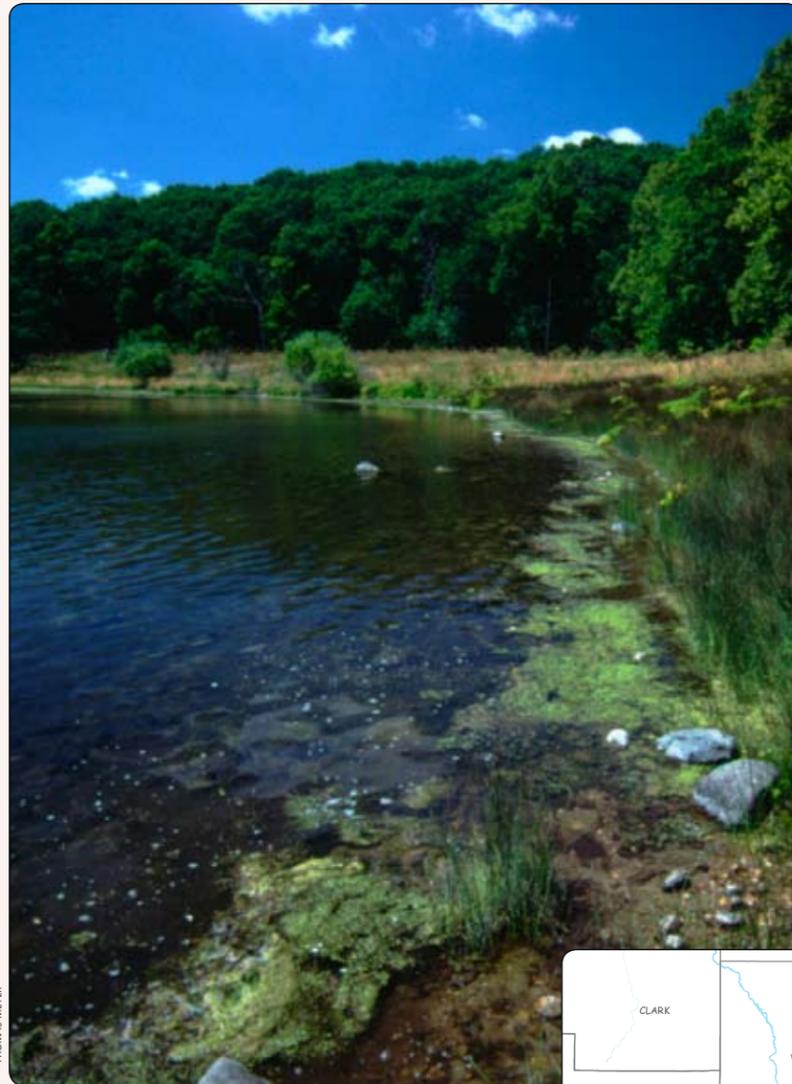




# Central Sand Hills

## *ecological landscape*



Headwaters of the Mecan River

### Attributes and Characteristics

This ecological landscape is located at the eastern edge of the old Glacial Lake Wisconsin and contains a series of glacial moraines that were later partially covered by glacial outwash. Pre-settlement vegetation consisted of oak forest, oak savanna, and a variety of prairie types in the uplands. Fens, wet prairies, and rare coastal plain marshes occurred in the lowlands. Soils throughout the landscape have a significant sand component. A mixture of farmland, woodlots, and a variety of wetlands now characterizes the area. Agriculture is successful in the sandy areas with the use of center pivot irrigation but there is a considerable amount of less productive and idle agricultural land.

Numerous small kettle lakes are associated with the pitted glacial outwash. Several larger lakes occur along the eastern side of the landscape

and include the state's deepest natural lake (Green Lake at 236 feet) and one of the shallowest large lakes in Wisconsin (Puckaway at over 5,000 acres and only 5 feet deep). Both Puckaway and Green Lake are very productive fishing lakes and between them contain nearly all species of game fish and panfish found in Wisconsin. In addition, a series of very high quality coldwater streams originate from the moraines and generally flow southeasterly.

### Legacy Places

- AP **Arlington Prairie**
- BA **Badger Army Ammunition Plant**
- BO **Baraboo River**
- CM **Comstock-Germania Marshes**
- GL **Grand River Marsh and Lake Puckaway**
- HE **Hartman & Emmons Creeks**
- LM **Lewiston Marsh**
- LV **Little Plover River**
- MW **Middle Wisconsin River**
- MP **Montello Area Coastal Plain Marshes**
- NN **Neenah Creek**
- OX **Oxford Savanna**
- PV **Plover River**
- PB **Portage to Buffalo Lake Corridor**
- SC **Sand Country Trout Streams**
- WM **White River Marsh and Uplands**

### Key characteristics:

- » Rolling topography and sandy soils of glacial origin
- » Pine-oak and oak forests
- » Oak savanna
- » Numerous wetlands, some very rare types
- » Coldwater springs, streams, and glacial lakes

### Size:

- » 2,170 square miles
- » 1,387,900 acres (3.9% of Wisconsin)

