data were then passed on to the county highway department.

- Entry of data into the Natural Heritage Information System, where it is available for distribution in the form of lists, brief reports, and maps. Data from other surveys and collection locations of specimens in herbaria and museums are also incorporated into this information system.

An Overview of Special Biological Features in Polk County

Historical Background

About 12,000 years ago, the majority of the western half of Polk County and the extreme northeastern townships were covered by Glacial Lake Agassiz, a huge lake formed by glacial meltwater. This lake left a legacy of fine clay soils in the Red River Valley and also a series of beach ridges–resulting from fluctuating water levels–that extend roughly from present-day Fertile to Dugdale and then swing eastward to Mentor, where they disappear. The westernmost of these beach ridges reappears in the northern part of the county in eastern Brandt and Belgium townships (fig. 1). The easternmost beach ridge reappears east of Mentor and runs interruptedly along the north border of the county, extending into the Chester Hills area just south of Highway 92. The area north of Highway 92 in Gully and Johnson townships is part of the Glacial Lake Agassiz plain. The McIntosh channel, a great drainage channel now occupied by the Sand Hill and Hill Rivers, is thought to have once connected the main arm of Lake Agassiz to an eastern arm called Lake Koochiching.

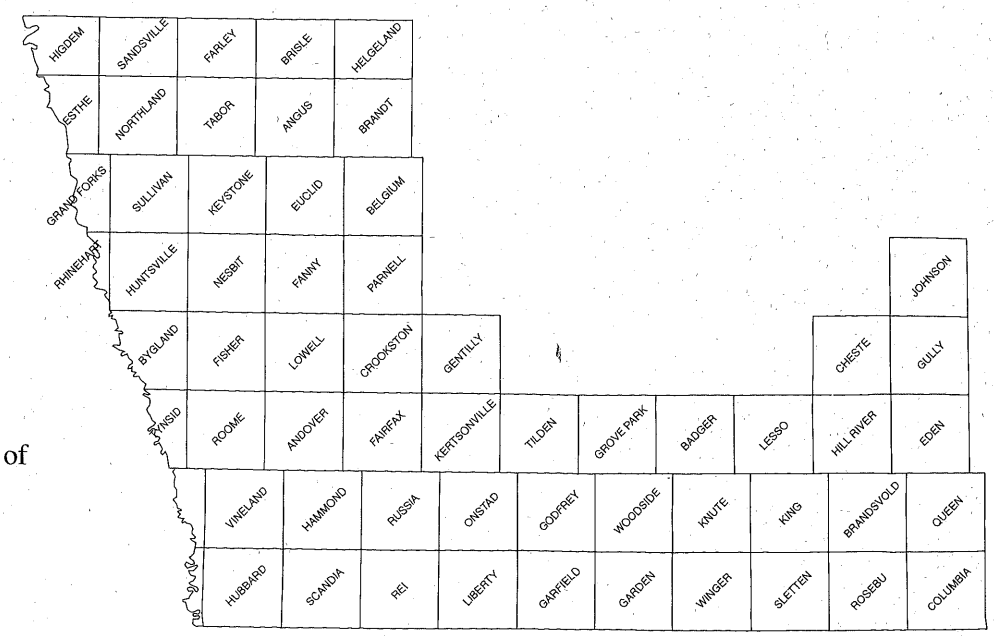


Figure 1. The townships of Polk County.

East of the beach ridges, glaciers left moraines pocked with lakes. Examples are the Erskine Moraine in northern Garden, eastern Woodside, and Knute townships, and the Alexandria Moraine in Columbia and Queen townships. The more gently rolling to level topography between these major hilly areas is part of the Fosston Till Plain and Mahnomen Lacustrine Plain.

The vegetation recorded in Polk County during the Public Land Surveys of 1871-90 reflects this glacial history and topography. As can be seen in figures 2 and 3, nearly all of the western half of the county was covered by prairie, which varied in species composition depending on topography, soil texture and available water. The composition of these prairies is reflected in present-day prairie remnants. Remnants of dry prairie, dominated by mid-height and short prairie grasses, occupy well-drained sandy and gravelly crests of the beach ridges, both in the central part of the county from Fertile to Mentor and also in the Chester Hills area. Remnants of tallgrass prairie dominated by big bluestem can be seen in less droughty midslope sites in the Fertile-Mentor area and east of Euclid and Angus. Prairie remnants in the gently undulating terrain between beach ridges are a mosaic of wet prairie, mesic prairie, and wetlands. The mesic tallgrass prairies farther west were responsible for the development of the deep rich agricultural soils for which the Red River Valley has long been famous. The only remnant of this prairie type in the valley itself is Malmberg Prairie Scientific and Natural Area in Roome Township. North of

