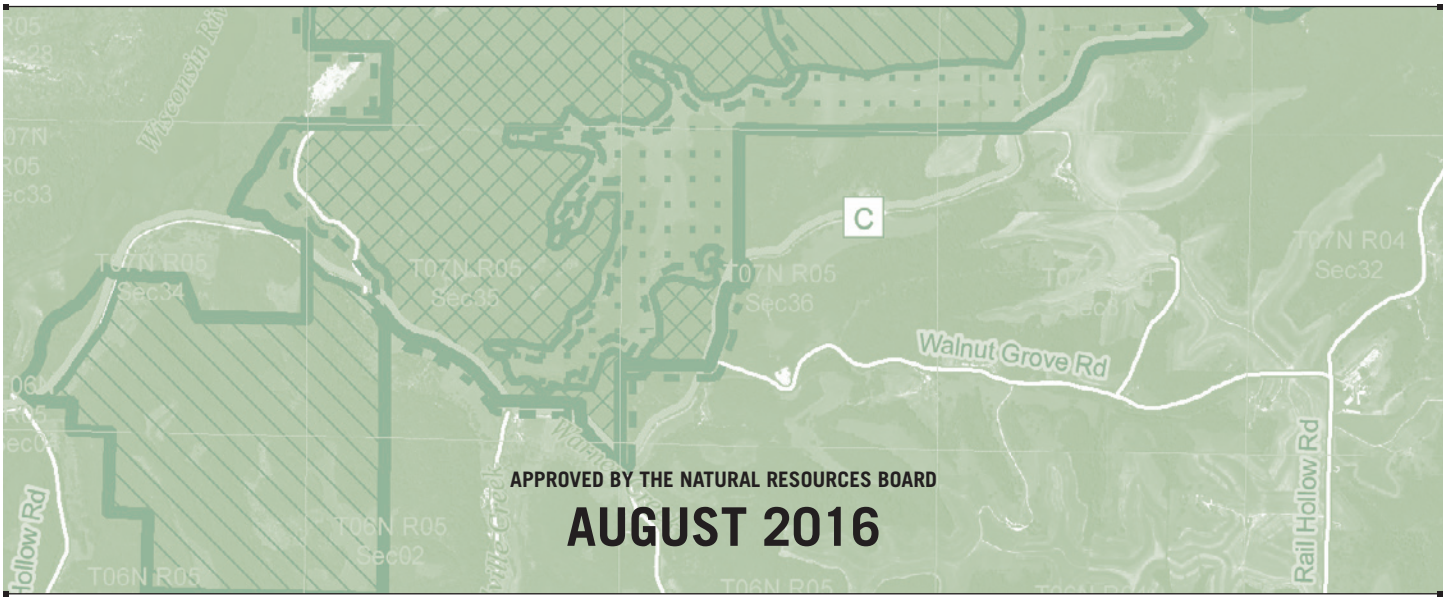
LOWER WISCONSIN STATE RIVERWAY

MASTER PLAN



APPROVED BY THE NATURAL RESOURCES BOARD

AUGUST 2016

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DNR PUB LF 093 2016

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Cover photo by Angela Trentadue

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INTRODUCTION AND PLAN OVERVIEW

I. PURPOSE OF THE PROPERTY AND MANAGEMENT AUTHORITY

The scope of use and management of a state property is governed by its official designation, State Riverway. The Lower Wisconsin State Riverway Property has a unique designation established by the legislature (ss. Chap. 30.40) for the purpose of protecting, maintaining and managing the rich and uncommon natural and cultural resources and outstanding natural scenic and recreational qualities of the lower river corridor.

There are 18 department managed State Natural Areas within the Lower Wisconsin State Riverway. Natural Areas are defined and authorized in State Statute 23.27-23.29 and Administrative Code NR 1.32 as "an area of land or water which has educational or scientific value or is important as a reservoir of the state's genetic or biological diversity and includes any buffer area necessary to protect the area's natural value". Section 23.27 (1) defines natural areas as "reserves for native biotic communities...habitat[s] for endangered, threatened, or critical species...or areas with highly significant geological or archaeological features". Section 23.28(1) provides authority to designate areas as State Natural Areas and Section 23.29 provides authority to legally dedicate and protect State Natural Areas in perpetuity. While the intent of the State Natural Areas program is to preserve the best examples of the state's diverse natural communities, other recreational uses may be allowed if those uses do not threaten those natural values.

II. SIGNIFICANCE OF THE LOWER WISCONSIN STATE RIVERWAY

The Riverway extends 92.3 miles along the lower Wisconsin River in southwestern Wisconsin, beginning at the Prairie du Sac dam and ending with the Wisconsin River's confluence with the Mississippi River (see Figure 1 and Map A). The Riverway boundary encompasses about 95,000 acres of public and private land. In 2016 the department owned around 45,000 acres of land and has slightly over 3,400 acres of scenic easements and about 1,200 acres of hunting and fishing access easements within the Riverway boundary. Tower Hill and Wyalusing State Parks abut the LWSR and provide additional developed recreational offerings that compliment the Riverway.

This 92-mile-long Riverway, with its characteristic gradient from river, sloughs and marshes, to forested bottomlands to sand terraces to bluff tops, harbors high species and community diversity and richness. Its importance is magnified through common boundaries with the nationally significant Mississippi River, the Driftless Area, and the Upper Mississippi migratory bird flyway. The Riverway property is included in the Lower Wisconsin River Important Bird Area by the Wisconsin Bird Conservation Initiative, for the critical habitat it provides for many forest, grassland and marsh birds of conservation concern.

The Riverway's breadth and abundance of natural communities and rare species are of statewide and broader significance. Within the LWSR, there are 114 high-quality natural communities representing 26 different types and the property harbors four State Endangered, five State Threatened, and 35 State Special Concern plant species. Further, over 100 rare animals

FIGURE 1.1 LOCATION MAPS

Photo by Ann Freiwald, DNR

have been documented on the Riverway. The Riverway also is a highly important migration route for many terrestrial and aquatic species because of its shared boundaries with the nationally significant Mississippi River, the Driftless Area, and the Upper Mississippi migratory bird flyway.

State Natural Areas (SNA) represent the best remaining examples of native plant communities in the state, and as such, encompass a significant percent of the state's biodiversity. Eighteen SNAs, totaling approximately 8,823 acres, have been designated within the LWSR, harboring a broad spectrum of native terrestrial and aquatic plant communities that are an excellent reflection of the diversity of this biologically rich landscape.

The lower Wisconsin River is listed as an Exceptional Resource Waterway by statute (ch. NR 102, Wis. Adm. Code), affording increased water quality protection. Furthermore, in the Driftless Area where natural lakes are scarce, an extensive network of Wisconsin River sloughs, floodplain and oxbow lakes function as ecologically significant areas for rare fishes, bryozoans, aquatic insects, reptiles and amphibians. Recent surveys of over 100 of these water bodies indicate that they are sanctuaries for aquatic plants and fish not typically found in the main channel. The floodplain lakes and sloughs may contain the most abundant populations of rare and endangered aquatic species in southern Wisconsin.

With over 92 miles of uninterrupted flow, the lower Wisconsin River is one of the longest free flowing stretches of river in the Midwest. The miles of scenic, natural shoreline, sandbars and islands, and backwater channels offer an exceptional recreational setting. While it is not designated as a National Scenic River it did qualify for inclusion in the national system, which is testament to the Riverway's recreational significance.

The river's outstanding natural beauty and the generally undeveloped character along its course are primary elements of the river's attraction and value to visitors and nearby residents alike. The technical ability today to build on almost any site, together with the growing attractiveness of the area to people from regional population centers, underscores the need for a coordinated plan to manage alterations to the landscape in a manner consistent with the valley's natural beauty and rural character. To this end, the Lower Wisconsin Riverway Board, a unique state agency with scenic performance standards jurisdiction on the Riverway was established. Permits are required from the Board, on both private and public land, for building or remodeling structures, utility facilities and other development, and for timber harvesting within the State Riverway (see SS 30.40 and Administrative Code Chapters RB 1, RB2 and NR 37).

The Riverway contains a highly diverse resource with a wide variety of historical and archaeological sites, wildlife, fisheries, and scenic beauty found nowhere else. The Riverway lies within a landscape dominated by privately owned lands where public recreation is extremely limited. In contrast, the river, backwaters, and uplands within the Riverway provide diverse recreational opportunities including boating, hiking, fishing, wildlife viewing, hunting, trapping, cross- country skiing, snowmobiling, horseback riding, and nature study. With many miles of accessible trails, rivers, prairies and forests, the Riverway is an important recreational resource for the state and Midwest and is one of the more important recreational resources for people of the southern half of Wisconsin and northern Illinois.

III. PURPOSE OF THE PLAN AND OVERVIEW OF THE PLANNING PROCESS

PURPOSE OF THE MASTER PLAN

The Lower Wisconsin State Riverway Master Plan outlines how the property will be managed, used and developed, and the benefits it will provide. It defines the land and water management practices, recreational uses, other management activities, and additional aspects of the property's future use and development. The revised plan reflects changing ecological, economic, and social conditions, and current management principles for resource and recreation management in the context of the larger landscapes as required by Wisconsin Administrative code NR 44 and NR 1.60. The master plan will receive a formal review approximately every 15 years and will be updated by plan amendments and variances as necessary through a formal process that includes public involvement.

BENEFITS OF THE MASTER PLAN

- Provides a vision and framework for the use, development, management and acquisition of the Riverway well into the future with an emphasis on the next 15 years.
- Identifies land management areas and plans for their future management.
- Describes general management objectives and specific management prescriptions for each area.

- Makes recommendations for resource management, recreation, and habitat conservation to meet current and future needs.
- Provides for continuing public involvement during plan implementation.

OVERVIEW OF THE PLANNING PROCESS

There are several major phases in the master planning process as well as opportunity for public input and participation. These phases include initial issue scoping establishing the property vision and goals at the beginning of the planning process, considering a draft plan and environmental analysis, and finally, review and approval by the Natural Resources Board (NRB).

The planning process is guided by Wisconsin Administrative code NR 44. Property master planning is also guided by the DNR's commitment to meeting the ecological, environmental, economic, recreational and social needs of current generations while protecting the property's ability to fill the same role for future generations. Additionally, the previous property plan and extensive ecological, economic, and social assessments provided a data foundation for the development of this plan. Public participation is an integral foundation of the planning process, beginning with public open house meetings and surveys to identify important planning issues and views on the Riverway's future direction then on throughout the planning process to create a shared vision for the future management and benefits of the property.

NEED TO REVISE THE LOWER WISCONSIN STATE RIVERWAY MASTER PLAN

The original plan for the LWSR was approved by the Natural Resources Board in 1988. It was part of the Environmental Impact Statement review regarding the establishment of the property. The plan is being revised due to the age of the plan, 25 years, the requirement that all property plans meet the newer NR 44 plan standards, as well as the need to revise the plan in light of changing ecological, economic, and social conditions, and to incorporate new information. In the future, this revised plan will receive a formal, rigorous review approximately every 15 years. At any time, if necessary, the plan may also be updated by plan amendments and variances through a formal process that includes public involvement.

IV. PLAN OVERVIEW

RECREATION MANAGEMENT OVERVIEW

The revised plan maintains the range of recreational uses on the Riverway that people have enjoyed for decades while adding many enhancements and new facilities.

The primary new recreational proposals include the following:

The Sauk City/Prairie du Sac – Mazomanie Area

Significant improvements are planned for the eastern portion of the Riverway. This area is nearest to major population centers and already receives high recreational use. Developing an array of new facilities or improvements to existing ones will greatly enhance the recreational opportunities and experiences here. This will be an important destination for a wide variety of nature based recreation.

Black Hawk Ridge

The rugged hiking and equestrian trails at Black Hawk Ridge have been popular for decades. On the top of the hill are a large grass area, a cabin pavilion (called the Rhinelander cabin), an open picnic shelter, and a few other buildings. Currently the ridge top facilities serve as a special events area available by permit. It is accessed via a narrow, steep service road that is generally closed to the public, except for special events. General public access is primarily from parking lots at the base of the ridge.

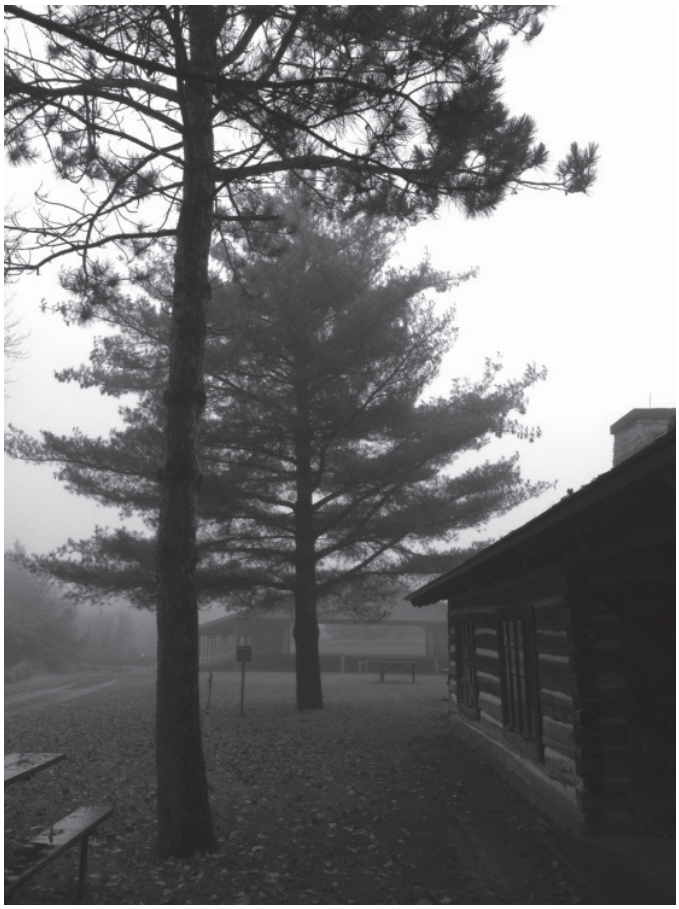


Photo by Ann Freiwald, DNR

Under this plan the ridge top facilities will be redeveloped and upgraded to a modern day use area that will be open for general public use. The access road will be open to the public, except during ice/snow conditions.

Mazomanie Recreation Area
This 2,000 plus acre area extends from the Mazo beach on the river shoreline to CTH Y on the east. In addition to beach use, hiking, and hunting, particularly for pheasant and deer, the area has a class 1 dog trialing area. Recreational opportunities for hiking and day use activities will be substantially expanded in this area. River bank facilities supporting intensive recreational uses will be developed along the river. Included will be a rustic day use area, new boat access site, and beach area facilities. Hiking trails will be formalized and expanded throughout the area, except within the dog trial area. A hiking trail link will connect to Dane County's Walking Iron Park near Mazomanie. The dog trial area and use here will remain largely unchanged.

Other Riverway Developments and Recreation Opportunities
Hunting and trapping The plan maintains and improves game habitat and hunting opportunities, particularly opportunities for deer, turkey and pheasant hunting. There will be improvements in hunter access, including opportunities for hunters with mobility issues.

Fishing: Access for both shore and boat fishing will be improved at a number of locations up and down the Riverway.

DNR managed boat landings: The DNR managed river boat landings will receive improvements, often including day-use facilities. Improving access and opportunities for people of all ages whenever possible is a priority for all sites. A new landing is planned near Boscobel and the existing landing there will be closed.

Satellite day use/wildlife watching sites: Small lightly-developed day use areas and wildlife viewing sites will be developed at various locations along the length of the Riverway. Most of the planned improvement are situated on backwaters, flowages or sloughs and are currently in use but have no or minimal facilities at this time. Many sites will feature walking trails and viewing sites; some will have small picnic areas, or accessible hunting and wildlife viewing blinds, or improved bank fishing access.

Walking/hiking trails: Walking/hiking is very popular across the Riverway and it mostly occurs on management roads and "volunteer" trails. This plan will expand the designated hiking trails from around four miles to between 30 and 40 miles. Some of these miles are associated with the sites discussed above.

Equestrian use: The Millville horse trails will be expanded from the current five miles to about 15 miles. With the planned development of an equestrian campground as well, day-long riding opportunities will be available.

Boating and river camping: Current "on river" recreation will be maintained. The plan details improvements at a number of DNR managed boat landings. Sandbar camping continues unchanged, and two new on-shore water-access-only campgrounds are planned at down-river locations.

ADA access: Many actions in the plan will provide expanded opportunities for less mobile persons to enjoy the outdoors, such as accessible hunting/wildlife viewing blinds, viewing sites, developed day-use sites, and trails.

Interpretation and education: Interpretation and education programs will be developed. On-site interpretive trails at several effigy mound sites are planned as well as improvements to the Wisconsin Heights Battlefield.

RESOURCE MANAGEMENT OVERVIEW
The Riverway hosts a wide assortment of wildlife habitats, ranging from the waters of the river,sloughs and flowages, to wetlands of several types, grasslands, prairies, savannas and barrens, to large tracks of bottomland and upland forests. About 23,960 acres are under general management for a variety of game and non-game species alike. The plan focuses on maintaining and improving the quality and extent of this habitat to sustain wildlife populations and provide recreational opportunities.

The Riverway also supports a wide array of high quality native communities that are important for sustaining rare species. In total, 24 Native Community Management Areas (NCMA) totaling 19,994 acres are delineated in the plan for site specific management that will maintain or enhance their long-term ecological values. There are 18 DNR managed designated State Natural Areas in the Riverway, all are within Native Community Management Areas. This plan will continue to protect, and in many cases, enhance the ecological function and values of these important communities and habitats, both at a regional and site-specific scale.

This is your plan. The LWSR master plan addresses people's desires for the future. Wisconsinites want their natural resources sustained for future generations. At the same time, they expect a full range of environmental, social, and ecological benefits today and in the future. This plan attempts to achieve that balance in a scientifically credible and sustainable way. It was developed with countless hours of expert staff and public input and several rigorous scientific and technical reviews. Many hands were involved in shaping it.

This is a visionary plan. The master plan captures an idealized view of the Riverway's long-term future and provides a general direction for short-term actions. The diversity and quality of the Riverway's habitats and native communities and recreational opportunities are enhanced over time, providing for a broad range of social and ecological values important to Wisconsin citizens, including recreation.

This is a focused plan. The master plan calls for active and passive management across the landscape and over time to achieve its goals and objectives. It relies on integrated and adaptive management of the resources and focuses on the compatibility of uses over time.

This is a flexible and adaptive plan. The master plan calls for adaptive management and monitoring the response to strategies outlined in the plan. The responses are evaluated against the objectives. The plan calls for continuous monitoring and regular public reviews and a major review every 15 years.

Photo by Ann Freiwald, DNR

MANAGEMENT AND DEVELOPMENT

Photo by Nate Fayram, DNR

MANAGEMENT AND DEVELOPMENT

I. PROPERTY VISION

The Lower Wisconsin State Riverway (LWSR) is an ecological landscape of continental significance, conserving a broad assemblage of important and rare natural communities and plant and animal species. The property provides a mosaic of important and diverse habitats for both common and rare species at a level found in few other locations.

Encompassing one of the longest reaches of free-flowing rivers remaining in the Midwest, the Riverway's broad waters, islands and sandbars, sloughs, wetlands and floodplain forests, prairies, and flanking hills and bluffs make this scenic treasure a truly unique recreational resource that's prized by nearby residents and visitors from across the state and beyond. The Riverway offers exceptional outdoor recreation opportunities in primarily lightly developed settings, provided in ways that sustain the corridor's exceptional ecological values. Within this context, the Riverway's abundant natural and recreational resources provide important contributions to local and regional economies.

II. PROPERTY GOALS

Goal 1: At a landscape scale; maintain and enhance the ecological function and exceptional values of the Lower Wisconsin State Riverway; specifically, the diversity of high quality natural communities in a continuum of connected habitats from river to hill top.

Goal 2: Protect and enhance natural communities of high importance; particularly, closed-canopy older forest, southern-mesic forest, floodplain forest, oak barrens, dry prairie, oak woodland, oak openings, open wetlands, and aquatic features, such as springs and seeps, oxbow lakes, sloughs, mussel beds.

Goal 3: Protect and enhance habitat for common wildlife and for wildlife species of greatest conservation need; including forest interior birds, grassland birds, rare fish, reptiles, and amphibians, and rare aquatic and terrestrial invertebrates, and bats.

Goal 4: Maintain and enhance the largely undeveloped, natural scenic beauty of the LWSR, particularly those areas visible from the river.

Goal 5: Manage forest lands using principles of sustainable forestry to support habitat and scenic management goals and to provide a variety of renewable forest products.

Goal 6: Provide opportunities for high-quality, nature-based open-space recreational uses that are compatible with the property's capabilities and the ecological and habitat management goals. Nature based activities are uses like; hunting, trapping, and wildlife viewing, fishing, paddling, picnicking, camping, hiking, equestrian use, and environmental interpretation and education.

Goal 7: Provide access to recreational opportunities for people of all ages and physical abilities in ways that are sustainable and protect the ecological resources and unique features of the Riverway.

Goal 8: Protect, and interpret where appropriate, historic, cultural and archeological resources.

Goal 9: Contribute benefits to local and regional economies through management of wildlife and recreational resources and sustainably produced forest products.

III. LAND MANAGEMENT AREAS AND LAND MANAGEMENT CLASSIFICATION

The LWSR has been divided into four land management areas. Each area is assigned a land management classification, which is discussed further below. There is one Habitat Management Area, 24 Native Community Management Areas, two Recreation Management Areas and two Recreation Management Overlay Zones, and two Special Management Areas (see Map F). The classifications are defined further below. Each management area is determined based on unique site-specific habitat or community types and characteristics or the presence of exceptional recreational use opportunities as well as the desired future condition for the area. These factors shape the area-specific management objectives and prescriptions.

A land management "classification" further clarifies the primary uses or management objectives for a property or sub-area within a property. The classification system is defined in WI Administrative Code (NR 44.06). Of course, the vast majority of department properties meet multiple conservation

and recreation objectives. For example, an area classified as a Habitat Management Area can offer a range of recreation opportunities ranging from hunting to biking. Similarly, lands classified as Recreation Management Areas will often be managed to provide multiple habitat benefits in addition to providing camping, horseback riding, and other developed recreation settings. In sum, land management classifications represent a primary use, but a wide range of conservation and recreation outcomes are possible.

All lands within the NRB approved project boundary are assigned a land management classification that reflects the primary management or use focus for the management area. If private lands lie within the project boundary, as is usually the case, the classification only indicates what the most likely management focus would be on those lands if they are purchased and included under the master plan in the future. Some homogenous properties have only one land classification for the whole property, and complex properties will have several or many different management areas. Each management area will be assigned a land management classification.

The lands covered under the LWSR master plan fall into one of the following land management classifications (see NR44.06 for further information):

Habitat Management Areas are managed to provide or enhance habitat, whether upland, wetland or aquatic, to support specific species of plants and animals. A master plan may authorize any management activity or technique that is consistent with the management objective specified in the master plan for the area, and is compatible with the site's ecological capability. Examples of potential management activities include timber harvesting, herbicide application, mowing, burning, planting, flooding, agricultural cropping, installation of fish habitat improvement devices, road construction and erosion control.

Native Community Management Areas are managed to represent, restore and perpetuate native plant and animal communities, whether upland, wetland or aquatic, and other aspects of native biological diversity.

Special Management Areas are managed to provide and maintain areas and facilities for special uses not included under other land management classifications. These can include administrative sites and areas closed to public access.

Recreation Management Areas are managed to provide and maintain land and water areas and facilities for outdoor public recreation or education.

Recreational Use Setting Sub-classifications: There are four sub-classes within Recreation Management Areas that further describe the general recreational setting or "feel" of the area – that is, the level of remoteness, intensity of interactions with other visitors, ease of access, and level of development of recreation facilities. Type 1 Settings are the least developed and provide a remote setting where visitors can experience solitude and independence. Only a limited amount of department lands are classified as Type 1 with most being large wilderness areas. At the other end of the spectrum are Type 4 Settings, which may provide for intensive recreational opportunities and have the most development (e.g., facilities that provide a high level of comfort for visitors, convenience, and environmental protection). Lands within the LWSR are primarily Type 3 Setting sub-classifications.

OVERLAY ZONES

Additional overlay zones are applied to some management areas. An overlay zone is a planning tool that allows for the application of additional management objectives and prescriptions to a portion of a management area or across multiple management areas. For example, an overlay zone may be used to map an area designated for specific recreational uses or management. The management objectives and prescriptions for overlay zones are in addition to the management objectives and prescriptions for the underlying primary management area.

TABLE 2.1 ACRES OF MANAGEMENT AREAS

Management Area		Acres
Habitat Management Area		22,800
Native Community Management Area		20,184
Special Management Area		209
Recreation Management Area	Type 3 Setting	2,206
	Type 4 Setting	218
Total		**45,617**

IV. RECREATION

In this subchapter recreation management is presented in two sections.

Property-Wide Recreation Management: A broad, overview of the entire property recreational program, facilities and opportunities, by type of activity.

Site-Specific Recreation Management and Development Plans: A detailed description of recreational management and

facilities at a number of specific sites that are more intensively managed or used.

PROPERTY-WIDE RECREATION MANAGEMENT

The LWSR plays a unique and important role in the region and state's recreational picture. As the largest public property in southern Wisconsin and one of the largest in the state, it provides abundant public open space for a broad spectrum of recreational activities ranging from hunting and fishing to hiking, wildlife watching, horseback riding and boating. River recreation in particular, such as fishing, canoeing and sandbar camping, are a major draw for people from across the state and upper Midwest, contributing important dollars to the local economy. Locally, the river and its associated natural lands are a key defining element for the residents of the communities dotting its banks (See Map D for locations of existing and planned infrastructure).

Many of the new recreational facilities or improvements to existing facilities, such as river public access sites, require a permit issued by the Lower Wisconsin State Riverway Board. The department will work with the board during plan implementation to assure the performance standards are met and high quality recreational facilities are provided for Riverway users.

Prior to engaging in any major land management activity a review of the acquisition funding history is needed to determine whether the proposal conflicts with federal post-grant funding regulations applicable to the site. If it is determined that the planned use is in conflict with the federal regulations for the funding source, replacement lands that were purchased with other funding sources must be provided.

Funding-related Management Restrictions

Federal funding was utilized for much of the land acquired in the Lower Wisconsin State Riverway. The three main programs are the Land and Water Conservation Fund (LAWCON), the Federal Aid in Wildlife Restoration Program (Pittman-Robertson), and the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson). Because these properties are subject to perpetual federal restrictions, it is important to review the acquisition funding history to determine consistency with federal post-grant funding regulations prior to engaging in any major land management/ recreational development or changes in use. The department is committed to working with our federal partner agencies to ensure compliance with the regulations governing these lands.

Hunting and Trapping

Objective

Provide abundant hunting opportunities, particularly for pheasant, deer, turkey, small game and waterfowl. Provide opportunities for furbearer trapping.

Management

The Riverway is open for all established hunting and trapping seasons. Campgrounds, day use areas and other public use areas may be closed to hunting and trapping by posted notice [NR 45.09(1)].

Many actions prescribed and detailed in other sections of this master plan support the hunting objective. A wide variety of game habitat is provided on the property through the habitat management actions outlined in the resource management section of this plan. The department also conducts an active pheasant stocking program at a number of sites on the Riverway.

Access is a significant component of providing hunter/trapper opportunities. Abundant hunting and trapping access is afforded by numerous public vehicle access roads and parking lots, which are detailed in the road management plan found in the Road Management and Vehicle Access Plan section of this master plan (See General Property Administration and Management Policies and Provisions). Many miles of hunter/ trapper foot access paths are provided on the property's designated trails and management roads. Further, numerous water-

Photo by Travis Anderson, DNR

craft access sites are maintained to provide hunter/trapper access to the main river and backwater sloughs, oxbow lakes and flowages.

Fishing

Objective

Support and provide opportunities for year-round fishing.

Management

Abundant access for boat, bank and ice fishing will be provided including access to the main stem of the river and the backwaters, sloughs and lakes. Other sections of this chapter detail actions that provide fishing access to meet this objective.

General Public Access

Riverway public access is well served by a public road network comprised of a variety of road types, including state and county highways, town roads and DNR managed roads. (The roads managed by other units of government, such as town, county or state highways, are outside the scope of this master plan.)

DNR maintains a network of mostly primitive to lightly developed roads within the Riverway for management purposes and for public access to parking lots, boat access sites and other public use facilities or sites. Approximately 26 miles of DNR managed roads are open to public vehicles. The remaining 42 miles of closed management roads provide an important network of foot access-ways for hunters and hikers, with designated trails adding additional access in many locations. Map E shows the current property road network, both roads that are open and those that are closed to public vehicles. More information on LWSR road management may be found in the Road Management and Vehicle Access Plan in the General Property Administration and Management Policies and Provisions section.

River Recreation

Across the Midwest the lower Wisconsin River is well known for canoeing, kayaking, tubing, swimming and sandbar activities, such as sunbathing and camping. Due to the shallow nature of the river and shifting sandbars, the majority of boating is paddle craft and small, shallow draft power boats.

Objective

Continue to improve opportunities for people to enjoy the unique river-based recreational opportunities afforded by the lower Wisconsin River.

Management

This management objective is met primarily through providing ample water craft access as well as land access to riverside day use sites. Opportunities are further enhanced by providing readily accessible information to Riverway users. Specific actions are detailed in other sections of this chapter.

STATE WATER TRAIL

The department will consider future initiatives to designate the lower Wisconsin River as a State Water Trail. Such a designation process would be a cooperative effort with multiple partners, particularly local communities that provide river access or other facilities for river users.

The State Water Trails Program

State Water Trails are a component of the State Trails System established by s. 23.175 (2) (a), Wis. Stats. "State water trails" are defined as:

"Recreational routes defined on waterways with a network of public access points, promoted by broad-based community partnerships. Water trails provide recreational opportunities both from the water and from land with information on access points, safety considerations, activities and points of interest."

The goal of this program is a system of water trails that are part of the State Trail System and serve to increase access to outdoor recreation on waterways and shorelines, provide recreational opportunities, encourage conservation along waterways, and protect, interpret, and promote Wisconsin's rivers, shorelines, and waterways.

State designation highlights a recreational opportunity, markets a local resource as part of the mix of local tourism offerings and provides a way to experience waters of the state. For water trail users, state designation signals that planning has been done to connect experiences users seek to those they are interested in; that information and signage is available and consistent.

Water trails that become state designated are able to utilize state resources such as technical assistance and review, prioritized department-managed funding assistance, listing on the department website, promotion at various locations and in media, possible future maintenance or enhancement assistance and informational updates.

TRAILS

The department will construct and improve trails throughout the Riverway for a variety of recreational uses including hunting access, historical interpretation, hiking, wildlife watching and horseback riding. Presently opportunities for trail-related recreation are very limited in the Riverway and southwest Wisconsin as well. The opportunities to develop new trails on the Riverway are somewhat limited due to poor soils and steep slopes on department owned land.

Objectives

- Provide expanded opportunities for high-quality, non-motorized trail experiences in ways and locations that are compatible with other recreation activities and resource management objectives.
- Provide high quality equestrian opportunities and facilities, with full-day trail riding when possible.
- Support, expand and enhance hiking and other non-motorized trail opportunities for local Riverway communities.
- Expand and enhance interpretive and educational opportunities for trail users.

Trail Classifications

The department constructs and maintains trails to different standards based on their intended use, anticipated level of use, and land management classification. Trails within the LWSR will be a range from primitive to moderately-developed. Trails are described in NR 44.07, Wis. Adm. Code as follows:

Primitive trail

A primitive trail shall be a minimally developed single-file trail with a maximum sustained cleared width normally not exceeding 8 feet and a minimal tread width for the intended use, have a rough, ungraded bed where large rocks, stumps and downed logs may be present. It primarily follows the natural topography, has no or few shallow cuts and fills, and is surfaced with primitive or native materials, except for limited distances where environmental conditions require the use of other materials. Modifications to the natural trail surface are limited to that which is minimally necessary to provide essential environmental protection.

Lightly developed trail

A lightly developed trail shall be a trail with a maximum sustained cleared width normally not exceeding 16 feet, a moderately wide tread width for the designated uses, a rough-graded base to remove stumps and large rocks, and a surface of primitive or native materials, except where other materials are required due to environmental conditions or where the trail also serves as a lightly developed road where other types of surfacing materials are used.

TABLE 2.2 DESIGNATED TRAILS OF THE LWSR

Trail Location	Current Miles	Total Future Miles
Hiking Trails		
West Point	0	1-2
Black Hawk	3	3
Ferry Bluff	0.37	0.37
Mazomanie	0	4-8
Bakkens Pond	0	4-5
Smith/Cruson Slough	0	2-3
Avoca to Muscoda	0	5-6
Goodwiler Lake	0	2-4
Muscoda to Blue River	0	2-5
Millville	0	9
Total Hiking Trails	3.37	32-45
Equestrian/Hiking		
Black Hawk	8.4	8.4
Millville	5.1	10-15
Total Equestrian/ Hiking Trails	13.5	18-23

A Through-Hiking Trail on the LWSR

There has long been a desire by some to develop a long-distance hiking trail running the length of the Riverway from Prairie du Sac/Sauk City to the Mississippi. The department supports the through-hiking trail concept but it is difficult to implement because of the limitations of wet soil and steep terrain and gaps in public land ownership. However, the community to community linking trails described in this plan provide the initial building blocks for a long-distance hiking trail on the Riverway.

The department will cooperate with other public and private partner organizations in efforts to establish additional links in a thru-hiking trail system.

Moderately developed trail
A moderately developed trail shall be a trail with a maximum sustained cleared width normally not exceeding 8 feet, a minimal tread width for the intended use, a relatively smooth graded base with a compacted surface composed of stable materials such as aggregate. Where practicable and feasible, a moderately developed trail shall, at a minimum, meet the standards for recreational trails accessible to persons with a disability.

Trail Management
The management and development is discussed below by type of trail.

Hiking Trails
Walking and hiking is popular across the Riverway. People have been primarily using management roads and the numerous volunteer trails that have appeared over the years. Under this plan many of these routes will be formally designated and managed for hikers and some new trail segments will be developed as well. In total, the designated hiking trail system will offer 32 to 45 miles of hiking opportunity in a variety of settings. Additionally, many more miles of hiking opportunity are available on department management roads and fire breaks. Hiking is allowed on equestrian trails, as well. Hiking trails are detailed in the site-specific sections further in this chapter. All designated trail locations are shown on Figure 2.1.

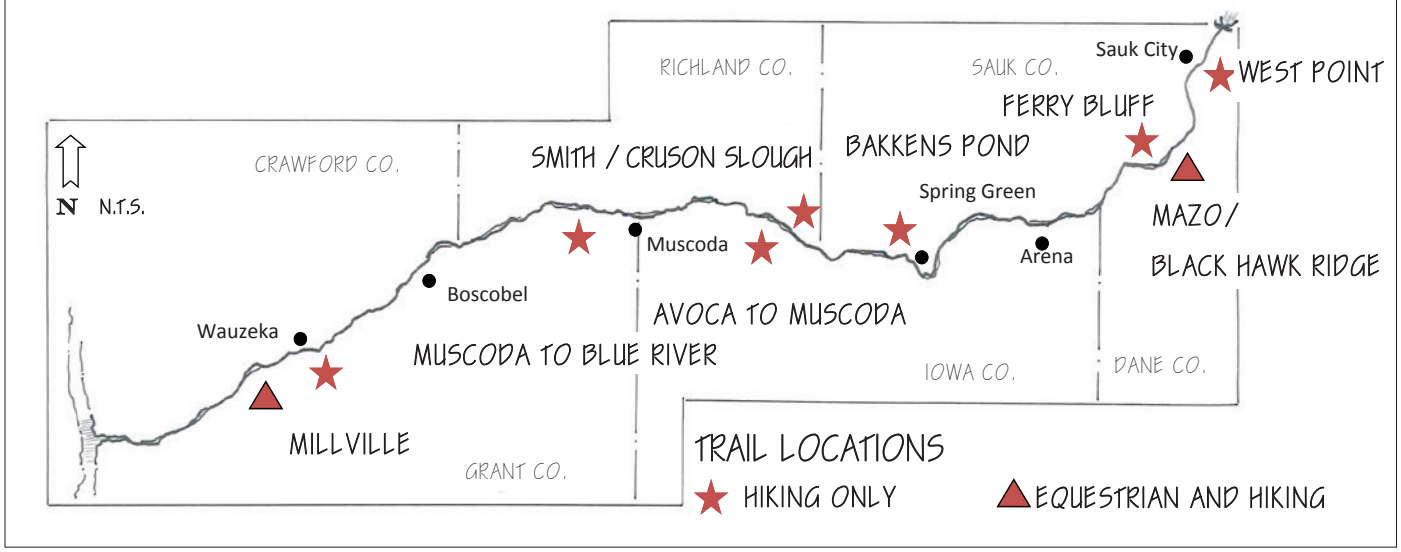
Cross-country Ski and Snowshoeing
All hiking and equestrian trails as well as all management roads and lands are open for these uses, however, no trails on the LWSR are or will be specifically designed or maintained for cross-country skiing or snow-shoeing.

Equestrian Trails
Horseback riding is a popular recreational activity on the Riverway. Currently, equestrian trails are located at Black Hawk Ridge near Sauk City (8.4 miles), at Millville (near Wyalusing State Park) (5.1 miles), and near Blue River (6.25 miles).

While Black Hawk Ridge is the most used equestrian trail system on the Riverway, our ability to improve the trailhead facilities and add miles to the trail system is limited by topographical and resource protection issues on DNR owned land. Millville attracts some equestrian use, but could attract more if the facilities were improved. Support facilities at Millville are currently limited and are in need of improvement. Also, there is demand for expanded trail miles to provide day-long riding opportunity (10 or more miles). To meet these demands, the department will upgrade the trailhead facilities at Millville and expand the total miles of equestrian trail there from about five miles to 10 to 12 miles.

The equestrian trails at both Black Hawk Ridge and Millville shall be open from April 22nd to October 31st. The property manager may close the trail to equestrian use if the conditions

FIGURE 2.1 LWSR TRAIL LOCATIONS



are not suitable for riding. See Recreation Management Areas 2 and 3 for additional details.

The previously designated bridle trail between Blue River and Muscoda (the Blue River Bridle Trail) is a combination of segments along open DNR management roads and other public rights-of-way and segments on a department snowmobile trail. The trail does not provide a high quality riding experience. Subsequently, not many equestrians travel to use it, yet, it is enjoyed by local riders. The Blue River Bridle Trail will not be maintained as a designated trail. However, horseback riding will continue to be allowed on the DNR management road portion of the trail as roads that are open to public vehicles are also open for horses.

Winter Biking Trails
Winter biking is gaining popularity and demand for trails open to this use in the Riverway has increased in recent years. Much of the use is "fat tire" biking but does include more typical bicycles, sometimes with the addition of studded tires. To meet this demand the equestrian trails at Millville and at Black Hawk Ridge will be open for winter biking from December 15 to March 1st unless otherwise posted by the property manager. The property manager has the authority to close the trail to biking by posted notice for concerns including but not limited to erosion and other maintenance and safety concerns. The dates may be adjusted depending on the weather and trail conditions at any point in time.

See Recreation Management Areas 2 and 3 for additional details.

Community-sponsored Trails
State lands abut the city or village limits of many Riverway communities. Several communities have expressed an interest in expanding their local hiking/biking trail loops onto DNR managed lands, establishing new access trails to the river, backwater areas or other nearby recreation sites.

The department supports such local community outdoor recreational initiatives and will partner in the future with local communities and organizations. The portions of the community trails on department owned land shall be located on routes that can be sustainably designed and where they are compatible with resource management objectives and other recreational uses. The trails are required to meet department development and maintenance standards.

Snowmobile Trails
For decades the DNR has been a partner in providing snowmobile trail riding opportunities by helping to provide connections in the regional snowmobile trail network across department managed land. Snowmobile trails typically are established and managed cooperatively by local clubs through land use agreements. Generally, property master plans do not designate specific snowmobile trail routes because from time to time the regional trail routes change necessitating a change in the connector route across department lands. The LWSR property manager is authorized to continue to work cooperatively with snowmobile clubs to establish linking trails routes and develop land use agreements for the LWSR development and maintenance. Snowmobile trails are sited to provide the most feasible route to maintain the regional trail system, while not degrading habitat or routing through important winter habitat areas.

DEVELOPED DAY USE AND SCENIC/WILDLIFE VIEWING

Objectives

- Provide opportunities for visitors to picnic, sightsee, relax and learn about the LWSR.
- Provide lightly developed readily accessible sites where visitors may view wildlife and scenery.

Management

A number of sites with vehicle access have traditionally provided or have the potential to provide good opportunities for wildlife watching, scenic viewing, fishing and other "day use" outdoor activities. Improved, easy access and day use facilities (at some sites) are planned at a number of locations. Easy access means viewing from the car or at most, a short walk along a readily accessible path to an accessible viewing site. Additional day use site facilities will range from toilets and picnic tables with grills to shelters in some cases. Specific sites and the development of each are outlined later in this chapter.

The department may develop additional scenic/wildlife viewing sites in the future as opportunities become available.

These lightly developed day use sites are scattered along the Riverway. More intensely developed day use sites are located at Black Hawk Ridge, Mazomanie Recreation Management Area and Tower Hill State Park.

CAMPING

Objectives

- Continue to allow boaters and paddlers to camp on the river sandbars and state owned islands where they may enjoy nature, a sense of solitude and camaraderie with family and friends.
- Provide opportunities for river bank camping to extend the camping options during high water events.
- Provide equestrian camping to support day-long trail riding.

Management

Primitive river camping on sandbars and state owned islands is the only type of camping currently available on the Riverway (except for camping at commercial and municipal campgrounds, and at Tower Hill and Wyalusing State Parks). Sandbar camping policies continue unchanged under this plan. New camping opportunities for boaters and paddlers are planned for two minimally developed river bank sites, these will be particularly useful during high water conditions when sandbar camping is limited or non-existent.

The addition of an equestrian campground will allow riders to take full advantage of a longer trail system at the Millville site.

INTERPRETATIVE AND EDUCATIONAL PROGRAMS

Objective

- Provide opportunities for visitors to learn about and appreciate the rich natural and cultural history of the Riverway.

Management

The department will develop and provide an education and interpretation program for the LWSR. The interpretive and education program will help foster visitor's awareness of the Riverway's scenic, scientific and wildlife values, its rich history and archaeological heritage and an awareness of human impacts on the resource. Much of the program will be integrated into other recreational facilities such as trails, boat landings and day use areas.

Because interpretive and education needs, opportunities and delivery systems change over time, the specific education/interpretation program will be developed and maintained through a separate property interpretation/education implementation plan.

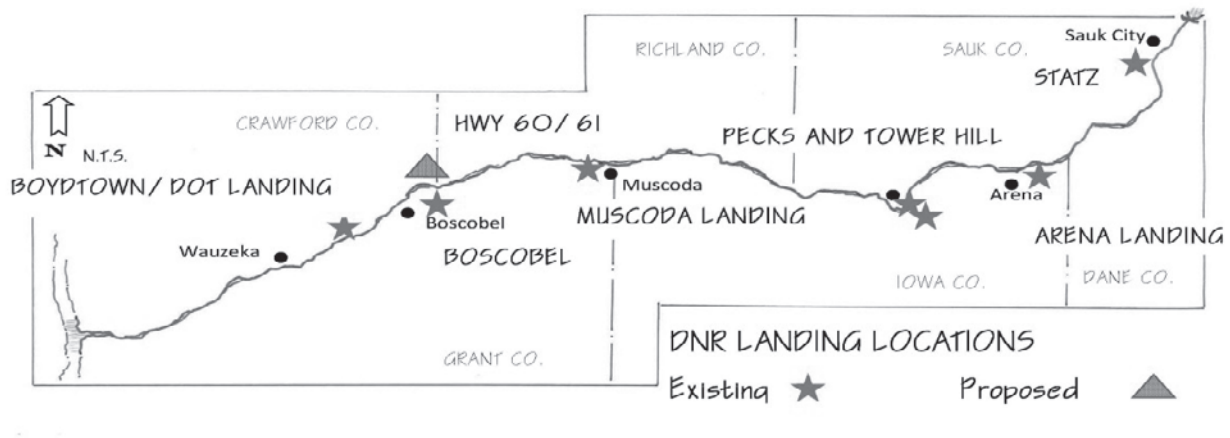
Potential Interpretive and Educational Themes

- Pre-glacial and glacial geology of the Wisconsin River
- Archaeological sites
- Historic uses of the river and its resources
- Plant communities
- Wildlife (species, status, and ecology)
- Native communities: River bottom forest, mesic forest, oak barrens, wet prairie, goat prairies, dry prairies, sand barrens
- Fisheries and aquatic habitats
- Resource management activities
- Creation and purpose of the LWSR
- Safety and recreation concerns

As part of this program, education and interpretation tools, such as signs or displays, will be located at varied locations throughout the Riverway. They will be designed to minimize impacts to sensitive habitats, aesthetics, and management activities at the sites where they are provided.

Five sites that especially highlight the archaeological history of the property have been identified and are described in Special Management Areas 6 & 7.

FIGURE 2.2 DNR BOAT LANDINGS



Additionally, the river corridor has long been an attractive, popular area for pleasure driving and sightseeing. In fact, in 2009 the Wisconsin Department of Transportation named STH 60, from Lodi to Prairie du Chien, the Lower Wisconsin River Road Scenic Byway. The scenic byway route will be incorporated into the LWSR interpretation/education plan, and it will feature vista and wildlife viewing sites, historic and archaeological sites, day use area stops and other points of interest. The department will collaborate with the LWSR communities, the Department of Transportation, and other partners in developing and promoting the scenic byway route and related materials.

RECREATIONAL OPPORTUNITIES FOR VISITORS WITH DISABILITIES

Objectives

- Provide outdoor recreation opportunities for Riverway visitors with disabilities, as well as for families with very young and very old members.

This plan provides expanded and enhanced opportunities for persons with disabilities. There will be opportunities to view wildlife and scenery from a vehicle as well as via short, accessible trails. Several ADA accessible duck and deer hunting blinds and fishing piers are planned. An auto trail will provide a unique opportunity for enjoying the Riverway's scenery, wildlife, and cultural resources.

Currently (2016), six boat landings on the main stem of the lower Wisconsin River are ADA accessible, two of them are DNR managed landings. The department will improve additional DNR landings to accessibility standards where possible. Some landings do not have the physical capability for improvement. [An ADA accessible landing is defined as a landing with at least one ADA van accessible parking stall and a barrier-free/accessible route to the top of the boat ramp.]

More detailed descriptions of accessible facilities are in the site-specific sections later in this chapter.

SITE-SPECIFIC RECREATION MANAGEMENT AND DEVELOPMENT PLANS

RIVER RECREATION SITES AND FACILITIES

Recreation on the lower Wisconsin River primarily revolves around paddle craft of all sorts, fishing, camping and sunbathing on sandbars, and to a lesser degree, pleasure power boating. Currently (2016) nine canoe liveries service the river putting an estimated 600 canoes on the water on peak season weekends. The upper half of the river receives the most recreational use, particularly by paddlers and campers, with the Sauk City to Spring Green section seeing the most visitors.

The overall goal for river based recreation is to provide recreational sites and facilities where visitors can access the main stem of the river and its shoreline to pursue outdoor activities such as; boating, fishing, wildlife and scenic viewing, camping and picnicking in an attractive setting (See Map D for locations of existing and planned infrastructure).

This plan section is divided into three topic areas;

- boat landings,
- river camping, and
- day use sites.

TABLE 2.3 DNR MANAGED BOAT LANDINGS EXISTING CONDITIONS (2016)

Landing	Location	River Mile	Landing Type	Parking Capacity	Toilets	Drinking Water
Statz Memorial Landing	North side of the river, Pasture Road, Just west of Sauk City	5	Carry In Only	50 (cars only)	Yes	No
Arena Landing	River Road, north of Arena	15.6	Trailer & Carry In	15 (cars & trailers) 30 (cars only)	Yes	No
Tower Hill State Park	Tower Hill State Park	25	Carry In Only	50 (cars only)	Yes	Yes
Pecks Landing	STH 23, north side of the river	25.5	Carry In Only	25 (cars only)	Yes	No
Muscoda Landing	West River Road, just west of STH 80 bridge	47.8	Trailer & Carry In	5 (cars & trailers) 6 (cars only)	No	No
Boscobel Landing	STH 61, south side of the river, On the east side of the highway	63.3	Carry In Only	10 (cars only)	No	No
Boydtown Landing	STH 60, just east of Boydtown	68.2	Trailer 7 Carry In	5 (cars & trailers)	No	No

MAIN RIVER STEM BOAT/CANOE LANDINGS

Boat landings and their associated grounds are the cornerstone of recreation on the lower Wisconsin River. They are used by canoeists, boaters, anglers (boat and bank), hunters, sunbathers, picnickers, wildlife watchers and as waysides for travelers. Landings often also serve as small local riverside parks, not just as a place to launch a boat or canoe.

The watercraft access sites discussed in this section are located on the main stem of the river. Boat access to sloughs and other backwaters are discussed in the plan section relating their specific location along the river.

Throughout the length of the Riverway, public river access is provided by counties, local municipalities, as well as the state. In total, there are 23 existing public boat landings on the main stem of the Wisconsin River between the Prairie du Sac dam and the Mississippi. Of those, seven are managed by the DNR. A number of the municipal boat landings are located in parks and offer a high level of amenities. This plan focuses only on DNR managed landing sites.

Sandbar Challenges

The lower Wisconsin River with its forever changing current patterns and shifting sandbars is a challenging environment to provide and maintain boat access sites, particularly for trailered boats. Landings that today serve as good boat launching sites may become sanded-in within only a few years. Such is the impermanent nature of this river, particularly on the upper half of the Riverway. The department recognizes and accepts this ever changing environment. Actions such as dredging channels in a sand choked landing are short-term solutions at best and are not practical or cost effective. One large storm event can wipe out all the work that was done. Department managed landings will be relocated, when possible, if they become unserviceable due to changing river conditions.

Currently, most of the department's landings have minimal user facilities. Some sites have boat ramps, some are carry-in. Most have portable toilets but do not have drinking water. Improvements are planned for a number of the DNR sites that will enhance access and other use opportunities. The DNR will maintain all existing department managed landings, except one, which will be replaced with a new, more sustainable and usable landing at a nearby location.