### Population:

- » 141,000 (2.7% of Wisconsin's population)

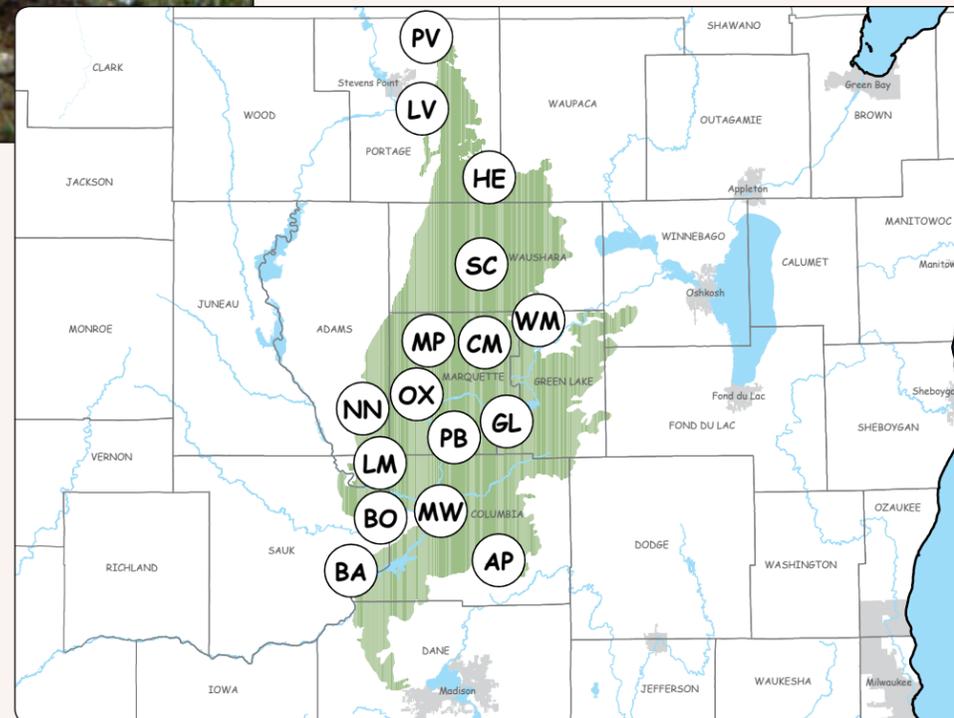
### Notable species:

- » Karner blue butterfly
- » Brook and brown trout
- » Mottled sculpin
- » Chorus and Wood frogs
- » Sandhill cranes
- » Fassett's locoweed
- » Virginia meadow-beauty
- » Long-beaked baldrush

### Natural communities:

(See Appendix B for descriptions)

- » Bog relict
- » Calcareous fen
- » Central Sands pine-oak forest
- » Coastal plain marsh
- » Dry prairie
- » Emergent aquatic
- » Northern wet forest
- » Shrub carr
- » Southern sedge meadow
- » Wet-mesic prairie





Observatory Hill in Marquette County

THOMAS MEYER

## Conservation Needs and Opportunities

Given the sandy, nutrient-poor, and acid characteristics of soils that are predominant throughout both the Central Sand Hills and the Central Sand Plains, the forests here differ significantly from those in surrounding landscapes. The dominant species are white and red pine, white, red, and black oaks, and on more mesic sites, red maple. The understory is typically not very diverse and consists primarily of huckleberry, blueberry, bracken fern, and Pennsylvania sedge. Although a significant amount of this natural community type, referred to as the Central Sands pine-oak forest, is protected in the Central Sand Plains ecological landscape, very little is protected in this landscape.

The lakes of this area harbor a wide diversity of aquatic life and provide some of the best and most popular inland lake fishing in the state. The lakes also provide important nesting, feeding, and resting habitat for resident and migratory birds, in particular waterfowl, shorebirds, and many birds that prey on fish (eagles, osprey, cormorants, and others). Maintaining and improving water quality, by expanding existing efforts to reduce pollutants entering these lakes, would help sustain the biotic richness of these lakes and the recreation they support. In addition to the lakes, many high



Autumn color with early season snow

GARY KNOWLES, WISCONSIN DEPARTMENT OF TOURISM

quality coldwater streams and springs originate from glacial deposits and support important aquatic invertebrate and coldwater fish populations. These streams harbor some of Wisconsin's best trout fishing and are renowned for their *Hexagenia* hatches. Protection of the streams and their groundwater sources would help insure that these important coldwater systems are maintained.

Also of note in this landscape is the presence of coastal plain marshes, a rare natural community type. These wetlands are found in and around the extinct Glacial Lake Wisconsin and support many rare species that are disjunct from their primary Atlantic coastal plain ranges, occurring from Massachusetts to Georgia. There are also significant opportunities to protect and manage two other important wetland communities, southern sedge meadow and calcareous fen, primarily at places such as White River, Germania and Comstock marshes, and along the Fox River corridor. Also of significance are management opportunities for wet-mesic prairie and tamarack bogs. In addition to the plant communities, there is ample opportunity to manage for wetland birds within these community types.