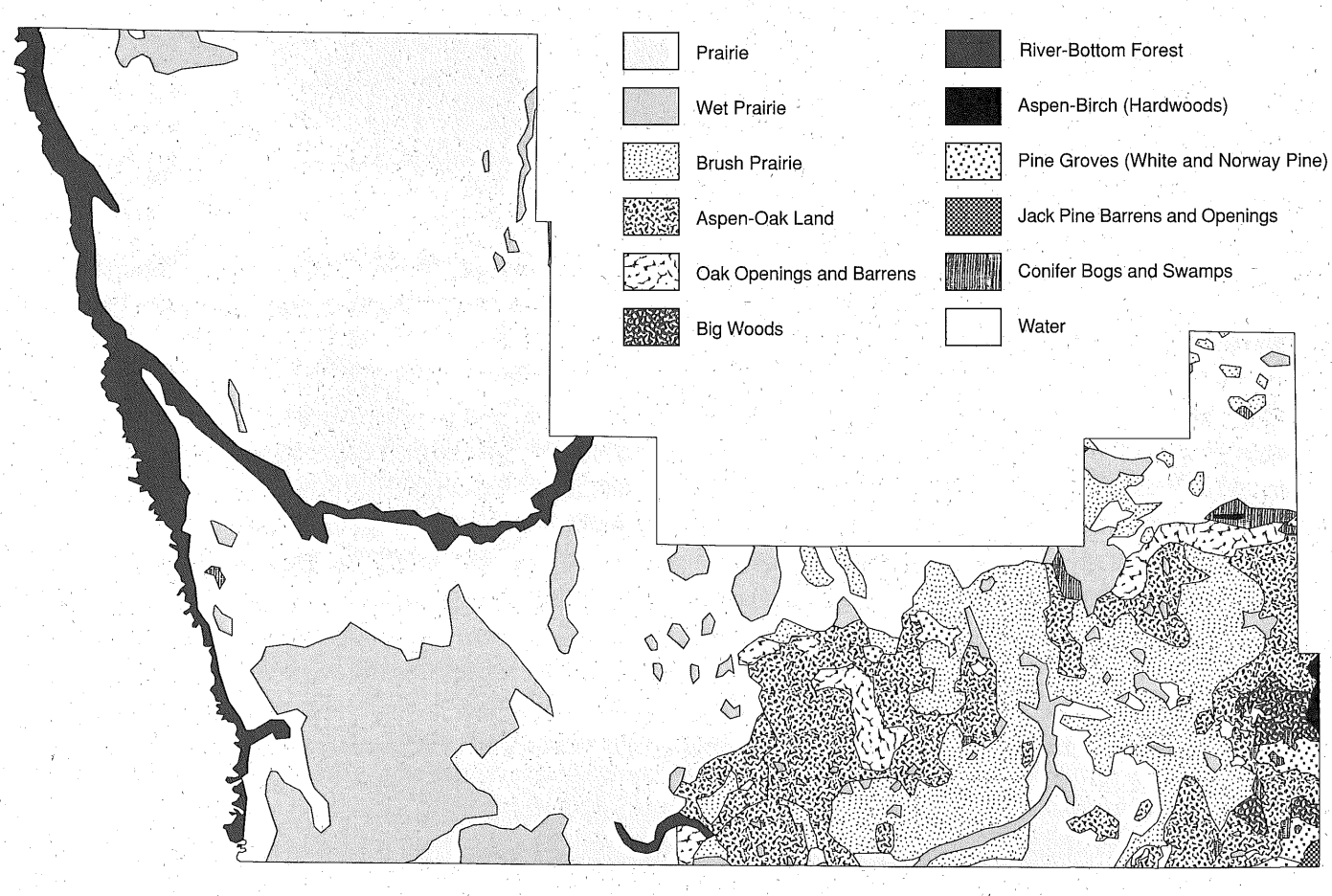
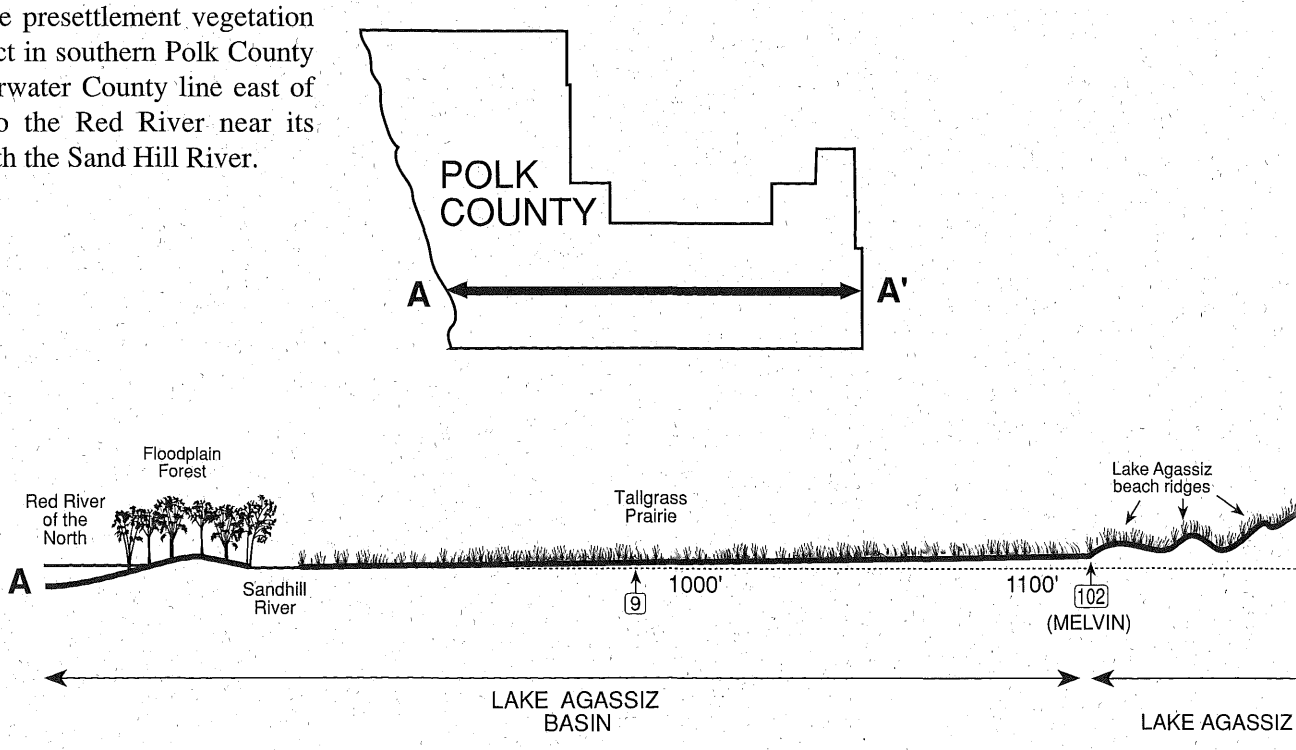