Each DNR access site is discussed below. See Appendix A for a complete listing of boat landings on the lower Wisconsin River. Figure 2.2 shows the general location of all of the DNR landings and Table 2.3 on the following page provides a list of the DNR managed river landings. The existing and planned DNR landings are also shown on Map D.

LAND MANAGEMENT CLASSIFICATION

All DNR managed main-stem river access sites described below are classified as Recreation Management Areas, Type 4 Setting [(NR 44.07(7)].

MANAGEMENT OBJECTIVES FOR ALL MAIN-STEM DNR LANDINGS

- As practicable, and in cooperation with local, county and other state agencies, provide a system of well maintained, watercraft river access sites (for both paddle craft and motor boats) to meet the recreational needs of the public.
- Provide sufficient and sustainable, well maintained watercraft access to the backwater sloughs and lakes within the Lower Wisconsin State Riverway.

Minimum Development Prescriptions for All Main-stem DNR Landings

- Paved (concrete, asphalt or gravel) surface on all entrance roads and parking lots,
- Vault or portable toilets,
- Informational signs,
- Landscaping,
- Drinking water and a light when possible.
- Comply with ADA accessibility standards for boat access sites (i.e. provide one or more accessible parking stalls, at least one must be van accessible, and an accessible route to the top of the boat ramp). Note: Due to the ever changing river environment (such as changing water levels and shifting sandbars) fully barrier free access to the water cannot always be provided or maintained.

Note on boat landing lighting: Landing lights will likely be solar powered due to lack of nearby power sources and will be designed to minimize light pollution.

Additional facility enhancements are planned for individual landings and are outlined below for each specific site.

Statz Memorial Landing (Sauk City)

Statz Memorial Landing is a carry-in canoe access site managed cooperatively with the Village of Sauk City. The site has a paved loop driveway with an unloading area and parking for up to 50 vehicles. There are large open, grass areas near the drive and shoreline. This landing has a barrier-free route to the top of the boat ramp; in recent years the river has sanded in the carry-in launch to the point where the shore line is about 100 feet from its former bank location.

With some upgrades, this site has potential to serve as a small day use area for both paddlers and the local community.

Site Management Prescriptions
- Maintain the landing as a carry-in site.
- Provide a day use area with picnic tables, drinking water and grills, toilets and if demand builds, a picnic shelter. Follow the standards in NR44.07(6)(e)3.

Arena Landing

At the time this landing was constructed there was a clear, deep channel along the shoreline. A boat ramp and a separate canoe launch area were built. River conditions have changed dramatically. A large sandbar now sits in front of the landing. Trailered boats cannot access the site, except in high water. During lower water, paddle craft can be worked down a shallow, narrow channel along the bank or carried across the sandbar to the river channel. This site currently has portable toilets, but no drinking water.

While the newly formed sandbar creates problems for boat launching, it provides a beach-like setting at the landing. Visitors are making use of the sandbar for sun bathing, sand volleyball and general outdoor enjoyment.

Arena Landing Channel Dredging

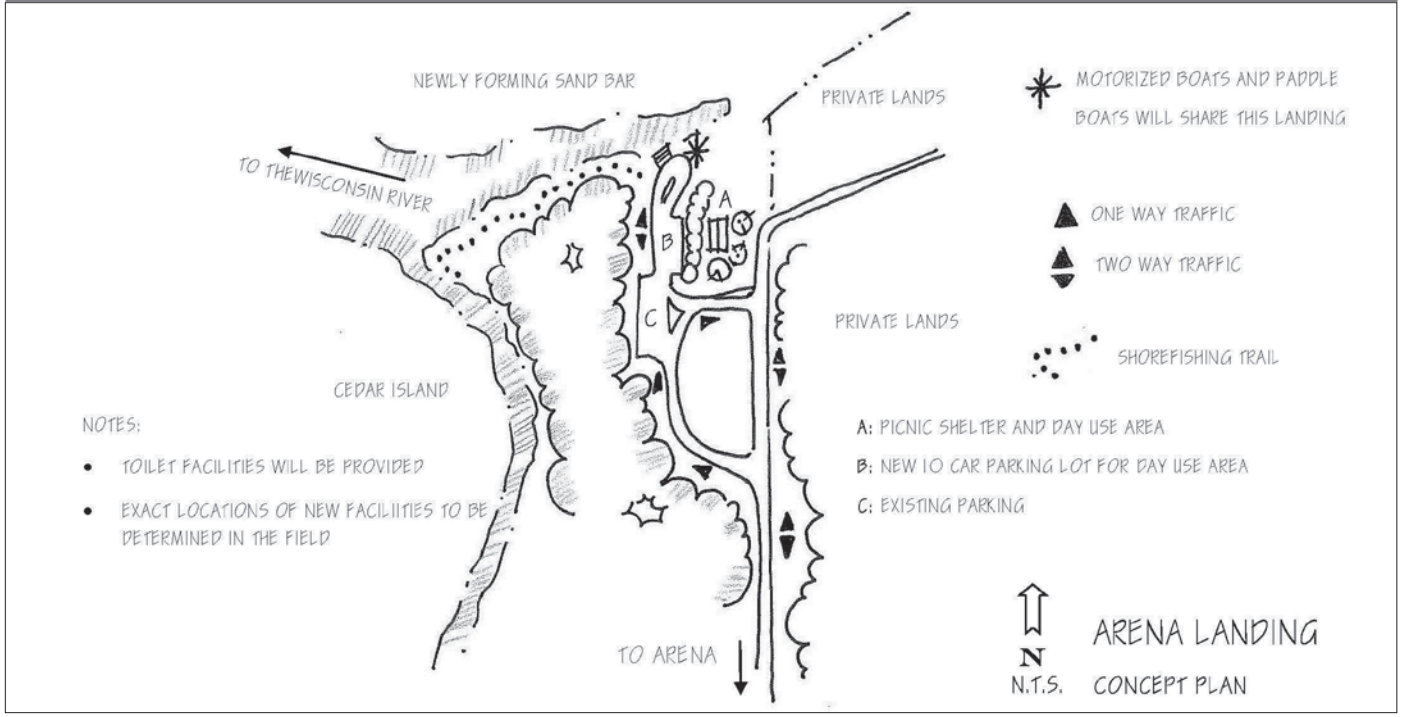
The department has explored dredging the channel but due to various concerns about costs, environmental issues, and the temporary nature of this solution, it does not appear to be a feasible option.

This site is a popular drop-off/pick-up location for canoe liveries and it will likely continue to be a popular canoe access site because it is the only access point between the Town of Mazomanie landing and Spring Green, a distance of approximately 16 miles.

In addition to serving as a landing, with some additional facilities this site will be a small day use area as well. The addition of a small picnic shelter, picnic tables and grills will serve day use visitors as well as river travelers. This site will be developed as a rustic day use area [NR 44.07(7)(e)5c].

Site Management Prescriptions
- Maintain the Arena landing primarily as a carry-in site, based on its current sandbar-blocked condition. Trailered boats may use the landing as river levels and sand conditions allow. Trailered boat access will not be restricted or limited.
- Reconfigure the access and parking area. Continue to provide space for both liveries and private users to load and unload their paddle craft. (see Figure 2.3)
- Provide a shelter, picnic tables, toilets and grills.

FIGURE 2.3 ARENA LANDING CONCEPT PLAN



Tower Hill State Park Landing (CTH C, near Spring Green)
Located up Mill Creek about 800 feet from the main stem, the Tower Hill State Park Launch is a carry-in site with amenities such as water and toilets located in the park. A state park admission sticker or payment of a daily admission fee is required at this site.

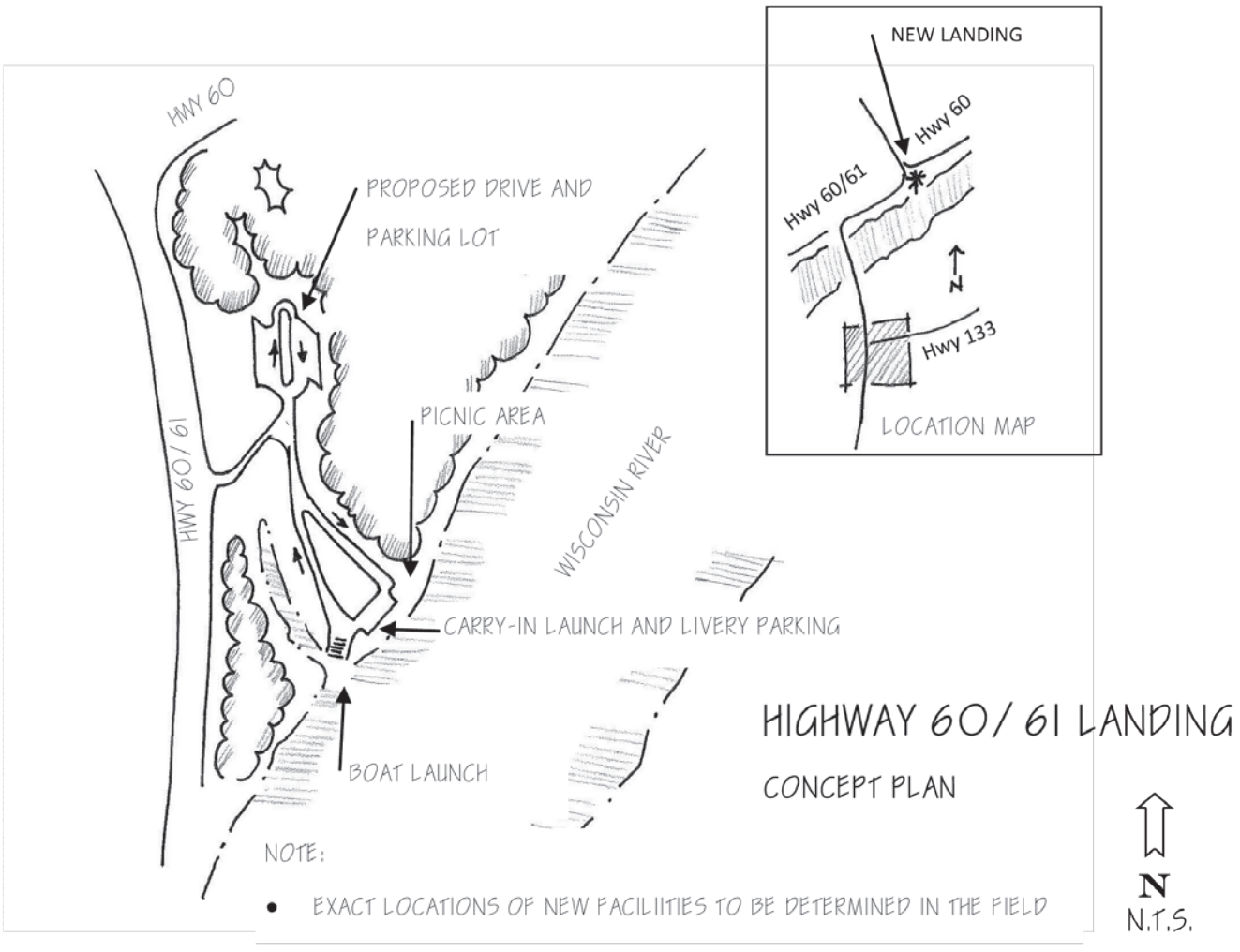
Site Management Prescription
- Maintain the landing for carry-in boat access (see the Tower Hill State Park master plan for more details.)

Pecks Landing (STH 23, near Spring Green)
Pecks Landing, at the STH 23 bridge and across the river from Tower Hill State Park, is one of the most popular places on the Riverway. It is a primary carry-in access point for individuals and canoe liveries and a large sandbar attracts many day users. It is crowded on nice weekends during the summer season. Nearby a small pond is host to a healthy fishery and is an additional attraction to the site.

Elevated, dry land for vehicle parking is limited. Parking and loading/unloading congestion is often a problem during high-use periods. Limited redevelopment of the site that will reduce conflicts and enhance user experience is possible. The lack of suitable space prevents adding picnicking facilities or a shelter.

Site Management Prescriptions
- Maintain the landing as a carry-in site.
- Expand parking near the landing. Develop 5- 10 car parking lot near the driveway along the north side of the pond.

FIGURE 2.4 HIGHWAY 60/61 LANDING CONCEPT PLAN



- Replace the existing fishing pier at the pond with a barrier-free fishing pier with a van accessible parking stall and an accessible route to the pier.

Muscoda Landing
The DNR landing at Muscoda lies on the south shore of the river and west (downstream) of STH 80. Vehicle access to it is off of West River Road. It is an underutilized access site. The very busy Muscoda municipal boat landing at Victora Park lies just up river on the east side of STH 80.

Currently (2016), the DNR landing has minimal development. It has a graveled access drive and a boat launch on the river bank. It is a pretty setting, with mature trees and high ground and good views of the river. The site has a lot of potential for enhancement and expanded use due to its proximity to the village services and the local population of Muscoda. This site will be developed as a modern day use area (NR 44.07(7)(e)5c).

Site Management Prescriptions
- Maintain the boat landing and improve the parking lot.
- Provide a picnic area with a shelter with pressurized drinking water.

Highway 60-61 Landing (new development)
This is an undeveloped landing located on the north bank of the river near the intersection of STH 60 and 61, about one mile up river from Boscobel. The only development here is a short driveway to the river's edge from STH 61. The developable open, upland area on the site is about two acres in size. This is an ideal access site to develop as a replacement for DNR's existing minimally developed landing in Boscobel. (See Figure 2.4)

Site Management Prescriptions
- Develop the access for both paddle craft and trailered power boats.
- Provide parking for approximately 20 vehicles, including some for vehicles with trailers.
- Provide an access area with loading/unloading space, and if possible, of a size that can accommodate canoe livery vehicles.
- Provide a small grassy area with a few picnic tables and shade for paddlers waiting for pick up.

Boscobel Landing (DNR)
This is a minimally developed DNR landing on the east side of STH 61 and the south bank of the river, just upstream of the City of Boscobel's well-developed Floyd Von Haden Boat Landing. The DNR landing consists only of a gravel access drive and a 10 car parking lot. This site lies in a wetland area which is prone to flooding. Due to its wetland status it cannot be upgraded and it is expensive to maintain.

The DNR landing is not a popular launching site because of the strong current along the bank and its secluded parking location. On the other hand, the city landing just across the highway, is well developed in a highly visible location, and offers a quiet lagoon to launch into.

Site Management Prescriptions
- Abandon this boat landing.
- Construct a five car parking lot near the highway on high ground to provide general access to the area.

Boydtown Landing (Hwy 60)
Boydtown Landing is located on the north bank of the Wisconsin River off of STH 60, across the river from the Village of Woodman. The launch is unusual in that it is tucked-in a back channel but has easy access to the main channel. The landing has a paved launch and a gravel driveway. No other facilities are provided at this site. This is also a popular shore fishing location.

Site Management Prescriptions
- Maintain the landing as a power boat accessible landing. Improve the launch by reconstructing the public access road and the parking area, and upgrading the launch approach and pad.
- Establish and maintain a mowed shoreline fishing area.

Potential Future Development of New Boat Landings
All new Riverway land acquisitions with river frontage will be evaluated for the potential development of a river access site. New access sites may be developed on suitable sites as demand and need warrant.

Secondary Backwater Landings
The department also maintains an array lightly improved small craft landings on the backwaters and sloughs of the LWSR. Most are carry-in only.

Objectives
Provide small-craft access (carry-in or trailered as appropriate) to sloughs, flowages and other backwaters for angling and hunting, wildlife watching and general recreation.

Management Prescriptions
- Provide and maintain lightly developed carry-in or trailered small boat launch sites at selected locations based on need and the physical capabilities of each site.
- Provide and maintain parking appropriate for each site.
- May provide portable toilets if demand warrants.

- The LWSR property manager may close (and abandon as appropriate), relocate, or establish new minimally developed backwater access sites as needed to address environmental or sustainability concerns or in response to changes in demand.

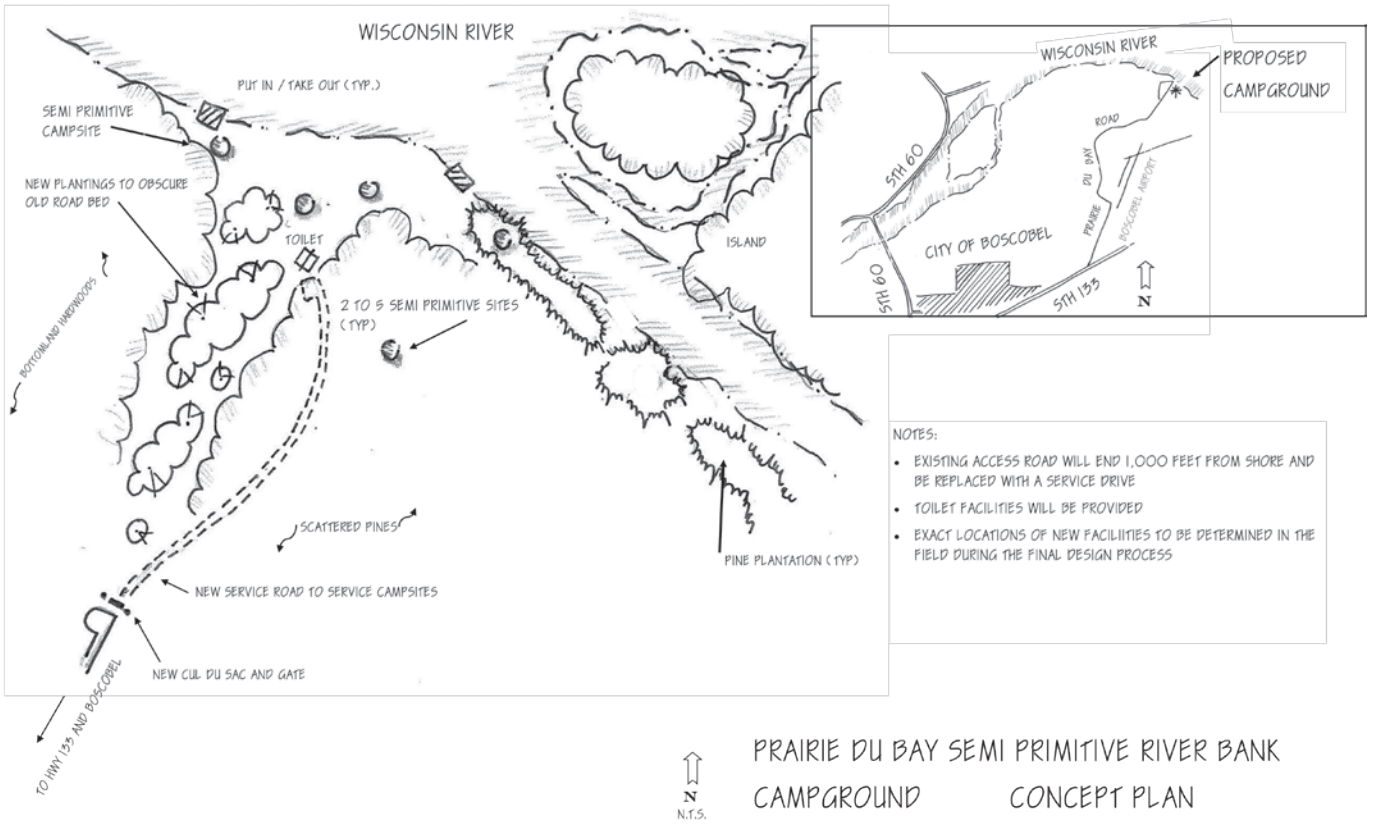
RIVER CAMPING

Camping is allowed on state owned sandbars and islands in the LWSR without a permit or fee (NR 45.10). No facilities or services are provided for campers. The department does not have authority to regulate the numbers of river users or sandbar/island campers on the Riverway.

Sandbar camping has been a popular activity on the lower Wisconsin River for generations. Under this plan sandbar camping will continue without change. When the river is high, few to no sandbars are to be found. In a typical year sandbars do not become abundant until mid to late June and may be present into the fall, except after heavy rainfall events. Sandbars overall, are less abundant on the lower river reaches in all seasons. There is a need for river bank camping opportunities due to unavailability of sandbars at certain times and locations.

However, due to the extensive wetlands along the river, suitable river bank camping sites on department managed land are limited, particularly along the upper half of the Riverway. River bank camping must be provided at developed/managed sites because of the need to manage vegetation and provide for sanitation. Therefore, viable campground sites must be accessible by management vehicles. There are two sites along the river's main stem that have the potential for development of watercraft accessible, semi-primitive campgrounds. The river bank campground capacity will be primarily determined by site conditions (i.e. space available) and by user demand. With the 60 person limit a semi-primitive campground can accommodate up to 10 single unit sites or 4 group (15 person) sites, or a combination of both. In the future, if demand increases beyond the allowed capacity of a semi primitive campground,

FIGURE 2.5 PRAIRIE DU BAY RIVER BANK CAMPGROUND CONCEPT PLAN



the department may upgrade these campgrounds to rustic campgrounds [NR 44.07(7)(e)4b].

Each campground is discussed below.

Objective

- Provide opportunities for river bank camping, accessible by watercraft- only.

Management and Development Prescriptions

All River Bank Campgrounds

- Provide individual or group campsites to accommodate up to 60 campers total in a semi-primitive campground [meet camping standards of NR 44.07(6)(e)2].
- In each campground provide toilets (vault or portable); and where possible, provide drinking water.
- At each individual campsite, provide a tent pad and fire ring. A picnic table is optional.
- Restrict camping to campers arriving by watercraft only and a one night only stay.

Potential Future Development of Additional River Bank Campgrounds

Evaluate all new Riverway land acquisitions with river frontage for the potential for river bank camping. New river bank, semi-primitive campgrounds may be developed on suitable sites as demand and need warrant.

Prairie du Bay Watercraft Campground

The Prairie du Bay site is in a secluded area, except for being near the airport, on the south shore a short distance up-river from Boscobel. Located on a high sand bank it features attractive views of the river. The campground area is a sandy, grassy opening with a scrub oak fringe and a pine plantation. Prairie du Bay Road, is a dead end one and one-third mile long public access road that leads to the river and this site.

As part of the campground development, the large graveled turn-around area at the end of the road will be moved to the south and vegetation screening will be planted between the road and the river. Approximately 1,000 feet from the river shoreline the road would be gated with a cul-du-sac and small parking area added. (See Figure 2.5)

Wauzeka Watercraft Campground

This undeveloped site has about three-tenths of a mile shoreline. It is located on the north shore of the Wisconsin River, just across the river from the Village of Woodman, and about 6.5 miles downriver from Boscobel. The area for high bank camping is a wood lot with a mix of young trees.

UPLAND AND BACKWATER RECREATION SITES

The following section focuses on Riverway recreational sites that are not primarily related to boating and associated river recreation. Specific sites or areas are described and recreational opportunities and developments at each site are discussed.

Photo by Jan Hake

Black Hawk Ridge and Mazomanie Recreation Management Areas

The Lower Wisconsin State Riverway has two highly popular recreation destination sites in the Sauk City/Prairie du Sac area that have significant potential for additional recreational development and use. They lie in the highest use portion of the Riverway, being close to the population centers of Dane County and the southeastern counties. These sites are the Black Hawk Ridge (834 acres) and an area labeled in this plan as Mazomanie (2,277 acres). Their locations are shown below on Figure 2.6.

Although these are separate areas, for management purposes they can be viewed as an interconnected recreational complex. These large areas will have a more intensive recreational focus then other locations on the Riverway.

Refer to the Black Hawk Ridge Recreation Management Area and the Mazomanie Recreation Management Area sections of this plan for a detailed description of these sites, their management and use.

West Point (Prairie du Sac)

The West Point site is located along the eastern side of the river across from Prairie du Sac and just south of the STH 60 bridge. This 80.0 acre, unimproved site has long been a popular local area for bank fishing, walking, river and wildlife viewing, and other outdoor activities. The site has approximately 0.7 miles of shoreline and no developed facilities, although there is a network of volunteer trails throughout. Visitors who drive here currently park along STH 188.

A number of improvements are planned that will make this site more inviting and accessible for day users of all ages. Development will include an accessible walking trail with benches along the shoreline, and loop hiking trails back from the river. Improved access will be provided at both the northern and southern ends of the site.

Management Prescriptions

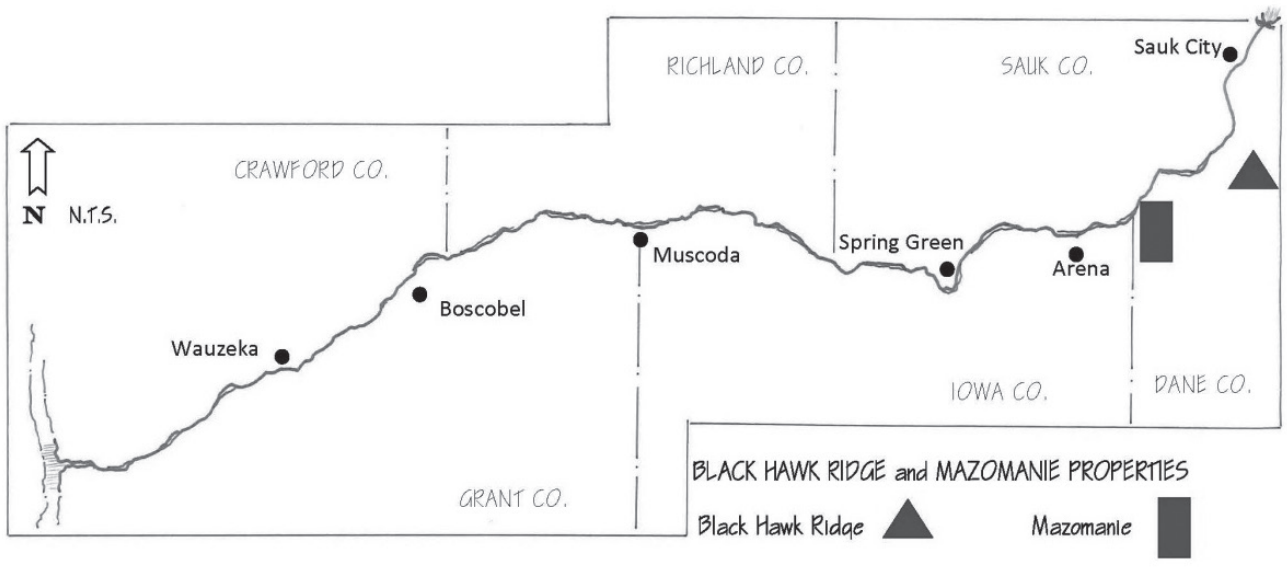
Site access

- Develop a 10 car parking lot.
- At the northern end of the site, develop a pedestrian connector-trail from the eastern end of the STH 60 bridge sidewalk to the Shoreline Trail.

Trails

- Develop an accessible, moderately developed hiking trail along the shoreline. Place sitting benches at appropriate locations along the trail.
- In addition to the shoreline trail, establish 1 to 2 miles of primitive to moderately developed loop hiking trails in the area.

FIGURE 2.6 BLACK HAWK RIDGE AND MAZOMANIE RECREATION AREA



Ferry Bluff Overlook

Ferry Bluff is an approximately 300 foot high cliff on the north bank of the river across from the Mazomanie Beach area. The views up and down the river from the overlook on the bluff top are exceptional. It long has been a popular site for boaters and paddlers to stop and climb to the bluff top on a steep, developed trail. There is a small parking lot at the base of the bluff for those accessing the site from STH 60. This site is located within the Ferry Bluff State Natural Area. Refer to the Ferry Bluff native community management area for management prescriptions for the trail and overlook. (See page 68.)

OTHER RIVERWAY DAY USE SITES, TRAILS AND SCENIC OVERLOOKS

Overview

There are many sites up and down the river off the main stem that provide excellent opportunities for focused day use activities like wildlife and scenic viewing, nature study, casual walking and hiking and bank fishing. Some sites also provide watercraft landings or carry-in access to sloughs and flowages. Most of these sites already receive significant use for these activities.

These sites have only minimal development, such as a native surface access road and a small parking lot, and, if located on a slough, there may be a lightly developed boat launch. Nature-based recreational opportunities and experiences would be greatly enhanced with only modest facility additions, and a variety of improvements are slated for a number of the popular "off-river" sites. The sites that will receive improvements are:

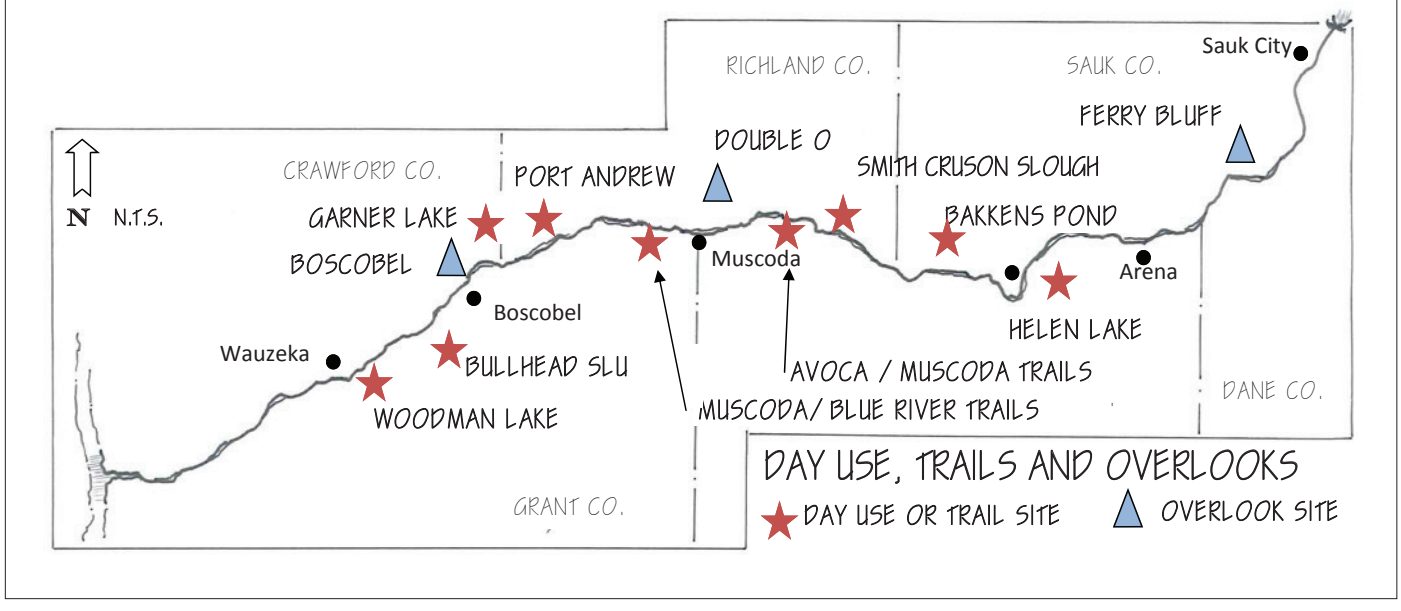
- Helen Lake Access
- Bakkens Pond
- Smith/Cruson Slough
- Avoca/Muscoda Area
- Muscoda/Blue River Area
- Port Andrew
- Garner Lake
- Bullhead Slu
- Woodman Lake

The type and level of development targeted for any particular site is driven by the type and extent of opportunities available. Overall, improvements will be designed to provide appropriate public access and necessary amenities, such as parking, trails, picnic shelters, restrooms, and interpretive information. Additional signage and information facilities will be added to strengthen a sense of place, and reinforce the LWSR identity. (See Figure 2.7 for locations.)

Overall Management Objective

- Provide enhanced opportunities at appropriate locations throughout the Riverway so people of all abilities may pursue outdoor activities such as wildlife and scenic viewing, nature appreciation, fishing, walking, and in some cases, picnicking, in an attractive outdoor setting.

FIGURE 2.7 DAY USE, TRAILS AND OVERLOOK LOCATIONS



The individual sites and their development are described below.

Helen Lake Access and Day Use Area
Helen Lake is a 13 acre lake located just north of USH 14 and near the USH 14 Wisconsin River bridge. The lake is long and narrow and offers angling opportunities for bluegill, largemouth bass, northern pike and walleye. This landing is a popular place to put in a fishing boat or other small craft to fish and watch birds, and is also a popular ice fishing access point. This site also serves as a wayside for highway travelers. A number of improvements are planned that will enhance the quality of recreational use and user accessibility.

Management Prescriptions
- Redevelop the site providing a lightly developed picnic area with a mowed lawn, picnic tables and grills. If future demand warrants, add a small picnic shelter. Follow the standards in NR44.07(6)(e)3).
- Remove the existing fishing pier and replace it with an ADA accessible boating pier and fishing deck.

Bakkens Pond Day Use Area
The Bakkens Pond site contains two flowages (Bakkens Pond and Long Lake) providing excellent waterfowl hunting, bird watching opportunities, as well as year round angling opportunities. Stretching from Spring Green to Lone Rock on the north side of the river, this is a popular site for a variety of recreational uses.

Current development is minimal. The public uses the existing management roads and volunteer trails to traverse the site. Small craft launches exist at the eastern and western parking lots off of Kennedy Road. This site has high potential to provide expanded and improved nature-based recreational opportunities. A number of upgrades will improve access, add trail opportunities, and provide basic user comforts. These are outlined below.

Management Prescriptions
- Construct a primitive hiking trail from the eastern edge of the property (Ruetten Drive and Sherwood Drive in Spring Green) to the western end, ending at a local street (Laudon Road in Lone Rock). Provide six trail access points, each with a small (5-10 car) parking lot (all lots currently exist), each having a sign with a trail map.
- Add an additional length of lightly developed (frozen conditions only) access road to the western portion of Hill Slough with parking for five to ten cars for ice fishing access.
- Develop a rustic, lightly developed picnic area near the Kennedy Road and Ellen Lane access to Bakkens Pond. Provide a mowed lawn, small picnic shelter and an ADA accessible wildlife observation deck overlooking the slough. Follow the standards in NR44.07(6)(e)3).
- Improve the small craft landing and the existing parking lot near Kennedy Road and Ellen Lane.
- Regularly mow the top of the dike.

Smith/Cruson Slough Day Use Area
This area is very similar to Bakkens Pond having two long flowages and similar wildlife habitats. Like Bakkens, it is popular for waterfowl hunting, bird watching, as well as ice fishing and angling.

Smith/Cruson Slough is located on the north side of the river, between STH 14 and the main stem of the river. Currently, development here is minimal. There is a public access road running along the north shore of both flowages and several small parking areas. Each flowage has a small boat launch.

A number of upgrades will improve access, add trail opportunities, and provide basic user comforts, greatly expanding recreational opportunities for a broad range of users. These enhancements are outlined below.

Management Prescriptions
- Improve the public access road to a moderately developed road, abandon selective volunteer parking areas and install up to four parking lots for five to ten cars each.
- Provide 2 to 3 miles of primitive hiking trail along the north shore of Smith Slough and Cruson Slough, including a trail across the Cruson Slough berm to the lower Wisconsin River shoreline. This trail will include interpretive displays and provide excellent views of the sloughs as well as access for fishing from shore.
- Remove the existing "informal" small craft launches along the road and install up to three carry-in launches at sustainable access sites.
- Construct a lightly developed picnic area providing a mowed with picnic tables and grills, toilets and interpretive displays. If future demand warrants, a small picnic shelter may be added as well. Follow the standards in NR44.07(6)(e)3).

Avoca to Muscoda Area Trails
The department manages over 4,800 acres of land on the south side of the river between Avoca and Muscoda. These lands vary from dry, sandy uplands (both forested and open) to floodplain forests braided with sloughs and backwaters. Currently, public use facilities on this tract are minimal, limited to access roads, small parking lots and small watercraft launches (carry-in access). This tract is popular with deer, duck, and pheasant hunters. The sloughs and backwaters are also

popular for angling and ice fishing. In addition, hikers use the interior road network to knit together informal walking trails.

Public use upgrades for this area focus on improving and expanding trails.

Management Prescriptions

- Develop a primitive to lightly developed hiking trail from Avoca to Muscoda.
- Develop 2 to 4 miles of lightly developed hiking trail loops in the area east of Muscoda between Goodwiler Lake and STH 133.

Muscoda to Blue River Trails

The department manages over 2,700 acres of land on the south side of the river between Muscoda and Blue River. As with the Avoca to Muscoda lands, they vary from dry, sandy uplands (both forested and open) to floodplain forests braided with sloughs and backwaters. Currently, public use facilities on this tract are minimal, limited to access roads, small parking lots and small watercraft launches (carry-in access). This tract is popular with deer, duck, and pheasant hunters. The sloughs and backwaters are also popular for angling and ice fishing. In addition, hikers use the interior road network as informal walking trails.

Public use upgrades for this area focus on improving and expanding trails.

Management Prescriptions

- Develop a primitive to lightly developed hiking trail from Muscoda to Blue River.

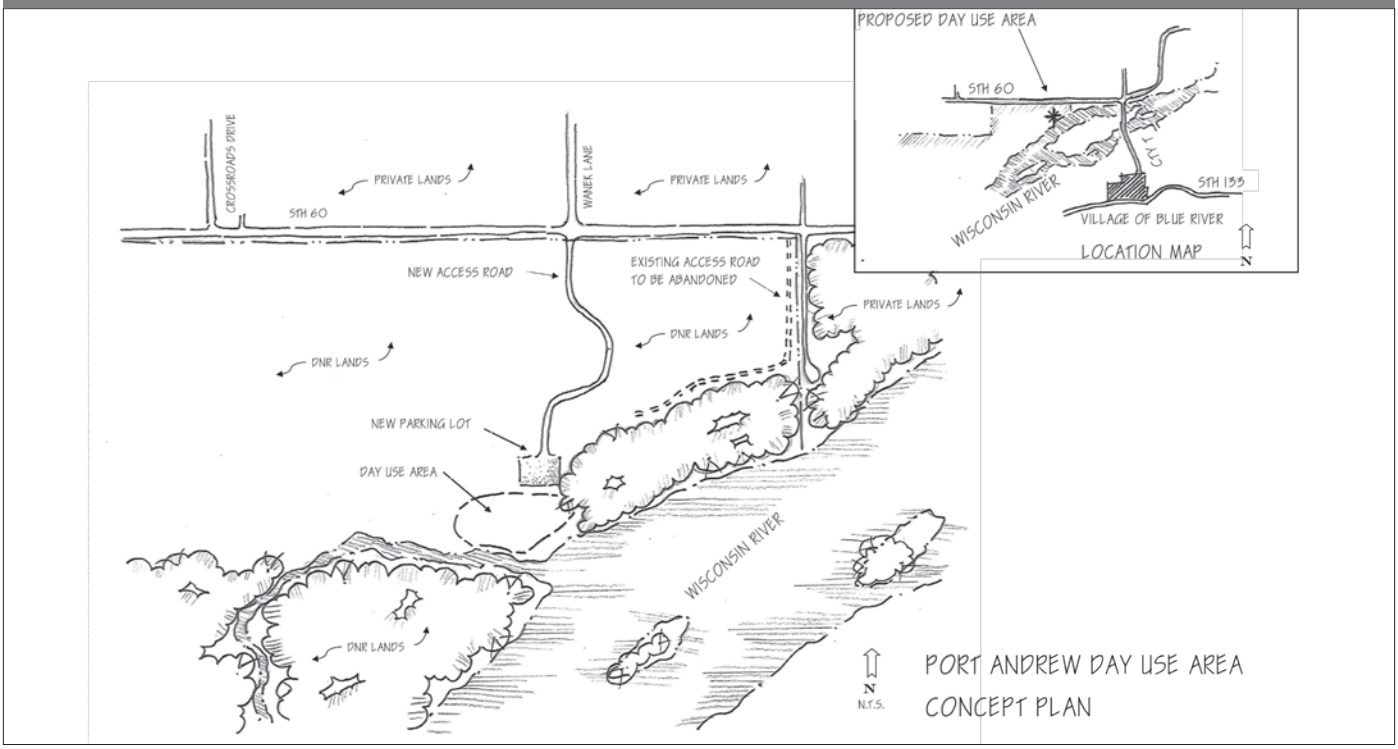
Port Andrew Day Use Area

The Port Andrew Day Use Area is located on the north bank of the Wisconsin River across from the Village of Blue River and just west of Port Andrew on STH 60. The site has views of the main stem of the Wisconsin River.

Currently this area is largely undeveloped, with a two-track, native surface, access road along the east property boundary that functions primarily as a burn break/service road for habitat management. The road is open to public use and extends to a mowed parking area allowing access to river views and shoreline recreation activities such as fishing and bird watching.

Improvements to the site, outlined below, will be designed to enhance public access, and to increase the public's enjoyment and use of one of the best river-view locations on the LWSR property. (See Figure 2.8)

FIGURE 2.8 PORT ANDREW DAY USE AREA CONCEPT PLAN



Management Prescriptions

- Develop the site close to the river's edge (on the high ground) as a lightly-developed day use area with a mowed lawn, picnic tables and grills. Add a small picnic shelter if demand warrants. Follow the standards in NR44.07(6)(e)3). See concept plan below.
- Provide improved access to the day use area by developing a new public access road (moderately developed per NR 44.07(3)(c) from STH 60. Align the new access road with Wanek Lane to the north.
- Develop a 10 to 15 vehicle parking lot.

Garner Lake

Garner Lake is an 11 acre lake located in the Richwood Bottoms area, which is north of the river near Blue River. This small lake is popular for fishing, wildlife watching and duck hunting.

Currently access to the lake is minimally developed; consisting of a two-tenths mile long public access road and a small parking lot on the lakeshore. Developments for this site include upgraded parking and improved recreational opportunities for visitors with mobility impairments.

Management Prescriptions

- Expand parking lot to accommodate 10 vehicles.
- Maintain a carry-in boat access.
- Install an ADA accessible duck hunting blind that can also be used for wildlife viewing.

Bullhead Slu

Bullhead Slu provides access to a large backwater that is popular for fishing, wildlife watching and waterfowl hunting. This site is accessed via a gravel road off of STH 133 just northeast of the unincorporated community of Woodman.

Currently this area is largely undeveloped, having only a small turn around at the end of the road and a volunteer trail leading to the shore of the slough. Improvements to the site, outlined below, will enhance access and the general usability of the site.

Management Prescriptions

- Develop a 10 vehicle parking lot.
- Develop a primitive trail from the parking lot to the shoreline of Bullhead Slu for launching of small water craft and wildlife viewing.
- Develop a moderately developed trail along the slough shoreline and install one to three ADA duck hunting and wildlife observation blinds at appropriate locations on the slough.
- Remove shrubs and small trees as necessary near primary observation points to improve and maintain views of the slough.

Woodman Lake Day Use Area

Woodman Lake is a long narrow backwater that connects to the main stem of the river just north and east of the unincorporated community of Woodman. This area is highly used by shore anglers. Ice fishing is popular here, also.

The site has a 1 mile long narrow public access road that connects to STH 133. Currently, there are two small craft launches to the lake along the road. There is a mowed grassy area adjacent to the shoreline along the last two-tenths of a mile of the access road.

A number of upgrades, described below, will expand and improve recreational opportunities here.

Management Prescriptions

- Establish a parking lot at the end of the road to accommodate up to 10 cars.
- Install two ADA fishing and wildlife observation decks on the slough at appropriate locations.
- Remove one to two of the existing "informal", undeveloped small craft launches along the road and improve the remaining launches, one for trailered boats and one for carry-in.
- Provide a lightly developed picnic area with a mowed lawn with picnic tables and grills. Follow standards in NR44.07(6)(e)3.

SCENIC OVERLOOKS

Views of the river valley and bluffs are spectacular, in particular those from high overlooks. There are only a few state owned sites within the Riverway that provide such viewing opportunities that could be made reasonably accessible from a highway. Two new overlook sites are planned. See Figure 2.7.

Double O Overlook

This undeveloped site is located west of Gotham and north of STH 60 on the east side of CTH OO. The wooded bluff rises about 300 feet above the river and offers excellent views of the river, Avoca Prairie to the east and Fish Trap Slough/Goodwiler Lake to the west.

This site is within the Harold C. "Bud" Jordahl, Jr. Unit of the LWSR, as designated by the Natural Resources Board in 2011. Until his death in 2010, Mr. Jordahl was a leading state and national conservationist that had a profound influence on Wisconsin and the nation. He was inducted into the Wisconsin Conservation Hall of Fame in 2005. As a member of

the Natural Resources Board, he was a leader in the effort to establish the LWSR, and he spent many hours on the river and the adjoining lands. A plaque commemorating his contributions to Wisconsin conservation and the Riverway will be placed at the overlook.

Management Prescriptions

- Develop a five car parking lot.
- Place a Bud Jordahl commemorative plaque at a prominent location at the overlook.
- Provide either a lightly developed trail or a moderately developed road to an overlook site on top of the bluff.

Boscobel Overlook

This undeveloped site is located just east of the STH 60/61 intersection just north of Boscobel. The wooded bluff rises about 300 feet above the river and offers excellent views of the bottomland forests and the river valley.

Management Prescriptions

- Develop a five car parking lot.
- Provide a ½ mile lightly developed trail to an overlook site on top of the bluff.

SHOOTING RANGE

The DNR's shooting range site evaluation guidance indicates that there is a need for expanded shooting opportunities in the highly populated southern 1/3 of the state. Shooting opportunities in the Dane and Sauk County area are particularly limited, and there is a high need for additional ranges to be developed in this area. The closest public shooting ranges are McMiller Sports Center in Waukesha County, Yellowstone Wildlife Area in Lafayette County and the soon to be developed Mud Lake range in Columbia County. Several private and one publicly owned (i.e. the Dane County Law Enforcement Training facility) shooting ranges provide some public access on a limited basis.

As part of the master plan revision process, department owned LWSR land in the Dane and Sauk County area has been screened for general suitability for range development. The shooting range screening component in this planning process only identifies sites with the potential for further consideration for range development. Three potential sites for constructing a shooting range have been identified within the Dane/Sauk County portion (Mazomanie/Sauk City area) of the LWSR. These sites are shown on Figure 2.9. This is the first step in the range siting process. Many factors will be considered in the final siting process; and that will occur in a detailed, public process following approval of the LWSR master plan. Refer to Appendix B for more background information on the department's shooting range program, the range siting criteria, and the shooting range site selection and decision process.

FIGURE 2.9 POTENTIAL SHOOTING RANGE SITES

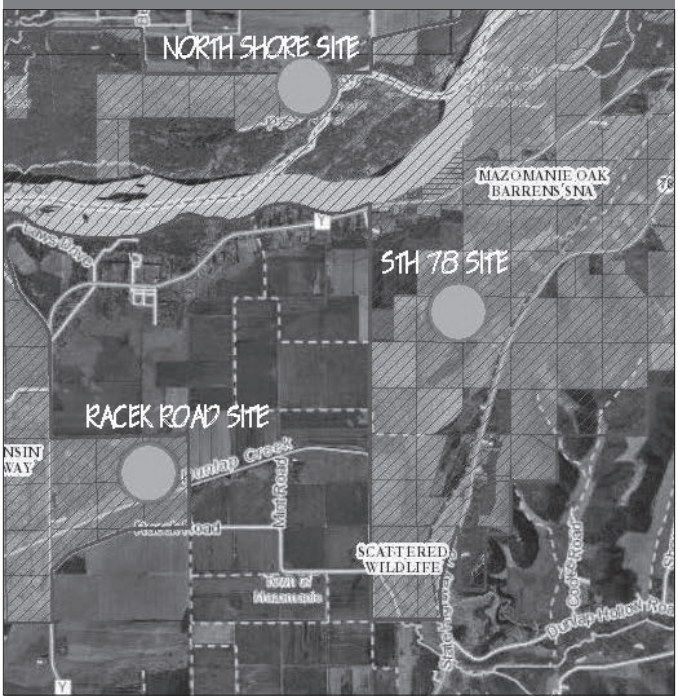


Photo by DNR

Objective

Provide target and recreational shooting opportunities on the LWSR in a high demand area.

Prescriptions

- Construct and maintain a shooting range at the authorized site selected through the shooting range site selection and decision process.
- Follow the recommendations of the site selection and decision process regarding the specific shooting opportunities to be offered, and the range's size, infrastructure, and operational elements.
- The Special Management Area land use classification will be assigned to the shooting range site.

RECREATION MANAGEMENT AREAS

Recreation management areas are managed with the primary objective of providing and maintaining land and water areas and facilities with a particular focus on outdoor recreation and education. Management activities to achieve habitat, native community, or scenic management objectives may also occur in these areas.

A master plan may authorize any resource or recreation management activity or technique that is consistent with the management objectives specified in the master plan for the area and is compatible with the site's ecological capability.

TABLE 2.4 RECREATION MANAGEMENT AREAS

Area #	Recreation Management Area	Acreage
1	Mazomanie Recreation Area	1,677
2	Black Hawk Ridge Recreation Area	732
5	Tower Hill State Park	52
Total		**2,461**

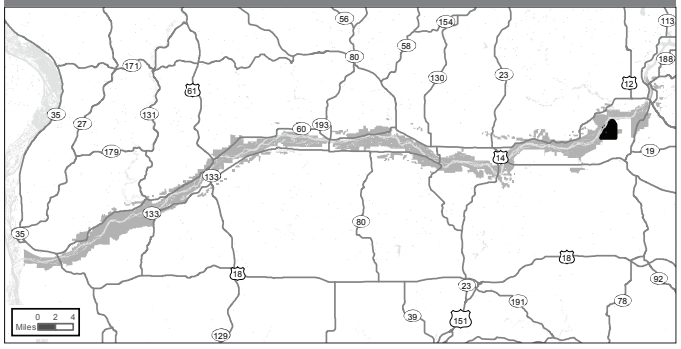
Photo by DNR

Photo by Kate Fitzgerald, DNR

MAZOMANIE RECREATION MANAGEMENT AREA

The 1,677 acre Mazomanie Recreation Management Area is located on the south side of the Wisconsin River and west of CTH Y. It lies about six miles southwest of Sauk City and three miles north of the Village of Mazomanie. The well-known Mazo Beach is here, as well as a Class I Field Trial Ground and dog training area. In addition to the recreational opportunities available on these DNR lands, Dane County's adjacent Walking Iron Park and Walking Iron Wildlife Area combined provide over 1,200 acres of additional public land offering hiking, horseback riding, hunting and wildlife viewing. See Map D-2 for details on planned development.