Figure 106: Land cover of the Central Sand Hills

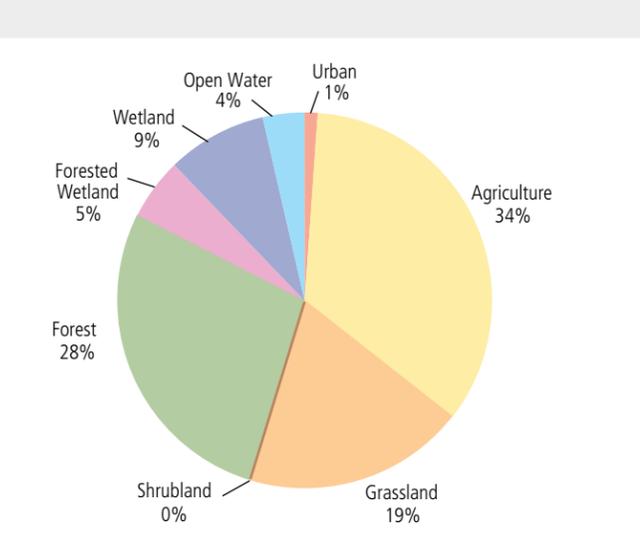


Figure 107: Public conservation and other land ownership in the Central Sand Hills