Figure 2. The original vegetation of Polk County as interpreted by Francis Marschner using Public Land Survey records from 1871-90.

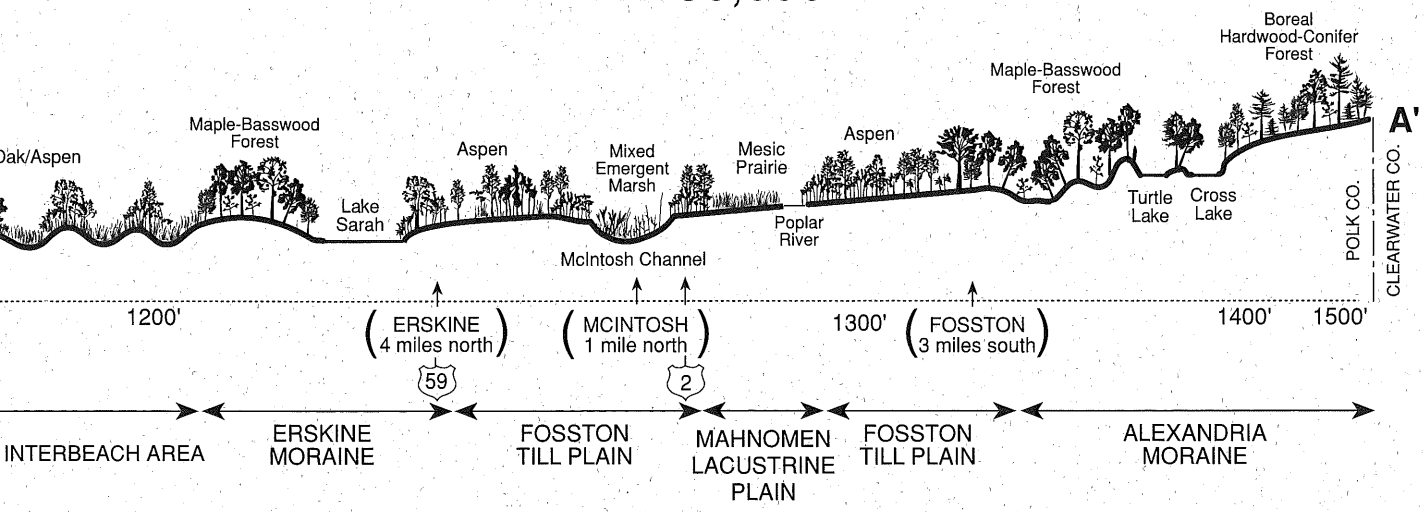
Figure 3. The presettlement vegetation along a transect in southern Polk County from the Clearwater County line east of Cross Lake to the Red River near its confluence with the Sand Hill River.