AREA 1 LOCATOR MAP



Land Use Classification
The majority of the Mazomanie Recreation Management Area is classified as Recreation Management Area, Type 3 Setting. [(NR 44.07(6)]. The day use area zone along the river is classified as a Recreation Management Area, Type 4 Setting [(NR 44.07(7)]. See Map 2.1.

Conditions
Resource management across the management area focuses largely on maintaining a range of wetland, open grassland/barrens and forested habitats. In addition to the Wisconsin River, other water bodies include Fishers Lake created by a long water control berm that runs north to south, and Dunlap Creek, a ditched creek that extends the full length of the southern border of the property.

The area is a popular destination for pheasant and deer hunters, day hikers, birders and sun bathers at the beach. The area's extensive network of management roads receives heavy use by hikers all year round.

Dog trials are held on almost every weekend throughout the summer and the fall. The Class I Field Trial Grounds and Dog Training Area (referred to as the Mazomanie FTG) is a designated area encompassing about 200 acres of mostly open fields with some scattered wood lots. Support facilities consist of a main staging area with a 24' x 30' open sided shelter, a well and hand pump and a portable toilet building. Additional nearby trialing areas may be authorized for temporary use on a case-by-case basis. The FTG is managed under a cooperative agreement with the Mazomanie Grounds Association.

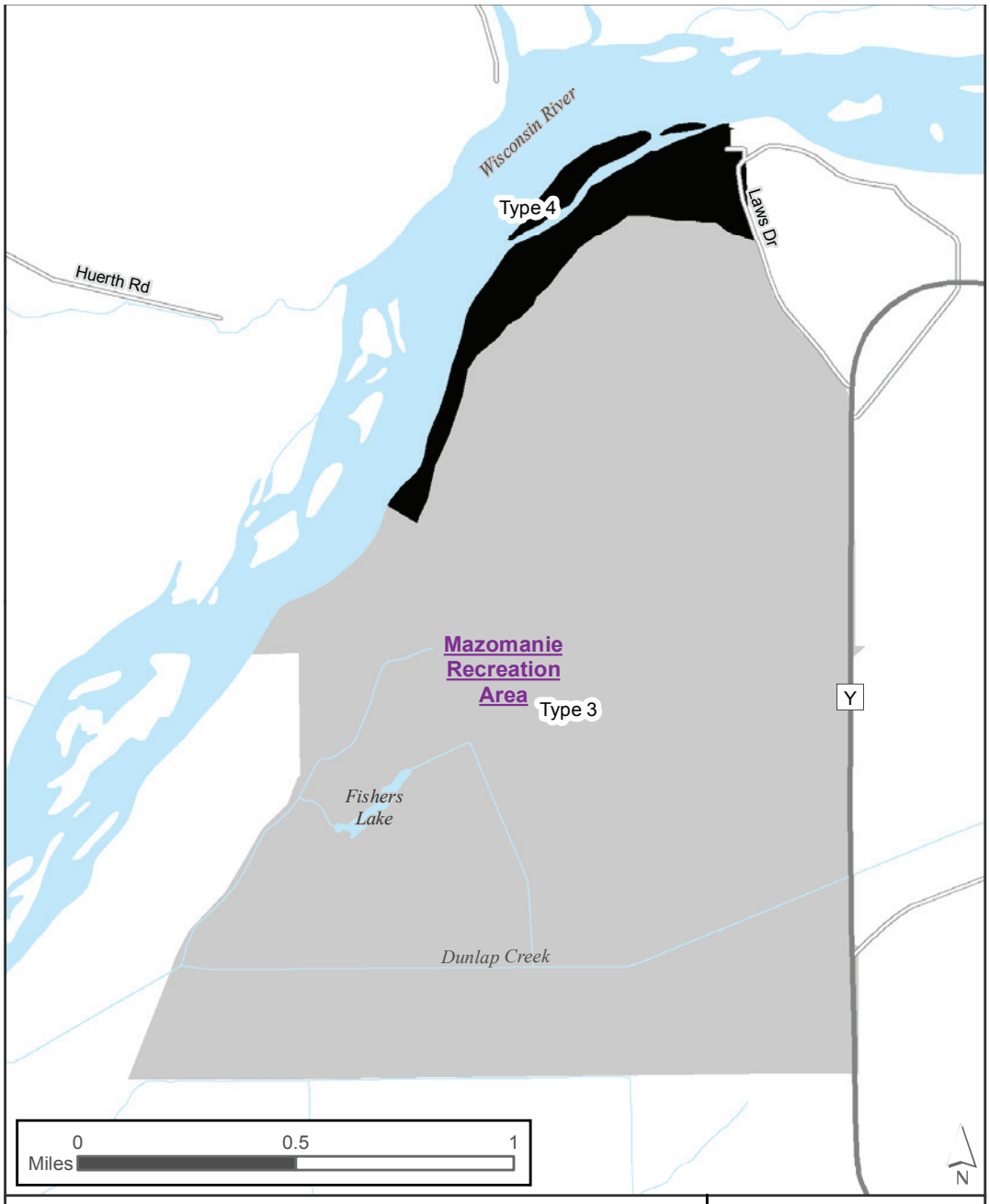
Current public use facilities within the Mazomanie Recreation Management Area include six parking lots, two on CTH Y, two in the dog trial grounds and two along Conservation Drive, which leads to the beach area.

Overview of Planned Changes
Due to the area's prime location and ready access from regional population centers there is strong interest in expanded recreational use here. The area offers good opportunities for an enhanced trail network and improved river's edge recreational facilities. A number of recreational facility improvements and developments are planned to better accommodate the existing uses and offer new opportunities, serving a wider range of the public. Key developments include a designated and expanded trail system, new picnic area and canoe landing and beach area improvements. These are detailed below.

Management Objectives
- Provide a destination area offering abundant opportunities for a broad range of nature-based recreational activities; such as hiking, wildlife watching, hunting, dog trialing and training, picnicking and swimming, as well as more passive recreational activities such as nature appreciation, interpretation and education.
- Provide habitat for a variety of game species, fur-bearers and other wildlife.

Management Prescriptions
Type 3 *Recreational Use Management Area*
Habitat Management
- Explore creating additional or expanded wetland scrapes for wildlife habitat, and develop, if determined to be feasible and funding is available.
- For the respective habitat and forest types within the Type 3 Setting Area, follow the management prescriptions found in the General Management by Habitat Type Section of this plan.
- Modify management activities to maintain an attractive recreational setting, and time management to reasonably minimize conflicts with recreation users.

MAP 2.1 MAZOMANIE RECREATION MANAGEMENT AREA



The data shown on this map have been obtained from various sources, and are of varying age, reliability and resolution. This map is not intended to be used for navigation, nor is this map an authoritative source of information about legal land ownership or public access. Users of this map should confirm the ownership of land through other means in order to avoid trespassing. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map.

Dog Trial Grounds

- Maintain the current facilities, and construct a vault toilet in the vicinity of the shelter building and, if possible, improve the drinking water supply.
- Work with the dog trial group to provide, on an as-needed-basis, a one to two acre short-grass dog training site within the dog trial ground.

Hiking Trails

- Designate and develop as necessary, 4 to 8 miles of primitive to lightly developed hiking trails. The preferred alignment will minimize conflicts with existing uses on the site, provide a looped trail experience and maintain environmental integrity as much as possible.
- Work with Dane County to site and establish a primitive to lightly developed hiking trail connection to Walking Iron County Wildlife Area and Park (if a feasible, sustainable route can be found). A boardwalk may be necessary in one or more locations. Provide trailhead signage and facilities at the primary trailhead parking lots.

Type 4 *Recreational Management Area*

This zone may be designated as a fee area. A park sticker or daily fee would be required for vehicular access.

Day Use Area and Canoe Access

- Construct a rustic day use area [NR 44.07(7)(e)4c] on the river shore at the north end of Conservation Road. The area would provide picnic tables, water and grills and a picnic shelter.
- Develop a new carry-in canoe landing. Design the facility to readily accommodate canoe livery use.

Beach Area

- Improve recreational use opportunities of the shoreline in the beach area by thinning shrubs and small trees between the shoreline and Conservation Road.
- Construct a changing building and picnic shelter, continue to provide toilet facilities, and improve the parking lot with a minimum capacity of 50 vehicles.

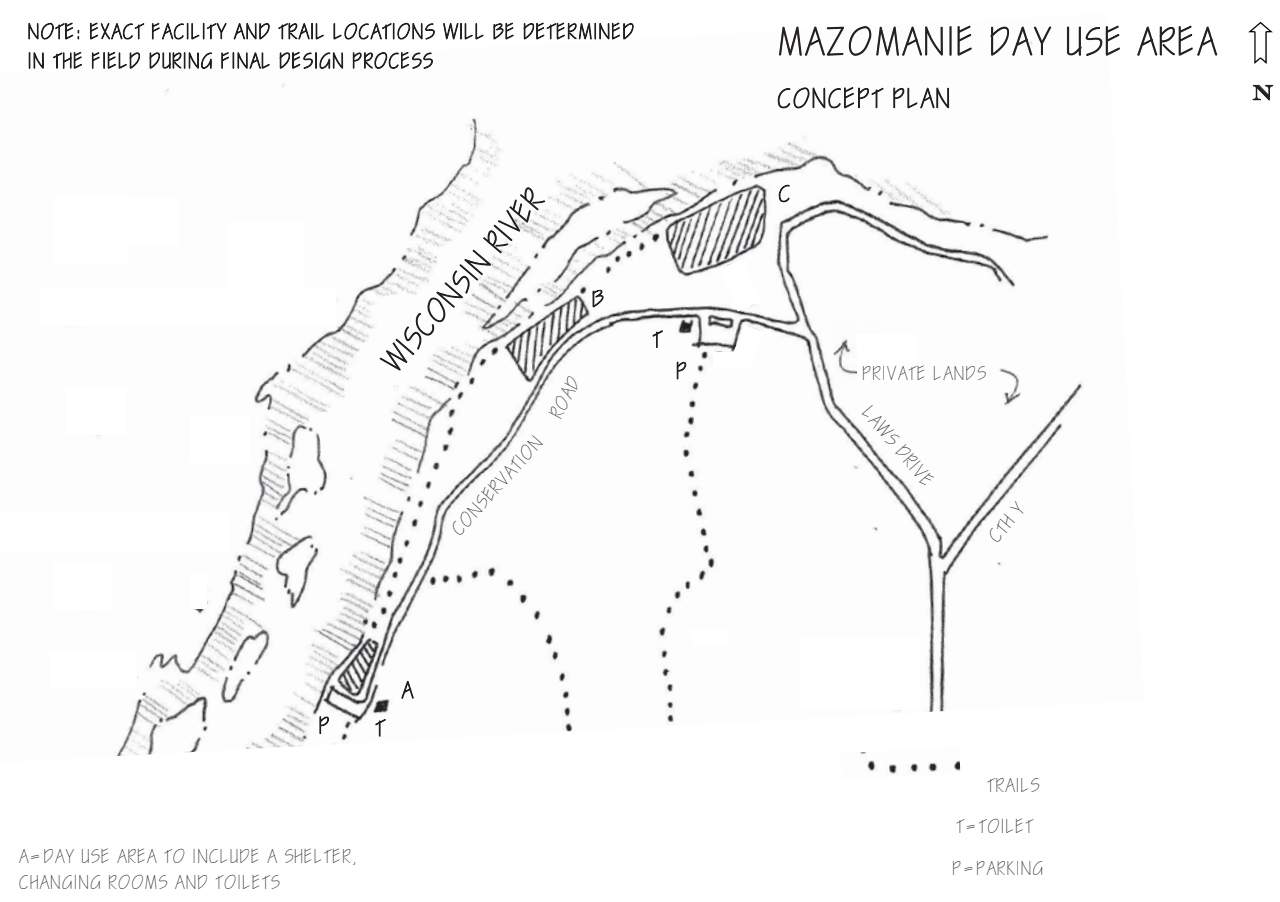
Vegetation Management

- Promote the growth and retention of larger trees in appropriate locations.
- Remove hazardous, diseased and defective trees.
- Provide maintained grass areas as appropriate for recreational use.
- Conduct additional management activities as needed to support the use and purpose of the area, such as mowing, brushing, cutting and controlling invasives.

Photo by Dan Deneen

FIGURE 2.10 MAZOMANIE DAY USE AREA CONCEPT PLAN

NOTE: EXACT FACILITY AND TRAIL LOCATIONS WILL BE DETERMINED IN THE FIELD DURING FINAL DESIGN PROCESS



A=DAY USE AREA TO INCLUDE A SHELTER, CHANGING ROOMS AND TOILETS

B= CANOE LIVERY AREA

C=DAY USE AREA TO INCLUDE A SHELTER, PICNIC AREA AND TOILETS

BLACK HAWK RIDGE

Black Hawk Ridge is an 842 acre area lying just south of Sauk City and along STH 78. As the name implies, the site encompasses a high, steep linear ridge with a flat to gently rolling area on top. The historic Wisconsin Heights Battlefield site lies off the northern end of the ridge. For specific management information regarding the battlefield site and the nearby Black Hawk mounds see the Historical/Archaeological Special Management Areas section.

Land Use Classification

The majority of the Black Hawk Ridge Recreation Area is classified as Recreation Management Area, Type 3 Setting. [(NR 44.07(6)]. The day use area on top of the ridge is classified as a Recreation Management Area, Type 4 Setting [(NR 44.07(7)]. See Map 2.2.

Existing Conditions

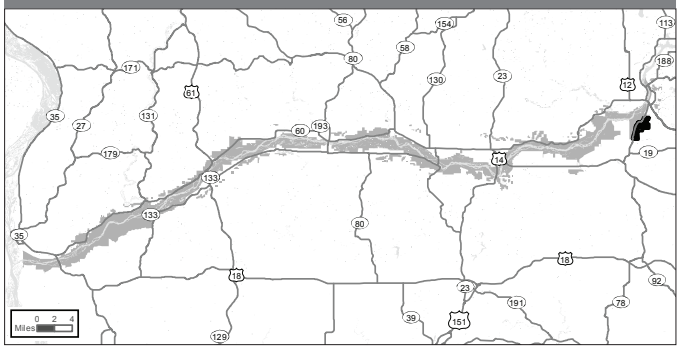
Black Hawk Ridge has long been a popular destination for hiking, horseback riding and day use activities on the ridge top. (Black Hawk Ridge was a private recreation area prior to state acquisition.) There are over 11 miles of trail, with about 8 miles designated as equestrian trails. (The equestrian trails are also open for hiking, snowshoeing and cross-country skiing use.) The battlefield trail leads from the battlefield, past an effigy mound group, and on to the top of the bluff. The ridge top trails lay roughly at equal elevation and vary from eight to ten feet in width. The trail network is primarily accessed from three parking lots located on STH 78.

Currently (2016), a special events focused area (about 35 acres) is located at the top of the ridge. Generally the special events area is open only by permit, which is issued by the property manager. Horse groups, family gatherings, weddings and trail runs are just some examples of the types of activities the property hosts each year.

The only vehicle access road to the ridge top is Wachter Road, a DNR road which is steep, narrow, winding and in poor condition. While it is generally closed to public traffic, the road is opened for special event access and the gun deer season.

Currently, portable toilets and non-potable water are available on the ridge near the Rhinelander Cabin. This cabin functions as an enclosed shelter building and is open for public use during the warm months. Other existing buildings on the ridge top include an 1860s homestead cabin, a large equipment storage shed, a small picnic shelter and a large, open shelter building covering over a half acre of land.

AREA 2 LOCATOR MAP



Overview of Planned Changes

The primary improvements to the Black Hawk Ridge Management Area include upgrading the facilities on the ridge top to create an open public day use area with 3-season vehicle access. (See Figure 2.11.) While special events may continue to be held here, the facilities would no longer be "reserveable" for exclusive use by individual groups. The existing extensive trail system and their uses across the area will remain largely intact with only a few small route changes to enhance their sustainability.

The Black Hawk Ridge Day Use Area redevelopment is on an approximately 35 acre site on the ridge top, with upgraded facilities to accommodate picnicking, social events, outdoor games, access, hiking, nature study and general relaxation. The facilities will be ADA accessible. The day use area and Wachter Road will be open for general public access during spring, summer and fall. Wachter Road, about .8 mile in length, connects STH 78 to the top of Black Hawk Ridge. The road is steep and narrow in several locations, varying from 15 to 20 feet wide, with several blind curves.

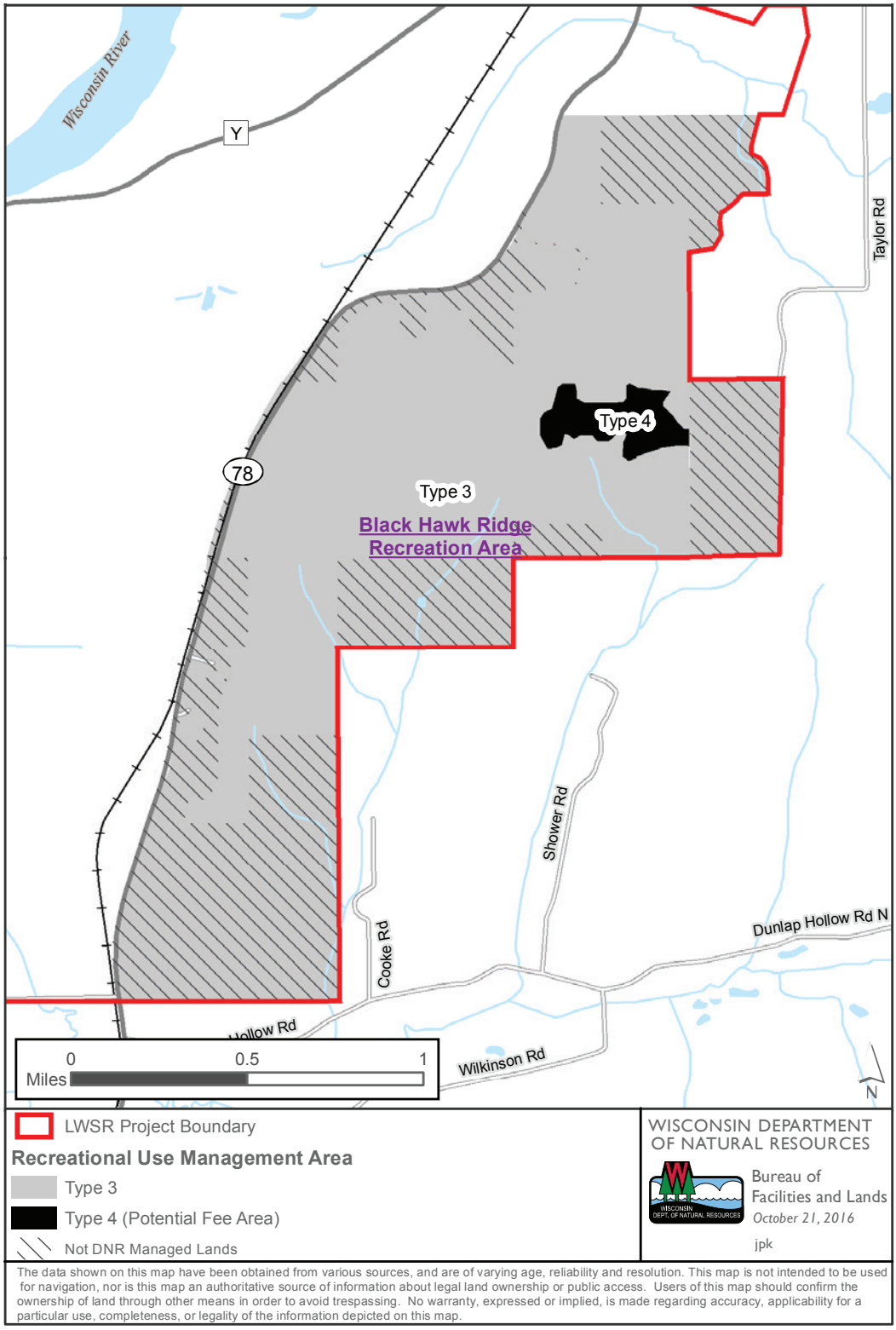
Trails

The existing trail system includes approximately 3 miles of hiking trail and about 8.5 miles of horse trail. Hiking, snow shoeing and cross-country skiing are allowed on all trails. No trails are groomed for skiing. The only significant change to the trail system is that winter biking will be allowed on the equestrian trails during certain months of the year. Unsustainable segments will be realigned as needed for ease of management and resource protection. Horse/winter bike trails may be closed due to trail/weather conditions.

Parking Lots

Three parking lots located along STH 78 serve Black Hawk Ridge and will be retained. These lots are popular with equestrians; however, they are too small for easy access with horse trailers. Due to wetlands and steep bluff faces there are

MAP 2.2 BLACK HAWK RIDGE



currently no options on state land for expanding the existing lots or developing new ones at or near their present locations. A new equestrian trail head will be developed near the day use area with access via Wachter Road, when it is improved.

Wachter Cabin
This cabin was built by the first European family to homestead this property in the 1860s. The cabin is on the National Register of Historic Places, but is not in a good location for interpretation. The department will explore options for moving the cabin to another location on DNR property, or if a suitable partner can be found, it will be deeded to another agency with interest in the cabin's historical significance.

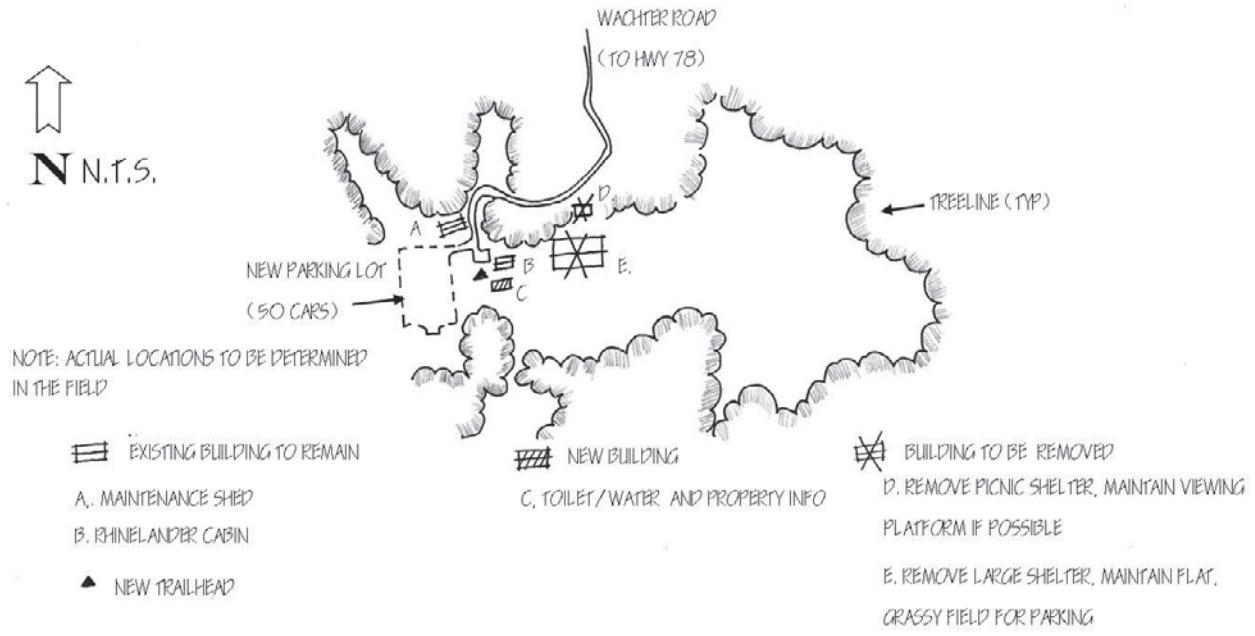
Picnic Shelter/Overlook Building and Large Open Sided Shelter
These existing buildings, located to the east of Rhinelander Cabin, are in poor condition and will be removed. The space will be incorporated into the redeveloped day use area.

Storage Shed
A maintenance storage shed is located just off of Wachter Road, near the clearing at the top of the ridge. While the shed is in good condition and provides much needed storage space for the LWSR, it is in an unfortunate location in terms of the type of experience the department would like to provide in the area for day use visitors. When feasible, a new storage facility will be built in a more appropriate location and this one removed.

ADA Deer Blind
The existing blind is located on the north side of Wachter Road about 500 feet from the entrance off of STH 78. The route leading to the blind is not accessible, and the blind is located in a poor location for a successful deer hunt. This blind will be removed. Several new accessible hunting blinds will be provided in the Riverway, these new blinds will be accompanied by accessible routes from the parking area, and a van accessible parking stall.

View Management
Two to five ridge-top vista sites looking over the river valley will be identified and managed to maintain scenic views. Strategic removal of shrubs and small trees will provide vistas of the valley to trail users and other visitors to Black Hawk Ridge. The department will work within the confines of the Riverway protection and aesthetic regulations while maintaining scenic views.

FIGURE 2.11 BLACK HAWK RIDGE CONCEPT PLAN



Fee Area
The day use area located on the top of the ridge near the Rhinelander cabin (Type 4 Recreation Use Zone (per NR 44)) may be designated as a fee area. At that time, a vehicle admission fee would be required for motor vehicle access.

Management Objectives
- Provide a destination area offering abundant opportunities for a broad range of nature-based recreational activities; such as hiking, horseback riding, hunting, wildlife watching, picnicking, family gatherings, special outdoor events and general outdoor play.
- Provide habitat for upland forest game and other wildlife.

Management Prescriptions
Ridge-top Modern Day Use Area Development [(NR 44.07(7)5c]
- Open Wachter Road for public vehicle access to the day use area from May through October and as "conditions allow" during the rest of the year.
- Upgrade Wachter Road, with better sight lines, improved shoulders, guard rail and wider pavement where possible.
- Maintain the Rhinelander Cabin for indoor group activities, the building will be open to the public.
- Construct a new open shelter and a picnic area.
- Develop and maintain an open grass area.
- Construct vault or flush toilets, and provide drinking water, information and interpretive signage.
- Develop parking for 50 cars, expand parking capacity in the future as demand warrants.
- Maintain views of the river valley from selected viewing locations.
- Develop an equestrian trail head with parking for approximately 25 vehicles with trailers, and amities such as hitching posts and water.

Buildings
- Remove the existing picnic shelter/overlook building and the large open sided shelter located to the east of the Rhinelander Cabin.
- Move Wachter Cabin to a new off-site location if possible.
- When possible, remove the storage shed and replace it at an appropriate location on the Riverway.
- Remove the ADA deer hunting blind and construct a new blind at a more suitable location on the Riverway in the upper river area.

Trails
- Maintain the existing system of primitive to lightly developed hiking and equestrian trails with slight alignment alterations as needed to provide improved sustainability.
- The equestrian trails shall be open from April 22nd to October 31st. The property manager may close the trail to equestrian use if the conditions are not suitable for riding.
- Develop an equestrian trailhead on the top of the ridge when Wachter Road is improved to accommodate trailers.
- Improve parking and access near STH 78 if opportunities become available.
- The Black Hawk Ridge equestrian trails shall be open for winter bicycle use from December 15th to March 1st unless otherwise posted. The property manager may close the trail if the conditions warrant closure to protect the trail and/or the users.
- The trails will not be groomed for winter bike use.
- Studded tires are allowed, provided they are installed by the manufacturer and extend no more than 2.2 mm past the surface of the tire knob.

Vegetation Management – Type 4 Recreational Setting Zone (the day use area)
- Promote the growth and retention of larger trees in appropriate locations.
- Remove hazardous, diseased and defective trees.
- Provide maintained grass areas as appropriate for recreational use.
- Conduct additional management activities as needed to support the use and purpose of the area, such as mowing, brushing, cutting and controlling invasives.

Forest and Habitat Management –Type 3 Recreational Setting Zone
- For the respective forest types within the management area, follow the management prescriptions found in the General Management by Habitat Type Section of this plan.
- Modify management activities to maintain an attractive recreational setting, and time management to reasonably minimize conflicts with recreational users.

MILLVILLE RECREATION MANAGEMENT OVERLAY ZONES

Millville is a large, rugged and remote tract of land on the south side of the river upstream of the confluence with the Mississippi and Wyalusing State Park. It offers a unique set of recreational opportunities and experiences. Resource management on the eastern portion is focused on maintaining and enhancing a variety of high quality native communities. Access into much of the area is highly limited by the steep, rugged terrain. An area to the west currently has five miles of equestrian trails and offers a quality riding experience. However, additional miles of trail that would provide for day-long ride as well as camping would greatly enhance equestrian use.

Recreation management and use for these two areas are presented below as two distinct recreation management overlay zones as shown on Map 2.3.

Management Overlay Zones
An overlay zone is a planning tool that allows for additional management prescriptions that span multiple management areas. It is most often used when there is a particular resource that requires additional prescriptions to meet the objectives of the zone or area. The objectives and management prescriptions for overlay zones are in addition to those of the underlying management area. In this case the overlay zone describes recreation use and management encompassing several resource management areas.

TABLE 2.5 RECREATION OVERLAY ZONES

Area #	Recreation Management Area	Acreage
3	Millville Equestrian Recreation Overlay	1,258
4	Millville Backcountry Recreation Overlay	3,121
Total		**4,379**

Photo by Ann Freiwald, DNR

MILLVILLE RECREATION MANAGEMENT OVERLAY ZONES

Photo by Ann Freiwald, DNR

MILLVILLE WEST - MILLVILLE EQUESTRIAN AREA

Management Objectives

- Provide an opportunity for a quality full-day (10 to 15 miles) horseback and winter bicycling experience.
- Provide opportunities for equestrian camping, if demand warrants.

Recreation Management Prescriptions

- The equestrian trails shall be open from April 22nd to October 31st. The property manager may close the trail if the conditions warrant closure to protect the trail and/or the users.
- Maintain the existing five miles of horse trail and develop five to eight miles of additional trail on department lands south of Barker Hollow Road. (The horse trails may also be used for hiking, cross-country skiing and snow shoeing, but they will not be managed for these uses.)
- Improve the equestrian trailhead along CTH C. Provide parking for approximately 25 vehicles with trailers, and amities such as hitching posts and water.
- If demand for equestrian camping is demonstrated, develop a rustic, equestrian campground of appropriate capacity. Rustic campgrounds are defined in NR 44.07(7)(e)4.b]. The campground may include a group campsite if there is a demand for group camping. If demand warrants, a number of campsites may also be developed in the campground for non-equestrian campers. The campground will have between 12 and 15 campsites. If a campground is developed, the campground site will be assigned the Recreation Management Area, Type 4 Setting NR 44 land use classification.
- The Millville equestrian trails are open for winter bike use from December 15th to March 1st unless otherwise posted. The property manager may close the trail if the conditions warrant.
- The trails will not be groomed for winter bicycle use.
- Studded tires are allowed, provided they are installed by the manufacturer and extend no more than 2.2 mm past the surface of the tire knob.

AREA 3 LOCATOR MAP

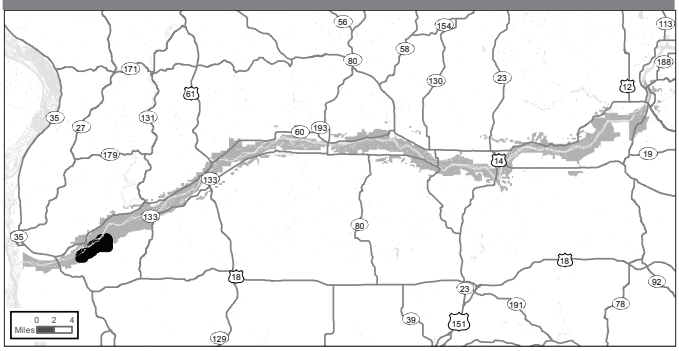
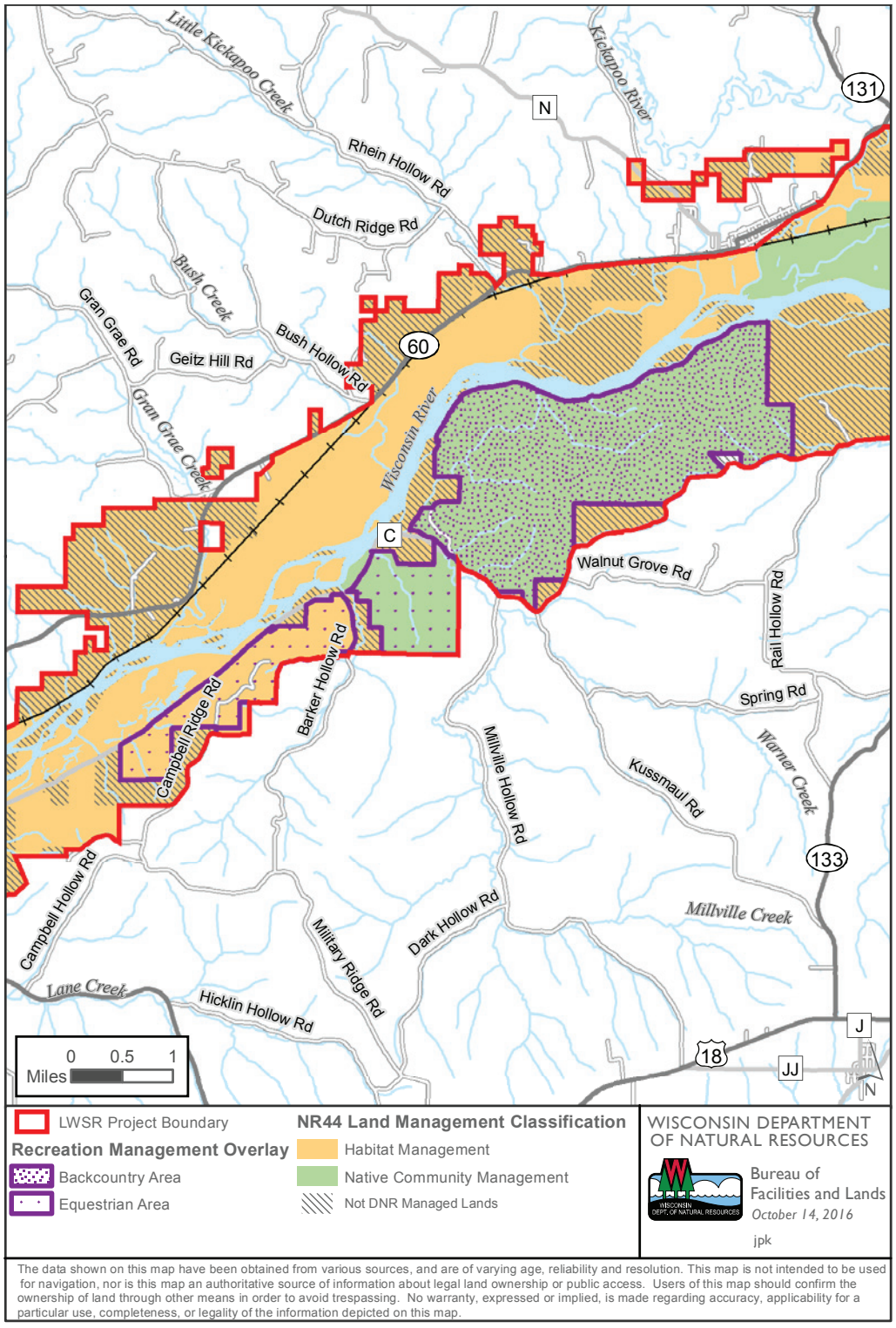


Photo by Robert Queen, DNR

MAP 2.3 MILLVILLE RECREATION OVERLAYS



The data shown on this map have been obtained from various sources, and are of varying age, reliability and resolution. This map is not intended to be used for navigation, nor is this map an authoritative source of information about legal land ownership or public access. Users of this map should confirm the ownership of land through other means in order to avoid trespassing. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map.

MILLVILLE EAST - MILLVILLE BACKCOUNTRY AREA

This rugged 3,000 acre tract is the largest remote and pristine area on the Riverway and perhaps in all of southern Wisconsin. The land cover is highly diverse, ranging from ridge top prairie and oak savanna steep bluffs with large blocks of closed-canopy forest on steep bluffs. It offers an exceptional opportunity to provide a unique "backcountry" recreational setting for hunting, hiking, wildlife watching and general nature appreciation.

Management Objective

- Provide and maintain opportunities for people to enjoy a remote and undeveloped recreational experience related to hunting, hiking, wildlife watching and nature enjoyment. Provide a recreational environment that is substantially similar to a Type 2 Recreational Use Setting as described in NR 44.07(5).

Recreation Management Prescriptions

The primary objective of the actions described below is to substantially reduce the extent of management roads in the area and develop a low density network of primitive walking trails.

- Provide 0.6 miles of moderately developed, public access roads and four parking lots.
- Abandon approximately 9.5 miles of existing management roads that are no longer needed for management purposes. (These roads are currently not open for public vehicle access.) The roads may be either actively or passively abandoned, as appropriate for the site. Continue to maintain roads that provide access to sharecrop fields until that use is discontinued.
- Convert approximately 9 miles of the abandoned management roads to pedestrian access-paths. Maintain them at the primitive trail development standard, NR 44.07(3)(e). In addition, establish approximately 4 miles of new primitive, pedestrian access-paths on the north side of the ridge, connecting the ridgetop access paths to the river and Winker's Lane. Maintain them at the primitive trail development standard, NR 44.07(3)(e).
- Temporary management roads may be established as needed for short-term access for specific activities, such as timber harvests or conducting prescribed burns. These will be abandoned when the management activity is completed.

Refer to Figure 2.12 for the locations of the roads, access paths and parking lots described above.

AREA 4 LOCATOR MAP

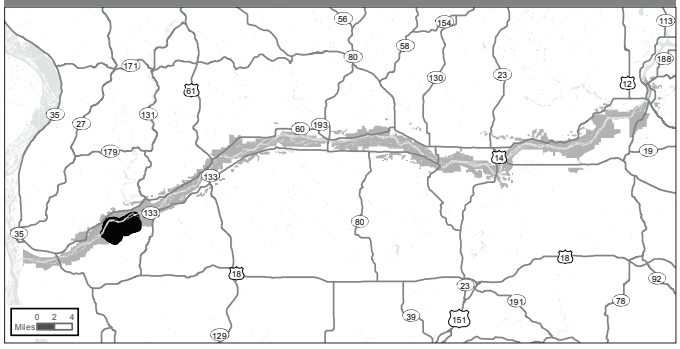


Photo by Ann Freiwald, DNR

MILLVILLE EAST - MILLVILLE BACKCOUNTRY AREA

Photo by Ann Freiwald, DNR

FIGURE 2.12 MILLVILLE BACKCOUNTRY CONCEPT PLAN

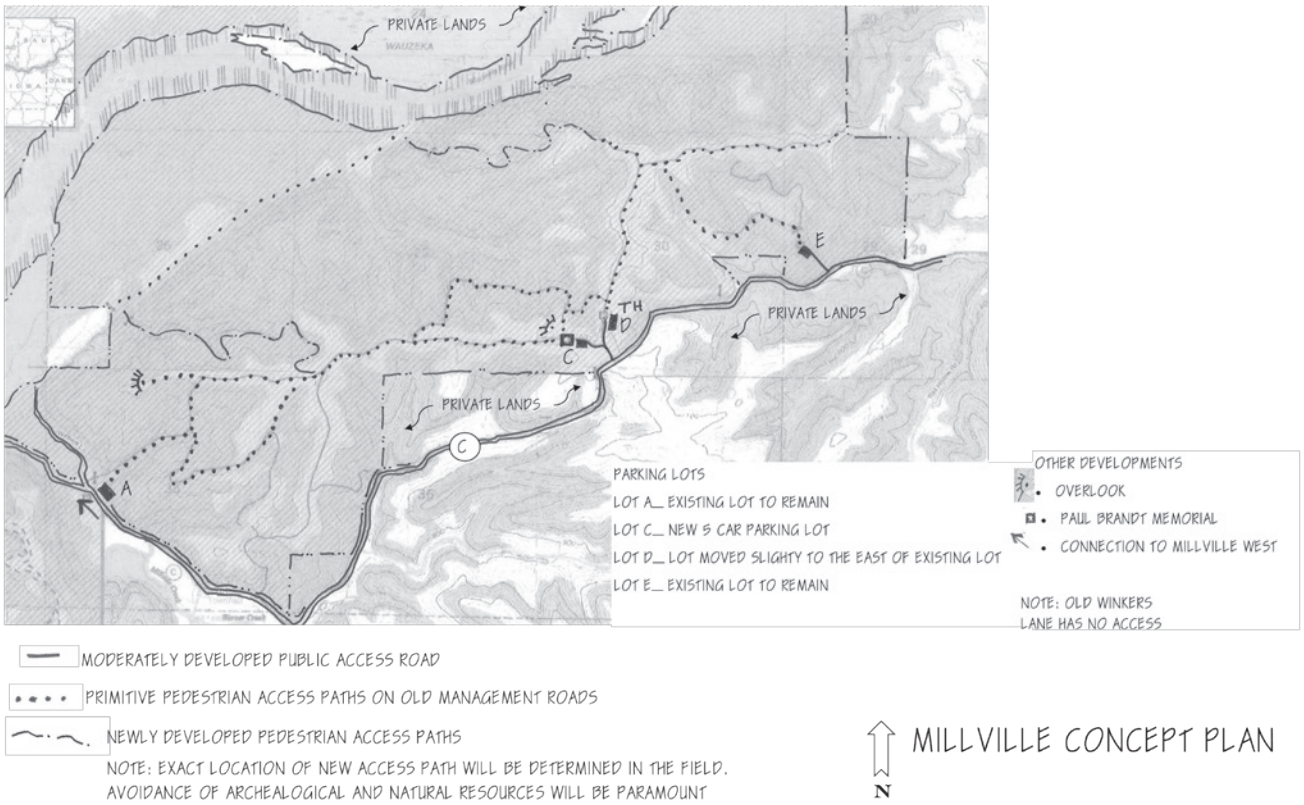


Photo by Rich Staffen, DNR

MILLVILLE EAST - MILLVILLE BACKCOUNTRY AREA

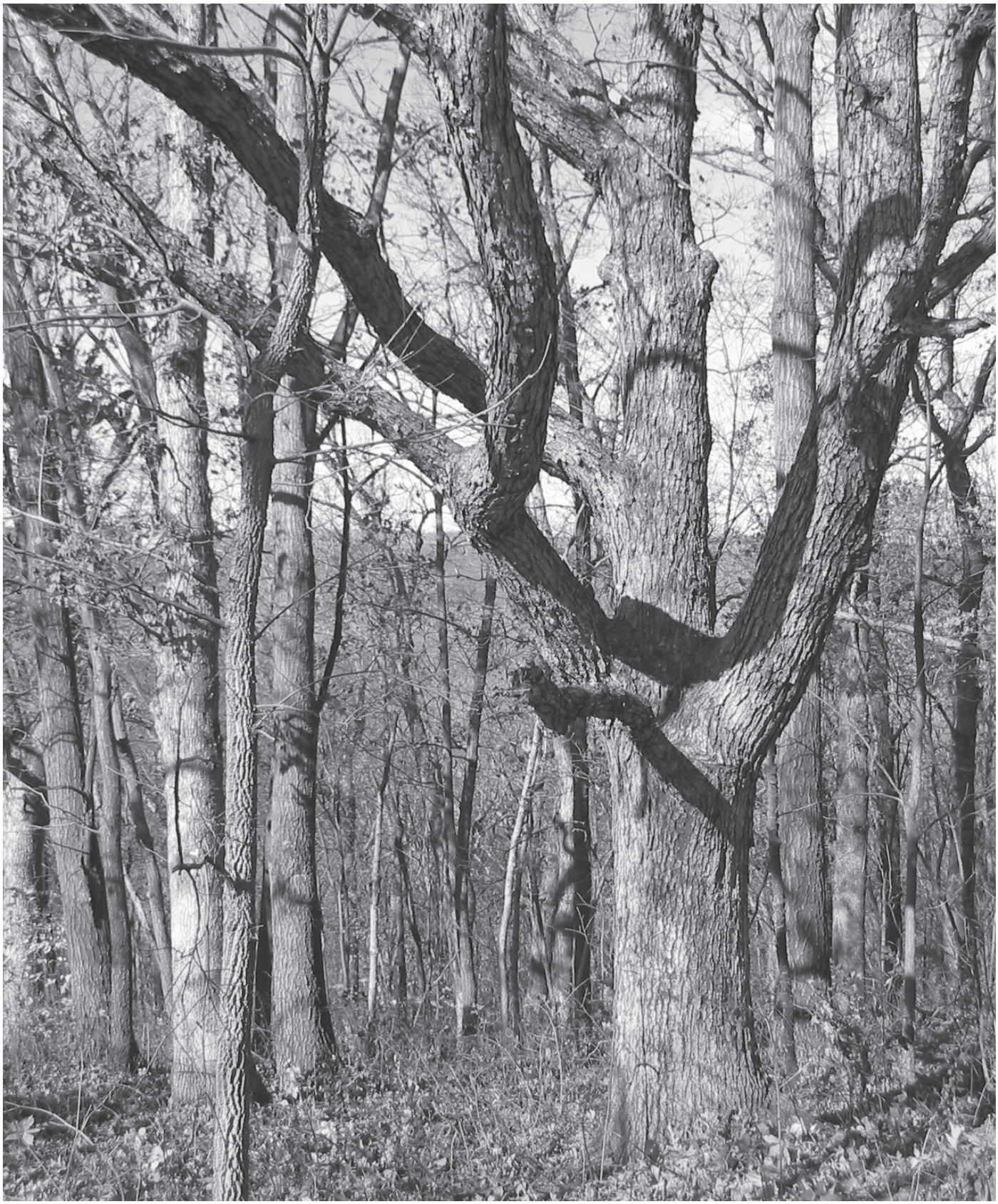


Photo by Ann Freiwald, DNR

TOWER HILL STATE PARK

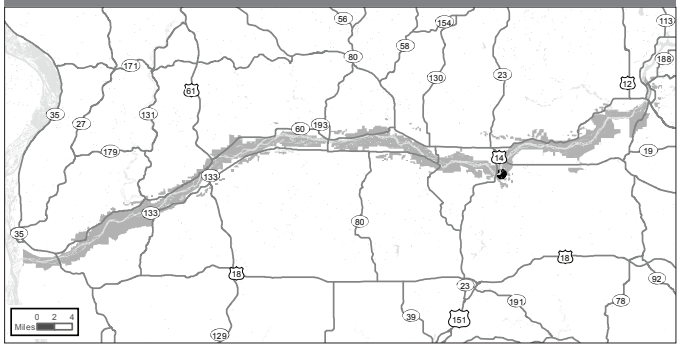
Tower Hill State Park is located adjacent to the Lower Wisconsin State Riverway just south of Spring Green on the Wisconsin River. Tower Hill is a separate, distinct property and is not part of the Riverway. However, due to the park's integral relationship with the Riverway its 1981 master plan was updated in conjunction with the Riverway's plan. In recognition of the close management and public use ties between the park and the Riverway, the park is recognized as a management area within the Riverway master plan. This management area discussion is for the purpose of providing background information about the park, its use opportunities and management. See the Wisconsin DNR website (key word: Tower Hill) for a full version of the Tower Hill State Park master plan.

Park Overview

Tower Hill State Park is a 76.5 acre property nestled adjacent to the Lower Wisconsin State Riverway and is located in Iowa County on the south bank of the Wisconsin River, near Spring Green. The park is relatively close to the major population centers of southern Wisconsin. Madison, about 40 miles from the park, is the nearest major urban area, with a population exceeding 240,000. It is located in a popular regional tourist area with many attractions. Well known nearby neighbors include the famous American Players Theater, Taliesin (the summer home and studio of Frank Lloyd Wright), and the House on the Rock Resort and Golf Course. Visitors coming to enjoy these attractions often stop at Tower Hill for a picnic and a quick hike to take in the views and learn about the shot tower, and some use the campground as home base for an extended stay. People have been coming to the park for generations and were enjoying the area long before it became a state park. While visitors come to Tower Hill to picnic, camp, hike and enjoy the

outstanding natural beauty and scenic vistas afforded from the bluff top trails, but a primary draw is the park's unique historic resources. Highlights of the park's interesting historic past include the shot tower and the old village of Helena, both dating from the 1830s, as well as the history of the site as the "Tower Hill Pleasure Co."

AREA 5 LOCATOR MAP



OVERVIEW OF MANAGEMENT

Recreation

The Tower Hill State Park master plan will be implemented in a way that provides safe and sustainable recreational access while protecting the ecological values and unique features of the park. Overall, the current recreational opportunities and facilities at the park will remain; however, a number of improvements are planned such as replacing the vault toilets, reconfiguring the campgrounds slightly and adding a group camp. More details can be found in the Tower Hill master plan.

Land and Vegetation Management

This plan revision continues management efforts to maintain the aesthetic character of the park's landscape. The high quality floodplain forest and habitat area will be managed as part of the larger Tower Hill Bottoms Native Community Management Area.

DNR Administrative and Support Facility

Buildings and grounds providing office and storage space for staff from multiple department programs (e.g. Parks, Wildlife Management, Forestry, Riverway and Law Enforcement) occupy a corner of the western boundary of the park. The main building provides limited public contact services as well as drinking water and public restrooms. The Tower Hill State Park master plan covers the public use areas within the park and does not direct the management, use and development of this administrative and management support area. That is covered by other DNR administrative policies or directives.

TOWER HILL STATE PARK

Photo by Nate Fayram, DNR

SPECIAL MANAGEMENT AREAS

HISTORICAL/ARCHAEOLOGICAL SPECIAL MANAGEMENT AREAS

The lower Wisconsin River is one of the richest historical/archaeological areas in the state. And importantly, Wisconsin is recognized as having the largest number of prehistoric burial mounds in the world, and beyond that, the largest number of "effigy mounds", mounds formed by Indian people of the Late Woodland period (ca. 600-1000 AD). Interpretation and education of the historical and archaeological resources of the Riverway will be provided in a number of ways in the LWSR's Interpretation and Education Program. Additionally, there are several specific sites where the main focus of the site will be interpretation and education.

Management Objectives

- Protect, interpret and foster an appreciation of the unique and important historical and archaeological resources of the LWSR.

Sites in two areas have been selected for special interpretation and management. One is the Black Hawk War's Wisconsin Heights Battleground and Effigy Mounds site near Sauk City, the other area contains several readily accessible effigy mound groups located along STH 60 near Muscoda. These historical/archaeological interpretation sites and their management are discussed below.