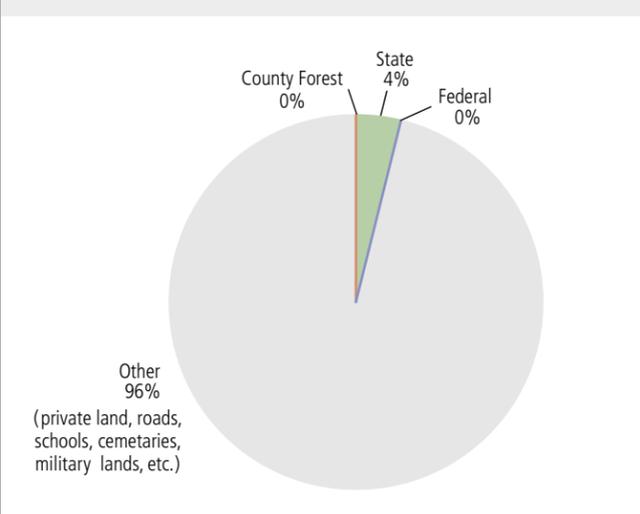


Figure 108: Land cover of public conservation lands in the Central Sand Hills

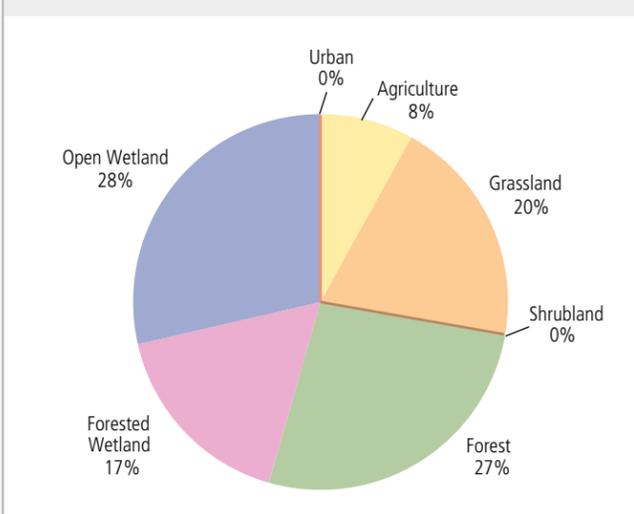
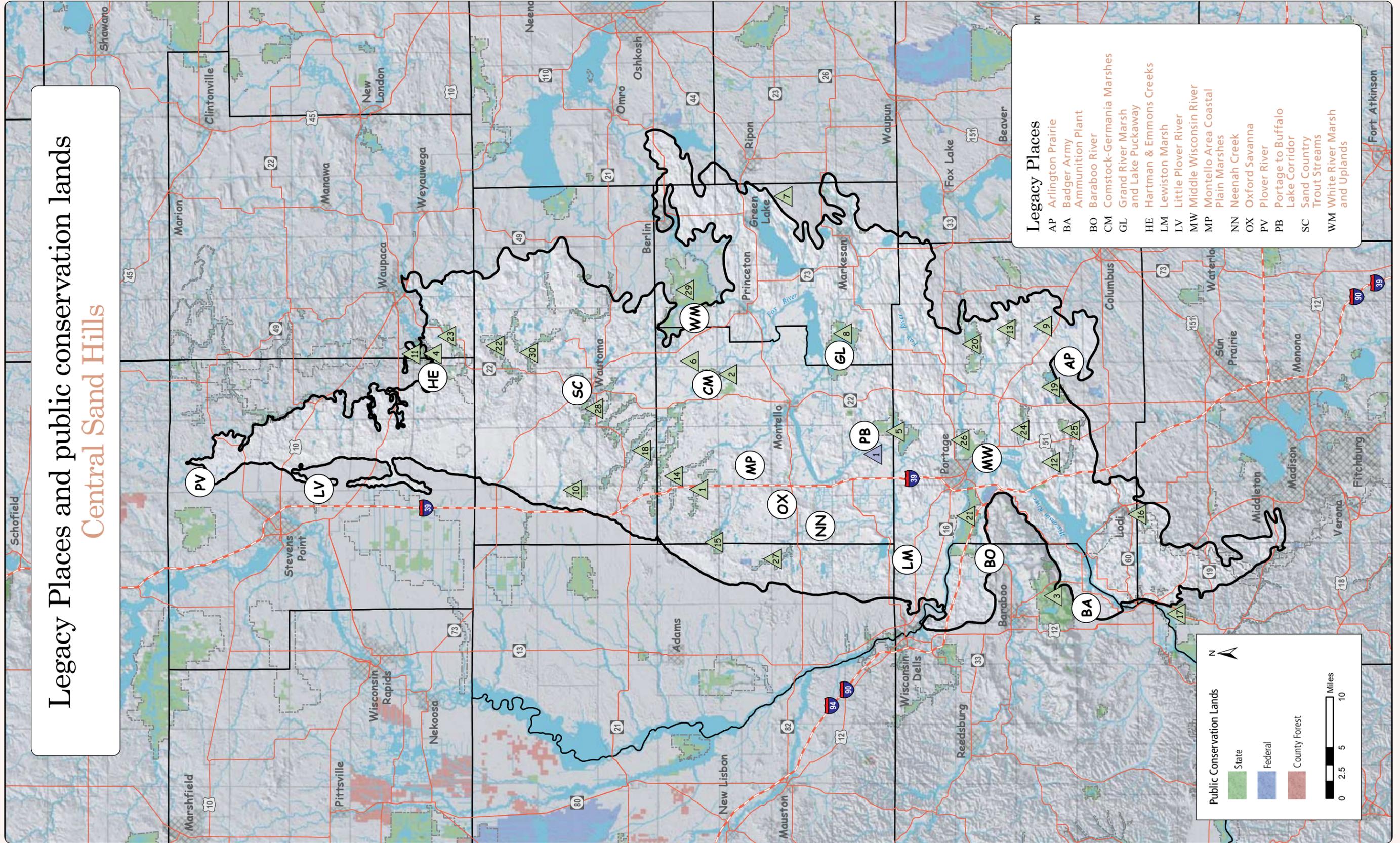