Highway 92, tamarack swamp and other associated wetlands occupied the old Lake Agassiz plain at the time of the Public Land Survey and continue to this day in those areas that have not been converted to agricultural use.

The Public Land Survey notes indicate that the only woodlands in the western part of the county were narrow corridors of elm, ash, willow and alder along the rivers. East of the beach ridges, oak and aspen communities were the most abundant woodland communities in the central part of eastern Polk County at the time of the Public Land Survey, with hardwood forests confined to the topographically diverse, heavier soils in the Erskine Moraine in Woodside and Knute townships and the Alexandria Moraine in Columbia and Queen townships. Hardwood stands in the latter two townships occurred in a mosaic with conifer forests. Survey records for Eden Township are missing from the Minnesota Historical Society and one can only extrapolate that the vegetation in that township resembled the vegetation in Queen and Hill River townships. A peninsula of prairie extended into Rosebud Township in the vicinity of Sand Hill Lake, associated with the better-drained soils of the Mahnomen Lacustrine Plain.

East-West Transect across Polk County through the Center of T148N Showing Original Vegetation and Major Geologic Features 1:150,000



Results

During the 1993 season, 98 of the sites identified by MCBS as potential areas of natural vegetation were intensively surveyed. An additional 21 lower priority sites were surveyed by brief reconnaissance. Nine of the identified sites were not surveyed because they were flooded, because access was denied by landowners, or because it was not possible to visit them before the field season ended. As a result of these site visits, 170 examples of natural communities and 153 new rare plant records were found, quadrupling the number of natural community records and more than doubling the number of rare plant records known in the county. A number of sites contained more than one natural community. The distributions of previously-known natural community and rare plant records and new natural community and rare plant records are shown in figures 4 and 5.

Prairies

Although approximately 99% of Minnesota's original prairie has been lost, Polk County contains some of the best and biggest tracts of the state's remaining prairie. It is not surprising that the majority of these remnants occur in the Agassiz Beach Ridge area, as this was the least suitable area for cultivation. The beach ridge tops are generally too sandy and the lowland soils between the ridges are often too wet or saline. Prairie remnants are present in Brandt, Belgium, Kertsonville, Tilden, Onstad, Godfrey, Garfield, Liberty, Hill River, and Chester townships. The best publicly-owned examples are in the several State Wildlife Management Areas (fig. 6), the Pembina Trail-Crookston Prairie Scientific and Natural Area, and on an area of dunes owned by the City of Fertile and The Nature Conservancy.

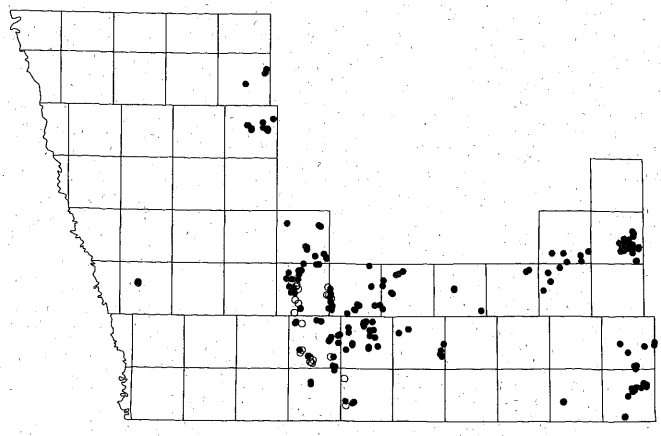


Figure 4. The locations of natural communities in Polk County. Locations designated by a circle (◦) were identified prior to the MCBS in Polk County. Those designated by a solid dot (•) were identified by the MCBS during the 1991-93 field seasons.