TABLE 2.6 SPECIAL MANAGEMENT AREAS

Area #	Special Management Areas	Acreage
6	Wisconsin Heights Battleground and Black Hawk Effigy Mounds	107
7	Lower Wisconsin River Effigy Mound Interpretive Sites	102
Total		**209**

These historical/archaeological interpretation sites have been assigned the Special Management Area land use classification. Areas classified as Special Management Areas are "special purpose" areas or facilities having special uses that not included under other land management classifications described in this section. No fees will be charged to visit these sites.

Examples of special management areas include administrative or service facility areas, cultural resource protection areas, propagation and nursery areas and demonstration or experimental management areas where the primary use is for research and testing of new resource management methods and techniques.

Photo by Ann Freiwald, DNR

Photo by Nate Fayram, DNR

THE WISCONSIN HEIGHTS BATTLEGROUND AND BLACK HAWK EFFIGY MOUNDS

The Battle of Wisconsin Heights took place on July 21, 1832 on the northern 60 acres of the Black Hawk Ridge property. In addition to the battle site the northern 60 acres of Black Hawk Ridge is home to a cluster of effigy mounds just south of the battle site. See "Cultural History of the LWSR" in Appendix C for additional information.

Management Prescriptions

- Relaying on the 1996 Wisconsin Heights Restoration Project Report as a base, manage the site's vegetation and interpretive program to highlight its history. To the extent possible, manage the vegetation to return the site to its pre-settlement oak savanna condition.
- Realign existing trails if necessary, to accommodate new interpretation efforts.
- Protect the integrity of the site. Follow the DNR's "Burials, Earthworks and Mounds Preservation Policy & Plan" management guidelines.

AREA 6 LOCATOR MAP AREA

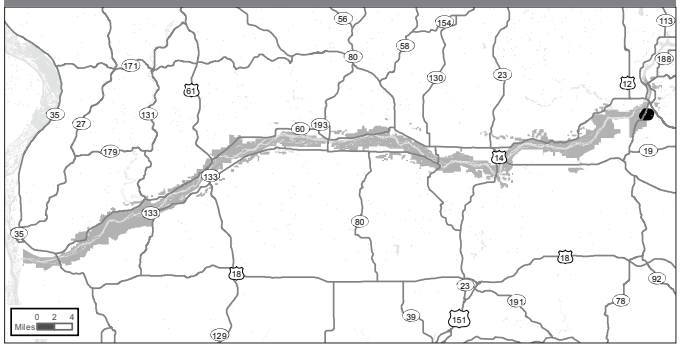


Photo by DNR

THE WISCONSIN HEIGHTS BATTLEGROUND AND BLACK HAWK EFFIGY MOUNDS

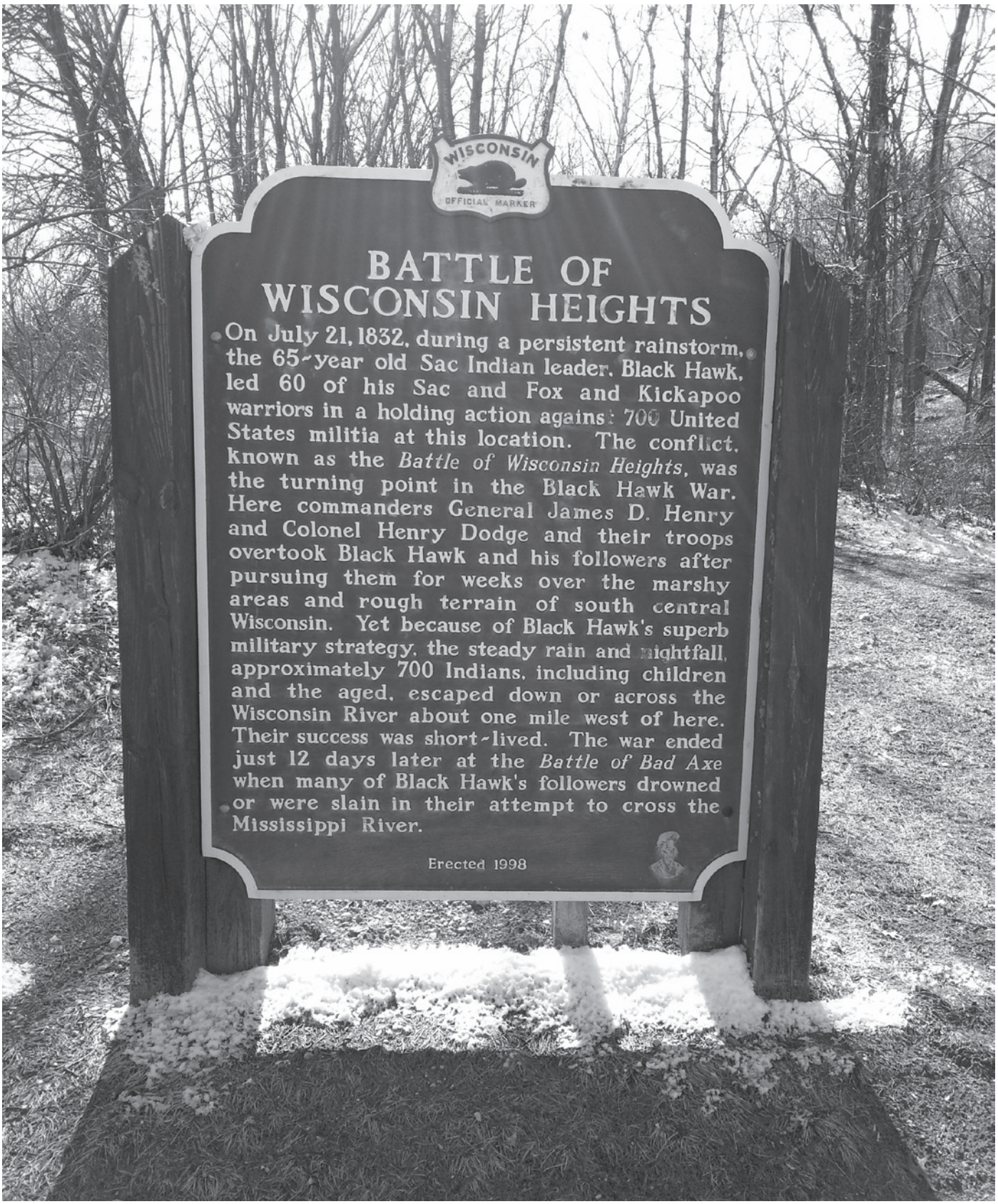


Photo by Ann Freiwald, DNR

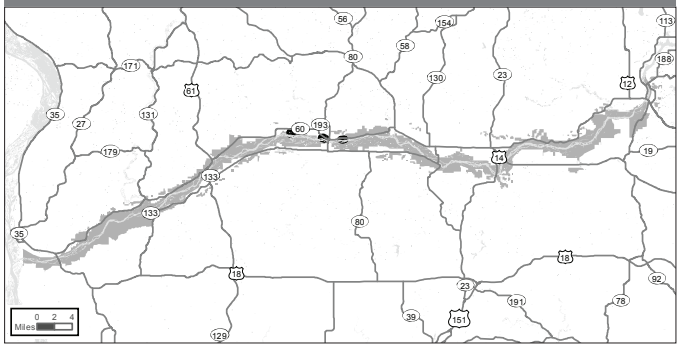
LOWER WISCONSIN RIVER EFFIGY MOUND INTERPRETIVE SITES

Effigy mounds were constructed in a variety of shapes resembling birds (including raptor, goose, and other bird forms), bear, lizard, deer, panther, human and other forms. These mounds may have served several functions: as grave markers, as group (clan) or territorial markers, or as representation of Native American cosmology, among others. While these mounds continue to fascinate, one must always remember that, as burial and sacred sites, they remain especially important to contemporary Indian peoples.

Stewardship of these sites presents DNR with both opportunities and challenges in the areas of interpretation, protection and management (cf. DNR's "Burials, Earthworks and Mounds Preservation Policy & Plan"). Within individual properties, these (as well as other mound sites) should be considered "archaeological preserves", with management requirements unique to such sites and, at times, very different from those of the larger property.

The following management prescriptions apply to Twin Lizard, Bird Mound and the Dingman Mound sites. The LWSR property manager, working with the DNR Archaeologist, may develop similar public access and interpretation at additional mound sites in the future if suitable opportunities become available.

AREA 7 LOCATOR MAP



Management Prescriptions for Twin Lizard, Bird Mound and the Dingman Mound Sites

- Construct an access drive and five car parking lot with a moderately developed access trail to the mound site.
- Provide appropriate interpretive signs at the site to educate visitors about the mound builders and the incredible collection of mounds in the immediate area.
- Protect the integrity of the site. Follow the DNR's "Burials, Earthworks and Mounds Preservation Policy & Plan" management guidelines.

Photo by Mark Dudzik, DNR

LOWER WISCONSIN RIVER EFFIGY MOUND INTERPRETIVE SITES

Photo by Jim Woodford, DNR

V. RESOURCE MANAGEMENT AND PROTECTION

This section of the plan outlines general resource management and protection strategies, objectives and management actions. Some are broad and apply to DNR managed lands across the whole Riverway property, while others are site-specific. The Riverway is sub-divided into specific management areas based on unique habitat or natural community characteristics or values or management purpose. Each management area is described and has specific objectives and management prescriptions detailed in the management area section below.

Photo by Ann Freiwald, DNR

WILDLIFE MANAGEMENT

This master plan seeks to achieve the following primary wildlife management purposes and strategies:

MANAGEMENT PURPOSES

- Manage habitat for the benefit of wildlife species in order to sustain hunting, trapping, wildlife watching and other wildlife-focused recreational activities. Utilize management practices which support ecologically sound and socially acceptable populations of game species.
- Promote sustainable wildlife populations by maintaining high quality permanent native and managed cover types for both game and non-game species.
- Protect and enhance habitats and populations of wildlife species of greatest conservation need (SGCN) by protecting high quality native plant and animal communities, and increasing the extent and quality of high value, under-represented habitats; in particular, grasslands and prairies, barrens and savannas, oak woodlands, bottomland forests, and diverse wetland and aquatic resources are of particular importance.

MANAGEMENT STRATEGIES

- Maintain or create a mosaic of lowland to upland habitats, and establish and maintain travel corridors for species movement between habitat blocks.
- Maintain and enhance stopover resting habitat for migratory birds.
- Create larger blocks of habitat where practicable and compatible with the management objectives for the site.
- Plant native or cool season grasslands on acquired parcels of cropped land.
- Stock small openings within managed large block forests with native tree species.
- Manage forests to provide cover, denning/nesting and food for wildlife.
- As appropriate, manipulate water levels in flowages and impoundments to manage wetland vegetation and promote a variety of wildlife habitats.
- Restore drained wetlands by filling/blocking ditches and breaking tile lines.
- Use nest boxes, platforms or similar devices as appropriate to enhance reproduction of desired wildlife.
- Continue to stock pheasants on suitable sites based on opportunity and demand.
- Plant sunflowers or otherwise manage food plots for dove hunters.

Photo by Travis Anderson, DNR

FISHERY MANAGEMENT

The rich fishery of the river and backwaters are sustained by maintenance of habitat and water quality. Many management actions within this plan are directed at maintaining fishery habitats and water quality. In particular are the management objectives and prescriptions for the river and stream riparian corridors; the sloughs, oxbow lakes and floodplain lakes, the flowages, and the various wetland types. See the plan section titled, "General Management by Habitat Type" for specific details.

No direct fish habitat management or population management actions are actions are included in this plan. Fishing regulations are established by separate, statewide processes.

Photo by Robert Queen, DNR

FOREST MANAGEMENT

The production of forest products is not a specific management purpose for the Riverway; however, it is an important secondary benefit of management. Timber harvesting is an essential tool for managing many Riverway habitats and native communities. Forest management objectives and prescriptions are an integral part of the management outlined in the pages below. The following tables give an overall summary of the upland and bottomland forests on the LWSR and their management level. All forest management complies with Forest Certification standards for sustainability (See Map C for existing land cover information).

FIGURE 2.13 UPLAND FOREST MANAGEMENT

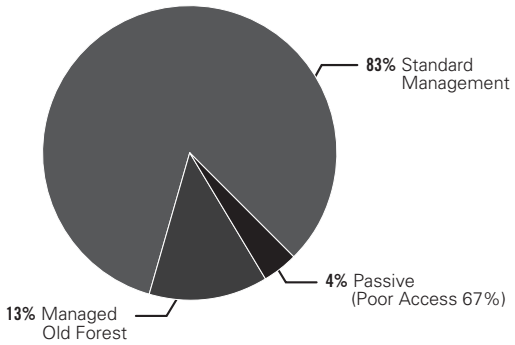


FIGURE 2.14 BOTTOMLAND FOREST MANAGEMENT

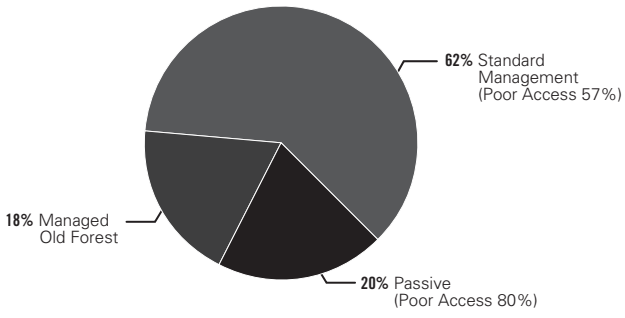


TABLE 2.7 LWSR FORESTED LANDS MANAGEMENT OVERVIEW

Management Type	Acres	Percent of Forest	Percent with Poor Harvest Access
Upland Forests*			
Standard Management	9,758	83%	0%
Managed Old Forest	1,514	13%	0%
Passive Management	422	4%	65%
Bottomland Forests*			
Standard Management	11,606	62%	57%
Managed Old Forest	3,498	18%	0%
Passive Management	3,720	20%	80%

**Lands managed by DNR*

Photo by Ann Freiwald, DNR

STATE NATURAL AREAS

State Natural Areas (SNAs) are part of a statewide system of sites identified for the purposes of ecological research, education and to assure the full range of ecological diversity for future generations. State natural area sites contribute to rare species habitat, provide ecological reference areas, or contain significant geological or archaeological features.

There are 18 DNR managed State Natural Areas (SNA) designated on the LWSR totaling 8,623 acres. Two additional privately owned and managed SNAs also lie within the LWSR, they are not covered by this master plan.

See the table below for a listing of the SNAs and data for each. Refer to the respective management area section of this plan for a description, map and management details for each SNA.

TABLE 2.8 STATE NATURAL AREAS OF THE LWSR

SNA NAME	County	Management Area Number	Acres	Year Est.	Management Area Number
Mazomanie Bottoms	Dane	11	352	1978	11
Mazomanie Oak Barrens	Dane	9	160	1991	9
Ferry Bluff	Sauk	10	400	1988	10
Bakkens Pond	Sauk	15	160	1991	15
Tower Hill Bottoms	Iowa	14	476	1958	14
Avoca Prairie and Savanna	Iowa	22	1885	1968	22
Arena Pines and Sand Barrens	Iowa	13	93	1991	13
Wauzeka Bottoms	Crawford	30	798	1989	30
Richwood Bottoms	Richland	26	884	1991	26
Smith Slough and Sand Prairie	Richland	16	375	1991	16
Gotham Jack Pine Barrens	Richland	17	414	1994	17
Orion Mussel Bed	Richland	21	170	1996	21
Blue River Sand Barrens	Grant	23	130	1968	23
Adiantum Woods	Grant	29	263	1991	29
Millville Oak Woodlands (Proposed)	Grant	29	1,265	2016	29
Woodman Lake Sand Prairie and Dead Lake	Grant	28	205	1991	28
Blue River Bluffs	Grant	24	394	1996	24
Wyalusing Hardwood Forest ^^	Grant	31	199	1952	31
			8,623		

^^Wyalusing Hardwood Forest SNA acres within the LWSR.

Photo by Nate Fayram, DNR

Overview of State Natural Area Program

The objectives of the State Natural Area Program are to: Locate, establish and preserve a system of SNAs that as nearly as possible represent the wealth and variety of Wisconsin's native landscape for education, research and long-term protection of Wisconsin's biological diversity for future generations.

The State Natural Area designation does not change the underlying management objectives, prescriptions, or authorized recreation and management activities outlined in this master plan for each management area. There are no additional management prescriptions associated with these State Natural Areas. See the specific Management Areas for detailed maps showing the SNA overlay zones.

The Wisconsin State Natural Areas Program oversees the establishment of SNAs and is advised by the Natural Areas Preservation Council.

HABITAT MANAGEMENT AREA

Habitat management areas are managed with the primary objective of providing or enhancing habitat, whether upland, wetland or aquatic, to support specific species of plants or animals. Habitats and communities in areas with this designation may be managed for a wide variety of purposes, including focused species production and protection. Areas that initially do not have desired habitat conditions but have a high potential to be restored to those conditions may be included under this classification. A master plan may authorize any management activity or technique that is consistent with the management objective specified in the master plan for the area, and is compatible with the site's ecological capability.

Habitat management areas also provide opportunities for compatible recreational uses, particularly those that are nature based, such as hunting, hiking, bird-watching, photography, and nature study. Opportunities are also available for research, nature interpretation and education.

The Habitat Management Area encompasses over 23,000 acres comprised of a wide variety of habitat types ranging from flowages and open wetlands to prairies and barrens and to lowland and upland forests. See Map F.

The following general habitat management objectives and prescriptions apply to all of the Habitat Management Area. They are intended to provide an overall framework for management of this large, complex management area. The management objectives and prescriptions for each habitat type may be found in the plan section titled General Management by Habitat Type.

GENERAL HABITAT MANAGEMENT AREA OBJECTIVES

- Maintain and enhance the habitats and landscapes to sustain game and other wildlife populations and to support recreational activities.
- Strive to maintain or create larger blocks of habitat to enhance their wildlife habitat value. As part of this management, maintain, or create as appropriate, a mosaic of lowland to upland habitats, and establish linkages between habitat blocks to create travel corridors for the movement of species over time.
- Gradually phase out conifer plantations over time, retain native white pine when practicable.
- Convert most cropped land to native cover types.
- Provide forest products to the local economy as a secondary benefit of habitat management.

GENERAL HABITAT MANAGEMENT PRESCRIPTIONS

- Actively manage old fields and pastures to create larger habitat blocks of grasslands by removing fence lines, conifer plantations, encroaching brush and isolated patches of trees.
- Convert cropped land to native cover types or surrogate grasslands except where plowing, sharecropping and food plots are being used to aid habitat restoration efforts or are being used to enhance wildlife populations and hunting opportunities, especially for doves and pheasants.
- Use water level manipulations at flowages and impoundments to manage wetland vegetation and improve wildlife habitat.
- Manage beaver and muskrat populations to mitigate dike damage and damming of water control structures, and flooding of neighboring private lands.
- Manage lands abutting Native Community Management Areas compatibly and maintain soft transitions between habitat types.
- See *Other Riverway Day Use Sites*, *Trails and Scenic Overlooks* for public use related prescriptions.

For each specific habitat and forest type, follow the management prescriptions in the plan section titled, General Management by Habitat Type.

The Value of Larger Blocks of Habitat

Gone are the extensive prairies, savannas, wetlands, and larger patches of forest that dotted this landscape prior to European settlement. Today, all types of remaining native habitats, but especially grasslands/prairies and upland forests, are severely fragmented, having been broken in small patches by agriculture, highways, and urban and rural development. Many grassland wildlife, especially birds, require a minimum of 40 acres of contiguous habitat, while blocks of 80-250 acres are more preferable. Similarly, larger blocks of forested habitat provide higher quality habitat for interior-forest bird species. In addition to the wildlife habitat benefits associated with large blocks of habitat, the ease and efficiency of management increases as patch size increases. In general, the wildlife benefits of a particular habitat type increase as patch size increases.

VEGETATION MANAGEMENT TOOLS

Active and Passive Management

The master plan refers to both active and passive habitat management prescriptions.

Active Management

Active management includes the direct manipulation of the plant and animal communities. Examples include seeding a parcel to re-establish grasslands, conducting prescribed burns, harvesting timber.

Passive Management

Passive management means no or very limited, specific direct action is taken to manage a habitat, allowing natural processes to respond to conditions and dictate the habitat's or community's composition and habitat attributes. Passive management is often used in habitats with the following characteristics:

- Size - management activities may be too expensive or difficult to conduct due to small size
- Location – isolated or difficult to reach habitats (such as islands),
- Habitat quality - Units with good to excellent habitat may be stable thus requiring little to no intervention, or it may be an infestation (i.e., an expansive reed canary grass infestation in a disturbed wetland) of such size and complexity that the tools and/or resources required for restoration are not currently available .

More commonly, some active management is conducted on a property or habitat unit (e.g., prescribed burns, timber harvests, adjusting water levels on a flowage), but the plant communities are allowed to evolve based on natural succession. For example, grasslands may be burned, but the species composition of the grasslands is allowed to evolve based on the competitiveness of the grasses and forbs naturally occurring at the site. This type of management seeks to promote stable and productive natural communities while minimizing the need for unnecessary and potentially expensive human intervention.

Prescribed Burns

Prescribed burns are the most important management prescription used to maintain and enhance grasslands, savannas, oak woodlands, barrens, and sedge meadow wetlands. A number of the pre-settlement plant and animal communities are fire dependent communities that were shaped over thousands of years by wildfires caused by lightning or set intentionally by Native Americans.

Prescribed burns mimic natural fire disturbance and help control many woody plants and invasive weeds, improve the quality of wildlife habitat, reduce fuels to lessen fire hazard, and liberate nutrients tied up in dead plant material.

Burns typically are conducted in late winter/early spring and in the fall. They may be conducted annually or on an as needed basis. Fire management for a given unit will depend on the plant community present, the habitat restoration or maintenance objectives, the physical characteristics of the site, and most importantly, on safety and fire control conditions.

Other management tools or actions that may be used:

- Mechanical cutting (e.g., mowing and brushing), hand cut, pull, bulldoze and/or smother.
- Chemical control of vegetation or pests using approved products and application techniques.
- Bio-control measures may be used as deemed appropriate, safe and effective.
- Grazing.
- Biomass harvests that follow approved Wisconsin Biomass Harvesting Guidelines.
- Seeding or planting native woody and herbaceous species.
- Agricultural activities may be used to achieve proper crop rotations for food patches, hunting cover, brush and invasive species control, and site preparation for native community restoration.
- Timber harvesting or timber stand improvement. This may include salvage of trees after a major natural disturbance.

Control Invasive Species

The threat of exotic and/or invasive species, both terrestrial and aquatic, including plants, animals, insects and diseases represent a significant and growing threat to our native plant and animal communities. On the LWSR terrestrial invasive infestations have been noted including buckthorn, honeysuckle, garlic mustard, spotted knapweed, wild parsnip, sweet clover, burdock, Russian olive, crown vetch, Japanese hedge parsley, Japanese knotweed, black locust, and other exotic species. Reed canary grass is a very common invasive on disturbed wet areas. Other common wetland invasives include narrow-leaved cattail, purple loosestrife, common reed and phragmites. Native species with invasive habits, such as red cedar, sumac, prickly ash and box elder, are also a management challenge in several areas along the Riverway. Terrestrial invasives present similar challenges on the LWSR as they do on any southern Wisconsin large DNR property and similar tools for management and control of invasive species will be utilized on the LWSR. Invasive plants may be controlled using appropriate and effective methods, including but not limited to the use of bio-control, herbicides, cutting, hand removal, fire or

bio-control. Control methods may be restricted in certain sensitive management areas.

A river system faces unique and complex Aquatic Invasive Species (AIS) challenges not faced by isolated water bodies such as lakes and ponds. The LWSR's extensive and ecologically rich and diverse backwater sloughs, lakes and ponds are particularly vulnerable to AIS degradation. As of today, most have not seen significant invasions. Vigilance and protective actions are critical.

On large river systems AIS prevention, containment and control can be more difficult with many of the backwaters being connected, at least seasonally, to the main river. The LWSR is also closely connected to the Mississippi River which is a "source waters" of over 130 invasive species. The LWSR's rich and valuable ecological diversity and its regional recreation values make AIS prevention critical.

In addition to the control methods listed above, the following management efforts will be undertaken at the DNR main stem and major backwater landings to help reduce the spread of AIS in the LWSR:

- Education and outreach
- Signage

The unique and complex challenges to the LWSR posed by AIS will take a team effort by government and non-government agencies, as well as citizen conservation, sporting and recreation groups. Resources to guide these efforts to fight AIS include the following:

- Wisconsin's Rapid Response Framework for Aquatic Invasive Species (DNR)
- Lower Wisconsin River Basin Aquatic Invasive Species Strategic Plan (the River Alliance of Wisconsin with DNR funding assistance)

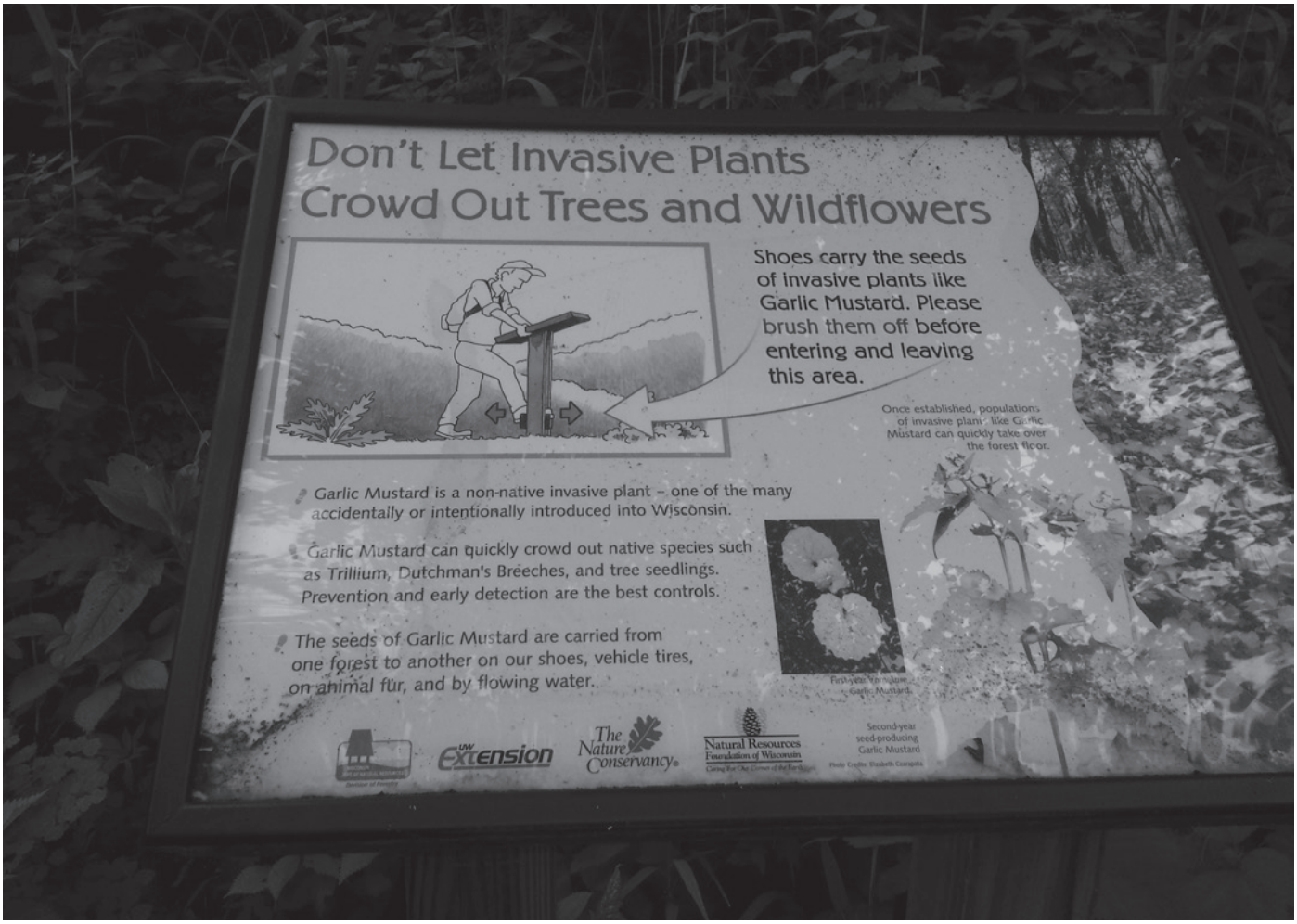


Photo by Ann Freiwald, DNR

Photo by Tom Watkins, DNR

NATIVE COMMUNITY MANAGEMENT AREAS

Native community management areas are managed with the primary objective of representing, restoring and perpetuating native plant and animal communities, whether upland, wetland, or aquatic and other aspects of native biological diversity. Areas that do not have the desired community conditions but have a reasonable potential to be restored to those conditions are included in the Native Community Classification "Map Ref." in Table 2.9 provides the specific map number for each Native Community Management Area.

Management activities are designed to achieve land management objectives through natural processes or management techniques that mimic natural processes when possible. However, management activities are not restricted; a master plan may authorize any management activity or technique, including passive management that is consistent with the management objective specified in the master plan for the area, and is compatible with the site's ecological capability. Examples of potential management activities include timber harvesting, mowing, burning, planting, herbicide application, and road construction and erosion control.

Native community management areas also provide opportunities for low-impact public uses such as hunting, hiking, bird-watching, photography, and nature study. Opportunities are also available for research, ecological interpretation and education.

TABLE 2.9 NATIVE COMMUNITY MANAGEMENT AREAS

Area #	Native Community Management Area	Acreage	Map Ref.
9	Mazomanie Oak Barrens	236	F-1
10	Ferry Bluff	402	F-1
11	Mazomanie Bottoms	352	F-2
12	Boneset Savanna	41	F-3
13	Arena Barrens and Wetlands	205	F-3
14	Tower Hill Bottoms	1,052	F-3
15	Bakkens Pond Marsh, Woods and Barrens	1,624	F-4
16	Smith and Cruson Sloughs	936	F-5
17	Gotham Jack Pine Barrens	414	F-5
18	Avoca Prairie and Savanna	2,198	F-5
19	Fishtrap Flowage and Bottoms	1,842	F-6
20	Bogus Bluff	340	F-5
21	Orian Mussel Beds and Mounds	175	F-5
22	Avoca - Muscoda Barrens	870	F-5
23	Blue River - Muscoda Sand Barrens	336	F-6
24	Blue River Bluffs	374	F-6
25	Dingman Mounds Pines	199	F-6
26	Richwood Bottoms	2,348	F-7
27	Clear Creek Lowlands	714	F-7
28	Woodman Sand Prairie and Dead Lake	286	F-8
29	Millville Woodlands and Prairies	3,689	F-8
30	Wauzeka Bottoms and Woodman Islands	1,129	F-8
31	Wyalusing Forests	311	F-9
32	Down River Remnant Bluff Prairies and Savannas	110	F-7
Total		**20,184**	

Note: Acres for Area 32 is an estimate

Photo by Nate Fayram, DNR

MAZOMANIE OAK BARRENS

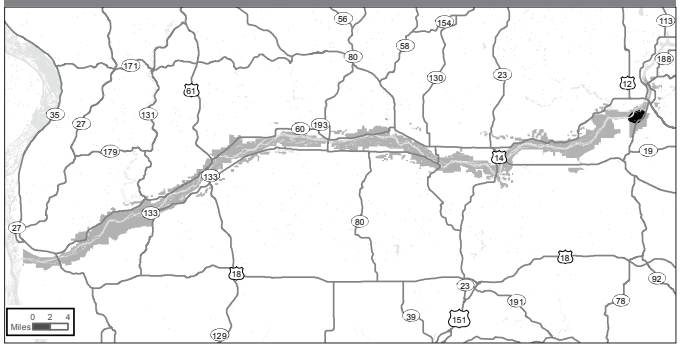
Mazomanie Oak Barrens was designated a State Natural Area in 1991.

Mazomanie Oak Barrens includes Mazomanie Oak Barrens State Natural Area (136 acres) and state-owned lands adjacent to the SNA (additional 100 acres). Situated on a broad and gently undulating sand terrace along the Wisconsin River, the site's cover types are a mix of open communities (Sand Prairie, Sand Barrens, Surrogate Grassland, wetlands) and wooded communities (Oak Barrens, pine plantation).

Oak Barrens are globally imperiled, and the Western Coulee and Ridges Ecological Landscape represents a major opportunity to sustain this natural community (WDNR In prep. a.). This site is important for a suite of Sand Prairie/Barrens-dependant reptiles. Two rare grasshoppers, the short-winged (*Dichromorpha viridis*) and large-headed (*Phoetaliotes nebrascensis*), find refuge in the open grasslands of this site. This site and open areas within the surrounding landscape (including wetlands) provide significant habitat for grassland birds, including lark sparrow (*Chondestes grammacus*) and yellow-breasted chat (*Icteria virens*). The barrens support numerous rare plant species including several special-concern species: yellow gentian (*Gentiana alba*), prairie fame-flower (*Phemeranthus rugospermus*), tall nut-rush (*Scleria triglomerata*), and prairie ragwort (*Senecio plattensis*).

Long Term Management Objectives (100 Years)
Maintain the site for oak barrens natural community to serve as an ecological reference area and a rare animal habitat site. Natural processes, frequent prescribed fire, and prescribed vegetation manipulation determines the structure of the savanna and the site's ecological characteristics. Management provides a shifting mosaic of barrens habitats across the site, while promoting habitat for reptiles and barrens dependent invertebrates and other species that require open habitat conditions. The site also provides opportunities for research and education on the highest quality native oak barrens.

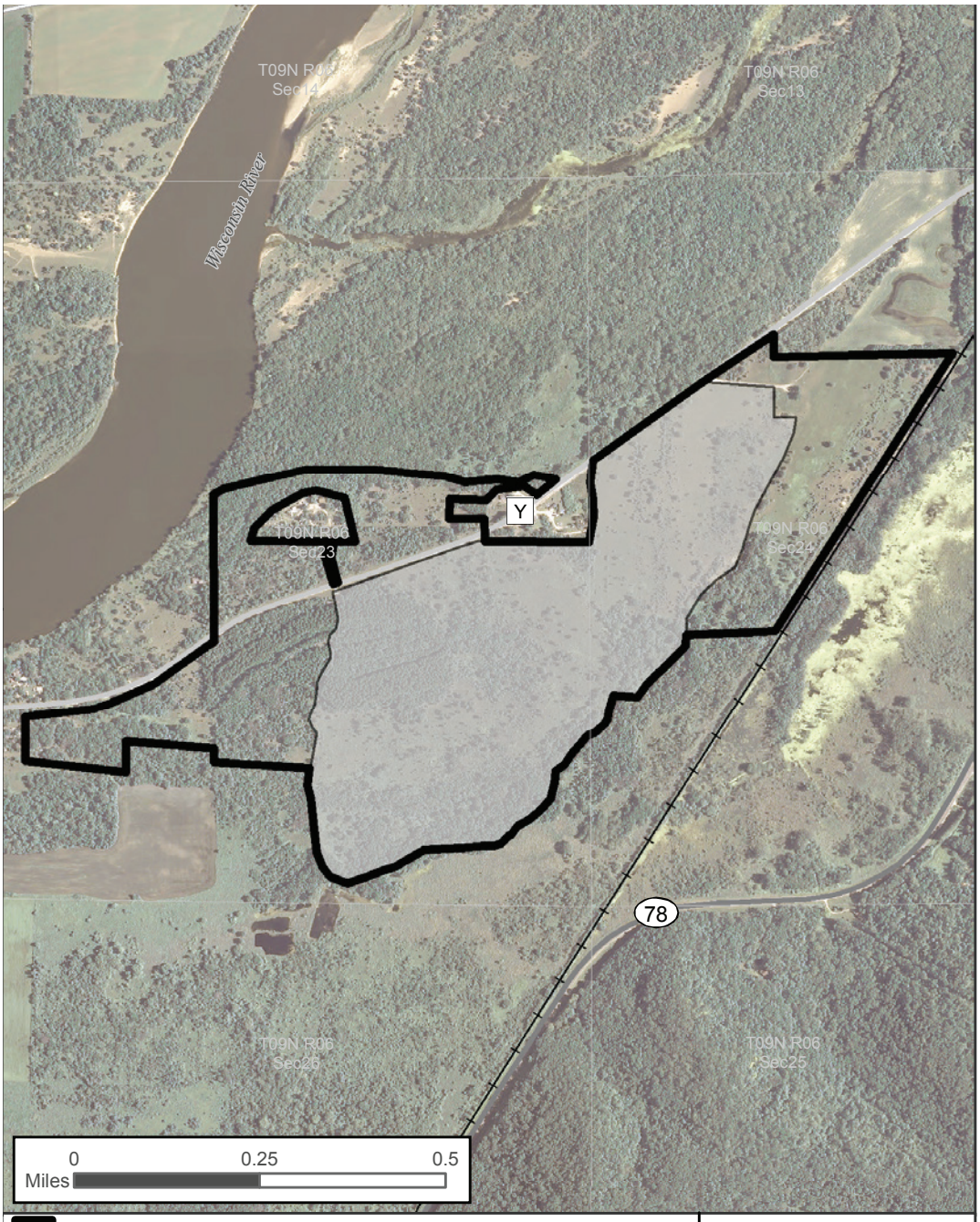
AREA 9 LOCATOR MAP



Short Term Management Objectives (50 Years)
- Provide areas with open, sandy soil with sparse vegetation to benefit the reptiles, invertebrates and rare plants that rely on this habitat. As appropriate, maintain a shifting mosaic of barrens across the site.
- Restore and maintain natural transitions from open barrens to adjacent communities.
- Expand management into previously unmanaged areas to promote additional open oak and sand barrens habitat for rare species.

Photo by Nate Fayram, DNR

MAP 2.4 MAZOMANIE OAK BARRENS



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AREA 9

NATIVE COMMUNITY MANAGEMENT AREA

MAZOMANIE OAK BARRENS

Management Prescriptions

- Manage according to Barrens State Natural Area Management Guide (WDNR 2011).
- Use frequent prescribed fire, prescribed vegetation manipulation and natural processes to maintain, enhance and expand barrens habitat. Primarily use an intensive fire management program to shape the ecological characteristics of the site. Consider impacts to reptiles regarding timing of prescribed burns; and consider providing appropriate unburned refugia for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units.
- Passively manage the native dominant savanna tree species (primarily oaks). Some thinning of the canopy, understory manipulation and shrub control via harvest, brushing or fire may be used where needed to mimic natural disturbance patterns. Retain snags and course woody debris as important habitat features.
- Use thinning and harvesting to convert the pine plantations to oak barrens.
- In previously unmanaged barrens areas on the site, use combinations of timber harvest, brushing, and prescribed fire to expand open barrens habitat, and create a soft edge or transition into adjacent communities. Encourage sand and oak barrens species to invade old fields and degraded portions of the site.
- Augment the ground layer only with species that historically would have been found on the site, using local genotype seeds or plugs.
- Although removal of hazardous trees from over and near state-approved snowmobile trails and field roads is an allowed activity, manipulation/removal of vegetation and soil disturbance must be minimized, and must have no impact on the rare species found at the site.
- Salvage of trees after a major wind event may occur with consultation if the volume of woody material inhibits fire prescriptions, or salvage meets other management objectives.
- If possible, relocate the snowmobile trail to a location outside of the management area's boundary.
- Follow Incidental Take Protocols for listed species.[1]

1 "Incidental Take protocols" are management protocols that must be followed when endangered/threatened species are present (according to a review of the Natural Heritage Inventory database or other knowledge). The taking of endangered/threatened species that occurs during the course of management is legally covered if the protocols are followed.

Photo by Ann Freiwald, DNR

MAZOMANIE OAK BARRENS

Photo by Nate Fayram, DNR

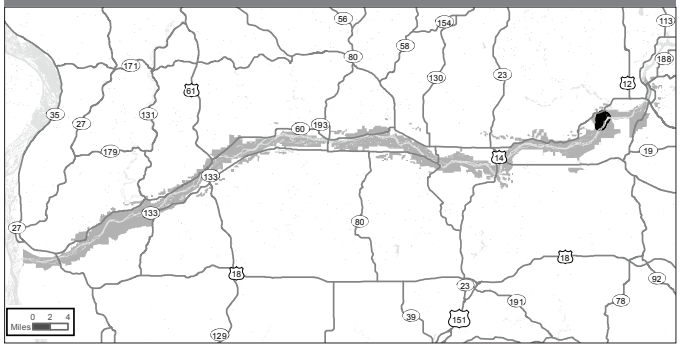
FERRY BLUFF

Overview and Summary
Ferry Bluff was designated a State Natural Area in 1988.

This management area is comprised of two disjunct units: Ferry Bluff and Cactus Bluff to the north and Hugo's Bluff to the south totaling approximately 402 acres. Ferry Bluff and the adjacent Cactus Bluff tower more than 300 feet above the confluence of Honey Creek and the Wisconsin River. The sandstone bluffs capped with dolomite harbor cliff communities, prairie remnants, and steep wooded slopes, producing an impressive array of diverse flora and fauna. About 1/2 mile to the south lies Hugo's Bluff, which has similar upland communities, plus a narrow band of open sand bars and Floodplain Forest.

At Ferry and Cactus Bluffs, a good-quality Oak Woodland covers the bluff top and the southeast-trending slopes. The canopy of this woodland has been opened up through the use of prescribed fire in recent years. Older open-grown white oaks mingle with younger semi-open grown red and white oaks to create a canopy over a rich ground layer, including 48 oak savanna indicator species. The steep, northeast-facing slope harbors good-quality Southern Dry-mesic Forest. The canopy is moderately dense (51-75% cover) with 12-24" red oak and basswood. Spring ephemerals are abundant on this slope in the early spring. The forest on the shallower northern slopes was logged in the recent past but is regaining aspects of its former structure and composition. The south-facing slope harbors Southern Dry Forest. Two small, south-facing Dry Prairies are perched above the cliffs of Ferry Bluff and feature a complete array of typical species. The rare purple-stem cliff brake (*Pellaea atropurpurea*) occurs on open sand within the Dry Prairie complex just above the cliff. A small Dry Cliff faces southeast below the southernmost prairie, while a long, Moist Cliff faces Otter Creek to the east-northeast.

AREA 10 LOCATOR MAP

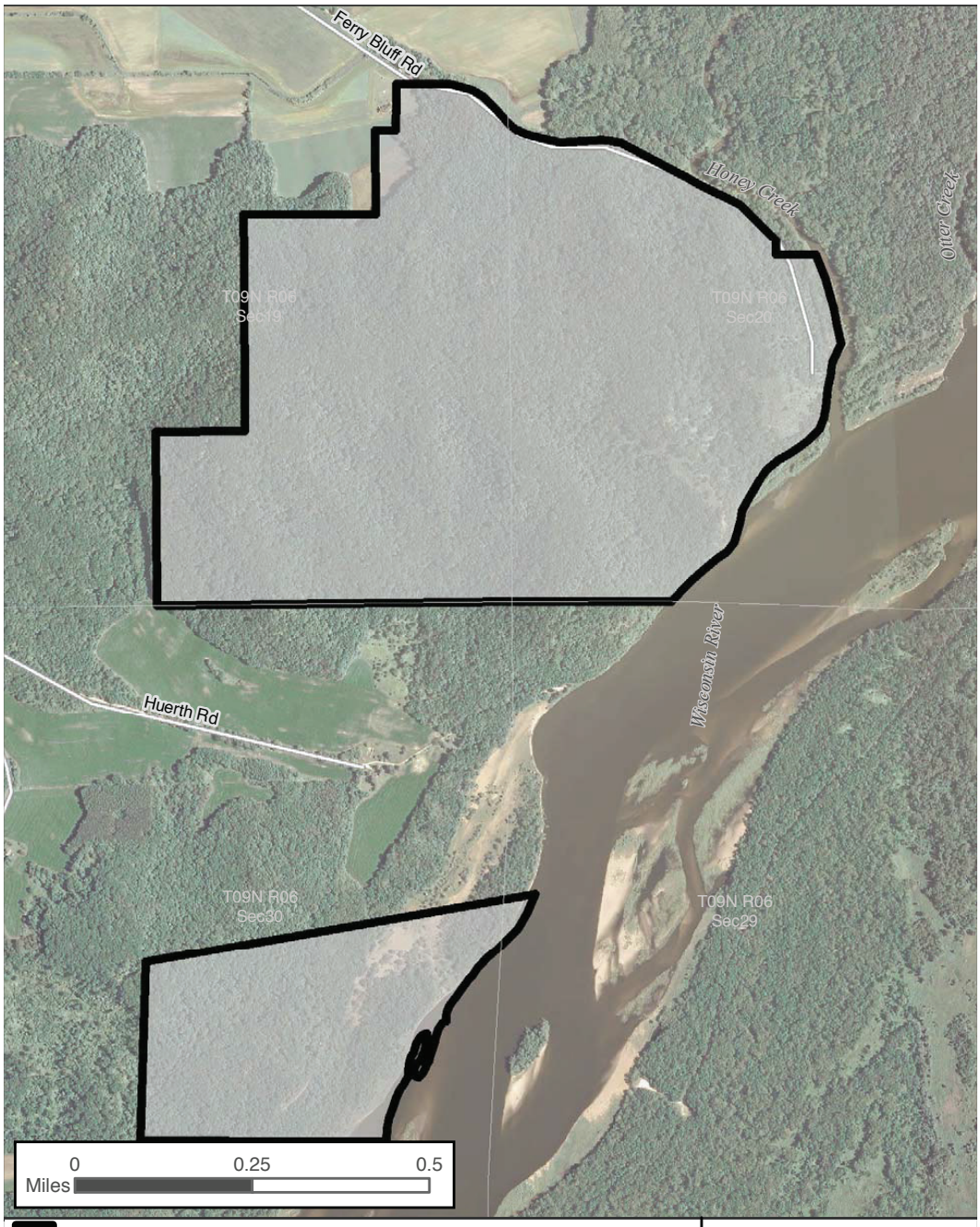


At Hugo's Bluff, the Southern Dry-mesic Forest has a canopy of 12-24" red oak, red maple and white oak. An overgrown but restorable Oak Opening on the ridge top features semi-open grown red oak and white oak with a characteristic ground layer. A small Dry Prairie lies above the cliff top and has good diversity of native species.

Ferry Bluff is the site of a former peregrine falcon Eyrie and continues to be an important winter roosting site for the bald eagle. For years a portion of the site including Ferry and Cactus Bluffs has been closed to all public entry between November

Photo by Ann Freiwald, DNR

MAP 2.5 FERRY BLUFF



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15 and April 1 to avoid disturbing roosting eagles. This is of less importance today as eagle populations have recovered and use many other winter roosting sites in the area.

The site also holds very good potential for a vast array of reptiles including large-bodied snakes (gophersnake, North American racer, timber rattlesnake, and gray ratsnake), as well as prairie ringneck snake, five-lined skink and six-lined racerunner, and rare turtles along the main channel of the river.

The Ferry Bluff Management Area is particularly significant for three reasons:

- This site is one of only two known high-quality Oak Woodland remnants known from the LWSR.
- The plethora of oak savanna indicator plant species that occur here further speaks to the potential for the site to be an exemplary oak savanna ecological reference area.
- It offers a unique opportunity to restore a Dry Prairie natural community.

Long Term Management Objectives (100 Years)

Maintain the continuum of dry prairie, oak woodland, southern dry forest, and southern dry-mesic forest native communities to provide high quality ecological reference areas and essential habitats for rare species. On this management area, natural processes determine the structure of the dry-mesic forest, while natural processes along with prescribed understory manipulation determines the structure of the dry forest, oak woodlands and prairie. Other benefits include maintenance of bald eagle roosting opportunities, and opportunities for research and education on the highest quality oak woodlands. Provide public walking trail access and associated interpretive facilities at the Cactus Bluff overlook.

Short Term Management Objectives (50 Years)

- Maintain and enhance the continuum of dry prairie, oak woodland, southern dry forest, and southern dry-mesic forest native communities. Develop and maintain natural transitions between different plant communities.
- Restore and maintain high quality Oak Woodlands to provide habitat for native plants and animals.
- Expand the size of remnant dry prairie openings to maintain conditions favorable to native prairie vegetation.
- Increase the diversity and abundance of native prairie, savanna, and open woodland vegetation and associated animal species with emphasis on rare species.
- Maintain the entire site as an ecological reference area.

Management Prescriptions

- In the dry prairie, oak woodlands, and dry forest (South slopes and ridge tops), passively manage the native dominant tree species (primarily oaks); however, some thinning of the canopy, understory manipulation and shrub control via harvest, brushing, and especially fire may be needed to mimic natural disturbance patterns. Restore and maintain the ecological characteristics of the site using frequent low intensity prescribed fire. Follow guidance from the Xeric Prairie, and Oak Savanna, State Natural Areas Management Guides (WDNR, 2010).
- Expand and restore the Dry Prairie and Oak Woodland natural communities using combinations of brushing, understory manipulation, and selective canopy thinning along with prescribed fire.
- In the dry-mesic forest (North slopes), use natural processes and passive canopy management to determine the structure of the forest, except active management may be used for the control of invasive and undesirable aggressive native species (such as box elder and red maple), and low intensity prescribed fire may be used.
- At the Hugo's Bluff site; initiate active management, including brush removal, prescribed fire, and clearing of undesirable trees such as red cedar to restore the dry prairie, oak opening, oak woodland, and sand terrace barrens.
- Consider impacts to rare species regarding timing of prescribed burns, and leave appropriate unburned refugia for remnant prairie dependent invertebrates within prescribed burn units.
- On sites that have sheltered aspects and close proximity to open water maintain and extend the life of large, mature canopy trees for bald eagle roosting.
- Do not salvage trees after a major wind event except where the volume of down woody material inhibits fire prescriptions.
- Seek to increase management access to the area through access easements or land purchase.
- Follow Incidental Take Protocols for listed species.
- Other allowable activities on the entire management area include control of invasive plants and animals, maintenance of existing facilities, and access to suppress wildfires.
- Maintain the existing hiking trail to the top of the bluff.

Photo by Travis Anderson, DNR

MAZOMANIE BOTTOMS

Mazomanie Bottoms State Natural Area was designated in 1978.