Figure 109: Legacy Places and public conservation land of the Central Sand Hills





## Public Conservation Lands

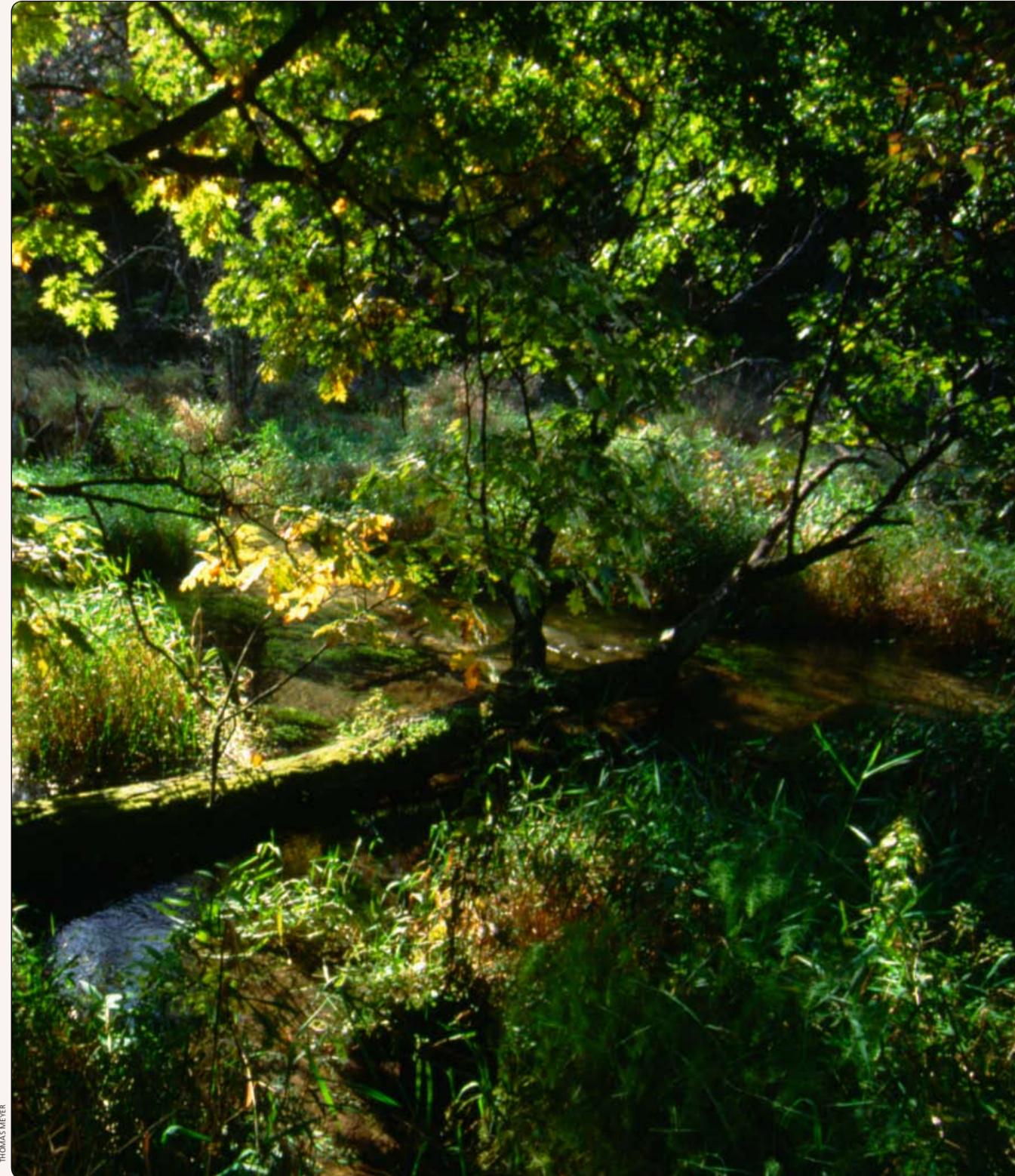
Map#	Property Name	Size (acres) <sup>1</sup>
<b>State</b>		
1	Caves Creek State Fishery Area	810
2	Comstock Bog-Meadow State Natural Area	630
3	Devils Lake State Park <sup>2</sup>	460
4	Emmons Creek State Fishery Area <sup>2</sup>	1,120
5	French Creek State Wildlife Area	3,260
6	Germania State Wildlife Area	2,410
7	Glacial Habitat Restoration Area <sup>2</sup>	340
8	Grand River Marsh State Wildlife Area	6,990
9	Grassy Lake State Wildlife Area	690
10	Greenwood State Wildlife Area	1,440
11	Hartman Creek State Park <sup>2</sup>	390
12	Hinkson Creek State Fishery Area	230
13	Jennings Creek State Wildlife Area	530
14	John A Lawton State Fishery Area	280
15	Lawrence Creek State Wildlife Area	940
16	Lodi Marsh State Wildlife Area	1,090
17	Lower Wisconsin State Riverway <sup>2</sup>	250
18	Mecan River State Fishery Area	6,390
19	Mud Lake State Wildlife Area <sup>2</sup> -Columbia County	2,010
20	Peter Helland State Wildlife Area	3,070
21	Pine Island State Wildlife Area	5,260
22	Pine River System State Fishery Area	1,920
23	Radley Creek State Fishery Area	1,420
24	Rocky Run Creek State Fishery Area	710
25	Rowan Creek State Fishery Area	650
26	Swan Lake State Wildlife Area	2,290
27	Upper Neenah State Fishery Area	380
28	White River State Fishery Area	2,970
29	White River Marsh State Wildlife Area <sup>2</sup>	840
30	Willow Creek State Fishery Area <sup>2</sup>	1,840
	Miscellaneous Lands <sup>3</sup>	4,260
<b>Federal</b>		
1	Fox River National Wildlife Refuge	800
	Waterfowl Production Areas	3,050
<b>County Forest<sup>4</sup></b>		
	None	
<b>Total</b>		<b>59,720</b>

<sup>1</sup>Actual acres owned in this Ecological Landscape.

<sup>2</sup>This property also falls within adjacent Ecological Landscape(s).

<sup>3</sup>Includes public access sites, fish hatcheries, fire towers, streambank and non-point easements, lands acquired under statewide wildlife, fishery, forestry, and natural area programs, small properties under 100 acres, and properties with fewer than 100 acres within this Ecological Landscape.

<sup>4</sup>Locations and sizes of county owned parcels enrolled in the Forest Crop Law are presented here. Information on locations and sizes of other county and local parks in this Ecological Landscape is not readily available and is not included here, except for some very large properties.



Lawrence Creek in Marquette County

## Recreation Uses and Opportunities

This ecological landscape, especially due to the southern portion's close proximity to Madison and the eastern portion's close proximity to Oshkosh and Neenah, has the potential to help meet growing demand for a variety of recreational activities. Properties and trails that provide hiking, off road biking, bird watching, horseback riding, cross-country skiing, hunting and fishing are in high demand in this part of the state and could likely be established in several places here. The stretch of the Wisconsin River from Wisconsin Dells to Sauk City provides many paddling, boating, and fishing opportunities.