NATURAL COMMUNITY TYPES	# of Pre-MCBS Locations	# of MCBS Locations
Wetland Communities		
Black spruce swamp	-	2
Black ash swamp	-	1
Calcareous seepage fen prairie subtype	8	10
Mixed hardwood swamp	-	1
Rich fen shrub subtype	-	6
Rich fen sedge subtype	-	18
Shrub swamp seepage subtype	-	4
Shrub swamp	-	3
Tamarack swamp floating mat subtype	-	2
Tamarack swamp minerotrophic subtype	-	4
Tamarack swamp seepage subtype	-	5
Wet brush-prairie	-	7
Wet meadow	-	4
Wet prairie	8	27
Wet prairie saline subtype	4	11
Wet prairie seepage subtype	3	1
Upland prairie Communities		
Dry prairie sand-gravel subtype	3	13
Mesic brush-prairie	-	4
Mesic prairie	10	46
Savanna Communities		
Dry oak savanna barrens subtype	1	-
Woodland Communities		
Oak woodland-brushland	-	2
Forest Communities		
Paper birch forest	-	1
Boreal hardwood-conifer forest	-	4
Lowland hardwood forest	-	3
Maple-basswood forest	-	11
Total	**37**	**176**

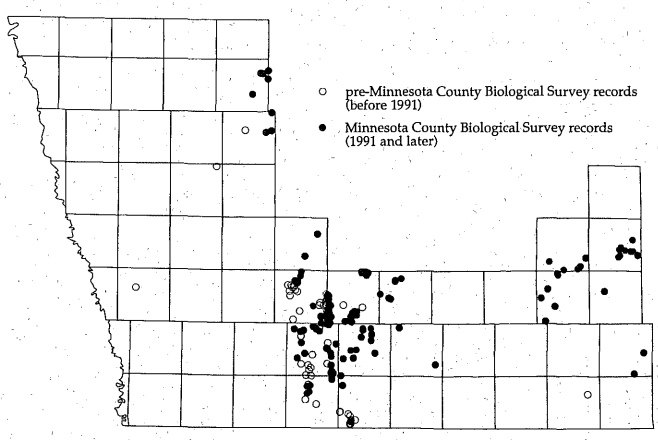


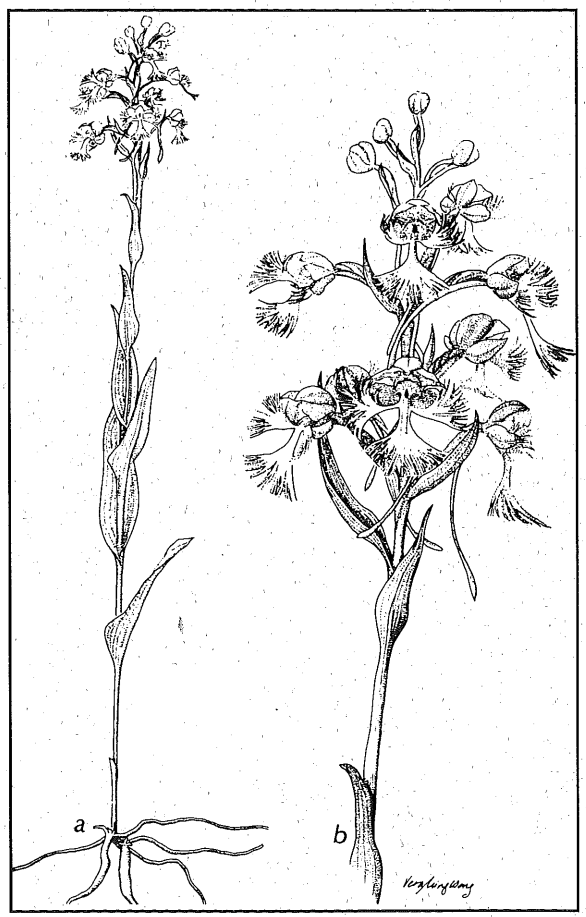
Figure 5. The locations in Polk County of plants classified as rare in Minnesota.* Locations designated by a circle (○) were identified prior to the MCBS in Polk County. Those designated by a solid dot (•) were identified by the MCBS during the 1991-93 field seasons. A dagger (†) following a species name indicates that the last recorded observation of that species in Polk County was before 1970.