This 352 acre State Natural Area harbors excellent quality Floodplain Forest dissected by old river channels that are dry except during periodic floods. Silver maple, elm, basswood, and ash dominate the forest; other trees include swamp white oak, cottonwood, willow, river birch, and hackberry. Openings in the canopy due to elm mortality have a dense understory of prickly ash, gray dogwood, and young trees. Ridges of sand support oaks but the slough margins are nearly pure silver maple. Vining plants and lianas are found in abundance: virgin's bower, wild yam, moonseed, wild cucumber, woodbine, poison ivy, carrion flower, and grape. Sand bars and ephemeral pools along the river add considerable diversity. As part of an extensive Floodplain Forest landscape along the river corridor, this site provides stopover habitat for thousands of migrating birds. The site also supports breeding of many area-sensitive forest interior birds including uncommon species including cerulean (*Dendroica cerulea*), Kentucky (*Oporornis formosus*), prothonotary (*Protontaria citrea*) and mourning warblers, red-shouldered hawk (*Buteo lineatus*), winter wren, and brown creeper. The site has a large woodpecker population and is used in winter by bald eagles (*Haliaeetus leucocephalus*).

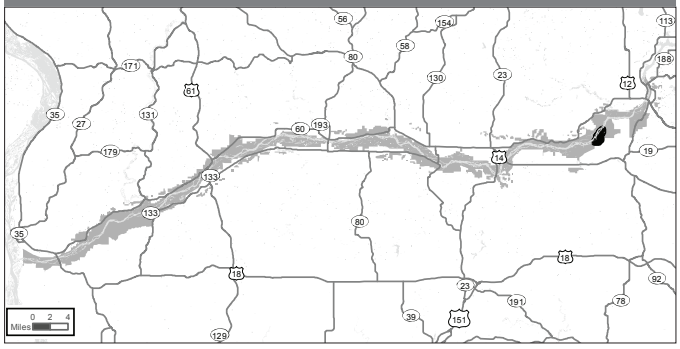
Management Objectives

- Maintain the site as an old growth floodplain forest and ephemeral pond ecological reference area. Allow natural processes with limited prescribed understory manipulation to determine the structure of the forest community.
- Maintain and develop habitat for species associated with old growth floodplain forest. Provide a large area of structurally and functionally diverse, older, intact, connected forest which is comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species. Provide the structural, compositional and functional characteristics associated with old growth forest, such as course woody debris and standing dead snags to provide habitat and structural diversity.
- Provide opportunities for research and education on the highest quality native floodplain forests.

Management Prescriptions

- Passively manage native vegetation, which allows nature to determine the ecological characteristics of the site.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Actively control non-native invasives or aggressive natives/ naturalized vegetation such as box elder, buckthorn, and reed canary grass.

AREA 11 LOCATOR MAP



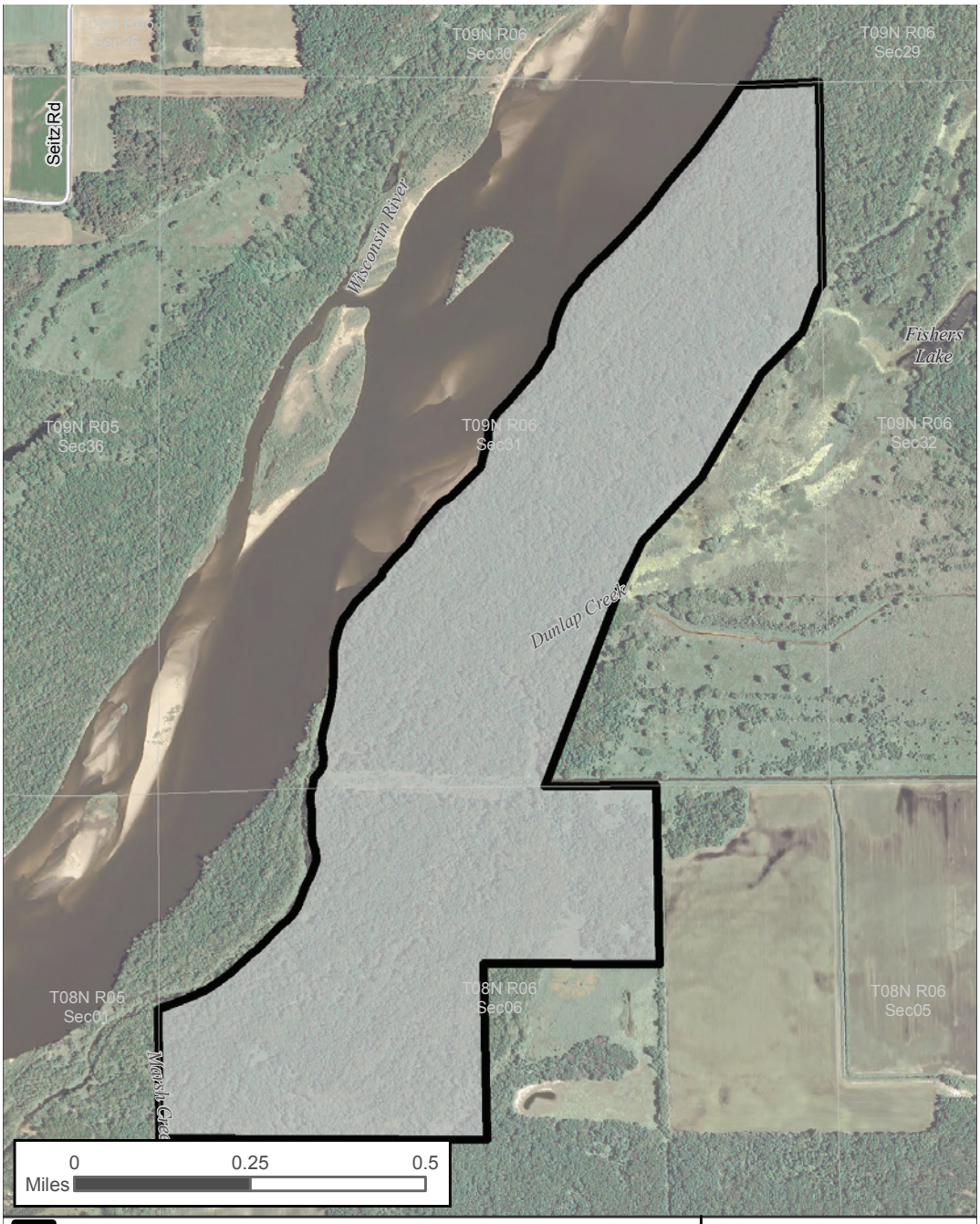
- Plant appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Salvage of trees after a major wind event is not compatible with the area's management objectives.

State Natural Area Designation

The Mazomanie Bottoms State Natural Area overlays the entire management area covering 352 acres. This SNA serves as an Ecological Reference Area.

Photo by Ann Freiwald, DNR

MAP 2.6 MAZOMANIE BOTTOMS



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BONESET SAVANNA

Overview and Summary

This 41 acre site is located on a narrow ridge overlooking the Wisconsin River, and is mostly forested with Southern Dry-Mesic Forest and overgrown Oak Woodland. Sandstone cliffs are exposed in several places, and have Dry Prairie and Dry Cliff associated with them. These natural communities are seriously threatened by woody succession and invasive plants. Several aspects of the site indicate a high potential for restoration, these include; the continuing survival of rare and conservative plant species, semi-open-grown, large-diameter savanna trees, and a somewhat high-diversity native ground layer.

Long Term Management Objectives (100 Years)

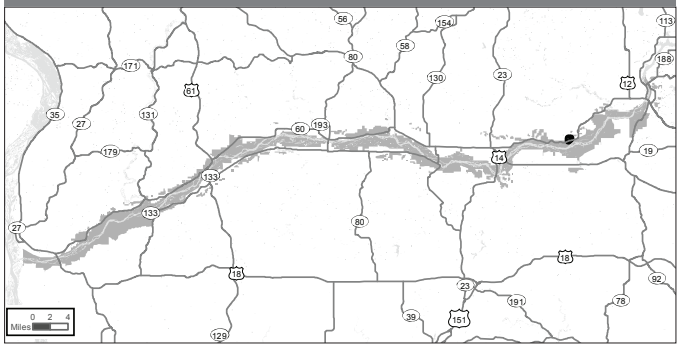
Provide an ecological reference area for Oak Woodland, Dry Prairie, Dry Cliff and Oak Opening.

Maintain and expand Dry Prairie remnants and Oak Opening habitat for native plants and animals. Maintain the lowlands to uplands gradient of site. Provide large, mature canopy trees for winter bald eagle roosts in appropriate locations.

Short Term Management Objectives (50 Years)

- Initiate restoration of Oak Woodland, Dry Prairie, Dry Cliff and Oak Opening.
- Expand the size of prairie openings to maintain conditions favorable to native prairie vegetation.
- Increase the diversity and abundance of native prairie and savanna vegetation and associated animal species with emphasis on rare species.
- Increase connections between patches of grassland vegetation.
- Return the natural process of fire to these disturbance dependent plant communities.
- Improve conditions for, and extend the life of, mature oak trees.

AREA 12 LOCATOR MAP

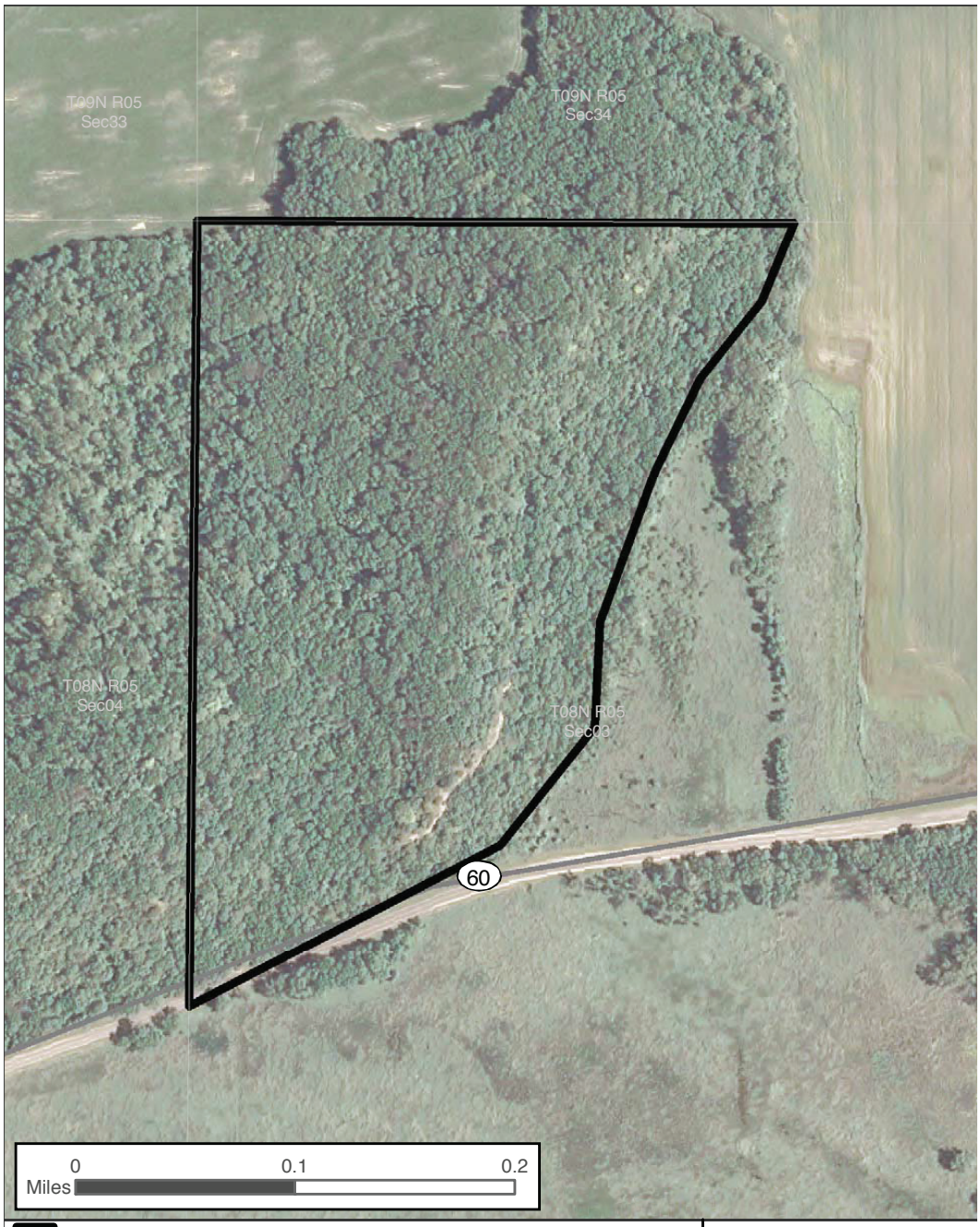


Management Prescriptions

- Use primarily an intensive fire management program to shape the ecological characteristics of the site.
- Passively manage the native dominant savanna tree species (primarily oaks). However, if needed, some thinning of the canopy, understory manipulation and shrub control via harvest or brushing may be used to mimic natural disturbance patterns.
- Remove shade tolerant tree competition from around and under mature oaks.
- In the prairie, actively control trees and shrubs using tree harvest, brushing and especially fire, mimicking natural disturbance patterns. Occasional fire-tolerant oaks, hickories, and native shrubs such as hazelnut may be retained at low densities.
- Augment the ground layer only with species that historically would have been found on the site, using local genotype seeds or plugs.
- Salvage of trees after a major wind event can occur if the volume of woody material inhibits fire prescriptions or other management objectives.

Photo by Nate Fayram, DNR

MAP 2.7 BONESET SAVANNA



WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Bureau of Facilities and Lands
November 11, 2015
WR-LWSR-MP-7925-Map 2.4 kmh

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ARENA BARRENS AND WETLANDS

Overview and Summary

This 205 acre site, situated in two tracts, lies on the deep sandy glacial outwash terrace bordering the Wisconsin River floodplain. The site features a diverse suite of barrens habitats including mostly open sand blow outs, a stabilized sand terrace with a very diverse bryophyte component, and Sand Barrens being invaded by trees and brush. The invading black oak, jack pine (*Pinus banksiana*) and red pine create moderate canopy cover (26-50%). A diverse ground layer is characterized by little bluestem, switch grass (*Panicum virgatum*), common sheep sorrel (*Rumex acetosella*), annual toadflax (*Linaria canadensis*), sand cress, goat's-rue, many tree seedlings (black oak, jack pine, red pine), and various lichens and mosses. Earthstar (*Geaster spp.*) is also present. Ninety three acres are designated as the Arena Pines and Sand Barrens State Natural Area.

Significance of Site

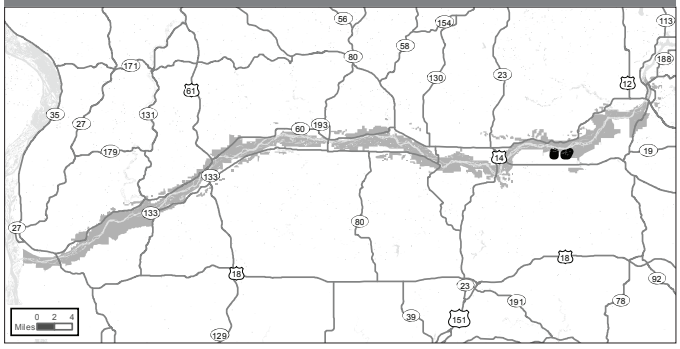
This site provides important habitat for grassland/shrubland bird species and herptile populations, (though its value as such diminishes as excessive trees and brush invade). SGCN birds currently known to utilize this site include field sparrow (*Spizella pusilla*), Bell's vireo, black-billed cuckoo, brown thrasher (*Toxostoma rufum*), and whip-poor-will.

The sandy soils of this site are likely an important nesting area for numerous turtle species that reside in nearby marshes, sloughs, and the main river channel (e.g., Blanding's turtles have been recorded in the vicinity). A moderate-quality Wet-mesic Prairie lies in the northeast corner of this site.

Within this management area is the 93 acre Arena Pines and Sand Barrens State Natural Area, which features two good examples of Sand Barrens vegetated with jack pine, black oak, and river birch. It was designated as a SNA in 1991.

Found along the edge of numerous sand blows scattered throughout the SNA is the evergreen false heather shrub (*Hudsonia tomentosa*), which helps stabilize the shifting sands. The ground layer harbors a mix of Sand Barrens and Sand Prairie species, including little bluestem, June grass, fork-tip three-awn grass (*Aristida basiramea*), flowering spurge, hoary puccoon, clasping Venus'-looking-glass (*Triodanis perfoliata*), annual toadflax, sand cress, Pennsylvania sedge, common sheep sorrel, rock spikemoss (*Selaginella rupestris*), prairie tickseed, and various bryophytes. Open sand blows and pockets of moist sand also occur within the site.

AREA 13 LOCATOR MAP



This site also harbors what is probably Wisconsin's largest known population of buttonweed (*Diodia teres var teres*), a state Special Concern species. A small clump of Sycamore (*Platanus occidentalis*), another state Special Concern species, is found at this site.

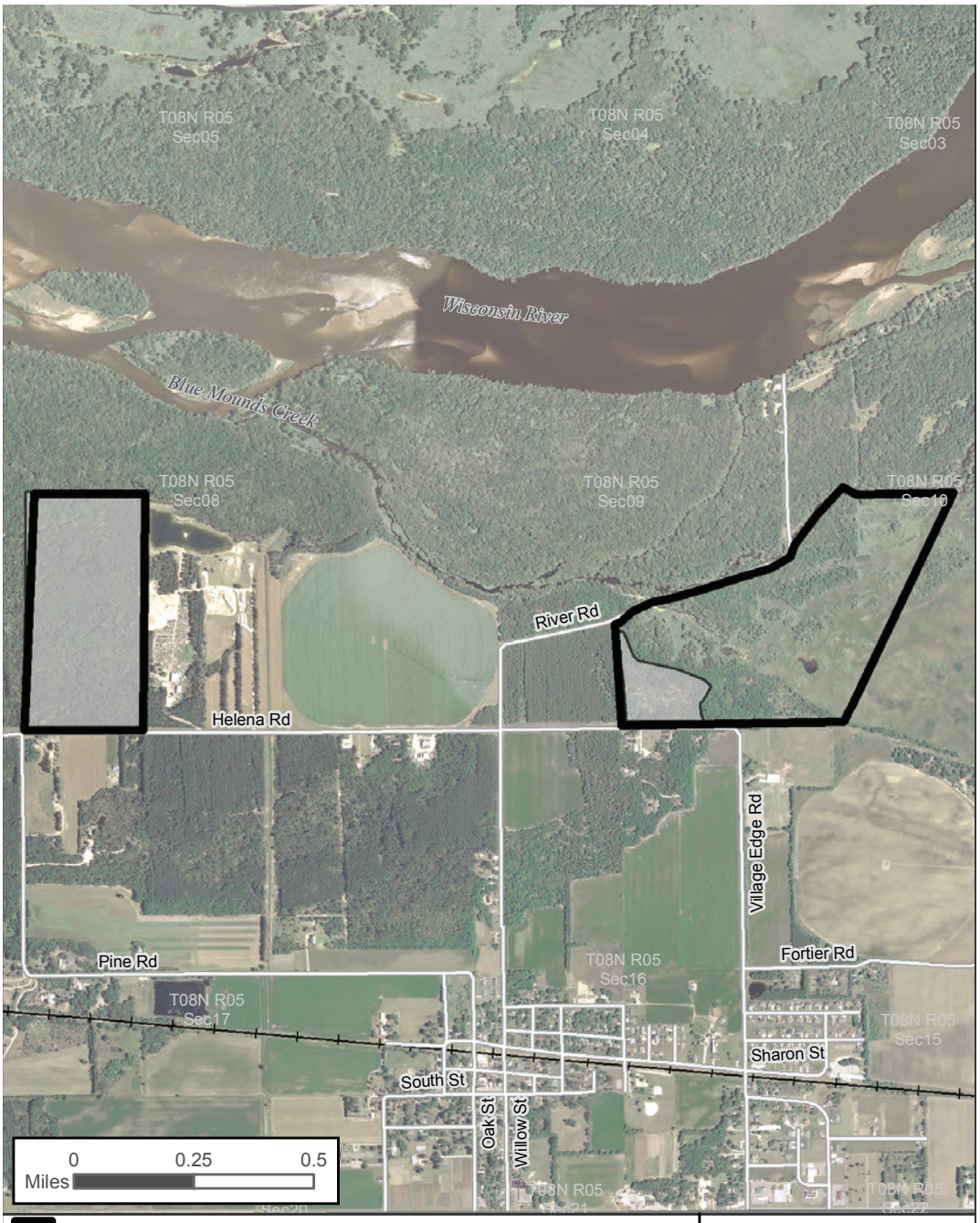
Long Term Management Objectives (100 Years)

Maintain the sand barrens and wet-mesic prairie to provide ecological reference areas, and maintain existing populations of herptile and bird Species of Greatest Conservation Need. To this end, provide a continuum of native communities with natural transitions between sand barrens, wet-mesic prairie, sedge meadow, shrub carr, and floodplain forest; provide appropriate native brush to provide habitat for wildlife that require early successional shrubby habitat; and promote grassland and wetland habitats for species that require open and early successional conditions.

Short Term Management Objectives (50 Years)

- Restore a continuum of habitats from sand barrens, wet-mesic prairie, sedge meadow, floodplain savanna, and floodplain forest. Develop and maintain natural transitions between different plant communities. Reduce hard edges between different cover types.
- Restore and expand the size of sand barrens and remnant prairie openings to create conditions favorable to native prairie vegetation.
- Increase the diversity and abundance of native prairie, barrens, savanna, and open wetland vegetation and associated animal species, with emphasis on rare species. Specifically, increase the acreage of open sand barrens habitat for nesting turtles and other reptiles.
- Provide habitat for wildlife that requires early successional shrubby habitat.

MAP 2.8 ARENA BARRENS AND WETLANDS



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Management Prescriptions

The overall management strategy is to use natural processes, prescribed fire, and prescribed vegetation manipulation to determine the structure of the communities and the ecological characteristics of the site.

- Manage grasslands and wetlands as a shifting mosaic of habitats, while promoting habitat for species that require open and early successional conditions.
- Use frequent prescribed fire to restore the site to a more open condition, and determine the ecological characteristics of the site. Consider impacts to reptiles regarding timing of prescribed burns.
- Actively manage the native sand barrens and wetland species through tree/shrub control using tree harvest, brushing and especially fire to mimic natural disturbance patterns.
- In sand barrens and wet-mesic prairie remove encroaching woody brush and trees especially non-native brush such as buckthorn, black locust, and honeysuckle.
- In the wetland, fire tolerant swamp white oaks and native shrubs such as dogwood and willow should be retained at low densities and in patches to mimic natural distribution. Other floodplain forest trees should be left as appropriate to mimic natural distribution (example – silver maple and river birch along wet swales or other natural barriers to fire).
- Provide and maintain appropriate patches of native brush within grassland communities for birds such as Bell's Vireo and Brown Thrasher.
- Control invasive species, specifically spotted knapweed, black locust, buckthorn, and honeysuckle.

The following additional objectives and management prescriptions apply to the SNA.

Arena Pines and Sand Barrens State Natural Area – 93 acres

Long Term Management Objectives (100 Years)

- Manage the site as a sand barrens reserve and as an ecological reference area, allowing natural processes with prescribed understory manipulation to determine the structure of the barrens.
- Provide opportunities for research and education on the highest quality native sand barrens.

Short Term Management Objectives (50 Years)

- Restore and maintain open sand barrens with patches of jack pine and oak barrens. Promote habitat for species that require open conditions; in particular, promote open sandy soil with sparse vegetation to benefit the reptiles, invertebrates and rare plants that rely on this habitat.
- Restore and maintain natural transitions from open barrens to adjacent communities.

Management Prescriptions

- Actively control trees and shrubs through tree harvest, brushing and prescribed fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks, jack pines, and native shrubs such as hazelnut may be retained at low densities. Remove other conifers and hardwood trees.
- Use combinations of timber harvest, brushing, and prescribed fire to expand open barrens habitat, and create a soft edge or transition into adjacent oak woodlands and floodplain forest.
- When conducting timber harvests, leave patches of jack pine of varied age classes and size, and leave scattered large oak. Remove fine woody material with a biomass harvest if possible. Following a timber harvest, use prescribed fire to restore the barrens ground layer, control brush, and restore desired structure and composition to the sand barrens. Chemical and mechanical control of brush and trees may also be used as needed for this purpose.
- Planting may be done to augment the ground layer for restoration or enhancement purposes. Augment the ground layer only with species that historically would have been found on the site, using local genotype seeds or plugs.
- When planning prescribed burn units, if appropriate provide for unburned refugia for fire sensitive barrens and prairie dependent invertebrates.
- Follow Incidental Take Protocols for listed species.
- Salvage of trees after a major wind event can occur with consultation if the volume of woody material inhibits fire prescriptions or salvage is consistent with management objectives.
- Long-term (after the short term objectives are met), maintain the structure and composition of the site by prescribed fire and natural processes, with additional control of trees, brush, and invasive species if needed to mimic natural disturbance patterns.
- For additional guidance, see the Barrens State Natural Area Management Guide (WDNR, 2011).

ARENA BARRENS AND WETLANDS

Photo by Nate Fayram, DNR

TOWER HILL BOTTOMS

Description of Site
Most of this 1,052 acre site is good-quality Floodplain Forest. The 476 acre Tower Hill Bottoms SNA features an excellent example of an undisturbed Floodplain Forest of silver maple, river birch, American elm, green ash, and swamp white oak.

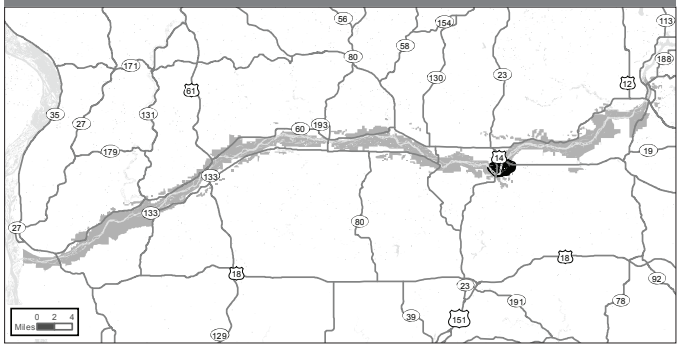
Significant portions of the western portion of this management area have been modified by humans: two artificial ponds, a snowmobile trail, and a power line right-of-way, plus State Highway 23 passes through the site, and Peck's Landing, a popular river access site, also lies within the area.

The Floodplain Forest has a dense canopy dominated by 12-24 inch dbh silver maple and swamp white oak. Other canopy species include river birch, bitternut hickory, and American elm; the subcanopy is moderately dense to dense, and has similar species composition. Shrubs range from sparse under the closed canopy to quite dense in areas where natural gaps have occurred with buttonbush, prickly ash, and silky dogwood (*Cornus amomum*) dominating. Especially common are climbing vines of grape (*Vitis sp.*), Virginia creeper, wild yam, carrion flower (*Smilax herbacea*), and poison ivy, which climb into the canopy giving the tree trunks a leafy appearance. By mid-summer, the groundlayer contains an abundance of wood nettle along with saw-tooth sunflower (*Helianthus grosseserratus*), cardinal flower (*Lobelia cardinalis*), sensitive fern (*Onoclea sensibilis*), fringed loosestrife (*Lysimachia ciliata*), and green dragon (*Arisaema dracontium*) other common ground layer species include dotted smartweed (*Polygonum punctatum*), small-spike false nettle (*Boehmeria cylindrica*), white grass (*Leersia virginica*), moneywort, and Muskingum sedge (*Carex muskingumensis*).

Breeding birds include pileated woodpecker (*Dryocopus pileatus*), tufted titmouse (*Baeolophus bicolor*), prothonotary warbler, and the state-threatened red-shouldered hawk.

Significance of Site
This site supports at least 3-4 active red-shouldered hawk territories. Other uncommon forest interior breeding birds also utilize this site and include one of only two breeding records for the State Endangered yellow-throated warbler within the LWSR, along with prothonotary warbler, Kentucky warbler, yellow-billed cuckoo, and wood thrush.

AREA 14 LOCATOR MAP



Most of the representative Floodplain Forest species such as wood thrush, yellow-throated vireo (*Vireo flavifrons*), and brown creeper (*Certhia americana*) are also present.

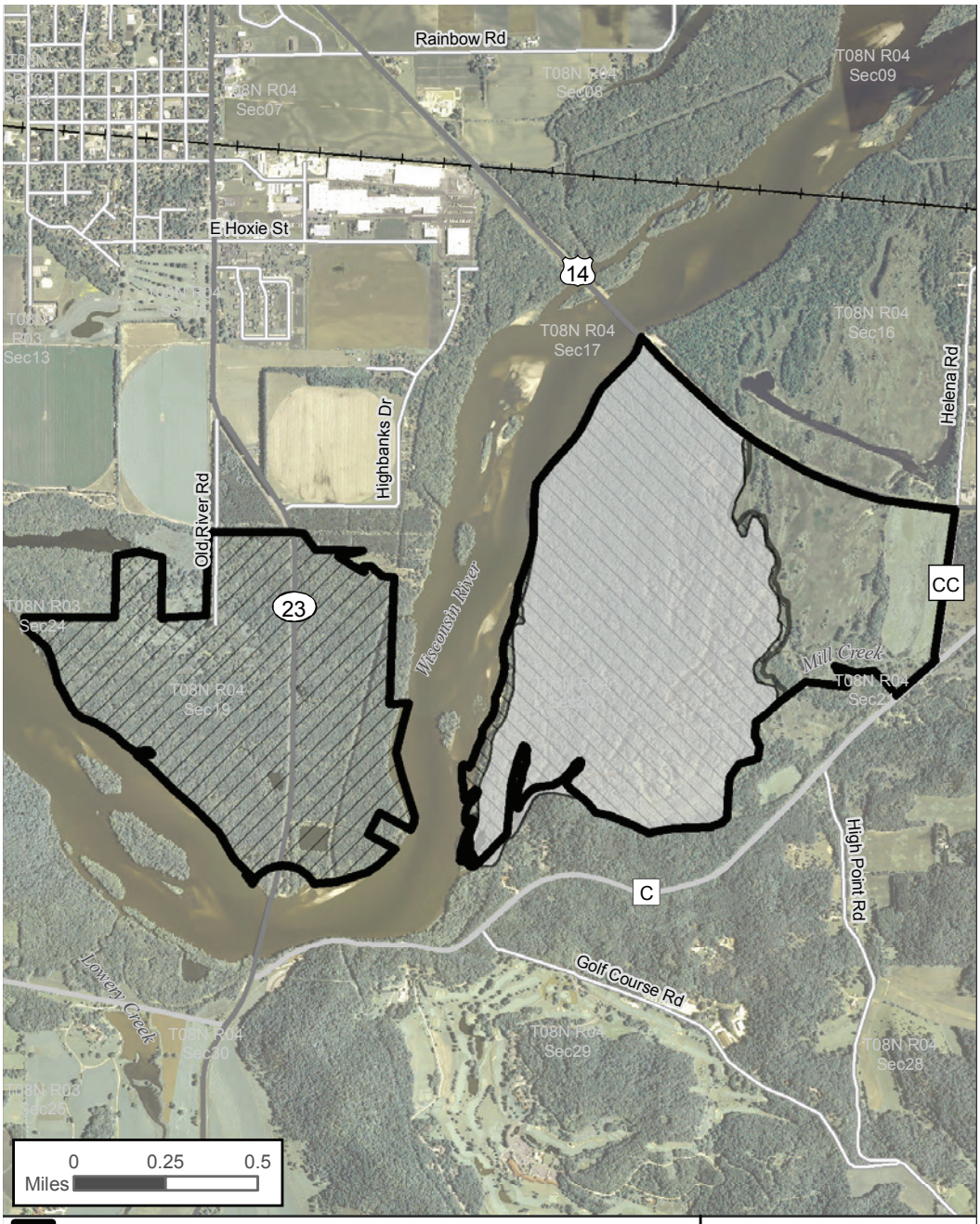
A moderate-sized Bird Rookery is present at the site with 15-20 great-blue heron (*Ardea herodias*) nests present. Only one other rookery of equal size is known from the entire LWSR.

The floodplain lakes and sloughs within the site support good populations of the State Endangered starhead topminnow (*Fundulus dispar*). Sweet-scented Indian-plantain (*Cacalia suaveolens*), a Special Concern plant, occurs at this site.

Long-Term Management Objectives (100 years)
Provide a large area of structurally and functionally diverse, older, intact, connected bottomland hardwood forest habitat with large diameter silver maple, swamp white oak, and mixed bottomland hardwood species for ecological values and rare species habitat needs. Old forest attributes such as coarse woody debris and standing dead snags are abundant. Maintain a continuum of native wetland communities adjacent to the floodplain forest to provide habitat for species associated with open grasslands and wetlands. Additionally, provide complimentary actively-managed old forest bottomland and passively-managed bottomland forest tracts for comparison and research.

Short-Term Management Objectives (50 years)
This management area will be managed as three segments; the floodplain forest area west of the river will be "managed old forest", the SNA will be a "reserved old growth forest and "passively managed", the remaining area, east of the SNA, is marsh and wetland. The management objectives and prescriptions for each are detailed below.

MAP 2.9 TOWER HILL BOTTOMS



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AREA 14 NATIVE COMMUNITY MANAGEMENT AREA

TOWER HILL BOTTOMS

Managed Old Floodplain Forest Area (407 acres)

- Actively develop and maintain a closed canopy forest of longer-lived species, such as swamp white oak, silver maple, and other bottomland hardwood species. Develop and enhance a complex old forest age structure and characteristics, such as canopy structure diversity, large diameter trees, standing dead snags, and coarse woody debris.
- Use Managed Old Forest silvicultural prescriptions and techniques to develop old forest characteristics within sideboards to meet native community objectives.
- Develop and maintain red-shouldered hawk and prothonotary warbler habitat. Protect the Great Blue Heron rookery.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River and Tower Hill State Park.

Tower Hill Bottoms State Natural Area (476 acres)

- Maintain as a Reserved Old Growth Bottomland Hardwood Forest and as an ecological reference area.

Emergent Marsh and Grasslands Area (175 acres) (17 of these acres lie within Tower Hill State Park)

- Manage grasslands and non-forested wetlands as a shifting mosaic of habitats, while promoting habitat for species that require open and early successional conditions.
- Restore open prairie and sedge meadows by reducing encroaching woody brush and trees. Maintain appropriate native brush to provide habitat for wildlife that require early successional shrubby habitat.
- Develop and maintain a transition (soft edge) between open wetlands and closed canopy floodplain forest.

Management Prescriptions

Managed Old Floodplain Forest Area

- Use active management techniques that mimic natural disturbances to maintain floodplain forest cover type for ecological values. Follow the managed old forest – bottomland hardwood management prescriptions in the General Habitat Management Section of this plan.
- Plant appropriate native trees to fill in gaps where reed canary grass dominates or is threatening to dominate.
- Actively control non-native invasives or aggressive natives/ naturalized vegetation such as box elder, honeysuckle, and reed canary grass.

Tower Hill Bottoms State Natural Area

- Use passive management to allow natural processes to determine the structure of the native forest. Actions to control invasive species and low intensity prescribed fire are allowed.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Plant appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Actively control non-native invasives or aggressive natives/ naturalized vegetation such as box elder, garlic mustard and reed canary grass.
- Salvage of trees after a major wind event is not compatible with the management objectives.
- Provide opportunities for research and education on the highest quality native floodplain forests.

Emergent Marsh and Grasslands Area

- Use prescribed fire, timber harvests, and tree/brush control to maintain grasslands and non-forested wetlands and to develop and maintain transitions between a natural continuum of plant communities from prairie, floodplain savanna, emergent marsh, and sedge meadow and to the closed canopy floodplain forest.
- In the open wetlands, retain fire tolerant swamp white oaks and native shrubs such as dogwood and willow at low densities and in patches to mimic natural distribution. Leave other floodplain forest trees as appropriate to mimic natural distribution (example – silver maple and river birch along wet swales or other natural barriers to fire).

Photo by John and Karen Hollingsworth

TOWER HILL BOTTOMS

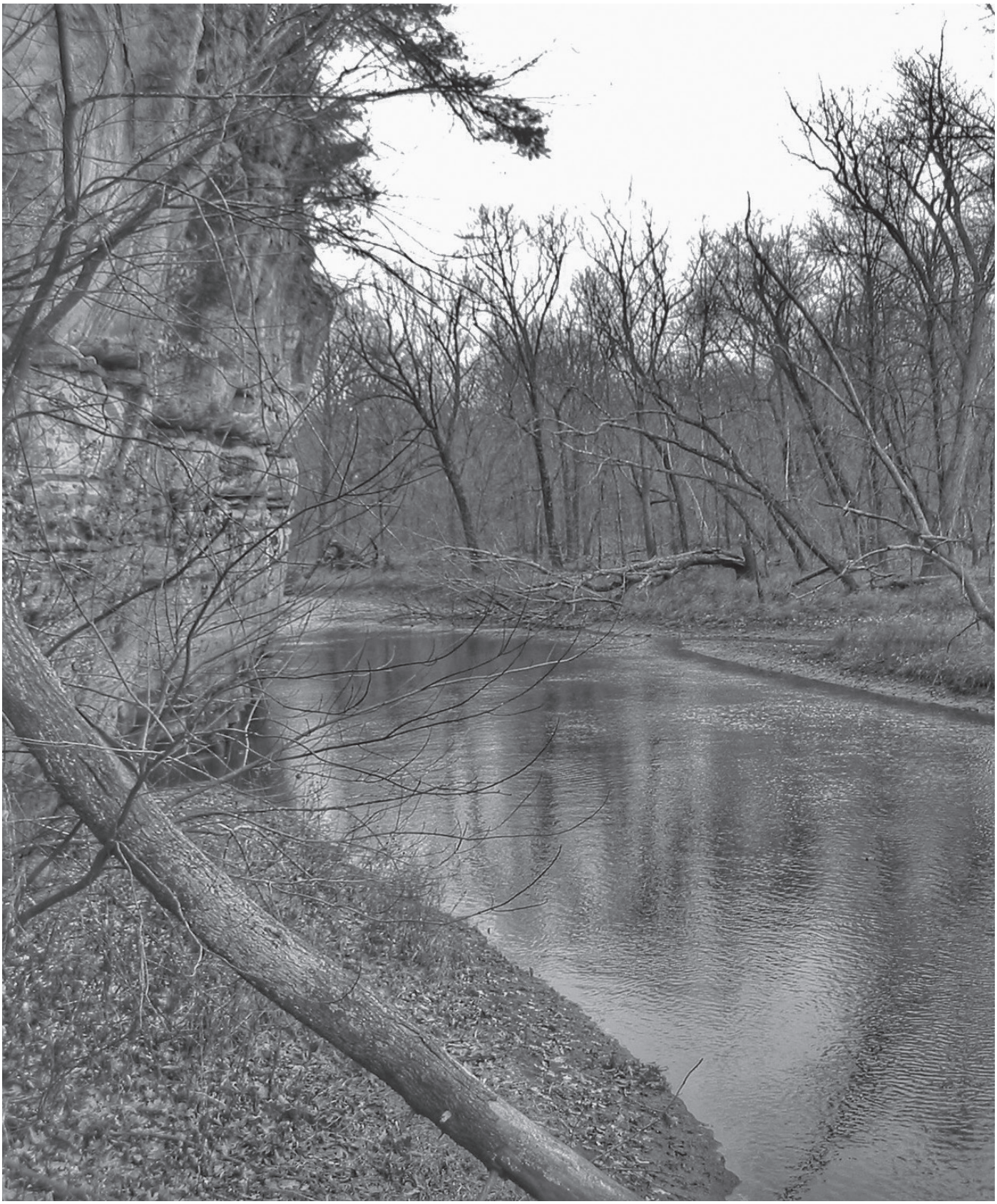


Photo by Ann Freiwald, DNR

BAKKENS POND MARSH, WOODS AND BARRENS

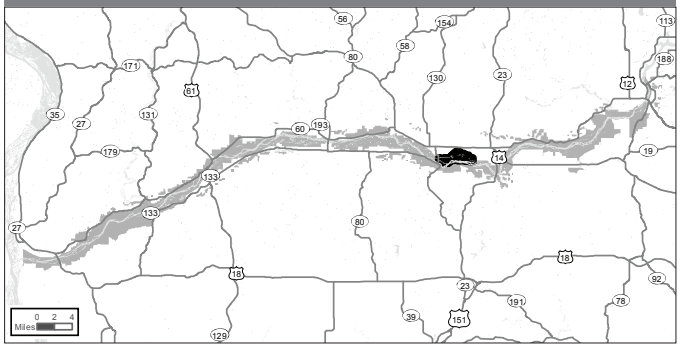
Overview and Summary

This site totals 1,624 acres, including the Bakkens Pond State Natural Area (160 acres) and an additional 1,464 acres of adjacent state-owned land. Barrens habitats are found in the northern part of the site, while a vast complex of aquatic and wetland communities lie to the south within the Wisconsin River floodplain, including Emergent Marsh, Southern Sedge Meadow and Floodplain Forest.

The barrens of the north lie on the rolling terrain of stabilized sand dunes. This area was historically Dry and Dry-mesic Prairie, and is recovering from past agricultural/silvicultural practices. The higher quality barrens are north of a former pine plantation area and are dominated by black oak. In areas with less shade, Sand Prairie plants are common, and include little bluestem, June grass, flowering spurge, rough blazing-star, goat's-rue, prairie tickseed, hairy puccoon, blood milkwort (*Polygala sanguinea*), Seneca snakeroot (*P. senega*), and plains prickly-pear (*Opuntia macrorhiza*).

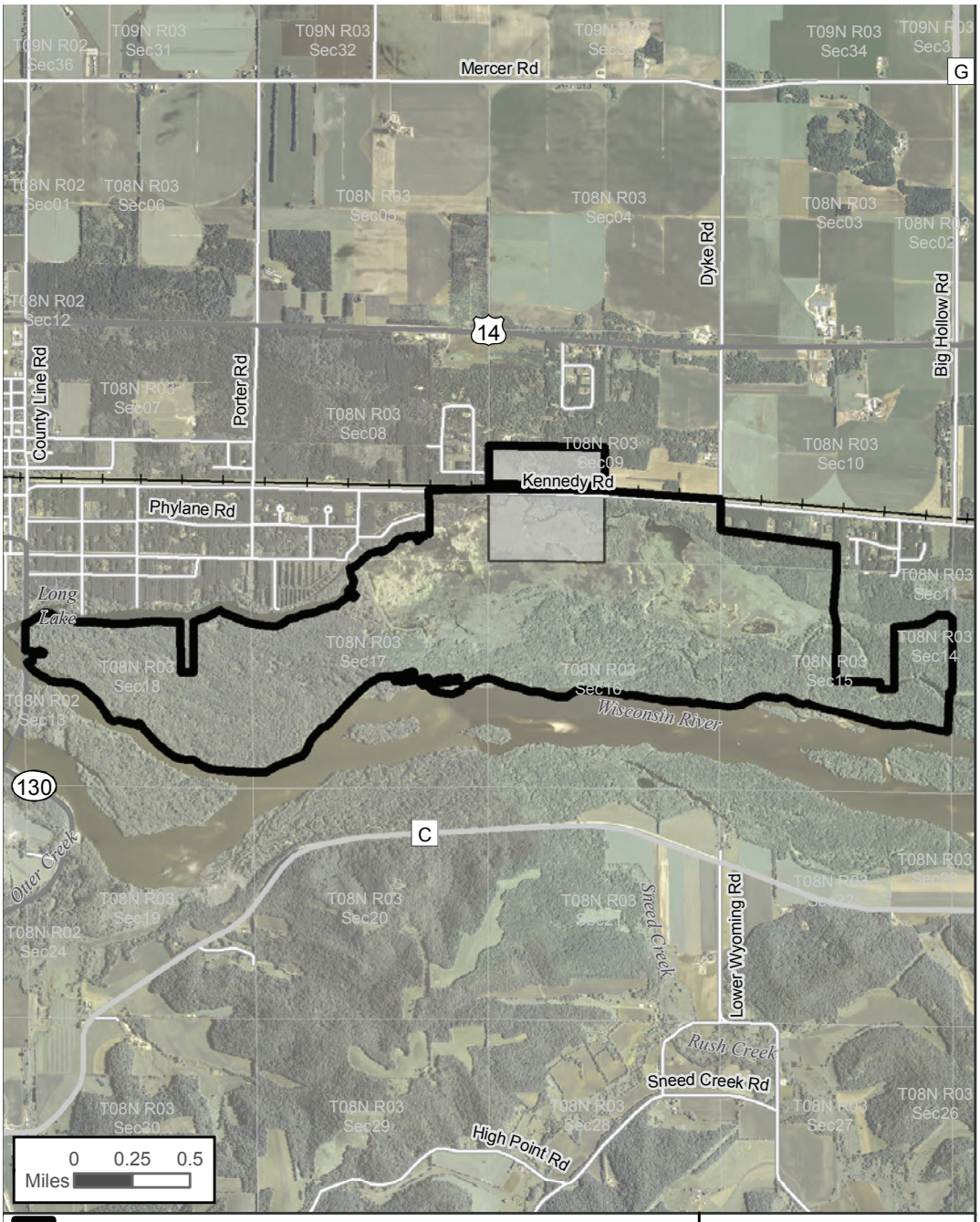
Bakkens Pond-proper features a cold spring-fed stream with diverse invertebrate and fish fauna. Bordering the stream to the south is an extensive wetland consisting predominantly of blue-joint grass (*Calamagrostis canadensis*), sedges (*Carex spp.*), and the invasive reed canary grass. Scattered woody vegetation interrupts the extensive sedge meadow with willows (*Salix spp.*), alders, elms, and silver maple. This patchy woody vegetation grades into a good-quality, second-growth Floodplain Forest that spans an approximately 5-mile stretch along the north shore of the Wisconsin River. A dense (80-90%) canopy prevails throughout, and is mostly dominated by silver maple (10-16 inch dbh), though one area has swamp white oaks that reach 14-18 inch dbh. Other common canopy associates include green ash, river birch, and bitter-nut hickory. The sapling layer is moderate and is mostly hackberry, with some silver maple, basswood, bitter-nut hickory, swamp white oak, and elm. A very sparse shrub layer is created by prickly ash. The ground layer is dense and variable, often heavily dominated by wood nettle, along with cut-leaved coneflower (*Rudbeckia laciniata*), rice cut grass (*Leersia oryzoides*), and various sedge species. Small (about 1-acre) Wet-mesic Prairie openings occur as inclusions within the forest, and have species such as big bluestem, prairie cord grass and Canadian goldenrod (*Solidago canadensis*); these openings are being encroached upon by prickly ash. Other openings within the forest are dominated by invasive reed canary grass.

AREA 15 LOCATOR MAP



This large site encompasses a variety of community types, lending itself to a diverse fauna. The large Floodplain Forest provides habitat for numerous conservative, area-sensitive forest interior breeding birds including red-shouldered hawk, Kentucky warbler, prothonotary warbler, and yellow-billed cuckoo. Two rare plants are found in the Floodplain Forest: sweet-scented Indian plantain and small forget-me-not (*Myosotis laxa*). The aquatic-wetland complex supports rare marsh birds including least bittern (*Ixobrychus exilis*), American bittern (*Botaurus lentiginosus*), and the willow flycatcher (*Empidonax traillii*), uncommon dragonflies species such as fragile forktail (*Ischnura posita*), Cyrano darner (*Nasiaeschna pentacantha*), and smoky shadowfly (*Neurocordulia molesta*), and an abundance of rare backwater fishes including starhead topminnow, lake chubsucker (*Erimyzon sucetta*), pirate perch (*Aphredoderus sayanus*), and mud darter (*Etheostoma asprigene*). In addition, the Sand Barrens within and adjacent to this site support good populations of a suite of rare, sand-dependant reptiles like six-lined racerunner and gophersnake, provide important nesting areas for numerous turtle species, and offer potential habitat for North American racer, prairie ring-necked snake, and plains gartersnake (*Thamnophis radix*) (all of these are known within close proximity to the site). Other amphibians and reptiles that use this site include green (*Lithobates clamitans*), chorus (*Pseudacris triseriata*), and leopard frogs (*L. pipiens*), tiger salamander (*Ambystoma tigrinum*), eastern newt (*Notophthalmus viridescens*), northern water snake (*Nerodia sipedon*), and eastern painted turtle (*Chrysemys picta picta*). The barrens provide opportunities for shrubland birds of conservation concern such as brown thrasher, whip-poor-will, field sparrow, and red-headed woodpecker (*Melanerpes erythrocephalus*).

MAP 2.10 BAKKENS POND MARSH, WOODS AND BARRENS



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AREA 15 NATIVE COMMUNITY MANAGEMENT AREA

BAKKENS POND MARSH, WOODS AND BARRENS

Long Term Management Objectives (100 Years)

Maintain a complex of high quality sand barrens, oak openings, oak barrens, open wetland communities, and a large block of Floodplain Forest to provide habitat for a wide range of species, including many that are rare. Protect the ecological values of the site, including water quality, hydrology, native flora and communities. In particular, provide high quality habitat for forest interior birds and marsh birds. Provide ample opportunities for research, education, ecological interpretation and compatible low-impact uses such as hunting, hiking, bird-watching, photography, and nature study.

Short Term Management Objectives (50 Years)

Bakkens Pond State Natural Area

- Manage the site for emergent aquatics, southern sedge meadow, oak barrens, and as an ecological reference area. Allow natural processes assisted by prescribed understory manipulation (see below) to determine the structure of the barrens. Allow natural processes and fluctuating water levels to determine the structure of the wetland and aquatic communities.

Floodplain Forest

- Maintain the large block of Floodplain Forest and associated lowland communities
- Follow the objectives for "Managed Old Forest" in the General Habitat Management section of this plan.

Open Wetlands

- Follow the objectives for "Flowages", "Sedge Meadow", and "Emergent Marsh" in the General Habitat Management section of this plan.
- Manage habitat for wildlife, waterfowl and fishing.
- Protect and enhance water quality in the flowages.