The northern portion of the ecological landscape is less densely populated and is fairly heavily used for hunting and fishing as well as other outdoor recreation pursuits. The many coldwater streams draw anglers from throughout Wisconsin. The larger streams and rivers receive some canoeing and kayaking use and additional "water trail" opportunities here would likely be popular. Large wetlands like Grand River Marsh, Mud Lake, Lake Puckaway, and Grassy Lake provide excellent waterfowl hunting. Pine Island provides upland game bird hunting in addition to deer and other types of hunting.

# Legacy Places



Fassett's Locoweed (*Oxytropis campestris*)

THOMAS MEYER

## AP Arlington Prairie

Size ..... Small  
Protection Initiated ..... Moderate  
Protection Remaining ..... Moderate  
Conservation Significance ..... ★★  
Recreation Potential ..... ★★

Once encompassing a wide swath of northern Dane County and southern Columbia County, this former deep soil prairie is now intensively farmed due to the highly productive soils in the area. Several scattered high quality prairie and prairie pothole remnants remain. Protected lands here include Grassy Lake, Mud Lake, Schoeneberg, and Otsego Waterfowl Production Areas and Audubon's Goose Pond Sanctuary, and could form the foundation of further restoration efforts. If additional grasslands are restored and linked to existing protected lands, the area could support significant populations of area-sensitive grassland birds.

## BA Badger Army Ammunition Plant

Size ..... Medium  
Protection Initiated ..... Substantial  
Protection Remaining ..... Limited  
Conservation Significance ..... ★★★★★  
Recreation Potential ..... ★★★★★

The Badger Army Ammunition Plant (BAAP) lies between the Baraboo Hills and the Wisconsin River. Although used to produce munitions for the Army for over thirty years, BAAP's 7,300 acres contain a mix of native prairie, scattered oak woodlands, farm fields, and thousands of idle buildings. It currently hosts some of the largest populations of grassland birds in southern Wisconsin (103 bird species have been recorded here, of which 21 have critical status in Wisconsin). With the Baraboo Hills adjacent to the north, BAAP provides a rare continuum of grassland to oak forest. The Army is disposing of the property and negotiations are underway to determine future uses.

## BO Baraboo River

Size ..... Large  
Protection Initiated ..... Limited  
Protection Remaining ..... Moderate  
Conservation Significance ..... ★★★★★  
Recreation Potential ..... ★★★★★

Scenic sandstone cliffs occur along the upper reaches of the Baraboo River and support hemlock and pine relicts, forested seeps, and many rare plants and animals. These hemlocks and pines are found in deep, moist ravines or on cool, north or east facing slopes. Groundlayers contain species typically found much further north, such as clubmoss, woodfern, and mayflower. Some headwater creeks contain trout.

Until recently, the lower stretches of the river had been impacted by a series of dams that warmed and slowed the flow. The last of the dams was removed in 2001 and the aquatic diversity of the river system is already beginning to recover, setting the stage for the restoration of a good warmwater fishery including smallmouth bass and walleye. The Baraboo River is now one of the longest free-flowing rivers east of the Mississippi River.

## CM Comstock - Germania Marshes

Size ..... Small  
Protection Initiated ..... Substantial  
Protection Remaining ..... Limited  
Conservation Significance ..... ★★★★★  
Recreation Potential ..... ★

These adjacent wetland complexes have unusual combinations of nutrients and water flow that enable unique combinations of plants and animals to thrive. These wetlands are sometimes referred to as "bog meadows" because they contain a mix of plants more typically found in open bogs, sedge meadows and calcareous fens. They also support nesting populations of both southern grassland birds (such as Henslow's sparrow) and northern grassland birds (such as La Conte's sparrow). Comstock is also the southernmost known nesting location for the elusive yellow rail. Recreation opportunities are mostly limited to hunting and wildlife watching, given the wet nature of the area.



Five-lined Skink (*Eumeces fasciatus*)

DAN NEIRELO

## GL Grand River Marsh and Lake Puckaway

Size ..... Medium  
Protection Initiated ..... Substantial  
Protection Remaining ..... Moderate  
Conservation Significance ..... ★★★★★  
Recreation Potential ..... ★★★★★

This wetland and lake complex lies in the bed of Glacial Lake Oshkosh, which filled with silt and decaying vegetation over thousands of years, eventually creating muck and peat soils that range from 12 inches to 12 feet deep. Lake Puckaway is a natural widening of the Fox River that averages about 3 feet in depth and which supports an excellent fishery of northern pike, walleye, bass, some channel catfish, and a variety of panfish. The Grand River Flowage, an equally shallow but man-made impoundment, has required periodic treatment to control carp but currently produces respectable numbers of northern pike and yellow perch.

The two bodies of water are surrounded by a complex of marshes and uplands that provide habitat for large numbers of ducks and geese, as well as a host of other wildlife including muskrat, mink, otter, beaver, cranes, woodcock, pheasants, and quail. There are large rookeries of herons and cormorants here, bald eagles have recently begun nesting in the area, and ospreys are occasional visitors. The area is partially protected by the Grand River Marsh State Wildlife Area.