Species	# of Pre-MCBS Locations	# of MCBS Locations	State Legal Status
Alkali cord-grass *(Spartina gracilis)*	4	6	special concern
Annual skeletonweed *(Lygodesmia rostrata)*	3	-	threatened
Blunt sedge *(Carex obtusata)*	4	4	special concern
Clustered broom-rape *(Orobanche fasciculata)*	-	3	special concern
Cooper's milk-vetch *(Astragalus neglectus)*	2	6	special concern
False asphodel *(Tofieldia glutinosa)*	10	23	special concern
Felwort *(Gentianella amarella ssp. acuta)* †	1	-	special concern
Few-flowered spike-rush *(Eleocharis pauciflora var. fernaldii)*	1	2	special concern
Goblin fern *(Botrychium mormo)*	-	1	special concern
Hair-like beak-rush *(Rhynchospora capillacea)*	5	3	threatened
Hall's sedge *(Carex hallii)*	12	13	threatened
Indian ricegrass *(Oryzopsis hymenoides)*	2	-	endangered
Louisiana broom-rape *(Orobanche ludoviciana)*	2	-	special concern
Marsh arrow-grass *(Triglochin palustris)*	4	17	special concern
Northern gentian *(Gentiana affinis)*	7	9	special concern
Nuttall's ground-rose *(Chamaerodos nuttallii)*	3	7	special concern
Scirpus-like sedge *(Carex scirpiformis)*	6	14	special concern
Small-leaved pussytoes *(Antennaria aprica)*	2	-	special concern
Small white lady's-slipper *(Cypripedium candidum)*	10	8	special concern
Sterile sedge *(Carex sterilis)*	6	16	threatened
Western prairie fringed orchid *(Platanthera praeclara)*	11	10	endangered
Total	**95**	**142**	

* Minnesota's rare plant and rare animal species are listed and described in *Minnesota's Endangered Flora and Fauna*, edited by Barbara Coffin and Lee Pfannmuller and available in area bookstores.

Figure 6. A mesic prairie at Dugdale Wildlife Management Area in Tilden Township. This publicly owned prairie is an example of a prairie remnant in the Agassiz Beach Ridge area. A beach ridge appears in the background of the photograph.

In 1993, the MCBS identified five major blocks of previously undocumented or unsurveyed high-quality prairie in Godfrey, Grove Park, Kertsonville, and Tilden townships. These interbeach prairies include good examples of dry, mesic and wet prairies. Saline soils are common in this area and support an unusual prairie type composed of species tolerant of elevated salt levels, including the rare species alkali cord-grass, northern gentian, and Hall's sedge. In addition to several state-listed rare plant species, the most notable resource of these prairies is the federally threatened western prairie fringed orchid (fig. 7). In fact, the largest known populations of this species in the world are found in Polk County. Examples of a number of common and rare prairie plants can be observed along the roadside of Highway 32 from Fertile to Marcoux Corner and in the triangles of prairie at Marcoux Corner.



Drawing by Vera Ming Wong,©1988 State of Minnesota.

Figure 7. Western prairie fringed orchid. This plant grows in several roadside populations documented by volunteers from the Agassiz Environmental Learning Center, who worked in cooperation with the MCBS in 1993.

East of these interbeach prairies, significant examples of dry prairie remain in the Chester Hills area. Excellent closeup views of prairie wildflowers can be seen along Highway 92 and County 6 in Chester Township, as well as adjacent to the Hill River one mile north of County 5. The one remaining known example of mesic prairie in Rosebud Township is in private ownership, but examples of mesic prairie wildflowers can be observed in the township in Hovland Wildlife Management Area along the east-west road just north of Sand Hill Lake.

Wetlands

Sometimes associated with both the interbeach and Chester Hills prairies are calcareous seepage fens, a rare wetland community that forms in areas of cold, mineral-rich groundwater seepage. In the interbeach area these fens tend to occur on the west-facing slopes of beach ridges. In Hill River and Chester townships tiny examples of these fens occur in seepage zones at the bases of steep hills, separated from adjacent dry gravel prairies by zones of deciduous trees or shrub swamps. In Gully Township large blocks of calcareous seepage fen occur within a complex of seepage tamarack swamp, lowland hardwood forest, shrub swamp, and black spruce swamp (fig. 8). In all of these settings calcareous seepage fens support a number of species restricted to such mineral-rich habitats, including sterile sedge, hair-like beakrush, false asphodel, and marsh arrow-grass, growing in conjunction with the more common grass-of-parnassus and gentians. Shrub swamps and conifer-dominated swamps in the eastern half of the county harbor a number of common but interesting wetland species such as pitcher plants, Labrador tea, and rein orchids. Also present in the western part of the county are numerous rich fens, a type of wetland community that occurs on peaty soil and is dominated by sedges, particularly wiregrass.

Figure 8. Calcareous seepage fens, which are rare in Minnesota, are present in association with tamarack seepage swamps and other seepage communities in Gully Township. A seepage fen appears to the left of the surveyor, while a tamarack seepage swamp is present in the background.