Sand Barrens

- Restore sand prairie, oak barrens, and oak opening habitats along sand terrace areas that are adjacent to open water, emergent marsh, and other wetlands.
- Provide a shifting mosaic of prairie and savanna habitats, while promoting habitat for species that require open conditions.
- Expand the barrens area to include previously unmanaged areas, promoting open prairie and savanna to provide additional habitat for rare species.
- Promote open sandy soil with sparse vegetation to benefit the reptiles, invertebrates and rare plants that rely on this habitat; especially improve habitat for nesting turtles and other reptiles.
- Restore and maintain natural transitions from open to closed canopy communities. Maintain existing populations of reptiles and other Species of Greatest Conservation Need.

Management Prescriptions

Bakkens Pond State Natural Area

- Passively manage the native wetland and aquatic species.
- Manage native barrens actively through tree/shrub control using tree harvest, brushing and fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks and native shrubs may be retained at low densities.
- Continue conversion of former pine plantation to sand/oak barrens with combinations of inter-seeding, prescribed fire, brush control, and invasive species control.
- Control invasive species, especially spotted knapweed.
- Other allowable activities include control of invasive plants and animals, and access to suppress wildfires.
- Roadside and railroad easement areas may be managed sporadically by township/state and railroad company. Current roadside easement management is spreading invasive species, in particular spotted knapweed, due to mowing and seed spread.

Floodplain Forest

- Follow the prescriptions for "Managed Old Forest" in the General Habitat Management section of this plan.

Marsh

- Use General Habitat Management prescriptions for Flowages and Emergent Marshes in the General Habitat Management section of this plan.

Photo by Nate Fayram, DNR

BAKKENS POND MARSH, WOODS AND BARRENS

Oak and Sand Barrens

- Use timber harvests, brush/tree clearing, prescribed fire, and chemical application to restore native community structure, composition, and function.
- In previously unmanaged areas, use combinations of timber harvest, brush/tree clearing, and prescribed fire to reduce woody cover, expand open habitat, and create a soft edge or transition into adjacent communities.
- Leave scattered oak, jack pine, and other native trees depending on community structural objectives. Retain snags and course woody debris as important habitat features, unless they conflict with other objectives (such as hazard trees near roads, or prescribed fire hazards).
- Leave course woody debris in sloughs and other water bodies to meet aquatic community objectives.
- Follow Incidental Take Protocols for listed species.
- Consider appropriate unburned refugia for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units, and consider impacts to reptiles regarding timing of prescribed burns.
- Prairie and barrens plant species should be seeded as needed. Use local genotype seed sources.
- Thin and harvest plantations and convert to native cover types where they conflict with management objectives.
- Control invasive species, specifically black locust, spotted knapweed, and non-native brush.
- If practicable, install fencing or an ecopassage to reduce the mortality of nesting turtles crossing Kennedy Road.
- See *Other Riverway Day Use Sites*, *Trails and Scenic Overlooks* for public use related prescriptions.

Photo by DNR

SMITH AND CRUSON SLOUGHS

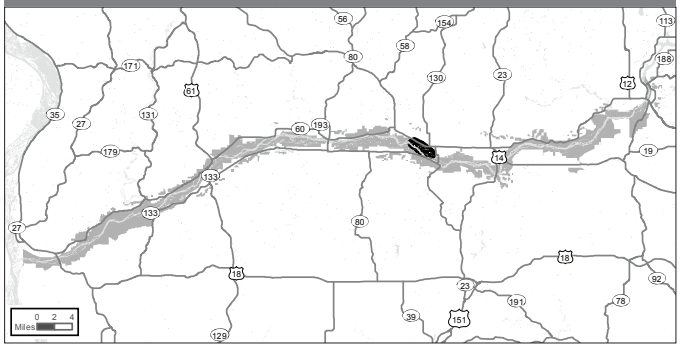
Description of Site

This site includes the 397-acre Smith Slough and Sand Prairie State Natural Area and the adjoining 539 acres to the northwest associated with Cruson Slough. This site's diverse communities span the floodplain of the Wisconsin River and the adjacent upland sand terrace, and include a shallow spring-fed lake, an oxbow lake, open water sloughs, a vast open wetland complex, Floodplain Forest, Oak Barrens, and areas of remnant and restored Sand Prairie.

Smith Slough is a shallow seepage-fed oxbow lake that has become hydrologically isolated from the river. Smith Slough and Sand Prairie SNA contains a large complex of plant communities located in the Wisconsin River floodplain on alluvial sand deposits that fluctuate no more than 6 feet in topography. Lying south and west of the lake is a large undisturbed complex of sedge meadow, shrub-carr, and aquatic emergents that grades into big blue-stem dominated sand prairie and swamp white oak savanna on slightly elevated ridges. On the sand terraces along the lake is a narrow band of black oak barrens with a ground flora of sedges, big and little blue-stem, and cream wild indigo (*Baptisia bracteata*). On higher ground is an area of open sand and old dunes that are now stabilized by false heather, black oak, and river birch. Also present is a bottomland hardwood forest dominated by swamp white oak with silver maple, green ash, American elm, and river birch in lower swales and swamp white oak, red oak, basswood, and bitternut hickory on slightly higher ground. Some trees are in excess of 4 feet in diameter. Of note is a plant species of special concern --the small forget-me-not (*Myosotis laxa*). Animal species of concern include the state-endangered starhead topminnow (*Fundulus notti*), and goldeye (*Hiodon alosoides*); Blanding's turtle (*Emydoidea blandingii*); and least darter (*Etheostoma microperca*).

Cruson Slough is a shallow, spring-fed, sandy bottomed oxbow lake that has been noted for its exceptional water quality. An earthen dike with a water control structure was constructed on the northwest corner converting the Slough to a flowage (sometimes called a raised lake). The addition of the dike changed the hydrology converting the lake's associated wetland complex from mostly Southern Sedge Meadow and Shrub-carr to Emergent Marsh. Remnants of the sedge meadow and Shrub-carr still occur within the marsh, creating a diverse matrix of communities. Common species of the wetland include blue-joint grass, common lake sedge (*Carex lacustris*), tussock sedge (*C. stricta*), broad-leaved cat-tail (*Typha latifolia*), and sensitive fern. The brushier areas have up to 60% cover from steeple bush (*Spiraea tomentosa*), silky dogwood, slender willow (*Salix petiolaris*) and meadowsweet

AREA 16 LOCATOR MAP



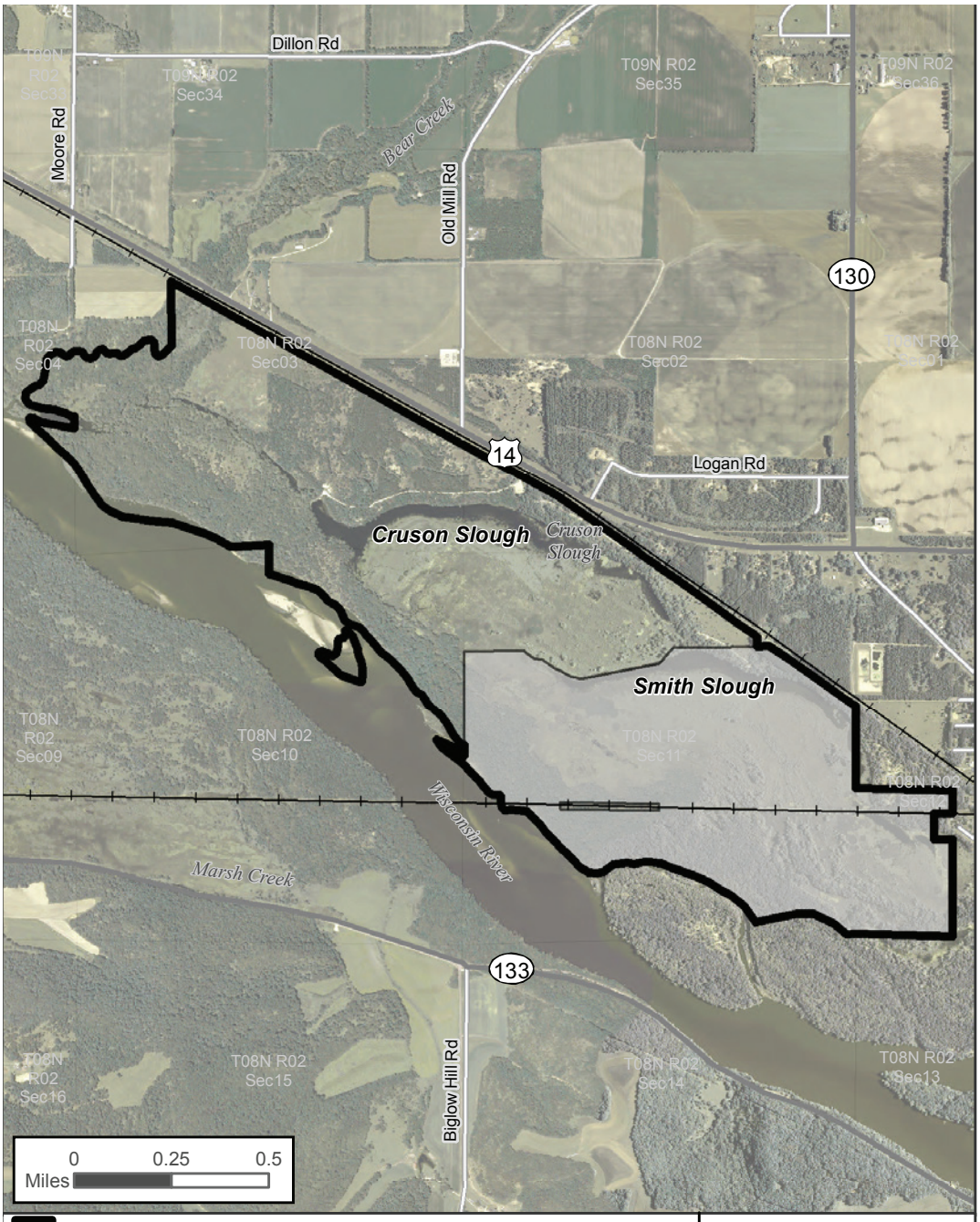
(*Spiraea alba*). Duck breeding ponds have been created at the east end of the wetland.

The Floodplain Forest is a mix of intact and second-growth forest. In intact areas, the canopy is dense, with 16-20 inch dbh silver maple, and lesser amounts of green ash, swamp white oak, basswood, river birch, eastern cottonwood (*Populus deltoides*), and some red elm (*Ulmus rubra*). In younger areas, the canopy is moderately dense, with mostly 8-10 inch dbh silver maple; a few trees reach 36 inches dbh. Throughout this community, the subcanopy is comprised of similar species, along with American elm and river birch. The shrub layer has moderate cover of prickly ash, Rydberg's poison-ivy, and occasional buttonbush. The ground layer is dense, and is characterized by wood nettle, jumpseed, blue phlox, green-headed coneflower, and bristly buttercup.

A 36-acre patch of good-quality Oak Barrens lies between Cruson Slough and U.S. Highway 14, and has a sparse canopy (6-25% cover) from 6-8 inch dbh black oak. Black oak grows sparsely in the sapling layer as well here. The ground layer is dominated by Pennsylvania sedge, big bluestem, June grass and false heather; a sparse bryophyte layer of mosses and lichens occurs here as well. Exposed sand comprises 6-25% of the area.

Remnant Sand Prairie is found along U.S. Highway14, and is characterized by little bluestem, gray goldenrod, showy goldenrod (*Solidago speciosa*), flowering spurge, common sheep sorrel, round-headed bush-clover (*Lespedeza capitata*), Muhlenberg's bracted sedge (*Carex muhlenbergii*), common spiderwort, rough blazing-star, dotted horsemint (*Monarda punctata*), prickly pear cactus, and Virginia dwarf-dandelion (*Krigia virginica*). Kentucky bluegrass is common here as well, along with sparse black oak saplings and stunted smooth sumac (*Rhus glabra*).

MAP 2.11 SMITH AND CRUSON SLOUGHS



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Significance of Site

This site has a diverse assemblage of community types present, ranging from Floodplain Forest to barrens to open wetlands. Each type supports a rare assemblage of representative avian taxa. The large expansive Floodplain Forest provides excellent habitat for uncommon forest interior breeding birds, including prothonotary warbler, yellow-billed cuckoo, and red-shouldered hawk, with a bald eagle nest occurring at the west end of the site along the river. The primary site is one of the best in the LWSR for marsh birds, with good numbers of least bittern, yellow-headed blackbird (*Xanthocephalus xanthocephalus*), willow flycatcher, and blue-winged teal (*Anas discors*), as well as more common representative species like Virginia (*Rallus limicola*) and sora rails (*Porzana carolina*), sedge wren (*Cistothorus platensis*), and marsh wren (*C. palustris*).

The floodplain lakes and sloughs within the site support two State Endangered fish species (starhead topminnow and goldeye [*Hiodon alosoides*]) and one State Special Concern species (least darter [*Etheostoma microperca*]).

The open wetland area provides habitat for a state-threatened plant species: pale green orchid (*Platanthera flava*). Two state Special Concern species, sweet-scented Indian plantain and small forget-me-not are found in or near the Floodplain Forest. For both of these species, the Floodplain Forests of the LWSR contain approximately 20% of the known populations in the state. The Floodplain Forest is unusual in that some areas show no evidence of past logging, and trees can be found that reach or exceed 4 feet dbh.

The Oak Barrens support a small population of the state Special Concern prairie ragwort. The Sand Prairie continues for approximately 4.5 miles along the highway, beyond the bounds of this site, and provides habitat for two state Special Concern species: clustered poppy mallow (*Callirhoe triangulata*) and prairie fame-flower. Both of these species are globally rare and reach their greatest abundance nationwide in Wisconsin.

This site, especially the large area on the east end of Lone Rock Sand Prairie, is a high priority for many species of invertebrates (Kirk 2009). Many dragonflies were observed, including the rare white-spangled skimmer (*Libellula cyanea*) and many immature grasshoppers. The rare species Phyllira tiger moth (*Grammia phyllira*) and tiger beetle (*Cicindela macra*) were also collected here in the past. Leonard's skipper (*Hesperia leonardus*) and Whitney's underwing moth (*Catocala whitneyi*) have been recorded just north of State Highway 14/60.

Open sand prairie habitat is a priority for management at this site for open sand invertebrates, as well as numerous turtle species, for which the sandy soils of this site are likely an important nesting area. Many of the turtle species that use this area reside in nearby marshes, sloughs, and the main river channel. False map turtles and Blanding's turtles are known here.

The Smith Slough and Sand Prairie tract was designated a State Natural Area in 1991.

Area-wide Objectives

The overall management objective for all of the Native Community Management Area is to maintain a large complex of communities located on alluvial sand deposits grading down to the Wisconsin River. Manage for a continuum of native communities to provide habitat for a wide range of wildlife. Restore and maintain ecotones from sand terraces to wetlands.

Management Objectives and Prescriptions by Site

Smith Slough and Sand Prairie SNA

Management Objectives

- Maintain the site as an ecological reference area for sand prairie, wetland, and aquatic communities.
- Provide opportunities for research and education on the highest quality native sedge meadows and sand prairies.
- For aquatic resources, follow the management objectives for Sloughs, Oxbow Lakes and Floodplain Lakes in the general habitat management section of this plan.
- For the barrens to wetlands "high bank" ecotone area; follow the management objectives for Sand Terrace High Bank Restoration – Open Nesting Habitat in the general habitat management section of this plan.

Management Prescriptions

- Control trees and shrubs on the native prairie and barrens areas by tree harvest, brushing and fire to mimic natural disturbance patterns. Fire-tolerant oaks and native shrubs such as hazelnut may be retained at low densities.
- In the sedge meadow and swamp white oak savanna, use fire and selective tree and brush control to restore and maintain structure. Passively manage swamp white oak.
- Use fire to restore and maintain transitions between communities. Use natural fire breaks (water bodies) and existing man-made breaks (railroad tracks and roads) and allow landscape scale fire to determine structure and composition of the native communities.
- Consider impacts to reptiles, especially Blanding's turtles, with regards to timing of prescribed burns.
- For the barrens to wetlands "high bank" ecotone area; follow the management prescriptions for Sand Terrace High Bank Restoration – Open Nesting Habitat in the general habitat management section of this plan.

- For aquatic resources, follow the management prescriptions for Sloughs, Oxbow Lakes and Floodplain Lakes in the general habitat management section of this plan.
- Other allowable activities include control of invasive plants and animals, and access to suppress wildfires.

Cruson Slough

Management Objectives and Prescriptions

Flowages, Emergent Marsh, and Sedge Meadows

- Follow the management objectives and prescriptions for these communities in the general habitat management section of this plan.

Oak and Sand Barrens

Management Objectives

- Maintain, restore, and enhance the ecological function of barrens communities with specific emphasis on habitat for sand barrens-dependent rare plants, birds, herptiles, and invertebrates.
- For the barrens to wetlands "high bank" ecotone area; follow the management objectives for Sand Terrace High Bank Restoration – Open Nesting Habitat in the general habitat management section of this plan.

Management Prescriptions

- Use prescribed fire as a primary tool to restore and maintain this community complex. Mechanical brushing and some forestry practices may be used as well.
- Manage as a moving mosaic of habitat, ensuring that habitat for the many species that require open conditions is not diminished or degraded. Tree harvesting and thinning and sowing of native seed may be used where appropriate.
- Retain occasional oaks and native shrubs for shrubland bird species, to provide shady retreats for herptiles, and to provide mast for wildlife.
- Connect and expand open barrens, prairie, and wetlands to provide grassland bird habitat and safe passage for reptiles to utilize barrens for nesting.
- Identify and control any existing invasive plants. Control the spread of new invasives by attempting to identify populations when they are small and eliminate them before they spread.
- Protect turtle nesting sites.
- For the barrens to wetlands "high bank" ecotone area; follow the management prescriptions for Sand Terrace High Bank Restoration – Open Nesting Habitat in the general habitat management section of this plan.
- Restrict off-road vehicle and other soil-disturbing activities in sensitive areas.
- See *Other Riverway Day Use Sites*, *Trails and Scenic Overlooks* for public use related prescriptions.

Photo by Travis Anderson, DNR

GOTHAM JACK PINE BARRENS

Description of Site

Gotham Jack Pine Barrens was designated a State Natural Area in 1994.

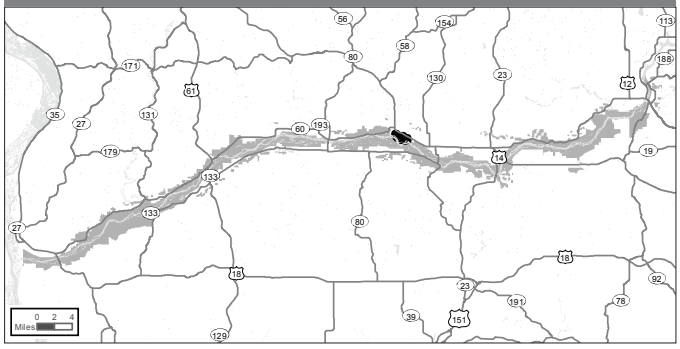
Located on Wisconsin River sand terraces, Gotham Jack Pine Barrens contains the largest and best remaining black oak and Pine Barrens in the LWSR. Three linear water bodies extend from the Wisconsin River: one is a backwater with connectivity to the main river channel, while the other two are land-locked, shallow oxbow lakes of high water quality. Also present are a Southern Sedge Meadow and open sand blows.

The northern third of the site is in the early stages of reverting from open sand barrens to Pine Barrens. Saplings of black oak and jack pine are moderately dispersed throughout this area, and the ground layer is dominated by Pennsylvania sedge, common sheep sorrel, switch grass, and little bluestem. The southern two-thirds of the site harbors good-quality, established Pine Barrens with a semi-open canopy of black oak and jack pine. The shrub layer has occasional prickly ash, common dewberry (*Rubus flagellaris*), Virginia creeper and poison ivy. The ground layer in this southern area is moderately dense, and is dominated by Pennsylvania sedge, with lesser amounts of Kentucky bluegrass, common sheep sorrel, hoary puccoon, starry false Solomon's-seal, wild lupine (*Lupinus perennis*), and prairie tickseed.

A 12-acre depression holds Southern Sedge Meadow comprised mostly of common lake sedge and blue-joint grass, with lesser amounts of broad-leaved arrowhead (*Sagittaria latifolia*), rice cut grass, river bulrush (*Bolboschoenus fluviatilis*), and wool-grass (*Scirpus cyperinus*).

Pine Barrens are globally imperiled and the Western Coulee and Ridges Ecological Landscape represents a major opportunity to sustain this natural community (DNR In prep. a.). This site supports the southern-most example of jack pine barrens in the state and provides habitat for good numbers of rare barrens-associated reptiles, birds, plants, and invertebrates. Known records exist of several Special Concern herptiles including North American racer, gophersnake, six-lined racerunner, and five-lined skink. The site holds very good potential for nesting of numerous uncommon big river turtle species including map, Blanding's, and softshell turtles. This assemblage makes this primary site a crucial area for herptile protection and conservation.

AREA 17 LOCATOR MAP



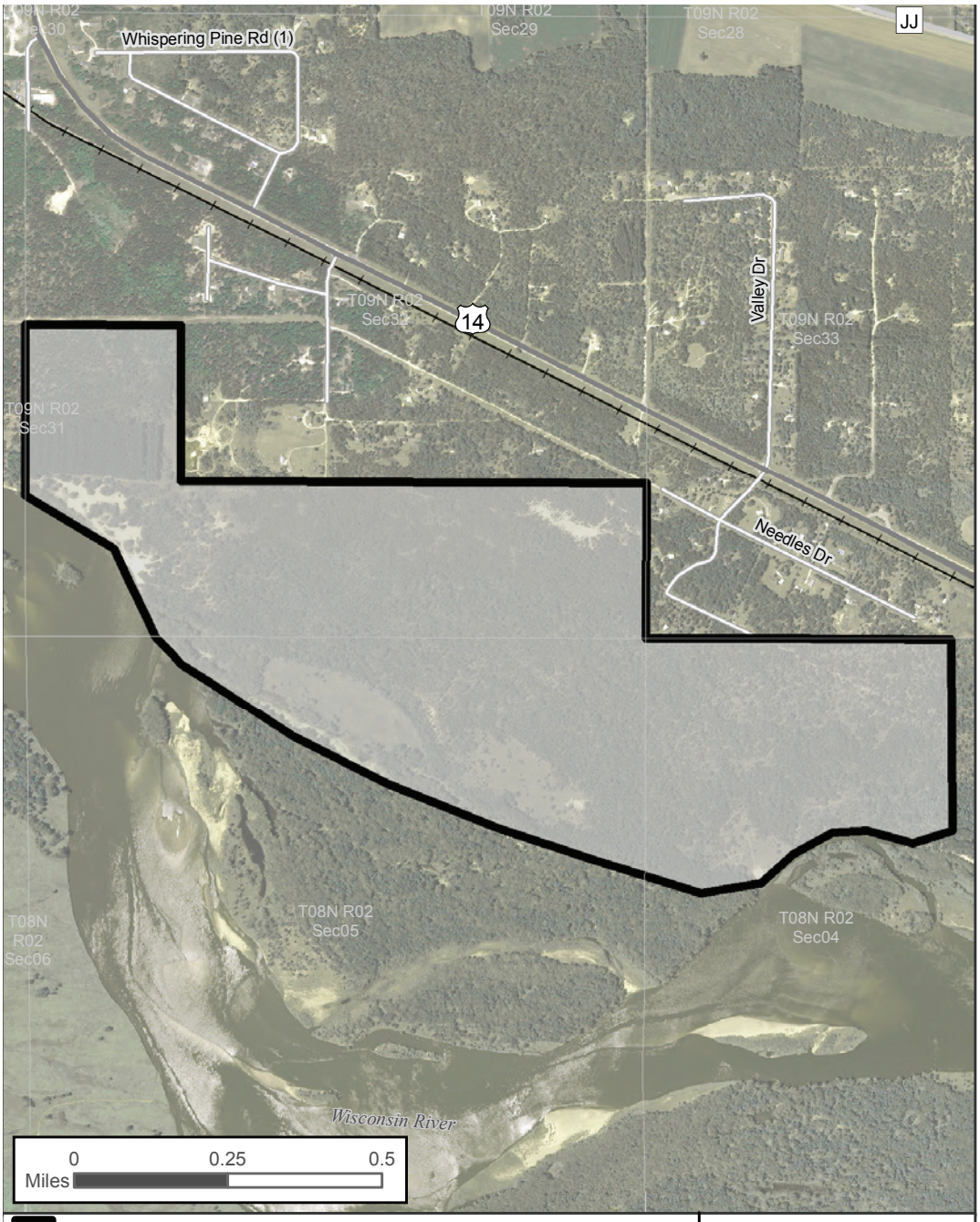
The birdlife present reflects the brushy prairie and barrens conditions, that support good numbers of SGCN birds including field sparrow, brown thrasher, whip-poor-will, red-headed woodpecker, and lark sparrow. Prairie fame-flower, a globally rare species that reaches its greatest abundance nationwide in Wisconsin is found here. This site also has good butterfly and grasshopper potential. Species observed include: mottled sand grasshopper (*Spharagemon collare; county record*), Boll's grasshopper (*S. bolli; county record*), narrow-winged sand grasshopper (*Melanoplus angustipennis*), Keeler's grasshopper (*M. keeleri*), slantfaced pasture grasshopper (*Orphulella speciosa*), and the State Special Concern spotted-winged grasshopper (*O. pelidna*). In addition, the state Special Concern pirate perch has been found in the backwater of the northwestern part of the site.

Management Considerations

The open sandy soils of this site support habitat for numerous turtle species, terrestrial invertebrates, and rare plants. These areas are likely an important nesting area for numerous turtle species that reside in nearby marshes, sloughs, and the main river channel. This habitat also has good butterfly and grasshopper potential and is a high priority for terrestrial invertebrate management. The open sand prairie, degraded barrens, and disturbed areas on the edge of the Pine Barrens present an opportunity to manage for plants like prairie fame-flower, a globally rare species.

Control of illegal off-road vehicle use at the site is vital to protecting this sensitive ecosystem and its inhabitants.

MAP 2.12 GOTHAM JACK PINE BARRENS



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AREA 17 NATIVE COMMUNITY MANAGEMENT AREA

GOTHAM JACK PINE BARRENS

Long Term Management Objectives (100 Years)
Maintain the pine barrens natural community on this site as an ecological reference area. Maintain existing populations of reptiles and barrens and prairie dependent invertebrates. Natural processes, prescribed fire, and prescribed vegetation manipulation determines the structure of the community's ecological characteristics. Provide continuing opportunities for research and education on the highest quality native pine barrens.

Short Term Management Objectives (50 Years)
Restore and enhance the quality and extent of the pine barrens community. Evaluate various restoration methods to aid in developing the best management approach.

Management Prescriptions
Pine barrens restoration and management evaluations:

- Divide the site into adaptive management experimental units and conduct combinations of timber harvest, prescribed fire, and other techniques to evaluate restoration methods for jack pine barrens.

Timber Harvest Unit:

- Conduct a timber harvest leaving patches of jack pine of varied age classes and size, and leave scattered large oak. Remove fine woody material with a biomass harvest if possible.
- Following timber harvest, use prescribed fire to restore the barrens ground layer, control brush, and restore desired structure and composition to the pine barrens.
- Chemical and mechanical control of brush and trees may also be used following the timber harvest to restore and maintain the desired structure and composition.

Prescribed Fire Unit:

- Use prescribed fire to restore and maintain the jack pine barrens.
- Consider timber harvest and other techniques in the future, after initial evaluations and comparisons with the adjacent timber harvest.
- Chemical and mechanical control of brush and trees may also be used to restore and maintain the desired structure and composition of the pine barrens.

Control Unit:

- Passively manage while restoration techniques are evaluated in adjacent units.
- In the future, consider combinations of timber harvest, prescribed fire, and other techniques after evaluating the effectiveness of experimental management on this site.

Entire Site:

- Follow guidance from the Barrens State Natural Area Management Guide (WDNR, 2011).
- Actively manage by harvesting the native dominant tree species (primarily jack pine), retaining scattered oak and patches of jack pine.
- Where jack pine is established, thinning of the canopy and shrub control via harvest, brushing or fire may be needed and used to mimic natural disturbance patterns.
- Long term (after the short term objective is met), use prescribed fire and natural processes, with additional control of trees, brush, and invasive species as needed to mimic natural disturbance patterns, to determine the structure and composition of the site.
- Consider appropriate unburned refugia for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units, and consider impacts to reptiles regarding timing of prescribed burns.
- Convert the pine plantation to pine barrens.
- In the early stages of restoration, augment the ground layer only with species that historically would have been found on the site, using seeds or plugs from local genetic material.
- Convert old fields and other disturbed or degraded portions of the site to sand prairie by burning and interseeding with locally collected sand prairie species.
- Maintain the sedge meadow through prescribed fire and active control of trees and brush as needed.
- Allow prescribed fire to pass through the adjacent floodplain forest, though consumption of fuel here will not be facilitated, other than to secure fire breaks.
- Salvage of trees after a major wind event can occur if the volume of woody material inhibits fire prescriptions.
- Follow Incidental Take Protocols for listed species.
- Other allowable activities include control of invasive plants and animals, and access to suppress wildfires.

GOTHAM JACK PINE BARRENS

Photo by Nate Fayram, DNR

AVOCA PRAIRIE AND SAVANNA

Avoca Prairie and Savanna was designated a State Natural Area in 1968.

Description of Site

Located on an extensive outwash sand terrace along the Wisconsin River, Avoca Prairie and Savanna contains the largest natural tallgrass prairie east of the Mississippi River. Frequent flooding has created braided stream topography characterized by low, sandy ridges interspersed with small linear wetlands, giving a local relief of 4 feet. The lower flats of the wetland complex harbor Southern Sedge Meadow that grades into Shrub-carr, while interspersed wet channels harbor Wet Prairie, Wet-mesic Prairie, and Emergent Marsh.

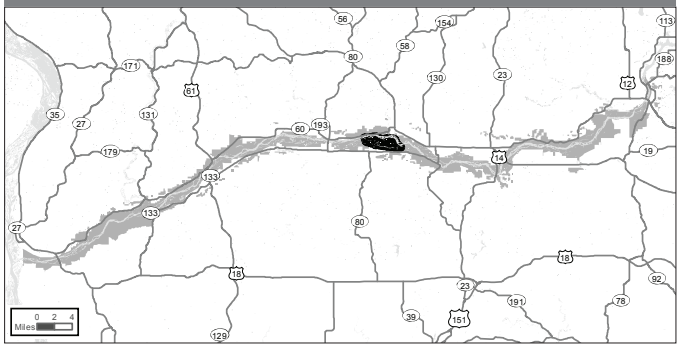
The typical Emergent Marsh community here is characterized by dense vegetation, including sweet-flag (*Acorus calamas*), broad-leaved arrowhead, river bulrush, common bur-reed (*Sparganium eurycarpum*), reed canary grass and common duckweed (*Lemna minor*), and a sparse shrub layer exclusively represented by buttonbush. Some Emergent Marsh areas are very wet, with standing water and deep muck, and are dominated by the invasive narrow-leaved cat-tail (*Typha angustifolia*).

The Southern Sedge Meadow communities are dominated by dense common lake sedge, tussock sedge, blue-joint grass, prairie cord grass, clasping-leaved dogbane (*Apocynum sibiricum*), and the invasive reed canary grass. In the Shrub-carr areas, slender willow and steeplebush achieve cover values of 26-50% over sedge meadow vegetation. Some typical moist prairie species noted here include big bluestem, prairie cord grass, Indian grass, Bicknell's oval sedge (*Carex bicknellii*), blue-joint grass, rough blazing-star, rattlesnake-master (*Eryngium yuccifolium*), and Michigan lily (*Lilium michiganense*).

Oak Openings occur on the highest sandy terrain, and are characterized by open-grown black and bur oaks. Sand cherry (*Prunus pumila*) and early wild rose (*Rosa blanda*) produce only 6-25% cover in the savanna's shrub layer. The savanna ground layer is characterized by big bluestem, white sage (*Artemisia ludoviciana*), white wild indigo (*Baptisia alba*), Bicknell's oval sedge, bastard-toadflax, grass-leaved goldenrod (*Euthamia graminifolia*), switch grass, little bluestem, Indian grass, and common spiderwort.

Two large stands of Floodplain Forest span the floodplain immediately adjacent to the river, one of which (the eastern one) is considered to be good- to fair-quality. The dense canopy in this stand is created by 12-20 inch silver maple, hackberry, river birch, swamp white oak, green ash, and eastern cottonwood. The subcanopy has similar species composition and cover values, while the shrub layer is very sparse. The ground layer is dominated by wood nettle, with lesser amounts of jumpseed, Canadian honewort (*Cryptotaenia canadensis*), cut-leaved coneflower, and blue phlox.

AREA 18 LOCATOR MAP



Significance of Site

This site is significant for being the one of the largest natural tallgrass prairies east of the Mississippi River, for its large open wetlands, and for its globally rare Oak Opening and Wet-mesic Prairie communities, both of which are the only high-quality examples in the LWSR. Also important are closed-canopy Floodplain Forests with representative rare species such as red-shouldered hawk and prothonotary warbler. This site supports an excellent population of the State Threatened Blanding's turtle, one of the few known populations of prairie voles (*Microtus ochrogaster*) in the LWSR, and large numbers of uncommon grassland, savanna, and shrubland birds.

Management Considerations

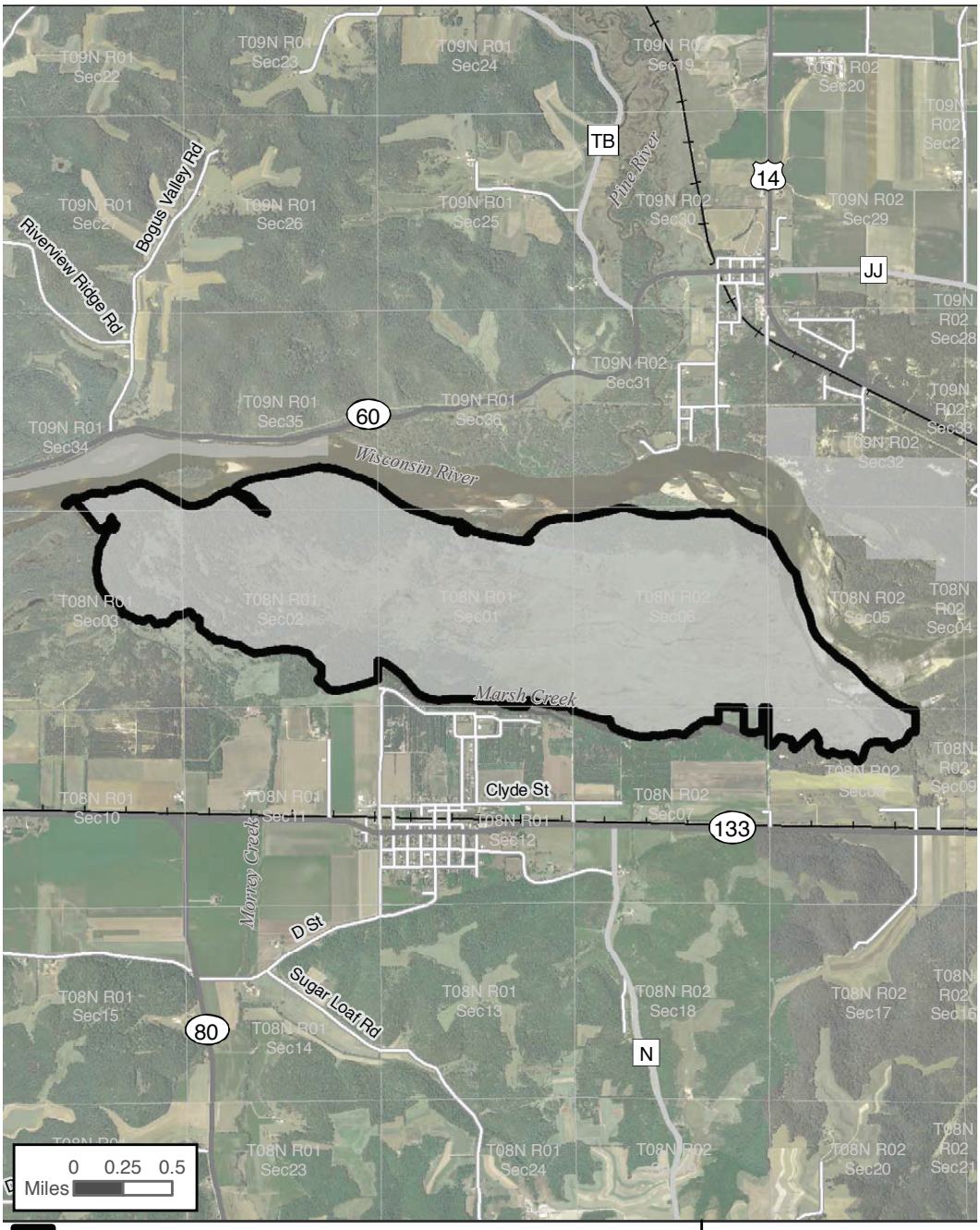
This large wetland matrix contains important open wetland natural communities that are a high priority for management at this site. The State of the Lower Wisconsin River Basin report (WDNR 2002) report identified Avoca Prairie-Savanna State Natural Area as one of the best opportunities for savanna and prairie/grassland restoration in the Lower Wisconsin River basin.

Invasive species of the open wetlands include reed canary grass, common reed grass and narrow-leaved cat-tail. Reed canary grass is common in the Floodplain Forest to the west and uncommon in the eastern stand.

Long Term Management Objectives (100 Years)

- Maintain the site as an ecological reference area for prairie, oak opening and floodplain forest, wetland and

MAP 2.13 AVOCA PRAIRIE AND SAVANNA



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aquatic community types, and for rare species habitat. Sustain a shifting mosaic of habitats (dry-mesic to wet-mesic prairie, southern sedge meadow, shrub-carr and oak opening), allowing natural processes, especially fluctuating water levels and prescribed fire, to determine their structure. Additionally, provide opportunities for research and education on the highest of quality native prairies and oak openings.

Short Term Management Objectives (50 Years)

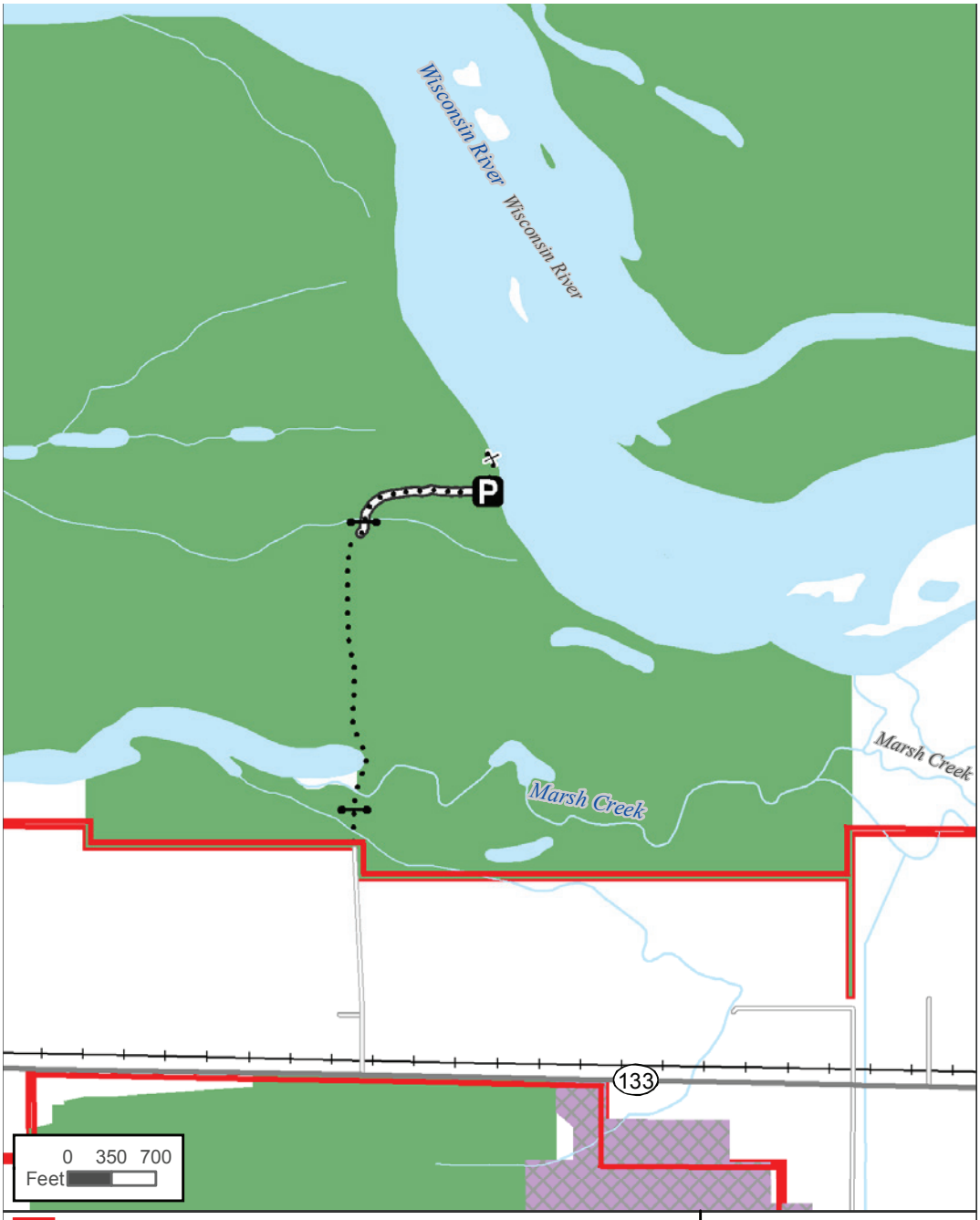
- Expand the size of prairie openings to maintain conditions favorable to native prairie vegetation.
- Increase the diversity and abundance of native prairie and savanna vegetation and associated animal species with emphasis on rare species.

Management Prescriptions

- Use an intensive fire management program as the primarily tool to shape the ecological characteristics of the site. Consider impacts to reptiles (in particular, Blanding's turtles) regarding timing of prescribed burns.
- Actively control trees and shrubs in prairies and wetlands using tree harvest, brushing and especially fire, mimicking natural disturbance patterns. Occasional fire-tolerant oaks and native shrubs such as meadowsweet may be retained at low densities.
- Passively manage the native dominant savanna tree species (primarily oaks). However; when needed, some thinning of the canopy, understory manipulation and shrub control via harvest, brushing or fire may be used to mimic natural disturbance patterns. The mostly passive canopy management and understory manipulation will determine the ecological characteristics of the oak opening. Follow guidance from the Oak Savanna State Natural Area Management Guide (WDNR, 2010).
- Passively manage the native floodplain forest species, which allows natural processes to determine their ecological characteristics. Prescribed fire, however, is allowed to pass through the floodplain forest, though consumption of fuel here will not be facilitated, other than to secure fire breaks.
- Follow Incidental Take Protocols for listed species.
- Other allowable activities throughout the site include control of invasive plants and animals, augmentation of native savanna species after careful review, maintenance of existing facilities, and access to suppress wildfires.
- Hay Lane is a narrow, one half mile long, open access road into the Avoca Prairie management area, reaching to within three tenths of a mile of the riverbank (see Figure 2.15). The road provides general management access, especially for pheasant stocking, and also public vehicle access for hunting and walk-in bank fishing. In order to provide improved river access for fishing and general recreational use, the open road will be extended and maintained to a parking lot to be located near the river with the following conditions:
  - The road is in a wet area and floods annually, causing washouts and making the road difficult and expensive to maintain. Therefore, the road will open only seasonally when conditions are favorable. Further, the road may be closed and abandoned if the accumulating repair costs become prohibitive or a catastrophic event damages the roadway to the point where it is too expensive to rebuild and maintain.
  - The road may be closed and abandoned if illegal off-road driving occurs, causing significant damage to the property including the road itself, to the adjacent prairie as well as any other infrastructure on the property.

Photo by DNR

FIGURE 2.15 HAY LANE AT AVOCA



FISHTRAP FLOWAGE AND BOTTOMS

Description of Site

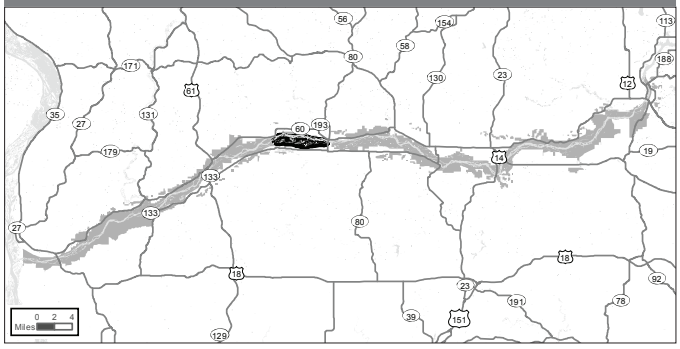
This 1,842 acre site captures approximately six miles of floodplain along the Wisconsin River. Lowland forest occurs at the east and west ends of the site, while open wetlands and aquatic communities occupy the middle area.

The west end harbors approximately 4.3 miles of moderate-quality Floodplain Forest, and has ridge and slough topography bisected by numerous open water and buttonbush-dominated sloughs. The variability in topography and logging history results in diverse structure and composition, but in general, the Floodplain Forest canopy is dominated by 20-28 inch dbh silver maple, swamp white oak, green ash, bitternut hickory, and basswood. The shrub layer includes moderate coverage of common winterberry (*Ilex verticillata*), nannyberry (*Vibernum lentago*), and, less commonly, eastern wahoo (*Euonymus atropurpurea*), elderberry (*Sambucus canadensis*) and prickly ash. Ground layer species on ridges includes wood nettle, common eastern wild-rye (*Elymus virginicus*), blue phlox, moneywort, eastern narrowleaf sedge (*Carex amphibola*), awned graceful sedge, Gray's sedge (*C. grayi*), greater bladder sedge (*C. intumescens*), bent seeded hop-sedge (*C. tuckermanii*), fringed sedge (*C. crinita*), Canadian honewort, cut-leaved coneflower, Canada moonseed, and fringed loosestrife. Dutch Elm Disease has taken a number of trees in the northern part, creating sunny openings. This stand has good age diversity, with dead trees also present.

The east end has a narrow, two-mile-long strip of second-growth Floodplain Forest along the sandy terrace of the Wisconsin River. The dense canopy (76-95% cover) is dominated mostly by 8-12 inch dbh silver maple (28 inch dbh maximum). Other canopy associates include river birch, swamp white oak, and green ash. The subcanopy is moderately dense, with silver maple, river birch, green ash, and swamp white oak. The shrub layer is sparse to moderately sparse, with common buckthorn, prickly ash, Bell's honeysuckle, and some buttonbush and poison ivy. The herb layer is dense, with common eastern wild-rye, common wood-reed, small-spike false nettle, bottomland aster (*Aster ontarionis*), moneywort, reed canary grass, jumpseed, wood nettle, and blue phlox. There are inclusions of black oak savanna on sandy terraces within the Floodplain Forest.

The central wetland complex is comprised of a matrix of moderate- to high-quality Southern Sedge Meadow, Shrub-carr, and Emergent Marsh. There is moderate to strong zonation between the marsh and sedge meadow, and is likely a reflection of age and depth of peat (the younger, less consolidated peat supporting marsh, the firmer peat supporting sedge meadow). Emergent Marsh dominates the site, with species such as common bur-reed, water smartweed (*Polygonum amphibium*), broad-leaved arrowhead, and soft-stem bulrush (*Schoenoplectus tabernaemontani*). The most abundant species of the Emergent Marsh survey site is wild rice (*Zizania aquatica*). The sedge meadow is interspersed throughout the marsh complex, and is dominated by tussock sedge, beaked sedge (*C. rostrata*), and blue-joint grass. Sweet-scented Indian-plantain occurs at the interface of the sedge meadow and floodplain forest to the north.

AREA 19 LOCATOR MAP



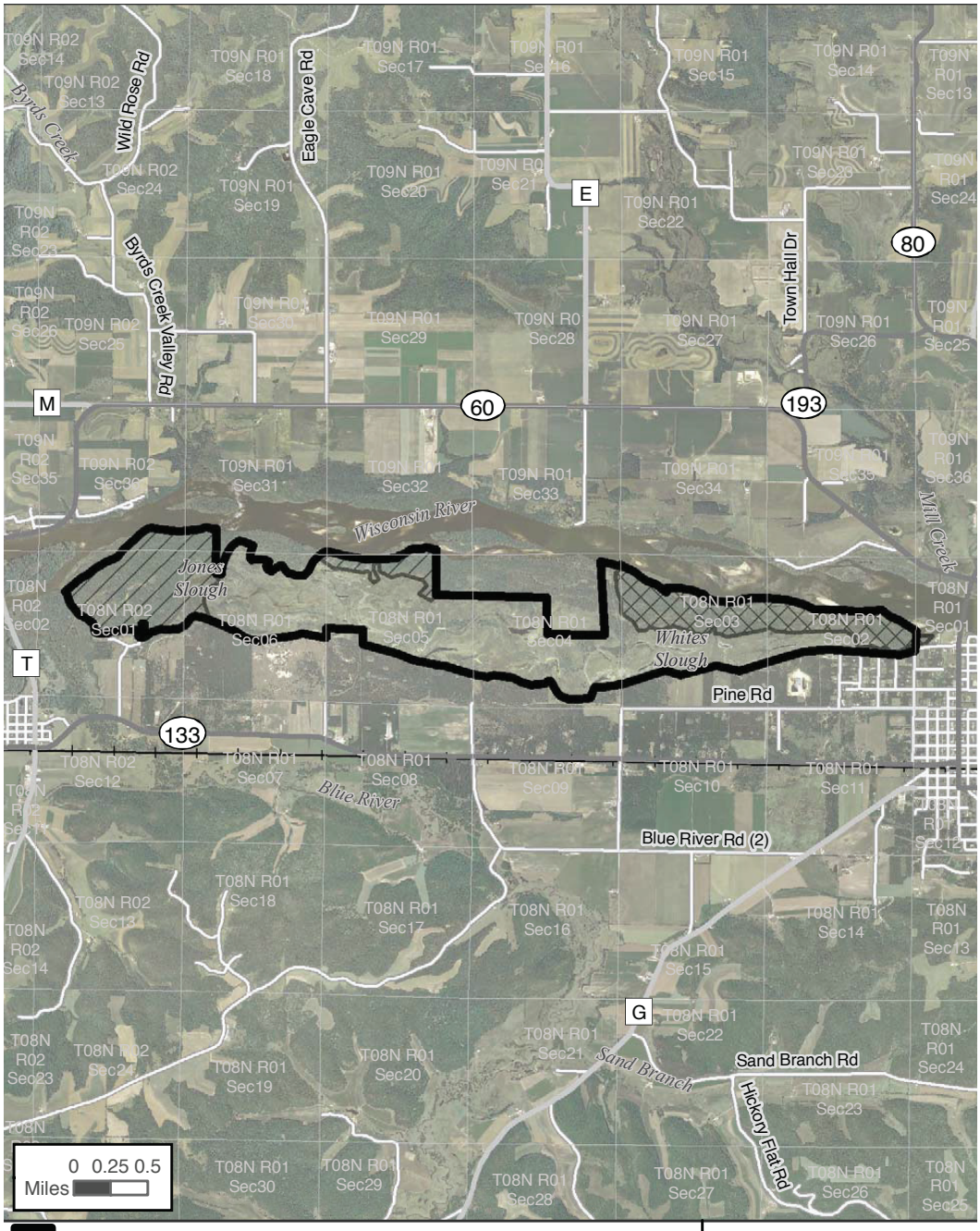
Significance of Site

This large site includes marsh, flowage, and Floodplain Forest communities supporting exceptionally high numbers of rare species. The proximity of the marsh habitats to upland Sand Barrens provides necessary resources to sustain possibly the best population of Blanding's turtle in the entire LWSR. An excellent diversity of uncommon dragonfly species utilizes this area including Hine's emerald dragonfly, smoky shadowfly, and russet-tipped clubtail (*Stylurus plagiatus*). Marshbird surveys in this area identified this site as one of the richest and most diverse in the LWSR. Target species located included least bittern, willow flycatcher, Virginia and sora rail, Wilson's snipe (*Gallinago delicata*), marsh and sedge wren, and swamp sparrow (*Melospiza georgiana*). The silver-haired bat (*Lasionycteris noctivagans*), a species of Special Concern, was found at its highest numbers in the LWSR at this primary site. Bat surveys done from boat detected the silver-haired bat along the shore where its preferred foraging habit of wooded banks borders along the river. This species is a tree-roosting bat that utilizes foliage and branches, loose bark, or cavities in trees.