## Central Sand Hills *ecological landscape*

Although distant from this area, these waters eventually flow into Lake Winnebago, the source of water for the Oshkosh, Neenah, Menasha, and Appleton municipal water systems. As a result, water from this area may affect the raw water quality of those municipal systems, which provide drinking water for approximately 162,000 customers.

### HE Hartman & Emmons Creeks

Size . . . . . Small  
Protection Initiated . . . . . Substantial  
Protection Remaining . . . . . Limited  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★★

Hartman Creek State Park and Emmons Creek State Fishery Area, two heavily used recreation areas, provide prime Karner Blue butterfly habitat. Protecting a larger area here could expand the populations of this federally rare species and provide additional recreation opportunities including multiple trail uses. Maintaining the existing open space surrounding these public properties, currently a mix of farms and forests, would be important in preserving the area's exceptional scenic values.



Io Moth (*Automeris io*)

### LM Lewiston Marsh

Size . . . . . Medium  
Protection Initiated . . . . . Limited  
Protection Remaining . . . . . Moderate  
Conservation Significance . . . . . ★★★  
Recreation Potential . . . . . ★

Lewiston Marsh harbors one of the largest tamarack and black spruce bogs in this part of the state. Along with tamarack and black spruce are cattail marshes, alder thickets, and southern sedge meadows. Two high quality small lakes and several streams occur within the marsh. The area provides nesting habitat for waterfowl and is an important resting area during the fall and spring migration. Given the limited access and wet nature of the area, recreation opportunities are likely limited to hunting and wildlife watching.

### LP Little Plover River

See the *Central Sand Plains ecological landscape*.

### MW Middle Wisconsin River

Size . . . . . Large  
Protection Initiated . . . . . Limited  
Protection Remaining . . . . . Moderate  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★★★★

The lower 40 miles of the Middle Wisconsin River corridor, between Wisconsin Dells and Sauk City, are found in the Central Sand Hills Ecological Landscape. A mix of agricultural and forested land characterizes land use here. A dam at Prairie du Sac provides hydroelectric power and impounds Lake Wisconsin, which is heavily used for recreational boating and fishing. Approximately 15 miles of the river's shoreline is protected by the Pine Island State Wildlife Area, the private Sand County Foundation, and a large utility ownership, although most of this protected segment is confined to just one bank.

Despite heavy industrial and commercial use, the Wisconsin River continues to support a robust warmwater fishery. Extensive southern floodplain forests dominated by silver maple, green ash, and hackberry are found along the river's lowlands. In concert with associated marshes, they provide important habitat for a variety of resident and migratory wildlife. Upland forests adjacent to the river contribute to the corridor's wildlife habitat



Coastal plain marsh along Plainfield Lake

values, help maintain water quality, and have significant aesthetic value. A protected corridor along the river could provide protection for critical habitats as well as increase the variety of public recreation opportunities available.

### MP Montello Area Coastal Plain Marshes

Size . . . . . Small  
Protection Initiated . . . . . Limited  
Protection Remaining . . . . . Moderate  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★

Located in central Marquette County are several small, unique wetlands that harbor an unusual collection of plants. Soils are mostly sandy, nutrient-poor, and slightly acidic and result in limited microbial decomposition. These conditions enable organic matter to accumulate as peat. Like other wetlands, these develop in depressions where runoff and seepage water collect. However, the water levels in these wetlands vary considerably based on annual precipitation. This variation in water levels results in the plant assemblages forming distinct zones in concentric rings.

In low precipitation years, large exposed shorelines provide habitat for several species such as umbrella sedge, long-beaked baldrush, and reticulated nutrush—species that are

found only here, in northwest Indiana, and along the Atlantic Ocean. They persist for years in the seedbank until the hydrologic conditions are right for germination.

### NN Neenah Creek

Size . . . . . Small  
Protection Initiated . . . . . Moderate  
Protection Remaining . . . . . Limited  
Conservation Significance . . . . . ★★  
Recreation Potential . . . . . ★

Although suffering somewhat from poor water quality at its source (McGinnis Lake), Neenah Creek supports a good quality coldwater fishery in its upper reaches. The State Fishery Area provides a scenic setting for anglers and also draws local bird watchers.

Below Oxford, the creek passes through farmland, scattered woodlands, and open marshes. Southwest of Briggsville, extensive areas of high quality sedge meadow and wet prairie occur. Canoeing and kayaking is possible when water levels are higher. Sandhill cranes, migrating songbirds, and a variety of other wildlife are commonly seen along this corridor. Below Briggsville, the creek gains considerable volume, widens, slows, and supports a good warmwater fishery. Neenah Creek flows into the Fox River near French Creek Wildlife Area.

## Central Sand Hills ecological landscape

Although distant from this area, these waters eventually flow into Lake Winnebago, the source of water for the Oshkosh, Neenah, Menasha, and Appleton municipal water systems. As a result, water from this area may affect the raw water quality of those municipal systems, which provide drinking water for approximately 162,000 customers.