Oak woodlands

The majority of oak woodlands in the county exhibit a long history of grazing. Although such common and pleasing spring wildflowers as bloodroot and bellwort persist in these sites, heavy invasions of prickly ash degrade their community quality. During the 1993 season, only two examples of good quality oak woodland were documented: one in the Fertile Dunes (fig. 9) and the other in Gully Township. Cooper's milk-

Figure 9. The Agassiz Dunes near Fertile. Oak woodland appears in the background; dry sand-gravel prairie is present in the foreground.

vetch, a rare but easily recognized native legume, is occasionally found in edge habitats, such as lakesides, woodland margins, and rights-of-way in those parts of the county where oak was recorded by the land surveyors (fig. 10). Until recently this species was believed to be very rare and was even proposed as a candidate for the federal endangered species list. However, MCBS work in Marshall, Pennington, and Polk counties suggests that it is more common than was previously believed.

Maple-basswood and related forests

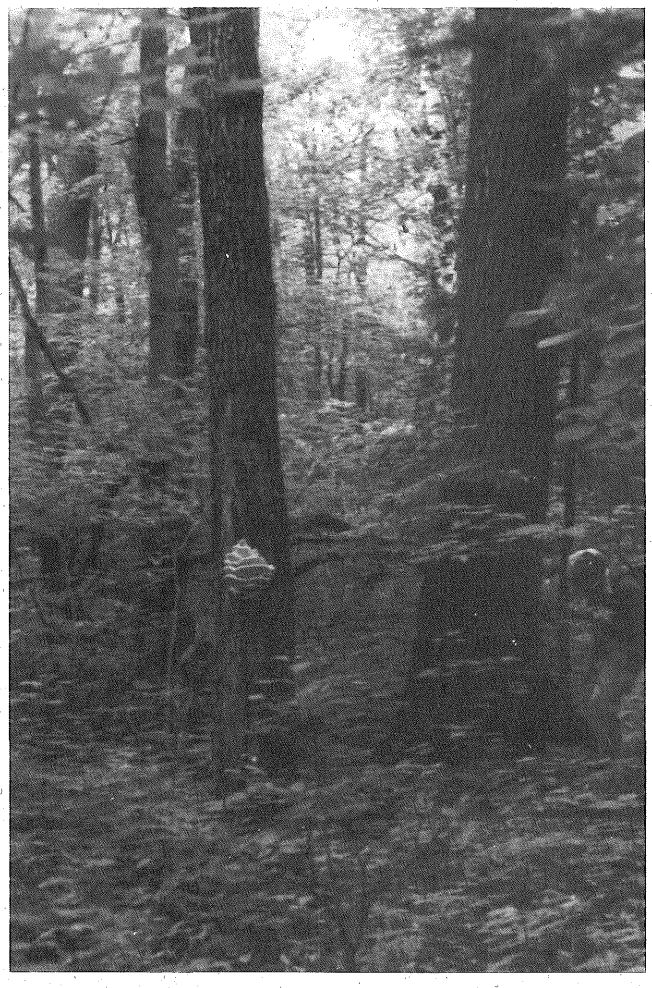
Despite the fact that maple-basswood communities were never common in the county, excellent examples presently occur in the area near Union Lake (fig. 11). Ironically, those stands near Maple Lake

Figure 10. Cooper's milk-vetch. This species, thought to be rare, is easily recognized by its large pods, which are visible in August. Readers are encouraged to report sightings of the plant to the MCBS because complete documentation of its range and abundance is necessary for determining its actual rarity.

were apparently never as numerous and their immediate proximity to the lake has resulted in their near-disappearance as the result of lakeside development. Maple-basswood forests on the Alexandria Moraine support an understory richer in species more typical of conifer forests, including balsam fir, paper birch, and mountain maple. Examples of these forests in Queen and Columbia townships sometimes include individual trees or clusters of large, impressive white pines, which were probably saplings at the time of original logging. Several rare ferns of the genus *Botrychium* were found in the maple-basswood forests in both of these areas, including the very rare goblin fern in Queen Township (fig. 12). The best publicly-owned examples of maple-basswood forests can be seen in the south part of Dorr Wildlife Management Area in Woodside Township, and at Hagen Waterfowl Production Area and Tilberg County Park in Queen Township. Of the riverine hardwood forests noted by the Public Land Surveys in the western part of the county in the late 1800s, only two remnants were identified by MCBS, one along the Red River and one along the Red Lake River.