Long-Term Management Objectives (100 years)

Provide a large area of structurally and functionally diverse, older, intact, connected floodplain forest for ecological values and rare species habitat needs. The forest community is comprised of large diameter silver maple, swamp white oak,

MAP 2.14 FISHTRAP FLOWAGE AND BOTTOMS



Fishtrap Flowage and Bottoms

Native Community Management Area

Active Old Forest

Passive Old Growth Forest

Section Line

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November 11, 2015

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and mixed bottomland hardwood species with abundant coarse woody debris and standing dead snags, enhancing the old growth habitat and structural diversity. Maintain a continuum of native wetland communities adjacent to the floodplain forest to provide habitat for species associated with open wetlands.

Short-Term Management Objectives (50 years)

- Develop and maintain an older, closed canopy forest of longer-lived tree species, such as swamp white oak, silver maple, and other bottomland hardwood species. Use focused, active management techniques to enhance forest structural diversity and development of old forest characteristics such as large diameter trees, uneven canopy, standing dead snags, and coarse woody debris in appropriate areas. Maintain a complimentary large, passively managed block of old growth floodplain forest as a comparison to actively managed stands and to provide habitat for species that prefer large tracts of unmanaged old forest.
- Maintain and develop habitat for species associated with old growth floodplain forest.
- Maintain the flowage and open wetlands. Maintain water quality through protection and maintenance of riparian habitat.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River.

Passive Old Growth Forest Area Prescriptions (290 Acres)

- Manage as a Reserved Old Growth Bottomland Hardwood Forest, and as an ecological reference area. Follow the management prescriptions for Reserved Old-growth and Reserved Old Forest for Bottomland Hardwoods in the general management by habitat type section of this plan.
- Passively manage the area, allowing natural processes to determine the ecological characteristics of the site. Retain snags and coarse woody debris to promote old growth characteristics. Exceptions include control of invasive plants and animals, and restorative planting of appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Control invasive species especially buckthorn, honeysuckle, and reed canary grass.
- Salvage of trees after a major wind event is not compatible with management objectives.

Managed Old Forest Area Prescriptions (412 Acres)

- Follow the management prescriptions for Managed Old Forest – Bottomland Hardwoods in the general management by habitat type section of this plan.
- Promote the growth and retention of large swamp white oak and other bottomland hardwood species.
- Monitor composition and structure changes to aid future management decisions.
- Manage specific stands in a way that maintains closed canopy conditions within a majority of the actively managed area.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Partial salvage is permitted, follow the general management prescriptions.
- Provide opportunities for research on active management to maintain and enhance old forest.

Flowage, Emergent Marsh, Sedge Meadow, and Shrub-carr Wetlands (1,135 Acres)

Management Objectives and Prescriptions

- Follow the objectives and prescriptions for each of these community types in the general habitat management section of this plan.
- Control invasive species, especially cattails and reed canary grass.

Photo by Travis Anderson, DNR

FISHTRAP FLOWAGE AND BOTTOMS

Photo by Nate Fayram, DNR

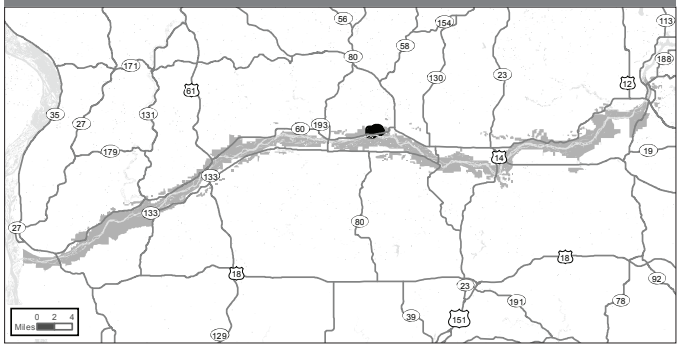
BOGUS BLUFF

Description of Site

This site is on two disjunct parcels with dolomite-capped sandstone bluffs. The western parcel is mostly Southern Dry-mesic Forest/Oak Woodland, along with some sandstone cliffs, steep slopes and rocky ridges. Portions of the ridgetop forest canopy, especially on the east side, are comprised of semi-open grown, moderately dense, 12-18 inch dbh bur oak and white oak, with lesser amounts of red oak and black walnut (*Juglans nigra*). Other areas are dominated by red oak, hickory, walnut, and scattered sugar maple depending on past management history, including logging, fire, and grazing. Bur oak, white oak, red oak, black walnut, shagbark hickory (*Carya ovata*), and hop-hornbeam (*Ostrya virginiana*) create a moderate subcanopy. The shrub layer is dominated by moderate amounts of hazelnut, prickly ash, Virginia creeper, poison ivy, and carrion flower. The ground layer is characterized by broad-leaf enchanter's-nightshade (*Circaea lutetiana*), hog-peanut (*Amphicarpaea bracteata*),pale-leaved woodland sunflower (*Helianthus strumosus*), clustered black snakeroot (*Sanicula gregaria*), hairy sweet cicely, pointed tick-trefoil (*Desmodium glutinosum*), bottlebrush grass (*Elymus hystrix*), and the rare violet bush-clover. There are significant amounts of coarse woody debris and brushy undergrowth here. A tiny but botanically rich Dry Prairie is associated with a steep slope and sandstone cliff in the northwest corner of the site. Another Dry Prairie is perched atop an exposed cliff overlooking the Wisconsin River in the southeastern part of the site. This Dry Prairie has a variety of native plant species including little bluestem, gray goldenrod, side-oats grama, prairie drop-seed, western sunflower, hoary puccoon, bristle-leaf sedge (*Carex eburnea*), yellow coneflower (*Ratibida pinnata*), purple prairie-clover, cylindrical blazing-star (*Liatris cylindracea*), big bluestem, wild bergamot (*Monarda fistulosa*), lead-plant and false boneset. Only sparse prickly ash and red cedar saplings grow on the prairie, but woody species are encroaching from the edges. Dry-mesic Prairie occurs at the base of the bluff slope within a powerline right-of-way that parallels the highway.

The eastern parcel also has Southern Dry-mesic Forest that shows less overt evidence of disturbance. The forest canopy is dense, 10-20 inch dbh red oak and white oak, with lesser amounts of shagbark hickory, white ash, green ash, basswood, and red elm. Forest canopy composition is varied across the parcel depending on past management and natural history. Red oak, white oak, hop-hornbeam, bitternut hickory, shagbark hickory, black walnut, white ash (*Fraxinus americana*), green ash, basswood, and red elm create a moderate subcanopy. The shrub layer has moderate amounts of Virginia creeper, while the ground layer is characterized by hog-peanut, pointed tick-trefoil, Pennsylvania sedge, elm-leaved goldenrod (*Solidago ulmifolia*), Canadian honewort, clustered black snakeroot, hairy sweet cicely, preacher in the pulpit (*Orchis spectabilis*), and two rare plants: putty root (*Aplectrum hyemale*) and ginseng. A botanically rich Dry Prairie lies above sandstone cliffs on the steep south-facing slope overlooking the river. Little bluestem, bristle-leaf sedge, yellow coneflower, violet wood-sorrel (*Oxalis violacea*), American pasqueflower (*Anemone patens*), silky aster, hoary puccoon, prairie blue-eyed-grass (*Sisyrinchium campestre*), and two rare plants are found here: one-flowered broom-rape (*Orobanche uniflora*) and lance-leaved buckthorn.

AREA 20 LOCATOR MAP



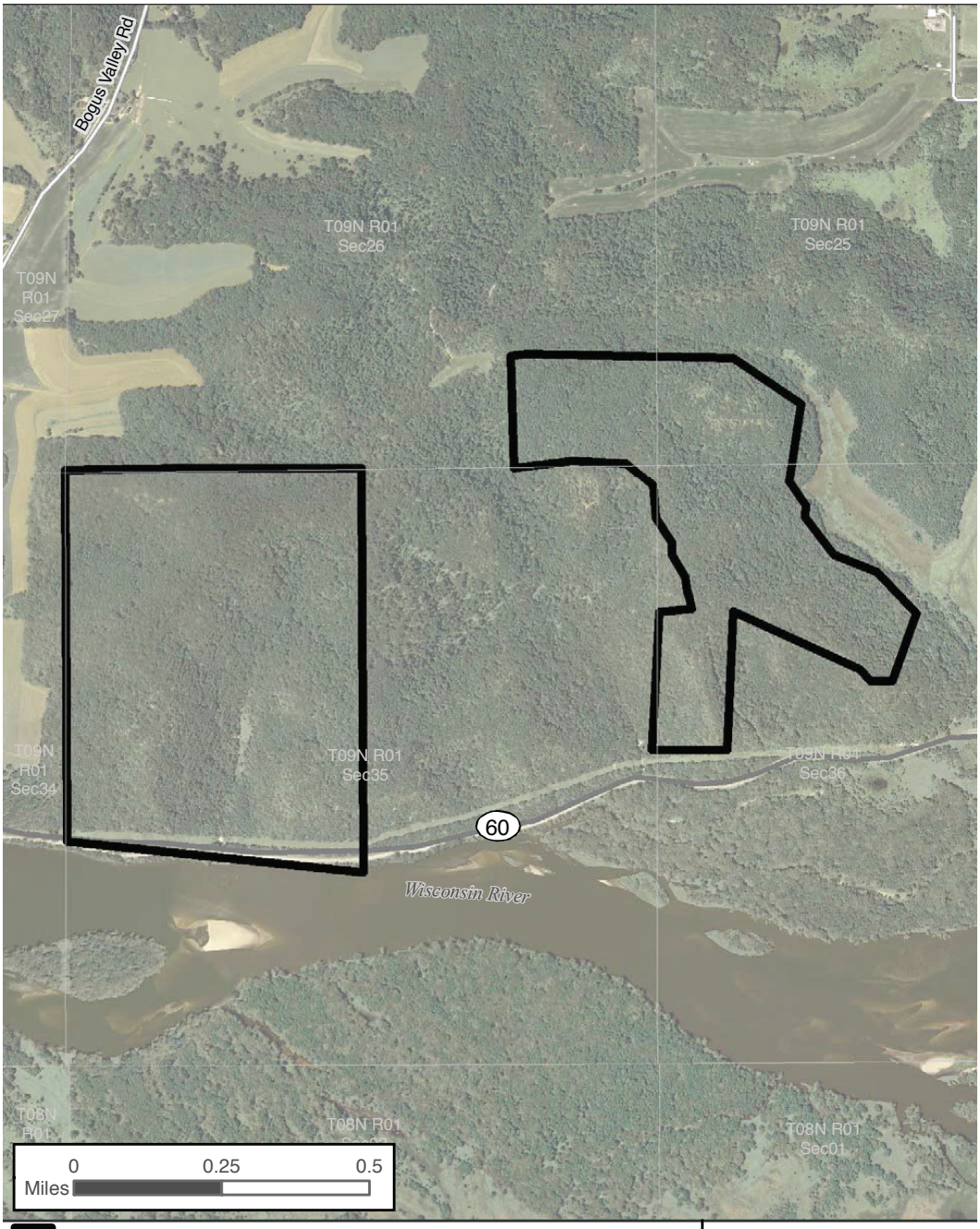
Significance of Site

The west unit of this primary site supports one of the best populations of forest interior breeding birds within the LWSR. The site includes a population of hooded warblers (*Wilsonia citrina*), rare within the LWSR and only found in extensive forest tracts in southern Wisconsin, along with other State Threatened birds like the cerulean warbler and Acadian flycatcher (*Empidonax virescens*) (this species was also found in the east unit). The east unit is known to support gray ratsnakes. Both units show good potential for other Oak Woodland and prairie reptiles like timber rattlesnake, prairie ringneck snake, North American racer, gophersnake, and five-lined skink, especially if the bluff prairies are opened and expanded.

Both units show high restoration potential, particularly for Southern Dry and Dry-mesic Forest and Oak Woodland, due to good basic structure and the relative absence of serious invasive species. The persistence of rare plant species further underscores this restoration potential.

The Dry Prairies are small but botanically rich and, in the case of the east unit, support some rare plant species and could be expanded to benefit herptiles, invertebrates and plants, while managing for the prairie-savanna-woodland continuum.

MAP 2.15 BOGUS BLUFF



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Together with the cliff communities, they contribute to the overall biotic diversity of the site.

Long Term Management Objectives (100 Years)
Maintain high quality Southern Dry and Dry-mesic Forest, Oak Woodland, Oak Opening, and Dry Prairie native communities to sustain populations of Species of Greatest Conservation Need and rare flora and fauna.

Forest
Short Term Management Objectives (50 Years)
- Develop and maintain old forest characteristics where appropriate, including biologically mature trees, large diameter trees, structural diversity, standing and down coarse woody debris, and an uneven canopy, through natural processes and active management to mimic natural disturbance.
- Conduct scientific research and silvicultural demonstrations that are compatible with the management area's ecological objectives. Promote research and demonstration projects that seek to balance the development of old forest characteristics with active forest management practices that maintain mid-successional species such as oak. Improve the oak age class distribution for long-term sustainability of the species.
- Maintain at least 50% in mature forest with closed canopy or near closed canopy conditions to benefit interior forest songbirds.
- Develop and maintain natural transitions between different plant communities. Reduce hard edges between different cover types.
- Develop the aesthetic qualities of old forest habitat where appropriate.

Management Prescriptions
The overall management strategy is to selectively use active management in ways that mimic natural processes to sustain and enhance large block forest characteristics. Specific authorized management prescriptions are outlined below.

Oak
- Maintain oak species through management techniques that mimic natural disturbance of limited size and scale relative to the size of the management area (i.e., see area canopy objectives).
- Regenerate oak (along with other mid-successional tree species) on a small scale to maintain the species within oak-dominated or mixed cover types.
- Natural regeneration systems include: overstory removal when sufficient advanced regeneration is present coppice when stump sprout potential is adequate, and shelterwood and group selection systems when advance regeneration or stump sprout potential is not adequate. Modify these regeneration systems as needed to accommodate the overall forest objectives, such as through the retention of reserve trees for better stand structure or by limiting the size of regeneration patches to maintain canopy.
- Prescribed fire may be used with other management techniques to help regenerate oak, to restore ground-layer composition, to control invasive species, and to restore ecosystem processes.
- Retain vigorous oak by thinning surrounding areas from below.
- Assess the degree of succession to central or northern hardwoods. Retain oak where oak regeneration seems unlikely.

Central and northern hardwoods
- Natural regeneration systems for central and northern hardwoods can utilize both even and uneven-aged methods; however uneven-aged methods are preferred to create diverse stand structure and maintain canopy. Allowed regeneration systems include single tree selection and group selection.
- Use intermediate treatments, such as release or crown thinning to manipulate composition, maintain vigor of selected trees, and accelerate old forest structural development.

Other forest management prescriptions
- Consider the DNR Old Growth and Old Forest Handbook management guidelines, particularly related to "Managed Old Forest" where appropriate. Monitor composition and structure changes to aid in future management decisions.
- Use combinations of timber harvest, brushing, tree planting, and prescribed fire to develop and maintain soft transitions between open, partial canopy, and closed canopy communities.
- Promote and retain standing and down coarse woody debris.
- Salvage of trees damaged by wind, fire, ice, disease, and insects may occur if consistent with the objectives of the area. Salvage operations will seek to retain course woody debris and "legacy" trees in order to improve old forest structural attributes.
- Convert conifer plantations to oak or restore to native communities considering context with adjacent stands.
- Plant open fields to oak trees within this management unit to reduce fragmentation, and to provide young oak within the block of older forest. Consult with all affected programs before converting fields to new cover types.
- Control invasive species especially black locust, honey suckle, and other non-native brush.

Dry Prairies and Oak Savannas

Short Term Management Objectives (50 Years)

- Restore and maintain oak opening, dry prairie, and dry cliff native communities.
- Maintain a continuum of fire-dependent native communities including dry prairie, oak opening, and oak woodland using natural processes, prescribed fire, and prescribed canopy and understory manipulation to determine the oak savanna's and prairie's structure.
- Restore and maintain natural transitions from open to closed canopy communities.
- Maintain existing populations of herptiles and remnant prairie dependent invertebrates and expand the extent of savanna and open prairie into previously unmanaged areas to provide additional habitat.

Management Prescriptions

- Use frequent prescribed fire to restore and maintain these fire-dependent upland communities. Also, as needed, use timber harvests, brush/tree clearing, and chemical application to restore native community structure, composition, and function.
- In previously unmanaged areas, use combinations of timber harvest, brush/tree clearing, and prescribed fire to reduce woody cover, expand open habitat, and create a soft edge or transition into adjacent communities.
- In the oak savannas, passively manage the native dominant tree species (primarily oaks). However, some thinning of the canopy, understory manipulation and shrub control via timber harvest, brushing or fire may be used to meet community structural objectives and mimic natural disturbance patterns.
- In the prairies, actively control trees and shrubs. Use tree harvest, brushing and especially fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks, hickories, and native shrubs such as hazelnut may be retained at low densities. Retain snags as important habitat features, unless they conflict with other objectives (such as hazard trees near roads, or prescribed fire hazards).
- Consider appropriate unburned refugia for fire sensitive, prairie dependent invertebrates when planning prescribed burn units.
- Consider impacts to reptiles regarding timing of prescribed burns.
- Follow Incidental Take Protocols for listed species.
- Prairie and savanna plant species should be seeded as needed. Use local genotype seed sources.
- Control invasive species, specifically red cedar, crown vetch, honeysuckle, and other non-native brush.

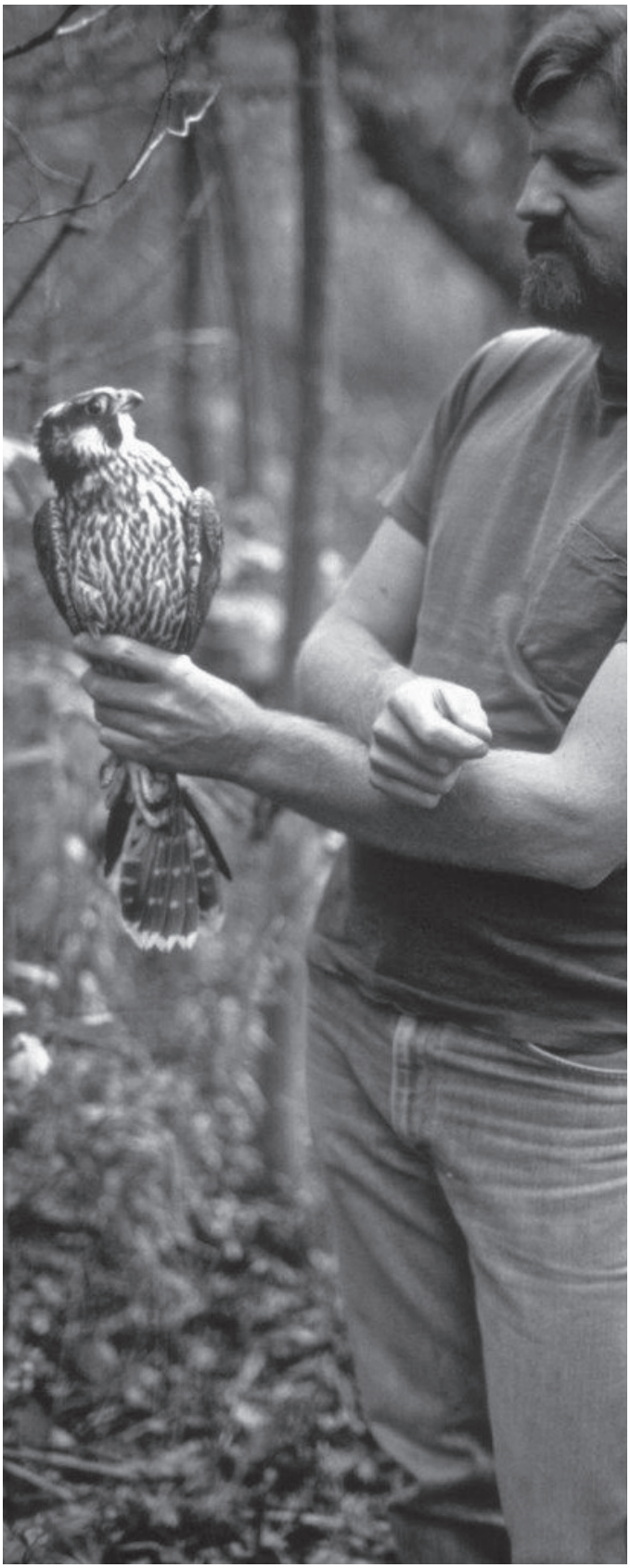


Photo by DNR

ORION MUSSEL BEDS AND MOUNDS

Description of Site

The Orion Mussel Bed lies along a narrow 4 mile long stretch of Wisconsin River bottom along the base of remnant sandstone bluffs. The river bottom contains a rock and gravel substrate with underwater sandstone ledges, which contrasts with the shifting sands that are more typical of the Lower Wisconsin River bottom. The area is critical habitat for numerous rare animals. Fifteen rare animals are known from this site including mussels, mayflies, dragonflies, beetles, and fish. The firm substrate that supports these species is restricted to a very narrow zone beginning at the shoreline and extending into the river along the 4.2 mile course.

In addition to the mussel bed, the natural area includes 1,500 feet of Wisconsin River frontage (17 acres) that holds one of the best preserved and least disturbed effigy mound groups in Wisconsin. Built by the Effigy Mound Culture of the Late Woodland period between AD 750 and 1000, the site features the Twin Lizards and Catfish mound group, which consists of 15 mounds including 3 birds, 1 bear, 2 lizards, 1 conical, and 8 lineal mounds. The mounds were carefully sculpted and look much as they did when they were built.

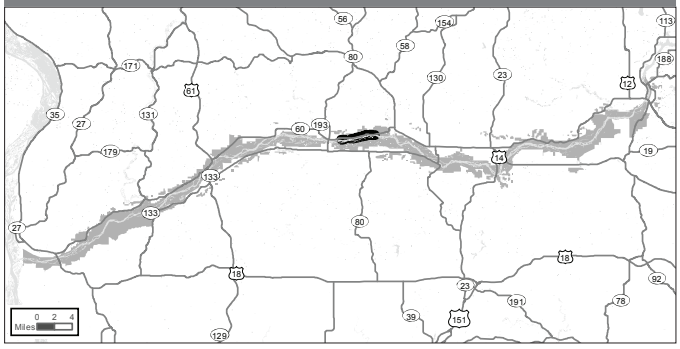
The 175 acre Orion Mussel Beds site was designated a State Natural Area in 1996.

Significance of Site

This site is considered the richest and most diverse mussel bed in the entire LWSR. A total of 24 mussel species have been documented here as recently as 2012 (Heath 2013). Fourteen of the fifteen state listed or Special Concern mussels known from the LWSR occur in this mussel bed, including Higgin's eye pearly mussel (*Lampsilis higginsii*) and bullhead mussel (*Plethobasus cyphyus*) (both Federally Endangered). The Federal Recovery Plan, as revised in 2004, identifies this mussel bed as an Essential Habitat Area and one of four sites for maintaining a viable population of Higgin's eye and other native mussels.

Other rare invertebrates found here include the smoky shadowfly (*Neurocordulia molesta*), elusive clubtail (*Stylurus notatus*), Knobel's riffle beetle (*Stenelmis knobeli*), and Wallace's deepwater mayfly (*Spinadis wallacei*). Uncommon fish include the mud darter (*Etheostoma asprigene*) and western sand darter (*Ammocrypta clara*).

AREA 21 LOCATOR MAP

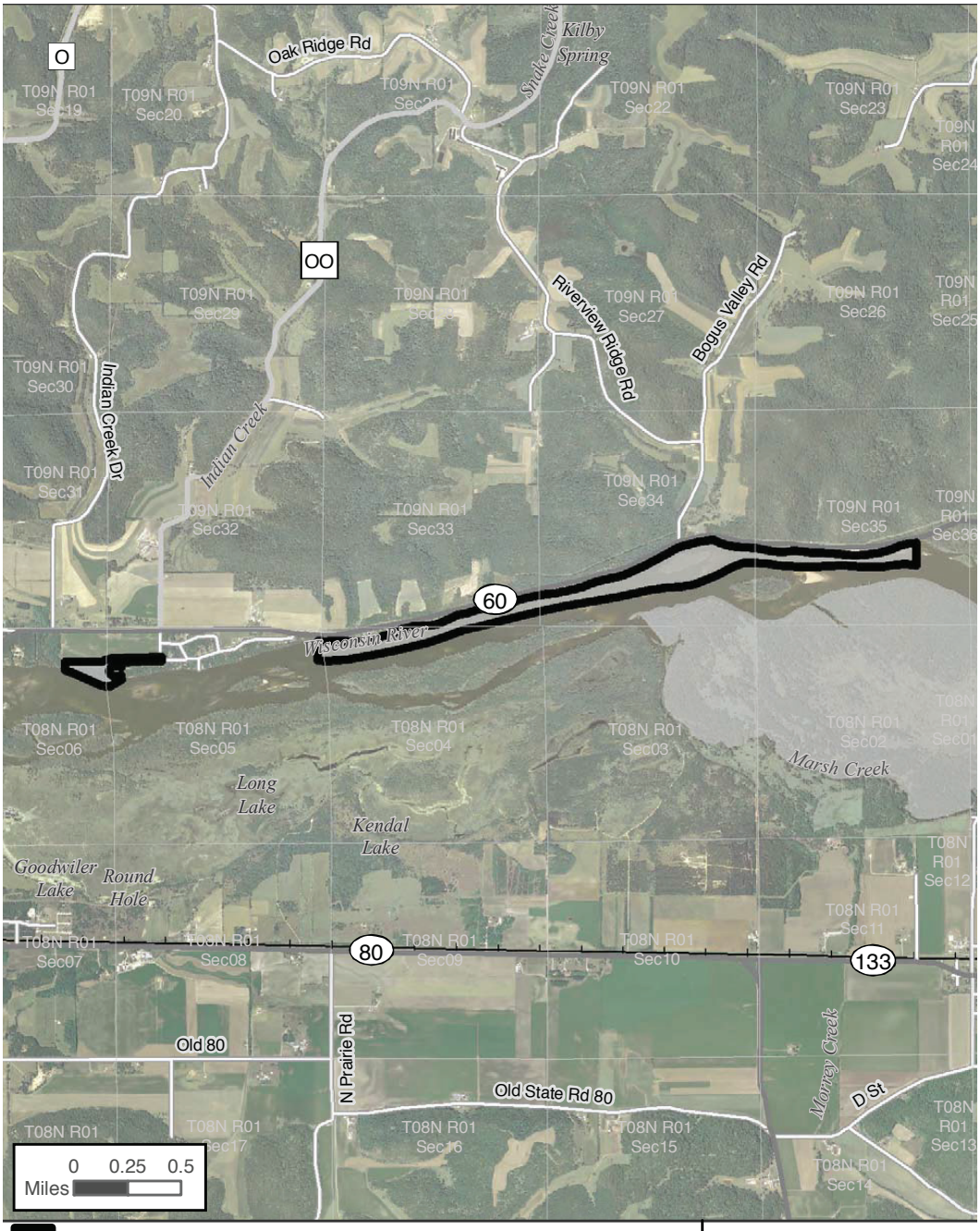


Management Considerations

Maintaining water quality is critical to the health and viability of the mussel bed community. Sedimentation, erosion, and nutrient-laden runoff into waterways are threats facing mussel survivability. Heath (2003) notes, "Orion Mussel bed has declined in quality since at least 1988. Population densities have declined greatly along with the proportion of younger mussels. Taxa that are more tolerant of environmental degradation declined less than those more sensitive ones." Measures aimed at reducing water-quality issues associated with organic and inorganic pollutants, controlling land-use changes (development and urban sprawl), limiting fragmentation of populations, losses to fish hosts, and controlling invasive aquatic species like zebra and quagga mussels (*Dreissena polymorpha and D. bugensis*) are crucial to protecting mussel beds throughout the LWSR.

Photo by Lisie Kitchel, DNR

MAP 2.16 ORION MUSSEL BEDS AND MOUNDS



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AREA 21

NATIVE COMMUNITY MANAGEMENT AREA

ORION MUSSEL BEDS AND MOUNDS

Management Objectives

Manage as a rare aquatic animal habitat site, a significant archaeological site, and an ecological reference area, allowing natural processes to determine the structure of the aquatic communities.

Provide opportunities for research and education on the highest quality aquatic communities.

Management Prescriptions

Aquatic Resources

- Passively manage the native aquatic species, allowing natural forces to determine the ecological characteristics of the site. Exceptions include control of invasive plants and animals, and shoreline stabilization.

Effigy Mounds

- The effigy mounds are managed according to department policy and existing state and federal legislation. This especially includes avoiding disturbance of the effigy mounds with the establishment of a "no disturbance" buffer zone within 15 feet of their perimeter or base. Vegetation on and around these features is generally managed in the same manner as the natural communities within which they occur. However, removal of trees and shrubs from effigy mounds (without any ground disturbance, e.g., stump pulling or vehicle use) and within the 15-foot buffer zone is generally desirable to protect them from windthrow, and to encourage growth of groundcover that helps prevent erosion.
- Selected trees may be retained for forestry purposes, or when unavoidable mound damage would occur during tree removal, or for other management purposes. Sites covered by grasses may be periodically mowed, burned and sprayed to maintain existing groundcover and to limit woody succession. The Departmental Archaeologist reviews all proposals for DNR-proposed activities within the buffered effigy mound area.
- Exceptions include control of invasive plants and animals, and maintenance of existing public use facilities.
- See discussion of Area No. 7 Effigy Mounds for additional details on the interpretive trail at this site. (Page 50.)

Photo by Nate Fayram, DNR

ORION MUSSEL BEDS AND MOUNDS

Photo by Lisie Kitchel, DNR

AVOCA - MUSCODA BARRENS

The Avoca - Muscoda Barrens (~ 870 acres) is a mixture of various ecological communities consisting of remnant prairie, restored native grasslands, oak barrens, and oak woodlands. Topography is flat to gently rolling, sloping down towards the sloughs and marsh communities to the north. This site offers excellent habitat for numerous grassland bird species such as Henslow's sparrow (*Ammodramus henslowii*), grasshopper sparrow (*Ammodramus savannarum*), dickcissel (*Spiza americana*), bobolink (*Dolichonyx oryzivorus*) and barrens/savanna species such as red-headed woodpecker (*Melanerpes erythrocephalus*) and whip-poor-will. The endangered ornate box turtle (*Terrapene ornate*) can be found on this site as well. Oak Barrens are globally imperiled, and this site is one of many within the Lower Wisconsin State Riverway offering excellent opportunities to maintain, enhance, and restore this rare community.

This site offers numerous opportunities for hunters wishing to pursue white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), American woodcock (*Scolopax minor*), and is annually stocked with ring-necked pheasants (*Phasianus colchicus*) during hunting season.

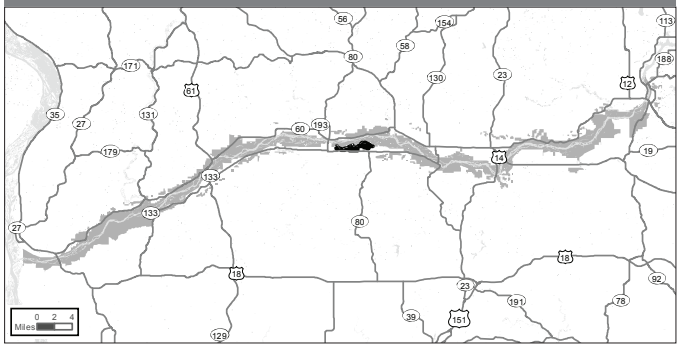
Long Term Management Objectives (100 Years)

- Provide a mosaic of differing ecological communities, ranging from open grasslands to oak barrens to oak woodlands, transitioning into adjacent wetlands. Maintain the extent and quality of the open grassland communities (remnant prairie and restored prairie) for grassland bird habitat. Provide high quality upland game hunting opportunities.

Short Term Management Objectives (50 Years)

- Restore and enhance the existing oak barrens, savanna, and oak woodland communities; increase their extent and functionality by extending management into suitable, previously unmanaged areas.
- Maintain the extent and quality of open grasslands.
- Restore and maintain natural transitions from open grasslands to oak barrens.
- Establish sand prairie restoration areas on high bank terraces adjacent to Goodwiler Lake wetlands to benefit nesting areas for turtles and other reptiles.

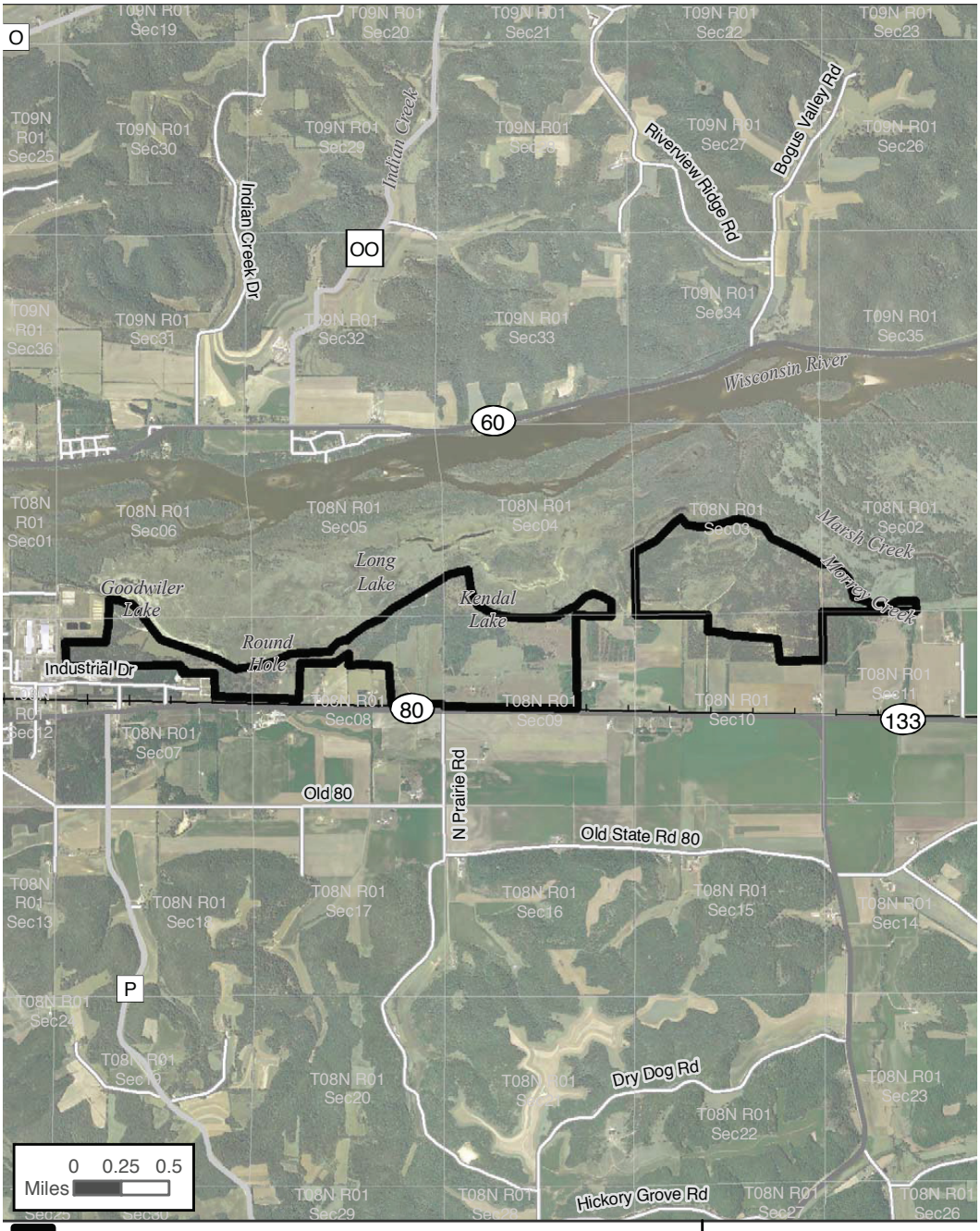
AREA 22 LOCATOR MAP



Management Prescriptions

- Use prescribed fire as a primary management tool in grassland areas. Herbicide application and mowing may be used to control invasive species and brush.
- When mowing grassland areas, follow grassland nesting bird avoidance guidelines and dates.
- Remove linear tree rows within grassland sites to increase grassland bird nest success.
- In barrens/savanna areas, prescribed fire, mowing, or herbicides may be used to maintain an open understory.
- When needed, provide appropriate unburned areas as refugia for fire sensitive species.
- Follow the high bank management objectives and prescriptions for Sand Terrace High Bank Restoration – Open Nesting Habitat in the general habitat management section of this plan.
- When they do not cause a hazard to prescribed burning operations, leave snag trees for wildlife habitat whenever possible.
- In previously unmanaged areas, use combinations of timber harvests, brushing, herbicide application, and prescribed fire to expand/restore to an oak barrens community and to create soft edges/transitions to adjacent communities.
- Encourage sand and oak barrens species to invade degraded portions of the site.
- When the conifer plantations reach rotation age, or if they conflict with habitat management objectives, remove the plantations and convert to oak barrens.
- Follow Incidental Take protocols for listed species.
- Salvage of trees after a major wind event is allowable with consultation of affected programs.
- Control invasive species, especially black locust and spotted knapweed.
- Stock ring-necked pheasant as needed to provide opportunities for hunters.
- See *Other Riverway Day Use Sites, Trails and Scenic Overlooks* for public use related prescriptions.

MAP 2.17 AVOCA - MUSCODA BARRENS



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BLUE RIVER - MUSCODA SAND BARRENS

Description of Site

This management area consists of four separate but proximal blocks totaling 336 acres. Included in the management area is the 130 acre Blue River Sand Barrens State Natural Area, designated a SNA in1968.

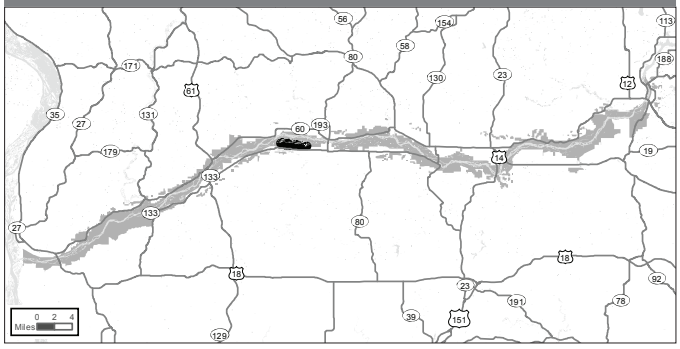
The Blue River Sand Barrens features one of the largest and best examples of this harsh and arid ecological community in Wisconsin. Sand Barrens are upland communities that develop on unstable alluvial sands along rivers such as the Mississippi and Wisconsin. They are partly or perhaps wholly anthropogenic in origin, occurring on sites historically disturbed by plowing or grazing. The flat, sandy areas resemble Dry Prairies but contain actively moving sand dunes and dunes stabilized by a thin forest cover of black and Hill's oak. 'Blowouts,' or large, unvegetated depressions in the sand surface eroded by wind, are scattered throughout. Early dune and blowout colonizers include false heather, bearberry (*Arctostaphylos uva-ursi*), and sedges, while species such as three-awn grass, June grass, rough blazing-star, hoary puccoon, sand cress, and prickly-pear cactus are common in the barrens.

The other three blocks contain sand prairie, oak barrens, jack pine barrens, and sand barrens in various stages of restoration. Barrens are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees, and scattered large trees. Both pine and oak barrens are rare and imperiled globally. Wisconsin has one of the best opportunities in North America for preserving and restoring barrens communities.

Significance of Site

This area is significant for terrestrial invertebrates, including prairie and remnant dependant species (Sauer 2008b, Kirk 2009; SWBA 2010). Species collected in 2009 include: slant-faced pasture grasshopper, narrow winged sand grasshopper, northern marbled locust (*Spharagemon marmorata*), red-legged spittlebug (*Prosapia ignipectus*), and the Special Concern sand locust (*Psinidia fenestrali*). The red-legged spittlebug is a spittle bug which is an inhabitant of jack pine barrens and is a Special Concern species in Michigan. Previous collections include: mottled sand grasshopper, spotted bird grasshopper (*Schistocerca lineate*), coral-winged grasshopper (*Pardalophora apiculata*),and three Special Concern species (seaside grasshopper [*Trimerotropis maritima*], yellow-winged grasshopper (*Arphia xanthoptera*], and velvet-striped grasshopper [*Eritettix simplex*]).

AREA 23 LOCATOR MAP



Surveys within the Avoca/Blue River area in 2010 resulted in locating 29 butterfly species with many species in high numbers. The Southern Wisconsin Butterfly Association (SWBA), which conducted the survey, indicated that it was the best butterfly survey their group has ever seen in Wisconsin. The species included an outstanding selection of migrant and immigrant butterflies from the south in high numbers, including: common buckeye, gray hairstreaks, painted lady, common checkered-skipper, little yellow, dainty sulphur, and the locally-rare sleepy orange. An abundance of sulphurs, crescents, blues, and coppers were also seen.

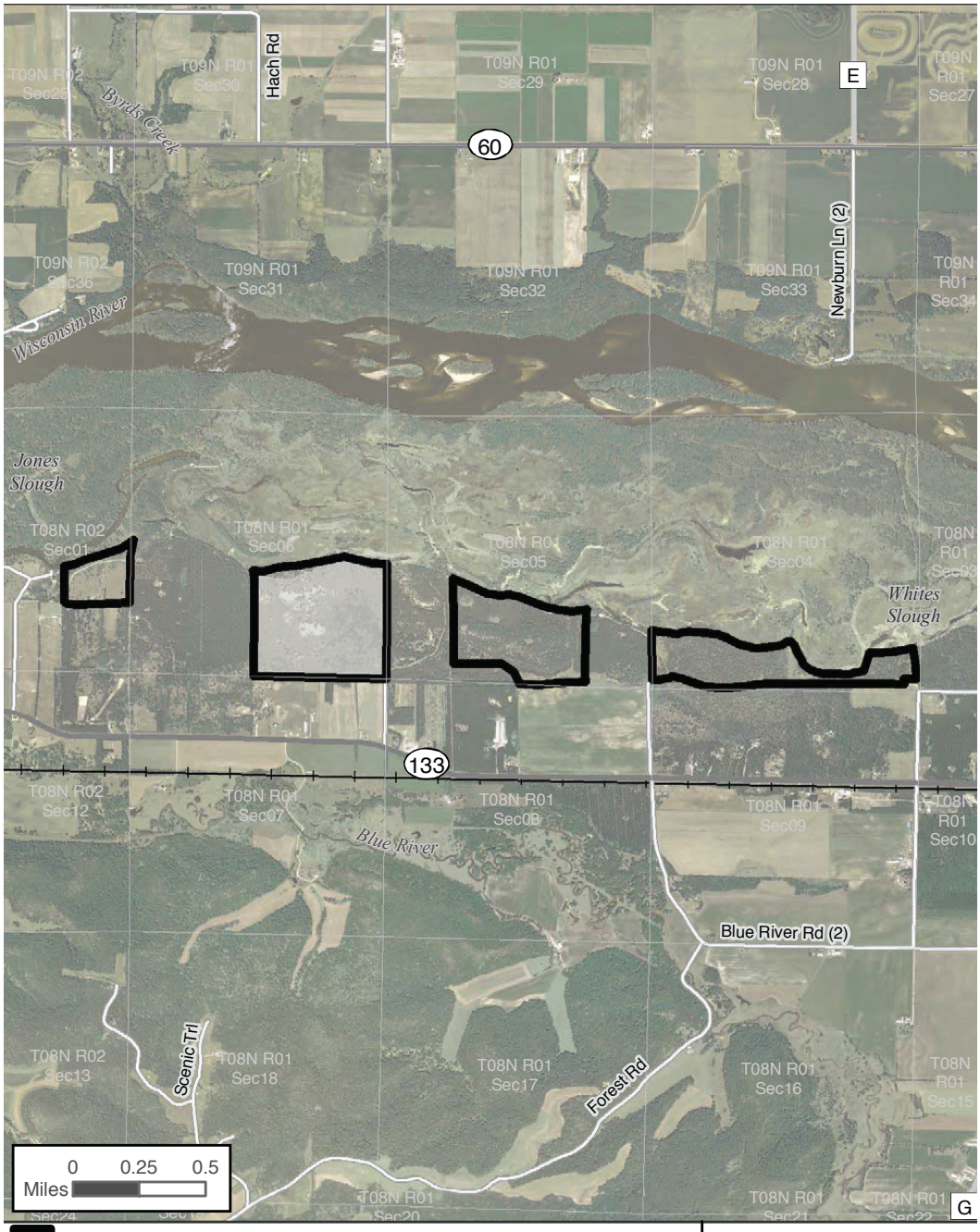
Reptiles are an important component of the barrens fauna and this site supports populations of rare reptiles including six-lined racerunner, eastern hognose snake (*Heterodon platyrhinos*), and North American racer, while many turtles use the sandy dunes for nesting. Additional animal life includes numerous grassland and shrubland birds and small mammals of conservation concern: vesper sparrow, lark sparrow, field sparrow, brown thrasher, blue-winged warbler, dickcissel (*Spiza americana*), eastern meadowlark, prairie vole, and prairie deer mouse (*Peromyscus maniculatus*).

Sizeable populations of two rare species, prairie fame-flower and poppy-mallow, are found here. Both of these species are globally rare and reach their greatest abundance nationwide in Wisconsin.

Long Term Management Objectives (100 Years)

Maintain a complex of sand barrens, oak barrens, jack pine barrens, and sand prairie as an ecological reference area. Allow natural processes, prescribed fire, and other prescribed vegetation manipulation that mimics natural processes to determine the structure and ecological characteristics of the site. As part of this effort, manage as a shifting mosaic of barrens habitats to provide habitat for species that require open condi-

MAP 2.18 BLUE RIVER - MUSCODA SAND BARRENS



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November 11, 2015
WR-LWSR-MP-7925-Map 2.16 kmh

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tions, with an emphasis on maintaining populations of barrens dependent plants, birds, reptiles and invertebrates.

Short Term Management Objectives (50 Years)

- Expand management into previously unmanaged areas to restore additional open oak and sand barrens habitat for rare species.
- Provide areas with open, sandy soil with sparse vegetation to benefit the reptiles, invertebrates and rare plants that rely on this habitat. Maintain a shifting mosaic of barrens habitats across the site.
- Restore and maintain natural transitions from open barrens to adjacent communities.
- Improve habitat for nesting turtles and other reptiles.
- Restore sand prairie, oak barrens, and oak opening habitats along sand terrace 'high bank' areas that are adjacent to open water, emergent marsh, and other wetlands.
- Restore and maintain grassland and savanna habitat to benefit small mammal and bird Species of Greatest Conservation Need.
- Retain jack pine in natural distributions, and restore jack pine barrens where possible.

Management Prescriptions

- Use timber harvests, brush/tree clearing, prescribed fire, and chemical application to restore and maintain native community structure, composition, and function.
- In previously unmanaged areas, use combinations of timber harvest, brush/tree clearing, and prescribed fire to reduce woody cover, expand open habitat, and create a soft edge or transition into adjacent communities.
- Leave scattered oak, jack pine, and other native trees depending on community structural objectives. Retain snags and course woody debris as important habitat features, unless they conflict with other objectives (such as hazard trees near roads, or prescribed fire hazards).
- Leave course woody debris in sloughs and other water bodies to meet aquatic community objectives.
- Consider appropriate unburned refugia for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units, and consider impacts to reptiles regarding timing of prescribed burns.
- Follow Incidental Take Protocols for listed species.
- Prairie and barrens plant species should be seeded as needed using local genotype seed sources.
- Use thinning and harvesting to convert conifer plantations to native cover types at rotation age, or when they conflict with management objectives.
- Control invasive species, specifically black locust, spotted knapweed, and non-native brush.
- See *Other Riverway Day Use Sites, Trails and Scenic Overlooks* for public use related prescriptions.