### OX Oxford Savanna

Size . . . . . Medium  
Protection Initiated . . . . . Limited  
Protection Remaining . . . . . Substantial  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★★

Northeast of Oxford lies an extensive block of forest on a rugged recessional moraine. Scattered through the woods are ancient, open-grown black oaks, some believed to be several hundred years old, indicating that the area once supported significant savanna habitat. Now, younger oaks and jack pine forests are intermingled with red pine plantations forming a canopy over scattered pockets of savanna groundlayer plants. Steep-walled kettle lakes add diversity to the area. Recreation opportunities could include a variety of trails.

### PV Plover River

See the *Forest Transition ecological landscape*.

### PB Portage to Buffalo Lake Corridor

Size . . . . . Medium  
Protection Initiated . . . . . Limited  
Protection Remaining . . . . . Moderate  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★★★★

Running from the City of Portage north to Buffalo Lake, this wide corridor encompasses many important historical, biological and recreation features. The Portage Canal, connecting the Mississippi River drainage to the Great Lakes, was a noteworthy (albeit

brief) chapter in establishing a transportation linkage across the country. The Ice Age Trail runs through this corridor (along the Marquette Trail) and follows the canal for part of its route. Long range plans are to secure a protected corridor to extend the trail further north and east to include parts of French Creek Wildlife Area and John Muir County Park. Page Creek, a high quality stream passing through mesic to wet prairies, meadows and marshes, flows into Buffalo Lake and provides a logical terminus to the corridor.

### SC Sand Country Trout Streams

Size . . . . . Large  
Protection Initiated . . . . . Substantial  
Protection Remaining . . . . . Moderate  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★★★★

Running from Portage and Waupaca Counties to northern Marquette County is a series of high quality, coldwater streams that originate in the recessional moraine left by the last advance of the glaciers. Often with sandy bottoms and soft water, these spring fed, low nutrient streams and rivers support healthy brook, brown, and rainbow trout populations. Aquatic insect life is rich and diverse. Along many of the creeks are high quality fens, sedge meadows and wet prairies. The number, quality, and close proximity of the streams to one another is unique in Wisconsin. The Mekan River alone, although only 17 miles long, has over fifty miles of trout stream in its watershed. Other important waters in the area include the White and Pine Rivers and Lawrence, Tagatz, and Willow Creeks and all their respective tributaries.

The surrounding uplands are a mix of oak-pine forest, active and idle farmland, and low-density housing. Both open and forested wetlands are associated with most of the creeks and occur throughout the area. Establishing upland connections between these stream corridors would provide ecological values and enable some upland recreation opportunities. The Ice Age Trail is planned to pass through this general area.

Although state fishery areas occur along many of these streams and rivers, in several cases headwater springs, important buffer areas, and lower stretches remain unprotected. Ensuring that these waters meet their conservation and recreation potential would require additional protection efforts.

Although distant from this area, these waters eventually flow into Lake Winnebago, the source of water for the Oshkosh, Neenah, Menasha, and Appleton municipal water systems. As a result, water from this area may affect the raw water quality of those municipal systems, which provide drinking water for approximately 162,000 customers.

### WM White River Marsh and Uplands

Size . . . . . Large  
Protection Initiated . . . . . Substantial  
Protection Remaining . . . . . Limited  
Conservation Significance . . . . . ★★★★★  
Recreation Potential . . . . . ★★

Occupying much of northwestern Green Lake County, this vast wetland complex harbors a diversity of wetland types surrounded by uplands of forest and farmland. The White and Puchyan Rivers join the Fox River here and all three rivers slowly wind through mostly open wetlands. Of particular note are the many high quality sedge meadows, emergent marshes and wet prairies that occur throughout this system. These wetlands, along with the nearby Germania and Grand River Marshes, provide important waterfowl nesting habitat and draw hundreds of thousands of migratory birds, especially sandhill cranes, during the spring and fall.

The surrounding uplands are only slightly higher than the wetlands in this relatively flat landscape. Wet mesic prairie covers a significant portion of the transition zone between the sedge meadows and oak-dominated upland forest. A few very resistant bedrock outcrops are found near the marsh that harbor plants and animals specialized to live on bare rock.

Although distant from this area, these waters eventually flow into Lake Winnebago, the source of water for the Oshkosh, Neenah, Menasha, and Appleton municipal water systems. As a result, water from this area may affect the raw water quality of those municipal systems, which provide drinking water for approximately 162,000 customers.



Long-tailed Weasel (*Mustela frenata*)

## Other Areas of Interest

### Fish Lake (Dane County)

Fish Lake is a 330-acre seepage lake with a good fishery for largemouth bass, with some northern pike and panfish. Rare inland cisco populations and banded killifish are found here as well. Bald eagles, osprey and waterfowl are often observed on the lake. Having no outlet, the lake suffers somewhat from pollutants that are carried in by runoff and then remain trapped in the lake. In recent years, the water level of the lake has been rising and has flooded lakeshore development.

A large stretch of shore on the east end of the lake has recently been purchased by Dane County for a park. Fish Lake has been extensively studied, and its somewhat unusual characteristics offer good potential for further research.