Figure 12. The very rare goblin fern *(Botrychium mormo)* growing on the floor of a maple-basswood forest in Queen Township. Note the size of the plant relative to the coin in the photograph.

Figure 11. A mature maple-basswood forest. Maple-basswood forests occur in the county on the heavy soils of the Erskine and Alexandria moraines. The presence of trees of different sizes and ages is characteristic of mature maple-basswood forests.

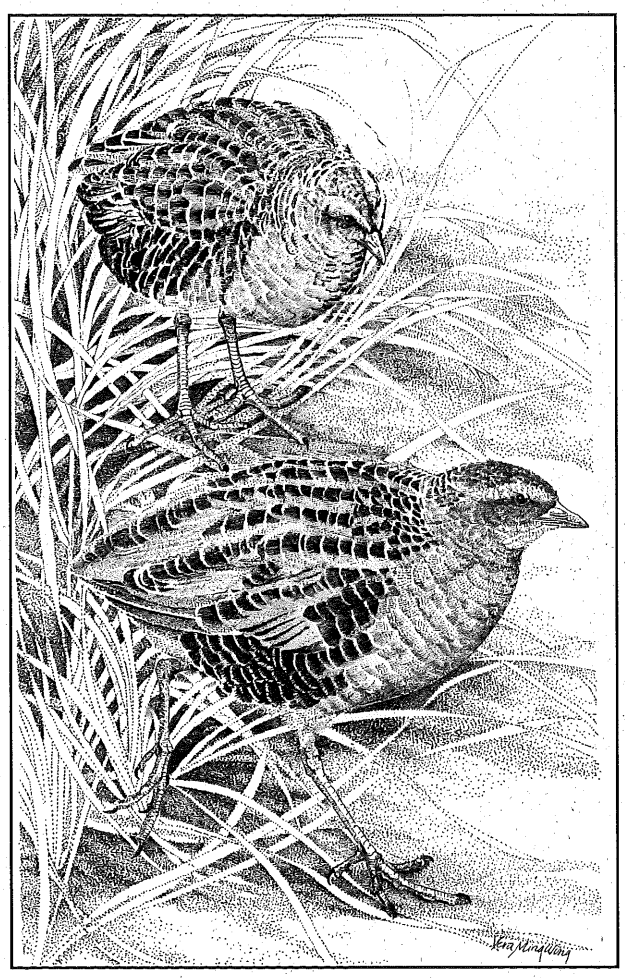


1994 and 1995 Field Surveys

Survey work in 1994 is focusing on the evaluation of several natural community sites that were flooded in 1993 or were otherwise not visited. MCBS is also conducting specialized searches and census work for the rare goblin fern, small white lady's-slipper, Cooper's milk-vetch, and western prairie fringed orchid. At the time that this report went to press an additional 11 natural communities and 15 rare plant occurrences have been found during the 1994 season. Highlights of the season thus far include:

- Documentation of over 100 western prairie fringed orchids in Grove Park Township.
- Sponsorship of an interagency workshop on the western prairie fringed orchid held at the University of Minnesota at Crookston.
- Survey of over 500 miles of rights of way for small white lady's-slipper. The survey was conducted under contract by the Agassiz Environmental Learning Center, using sixteen local volunteers. Large populations of this protected rare orchid were found in roadsides in the vicinity of Fertile.

Animal surveys will be completed in Polk County, along with those in neighboring Mahnomen County during the 1995 field season.



Drawing by Vera Ming Wong, ©1988 State of Minnesota.

The yellow rail is a secretive resident of sedge meadows and grassy marshes. The MCBS Animal Survey will be searching for this and other rare animals in Polk County in 1995.

Minnesota County Biological Survey

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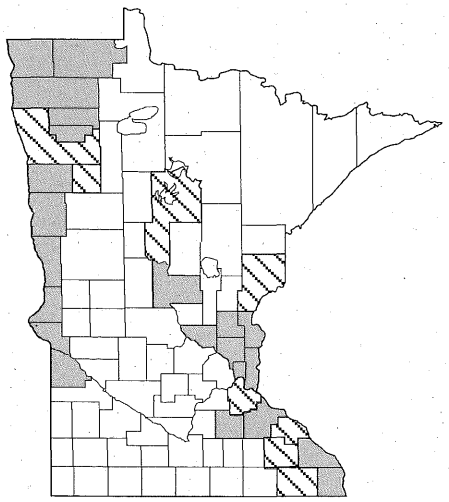
MCBS Statewide Status



COUNTY SURVEY COMPLETED 1987-1993

SURVEY IN PROGRESS 1994

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