Blue River Sand Barrens State Natural Area

Management Objectives

Maintain as an oak barrens, sand barrens, and sand prairie ecological reference area. Allow natural processes, and prescribed understory manipulation that mimics natural processes, to determine the structure of the barrens and prairie. Provide opportunities for research and education on the highest quality native oak barrens and sand prairie.

Management Prescriptions

- Follow the guidance in the Barrens State Natural Area Management Guide (WDNR 2011) for general management of the site. The following prescriptions provide additional guidance for management of this site:
- Use a fire management program to primarily shape the ecological characteristics of the site.
- Passively manage the native dominant oak barrens tree species (primarily oaks); however, if needed, some thinning of the canopy, understory manipulation and shrub control via harvest, brushing or fire may be used to mimic natural disturbance patterns.
- Augment the ground layer only with species that historically would have been found on the site, using local genotype seeds or plugs.
- On the oak barrens, primarily use passive canopy management with understory manipulation practices that mimic natural disturbance processes.
- On the native prairie areas actively control trees and shrubs with tree harvesting, brushing and especially fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks, jack pine, and native shrubs such as hazelnut may be retained at low densities.
- Other allowable activities on the entire site include control of invasive plants and animals, maintenance of existing facilities, and access to suppress wildfires.
- Salvage of trees after a major wind event can occur if the volume of woody material inhibits fire prescriptions, or if salvage meets other native community objectives.
- Restore any abandoned roads to sand prairie.
- Although removal of hazardous trees from over and near trails is an allowed activity, manipulation/removal of vegetation and soil disturbance should be minimized to the extent possible.
- If possible re-route snowmobile trails to reduce habitat fragmentation and impacts of trail maintenance on high quality areas.
- Off road vehicle use is prohibited. Prevent off road vehicle use, which has been an issue on this site.

BLUE RIVER - MUSCODA SAND BARRENS

Photo by Nate Fayram, DNR

BLUE RIVER BLUFFS

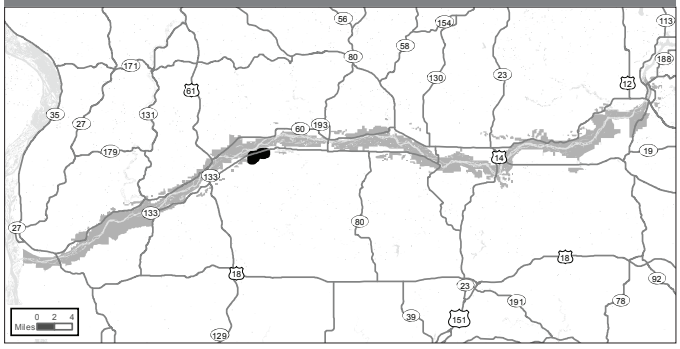
Overview and Summary
Blue River Bluffs was designated a State Natural Area in 1996.

Description of Site
Blue River Bluffs features a complex of Dry Prairies and oak savannas situated on sand terraces above the floodplain of the lower Wisconsin River. The high quality prairies on the steep bluff faces are rich in species diversity and vary from dry open prairie to areas overgrown with shrubs due to fire suppression. Common grasses include Indian grass, little bluestem, porcupine grass, and June grass. Numerous showy forbs grow here including pasque flower, lead-plant, white camas (*Zigadenus elegans var. glaucus*), whorled milkweed (*Asclepias verticillata*), silky aster, butterfly milkweed (*Asclepias tuberosa*), goat's-rue, spiderwort, and New Jersey tea. The savannas surrounding the prairie openings occupy the bluff tops and the lower elevations of the sand terraces. Numerous open grown oaks are scattered throughout the area with black, white, red, and bur oaks present. The savanna ground layer is recovering with the application of prescribed fire.

Significance of Site
This site is significant for Oak Woodland/Oak Opening/Dry Prairie-associated rare plants, including the State Endangered pale false foxglove (*Agalinis skinneriana*), the State Threatened yellow gentian (*Gentiana alba*), and the Special Concern upland boneset, narrow-leaved dayflower (*Commelina erecta var. deamiana*) and prairie fame-flower. Prairie fame-flower is a globally rare species whose greatest nationwide abundance occurs in Wisconsin.

This site is also important for terrestrial invertebrates of prairie and savanna (Sauer 2008b, Kirk 2009; SWBA 2010). The site supports a good population of slantfaced pasture grasshopper, a common species found in Dry to Dry-mesic Prairies and Pine/Oak Barrens. Boll's grasshopper, a moderately uncommon species, was found near the edge of the woodland/oak savanna habitat at the top, consistent with its habitat preference of open, sunny dry-prairie-woodland margins. Twostriped grasshopper (*Melanoplus bivittatus*) was also present, a common species of both forests and grasslands. The bluff prairies and barrens at the site offer excellent potential for a full array of prairie reptiles (North American racer, gophersnake, prairie ringneck snake, and six-lined racerunner). The savanna and oak woodlands at the site have high potential to support a good gray ratsnake population.

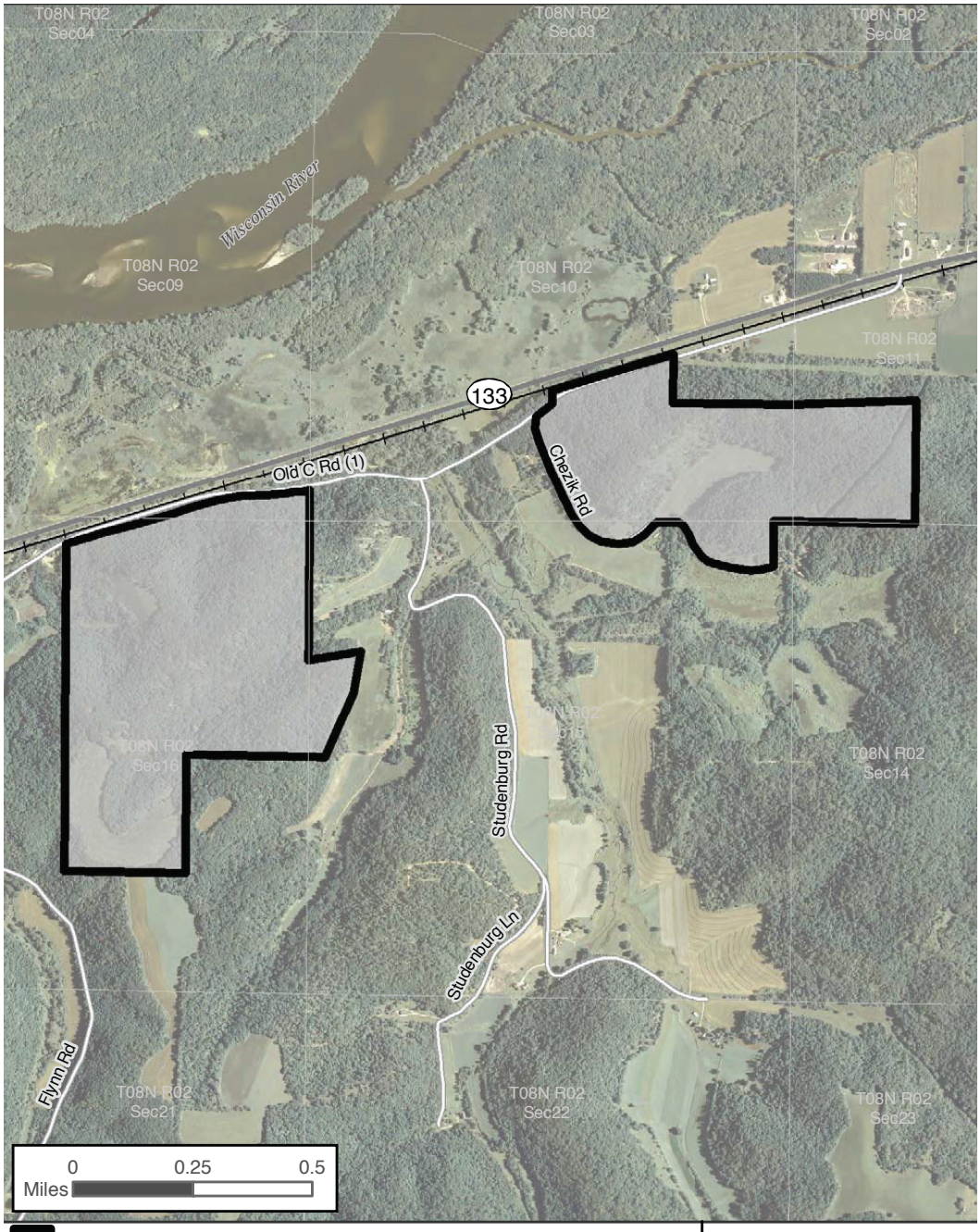
AREA 24 LOCATOR MAP



Management Objectives
- Maintain an oak savanna and dry prairie ecological reference area with natural processes, prescribed fire and prescribed understory manipulation determining the structure of these natural communities.
- Across the management area, maintain a continuum of high quality, fire-dependent native communities ranging from dry prairie, oak barrens, and oak opening; to oak woodland, southern dry forest, and southern dry-mesic forest.
- Maintain existing populations of herptiles and remnant prairie dependent invertebrates.
- Provide opportunities for research and education on the highest quality native oak savannas and prairies.

Photo by DNR

MAP 2.19 BLUE RIVER BLUFFS



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AREA 24 NATIVE COMMUNITY MANAGEMENT AREA

BLUE RIVER BLUFFS

Management Prescriptions

- Follow guidance from the Xeric Prairie, and Oak Savanna, State Natural Area Management Guides (WDNR, 2010).
- Use an intensive fire management program as the primary tool to restore and maintain the continuum of fire-dependent upland communities on the site, and to shape the long-term ecological characteristics of the area. Leave appropriate unburned refugia for remnant prairie dependent invertebrates within prescribed burn units. Consider impacts to reptiles regarding timing of prescribed burns.
- In the oak savannas and forests, passively manage the native dominant tree species (primarily oaks); however, if needed, some thinning of the canopy, understory manipulation, and shrub control via harvest, brushing or fire may be used to mimic natural disturbance patterns. This management approach will determine the ecological characteristics of the oak opening, oak woodland, dry forest, and dry-mesic forests.
- Actively restore and maintain the prairies through tree/shrub control using tree harvest, brushing and especially fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks, hickories, and native shrubs such as hazelnut may be retained at low densities.
- If augmentation of the ground layer is needed for restoration, only add species that historically would have been found on the site, using seeds or plugs from local genetic material.
- Salvage of trees after a major wind event can occur if the volume of woody material inhibits fire prescriptions.
- Other allowable activities on the entire site include control of invasive plants and animals, maintenance of existing facilities, and access to suppress wildfires.
- Follow Incidental Take Protocols for listed species.

Photo by Ann Freiwald, DNR

BLUE RIVER BLUFFS

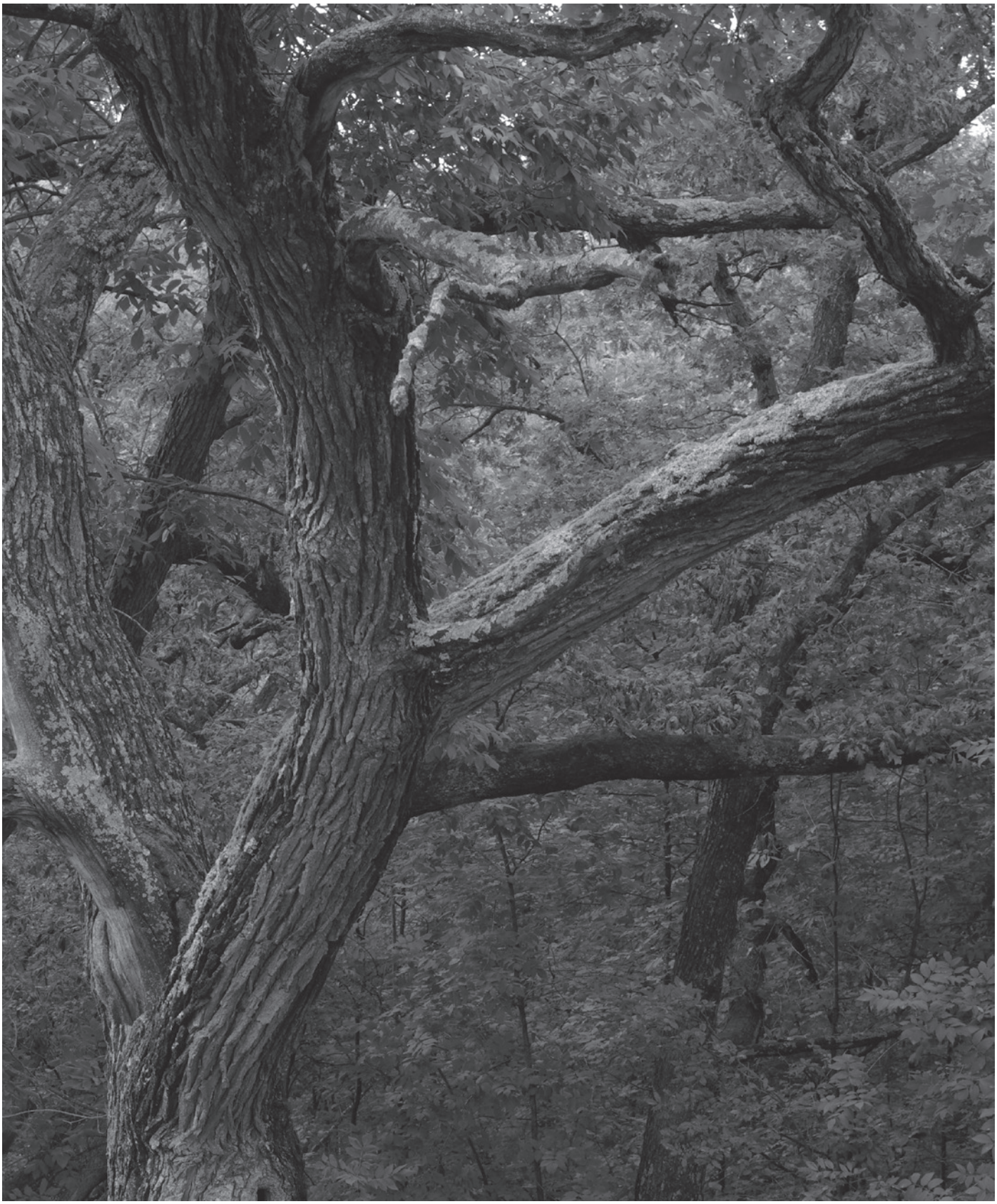


Photo by Thomas Meyer, DNR

DINGMAN MOUND PINES

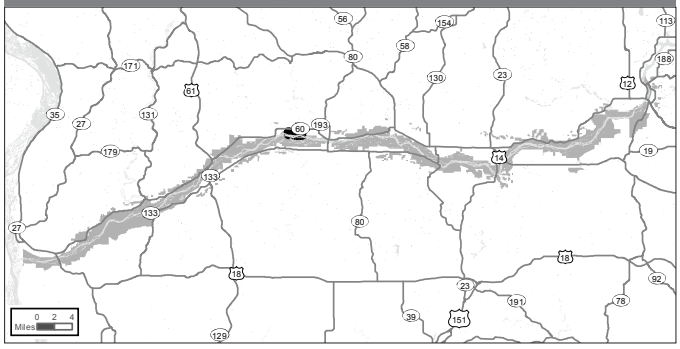
Located on the north side of the Lower Wisconsin River, this site features a narrow Floodplain Forest along the river and, on low sandstone cliffs and steep slopes between the floodplain and the terrace above, a 58-acre Pine Relict. The Pine Relict is dominated by a moderately dense canopy of 12 – 20 inch dbh white pine with white oak (up to 30 inches dbh), red oak, red maple, and bigtooth aspen (*Populus grandidentata*) as canopy associates. The subcanopy is dense, mostly white pine and red maple, with red and white oaks as associates. The sapling layer has moderate cover of red maple with red oak, hackberry, bitternut hickory, and shagbark hickory. The shrub layer has moderate cover, dominated by prickly ash, common blackberry, Virginia creeper, and red raspberry. The ground layer is sparse and is characterized by wood nettle, wood anemone *(Anemone quinquefolia*), wild sarsaparilla, partridgeberry (*Mitchella repens*), and hairy sweet cicely. East of the Pine Relict is a low-quality Southern Dry-mesic Forest that has a more recent history of logging. This forest is a mixture of white oak, sugar maple (*Acer saccharum*), red oak, shagbark hickory, hackberry, and basswood. Ground layer species include wood nettle, hairy sweet cicely, blue phlox, annual bedstraw, mayapple, and hairy sedge (*Carex hirtifolia*).

This particular block of pines is the only known Pine Relict (natural origin white pine stand) on the LWSR, and was noted in several pre-settlement explorer's journals as the first pines encountered on the Wisconsin River coming up from the Mississippi River. Native Americans may have influenced the site, as evidenced by the extensive set of effigy mounds and a habitation site. The ground layer here differs from those of other Pine Relicts in the Driftless Area in the relative dearth of species with northern affinities.

The silver-haired bat, a species of Special Concern, was found in very low numbers throughout the LWSR during summer resident acoustical surveys but in relatively good numbers at this primary site and across the river at the Fishtrap Flowage and Bottoms. Summer resident acoustical surveys performed throughout the LWSR identified this stretch of river as the best location to find these tree roosting bats. The extensive, mature Floodplain Forest and forested bluffs along this stretch of river offer good roosting and foraging opportunities.

The Pine Relict and Southern Dry-mesic Forest support a population of putty root, a state Special Concern species. The LWSR supports significant populations (over 25% of the known populations in the state) of putty root.

AREA 25 LOCATOR MAP



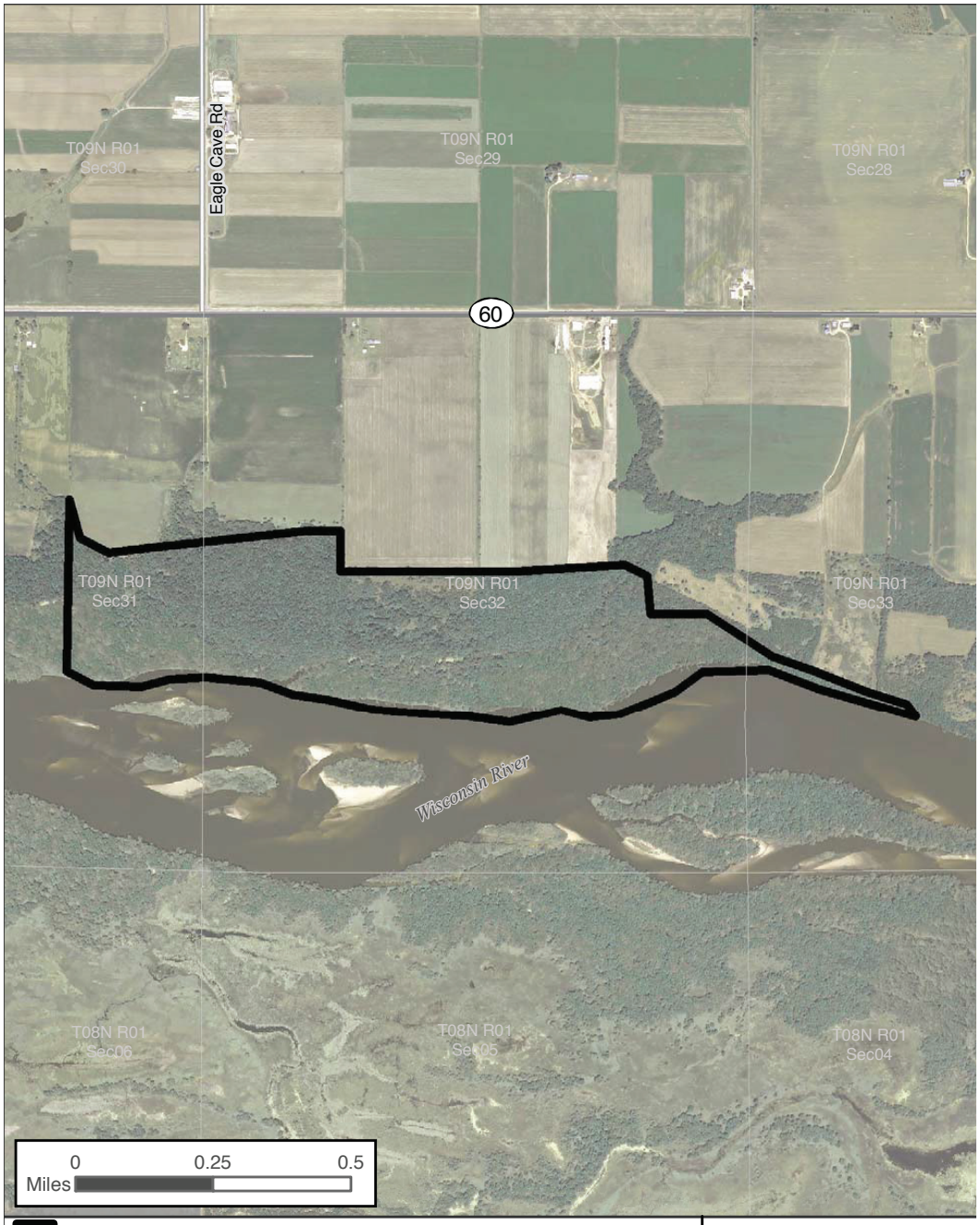
Long Term Management Objectives (100 Years)
Maintain the natural-origin pine stands and current plant communities for aesthetics and protection of the archeological features. Provide opportunities for research and education on natural origin pine stands, which are rare in Southern Wisconsin.

Short Term Management Objectives (50 Years)

- Maintain the natural-origin white pine and the adjacent oak and floodplain forests using Old Forest management techniques.
- Control shade tolerant competition to maintain opportunities to manage for large pine and oak.

Photo by Nate Fayram, DNR

MAP 2.20 DINGMAN MOUND PINES



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WR-LWSR-MP-7925-Map 2.15 kmh

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AREA 25 NATIVE COMMUNITY MANAGEMENT AREA

DINGMAN MOUND PINES

Management Prescriptions

- Because of the archeological features present, consult with DNR Archeologist prior to any work within this site.
- See discussion of Area 7 Lower Wisconsin River Effigy Mound Interpretive Sites for additional details on the interpretive trail at this site.
- White Pine: Use Extended Rotation (110-180 years depending on tree health condition), then shelterwood harvest with legacy trees when existing over-story trees begin to decline.
- Follow the Old Growth and Old Forests Handbook to manage Bottomland Hardwood and Oak stands. Use Extended Rotation or Managed Old Forest prescriptions, and consider passive canopy management.
- Control Red Maple and other shade tolerant woody species that will prevent white pine and oak regeneration.
- Consider use of prescribed fire to promote white pine and oak regeneration, remove duff to prepare white pine seed bed, control invasives, restore ground layer, and to control shade tolerant species such as red maple.
- Maintain mature legacy trees, consider passive management, and/or maintain minimum canopy closure in areas to protect archeological sites, for aesthetics, or to protect rare closed canopy dependent plant species (Putty Root).
- Salvage of trees after a major wind event can occur if the volume of woody material inhibits meeting site objectives, and with consultation from affected programs and DNR Archeologist.
- Other allowable activities include control of invasive plants and animals.

Photo by Nate Fayram, DNR

DINGMAN MOUND PINES

Photo by Ann Freiwald, DNR

RICHWOOD BOTTOMS

Description of Site

This site is comprised of approximately 2,348 acres of lowland communities, 884 acres of which are designated as a State Natural Area.

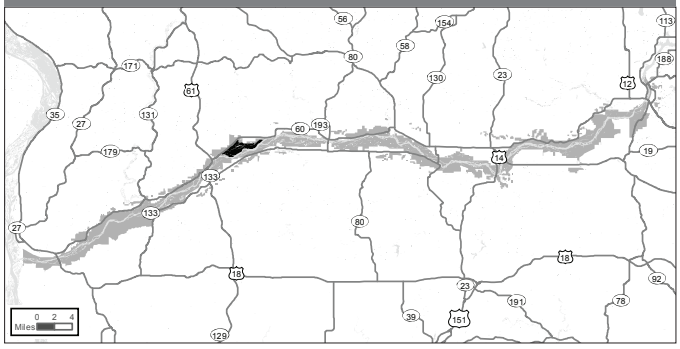
Southeast of State Highway 60 is a large complex of wetlands including an extensive floodplain forest system along three miles of the Wisconsin River. The northern and eastern two thirds of this area harbors Floodplain Forest, open wetlands, and two floodplain lakes. The western part of the site, including the SNA (approximately 884 acres) are ranked as high-quality Floodplain Forest, exhibiting exceptional topographic, structural, and species diversity. The northern portion of this high-quality stand is younger and more disturbed than the southern portion. The extensive bottomland forest varies from a typical Floodplain Forest along the river to drier forest on sandy alluvial ridges divided by water-filled swales. Swamp white oaks and basswood dominate the ridges while the flats contain silver maple with American elm, green ash, and river birch. Canopy trees average 18-24 inch dbh; some oaks are as large as 30 inches dbh. Shrubby openings and sloughs are dominated by buttonbush, and lianas of Virginia creeper, poison-ivy, Canada moonseed and wild yam are common. The variable ground layer includes such characteristic species as wood nettle, cut-leaved coneflower, and green dragon. Also present are small openings supporting Southern Sedge Meadow, Shrub-carr, and Emergent Marsh. Small areas of reed canary grass have been noted in the sloughs, but the forest is otherwise free of serious invasives.

Significance of Site

Richwood Bottoms SNA is considered a relict old-growth stand or old-growth landscape (WDNR In prep. b). Relict stands or landscapes appear never to have been manipulated, exploited, or severely disturbed by humans of European origin; in Wisconsin, the stand and site should show no evidence of significant human disturbance since about 1800 AD. Greater than 200-year-old swamp white oaks are known from Richwood Bottoms SNA.

This large, diverse site supports an exceptionally rich assemblage of closed-canopy forest and open wetland associated species. The expansive, mature floodplain forest at the site provides excellent habitat for one of the best forest interior bird populations in the LWSR. State listed and SGCN birds

AREA 26 LOCATOR MAP



are prevalent throughout and include veery, least flycatcher (*Empidonax minimus*), prothonotary warbler, Kentucky warbler, yellow-billed cuckoo, acadian flycatcher, and wood thrush. The site is important for several nesting raptor species, including red-shouldered hawk, bald eagle, Cooper's hawk (*Accipiter cooperii*), and barred owl (*Strix varia*).

The open marsh and floodplain lakes at the site are important for marsh birds, aquatic invertebrates, and non-game fish populations. The Federally Endangered Hine's emerald dragonfly is found here along with smoky shadowfly and russet-tipped clubtail. Rare backwater fish include the Special Concern species mud darter.

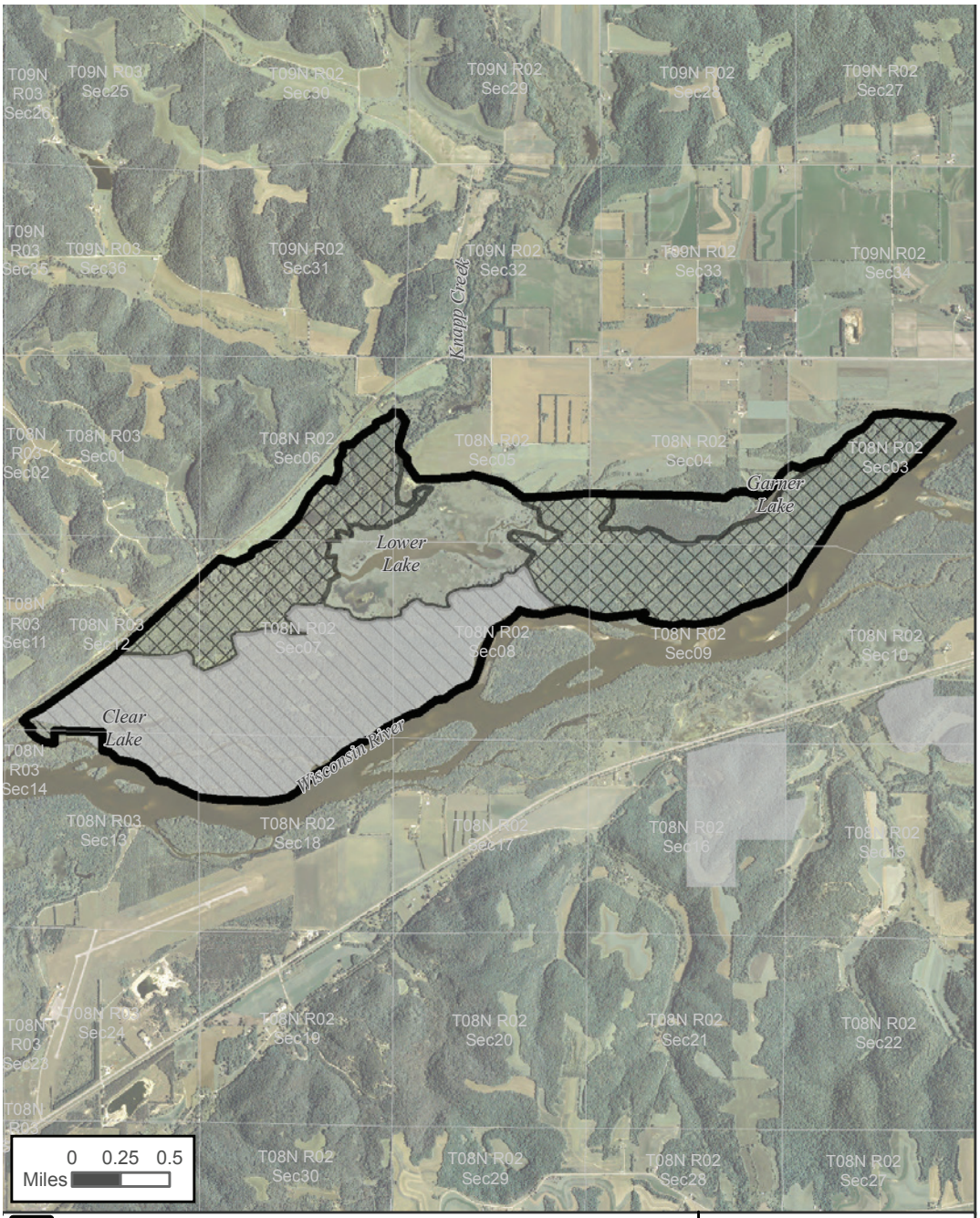
This site supports a population of purple rocket (*Iodanthus pinnatifidus*) and represents one of only four extant sites in the state. The species was found on wet-mesic ridges dominated by swamp white oak in dense, mature Floodplain Forest. Richwood Bottoms SNA features one of the best swamp white oak-dominated Floodplain Forests in the LWSR.

Floodplain Forests

Long-Term Management Objectives (100 years)

Provide a large area of structurally and functionally diverse, older, intact, connected floodplain forest for ecological values and rare species habitat needs. The forest community is comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species with abundant coarse woody debris and standing dead snags, enhancing the old growth habitat and structural diversity.

MAP 2.21 RICHWOOD BOTTOMS



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Short-Term Management Objectives (50 years)

- Develop and maintain an older, closed canopy forest of longer-lived tree species, such as swamp white oak, silver maple, and other bottomland hardwood species. Use focused, active management techniques to enhance forest structural diversity and development of old forest characteristics such as large diameter trees, uneven canopy, standing dead snags, and coarse woody debris in appropriate areas. Maintain a complimentary large, passively managed core block of old growth floodplain forest as a comparison to actively managed stands and to provide habitat for species that prefer large tracts of unmanaged old forest.
- Maintain and develop habitat for species associated with old growth floodplain forest.
- Protect water quality through protection and maintenance of riparian habitat and seeps consistent with Best Management Practices (BMPs) for water quality.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River.

SNA (Old Growth Forest Area) Management Prescriptions (884 Acres)

- Manage as a Reserved Relict Old Growth Bottomland Hardwood Forest, a floodplain forest preserve, as an aquatic preserve and wetland protection site, and as an ecological reference area. Follow the management prescriptions for Reserved Old-growth and Reserved Old Forest for Bottomland Hardwoods in the general management by habitat type section of this plan.
- Passively manage the area, allowing natural processes to determine the ecological characteristics of the site. Retain snags and coarse woody debris to promote old growth characteristics. Exceptions include control of invasive plants and animals, and restorative planting of appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Salvage of trees after a major wind event is not compatible with management objectives.
- Provide opportunities for research and education on the highest quality native floodplain forests.

Managed Old Forest Zone Prescriptions (956 Acres) (Forested area outside of SNA)

- Follow the management prescriptions for Managed Old Forest – Bottomland Hardwoods in the general management by habitat type section of this plan.
- Promote the growth and retention of large swamp white oak and other bottomland hardwood species.
- Monitor composition and structure changes to aid future management decisions.
- Manage stands in a way that maintains closed canopy conditions within a majority of the actively managed area.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Partial salvage is permitted, follow the general management prescriptions.
- Provide opportunities for research on active management to maintain and enhance old forest.

Open marsh and wetlands, Southern Sedge Meadow, Shrub Carr, and Floodplain Lakes (508 acres)

Management Objectives and Prescriptions:

- Follow the objectives and prescriptions for each of these community types in the general habitat management section of this plan. Place special attention on maintaining the hydrology and water quality.

Photo by Ryan O'Connor, DNR

RICHWOOD BOTTOMS

Photo by Thomas Meyer, DNR

CLEAR CREEK LOWLANDS

Description of Site

Clear Creek bisects this site as it flows from the adjacent uplands into the Lower Wisconsin River. Southeast of State Highway 60, the floodplain harbors a mix of moderate-quality Emergent Marsh and Sedge Meadow and Floodplain Forest of varying qualities (from recently logged and grazed to moderate-quality to mature/high-quality).

The highest quality Floodplain Forest stand (about 440 acres) has a dense canopy of 20-30 inch dbh silver maple, swamp white oak and green ash. A dense subcanopy is comprised of the same species, plus American elm and black ash (*Fraxinus nigra*). The shrub layer cover varies from moderate to sparse, with prickly ash and poison ivy. Herbs create a dense ground layer, the most common of which are wood nettle, bottomland aster, moneywort, sensitive fern, and blue phlox.

Significance of Site

The Floodplain Forests at this site provide good breeding habitat for uncommon forest interior birds including red-shouldered hawk, bald eagle, yellow-billed cuckoo, prothonotary warbler, and wood thrush. Sizable areas of open and shrubby marsh provide habitat for SGCN birds such as willow flycatcher and blue-winged warbler, along with more common, representative marshbirds (e.g., sora rail, swamp sparrow, and sandhill crane [*Grus canadensis*]). A rare plant, sweet-scented Indian-plantain, is found in the Floodplain Forest. This site also supports a population of purple rocket and represents one of only four extant sites in the state. The species was found on wet-mesic ridges dominated by swamp white oak in dense, mature Floodplain Forest.

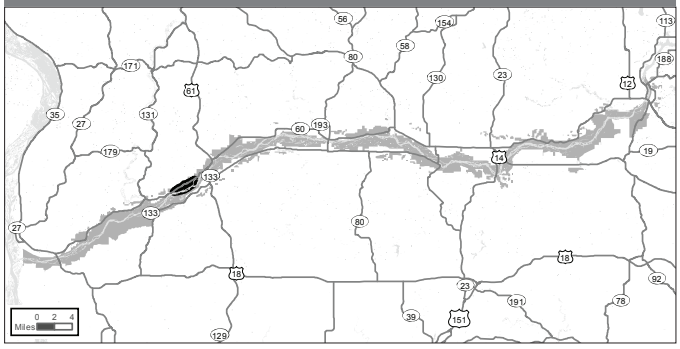
Long-Term Management Objectives (100 years)

Maintain a continuum of native wetland communities. Provide a large area of structurally and functionally diverse, older, intact, connected forest comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species. Preserve coarse woody debris and standing dead snags for old growth habitat and structural diversity. Protect, manage, and enhance natural communities for ecological values and rare species habitat needs.

Short-Term Management Objectives (50 years)

- Develop and maintain an older, closed canopy forest of longer-lived species, such as swamp white oak, silver maple, and other bottomland hardwood species.
- Enhance forest structural diversity and development of old growth characteristics such as large diameter trees, uneven canopy, standing dead snags, and coarse woody debris.
- Protect water quality through protection and maintenance of riparian habitat and seeps consistent with Best Management Practices (BMPs) for water quality.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River.
- Restore and maintain the extent and quality of the sedge meadow and emergent marsh.
- Manage the site to maintain existing populations of bird Species of Greatest Conservation Need.

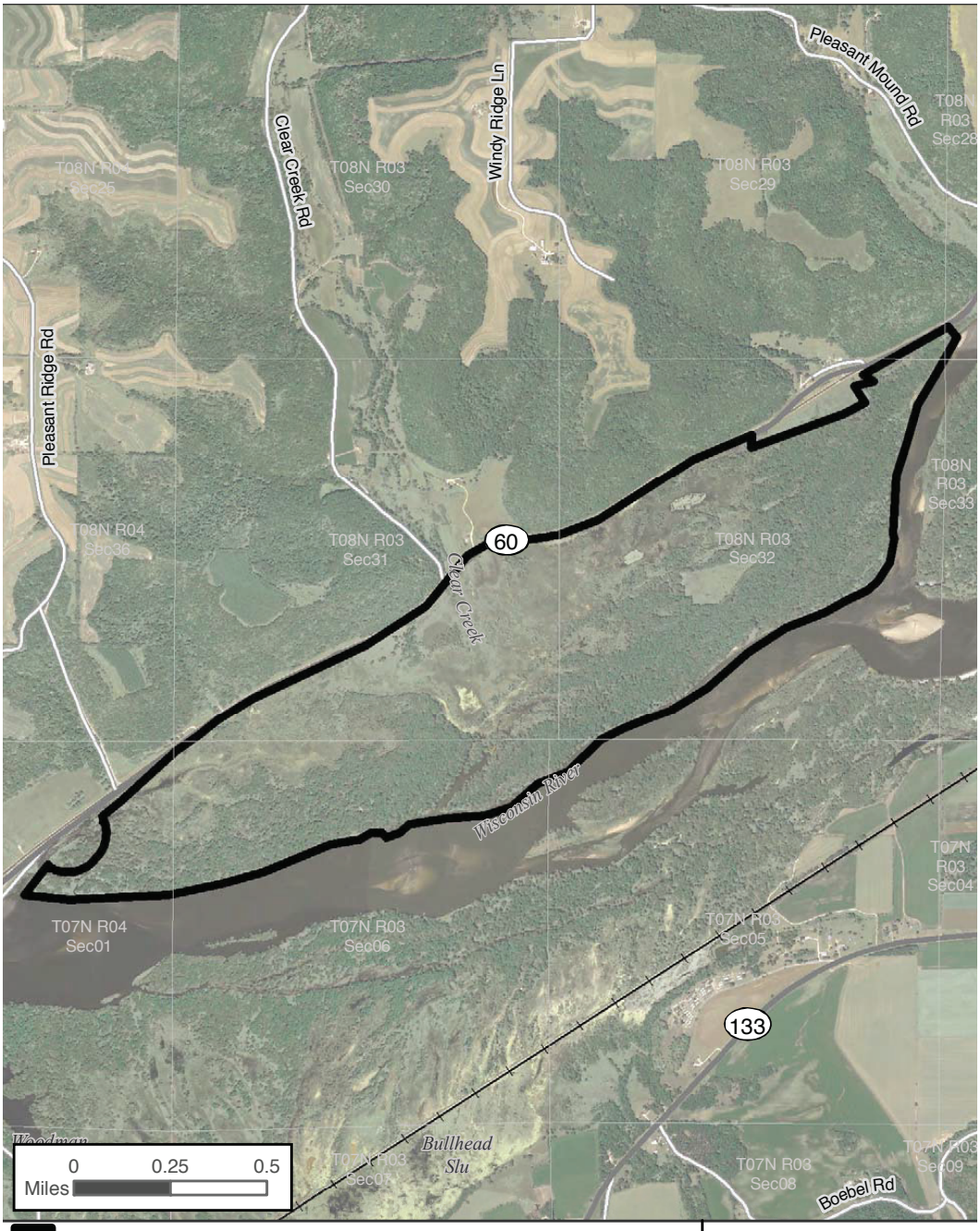
AREA 27 LOCATOR MAP



Management Prescriptions

- Promote the growth and retention of large swamp white oak and other bottomland hardwood species. Follow the DNR Old Growth and Old Forest Handbook for Managed Old Forest (refer to full details elsewhere).
- Monitor composition and structure changes to aid future management decisions.
- Manage specific stands in a way that maintains closed canopy conditions within a majority of the actively managed area.
- Retain snags and coarse woody debris to promote old growth characteristics.
- In areas undergoing conversion from open sedge meadow/wet prairie to shrubs and brush use combinations of prescribed fire, mechanical mowing, grazing, bio fuel harvest and herbicide to reduce the woody vegetation.
- Where feasible, use prescribed fire, mowing, and herbicide treatment to reduce monotypic stands of reed canary grass and narrow-leaved cattail.
- Restore the site's original hydrology, where possible and compatible with the other primary objectives and practicable given adjacent ownership, land uses and agency resources.

MAP 2.22 CLEAR CREEK LOWLANDS



WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Bureau of Facilities and Lands
November 13, 2015
WR-LWSR-MP-7925-Map 2.20 kmh

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WOODMAN SAND PRAIRIE AND DEAD LAKE

Woodman Sand Prairie and Dead Lake was designated a State Natural Area in 1991.

Description of Site

Woodman Sand Prairie and Dead Lake SNA features a dry Sand Prairie and Sand Barrens with several blowouts and dunes and Dead Lake, a shallow, seepage lake. The 17-acre lake has a maximum depth of only three feet and is considered to be deep marsh wetland with excellent habitat for muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), mink (*Mustela vison*), and puddle ducks (*Anas spp.*). In the Sand Prairie and barrens, dominant vegetation includes little bluestem, few-flowered panic grass (*Panicum oligosanthes*), Muhlenberg's bracted sedge, rough false pennyroyal (*Hedeoma hispida*), Virginia dwarf-dandelion, and wormwood (*Chenopodium ambrosioides*). Lichens and mosses are abundant and include such species as British soldier (*Cladonia cristatella*) and reindeer lichens (*Cladonia rangiferina*). Also present are white wild indigo, American figwort (*Scrophularia lanceolata*), bitter milkwort, whorled milkweed, flowering spurge, and round-headed bush-clover. Several blowouts and smaller dunes are present with the larger blowouts being stabilized by false heather and rock spikemoss. The northwest portion of the area is of special interest due to the proximity of the rich Dead Lake Marsh. The marsh edge is quite dramatic as it grades rapidly from a wetland dominated by steeplebush and sedges to a sand blow all within a few feet.

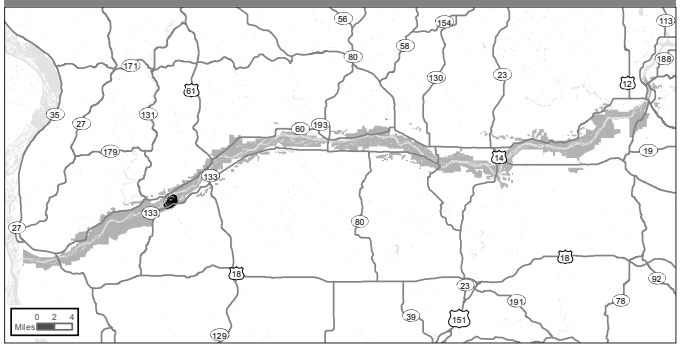
Significance of Site

The upland sand areas at the site are an important turtle nesting area for numerous species. Blanding's turtles are known from the site as it offers excellent overwintering, foraging, basking, and nesting habitat. There is good potential for the full suite of prairie reptiles to utilize the open upland sand habitats.

The site offers moderate opportunities for marsh and grassland/brush birds. Important birds noted in the uplands include red-headed woodpecker, field sparrow, brown thrasher, and blue-winged warbler.

Large numbers of northern long-eared bats (*Myotis septentrionalis*) and one record of the eastern red bat (*Lasiurus borealis*) (found in very low numbers in the LWSR) were encountered during summer resident bat surveys at Woodman Lake and the backwaters in close proximity to this primary site. The State

AREA 28 LOCATOR MAP



Threatened northern long-eared bat was found to be rare in the LWSR and is likely utilizing the small open water areas at Dead Lake for foraging activities. The expansive floodplain forests adjacent to the site are likely important roost areas for these bats.

This site has good potential for terrestrial invertebrates, as revealed during recent surveys where species identified including the following: sulphur-winged grasshopper (*Arphia sulphurea),* a little wood satyr (*Megisto cymela*), northern marbled locust, slantfaced pasture grasshopper,short-winged toothpick grasshopper (*Pseudopomala brachyptera*) and narrowwinged sand grasshopper, sidewalk tiger beetle (*Cicindela punctulata*), and a number of true bugs (*Heteroptera*) and beetles on cinquefoil (*Potentilla sp.*).

Management Considerations

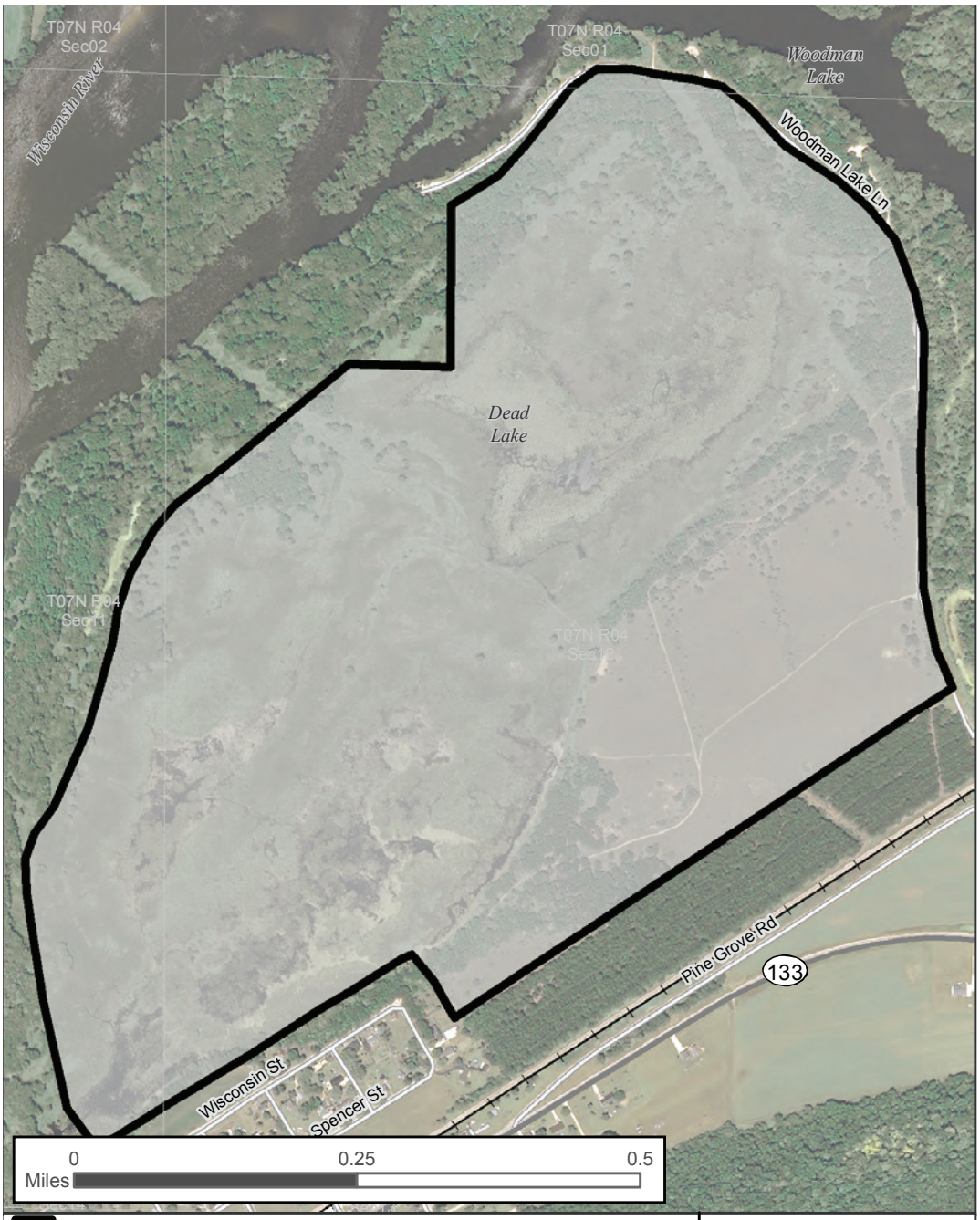
Control of off-road vehicles at the site is of high importance. Removal and restoration of pine plantations adjacent to the site could improve viability of area-sensitive grassland birds and enhance populations of prairie reptiles.

Long Term Management Objectives (100 Years)

- Maintain the site as an ecological reference area for sand prairie and emergent marsh using natural processes and prescribed fire to determine the structure of the prairie and associated wetlands. Additionally, the site provides valuable habitat for herptiles and remnant prairie dependent invertebrates, as well as opportunities for research and education on the highest quality native prairies and emergent marshes.

WOODMAN SAND PRAIRIE AND DEAD LAKE

MAP 2.23 WOODMAN SAND PRAIRIE AND DEAD LAKE



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AREA 28 NATIVE COMMUNITY MANAGEMENT AREA

WOODMAN SAND PRAIRIE AND DEAD LAKE

Short Term Management Objectives (50 Years)

- Restore and maintain habitat for species that require open conditions. As part of this effort, increase the diversity and abundance of native prairie and savanna vegetation and associated animal species with emphasis on rare species. Develop and maintain natural transitions between different plant communities with soft edges between them.
- Maintain habitat for rare shrub and savanna species.
- Expand the size of prairie openings to maintain and enhance conditions favorable to native prairie vegetation.

Management Prescriptions

- Follow guidance from the Xeric Prairie State Natural Area Management Guide (WDNR, 2010).
- Use an intensive fire management program as the primary tool to shape the site's ecological characteristics.
- Consider impacts to reptiles regarding timing of prescribed burns, and provide appropriate unburned refugia as needed for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units.
- To control native trees and shrubs use tree harvests, brushing and especially fire, mimicking natural disturbance patterns. Occasional fire-tolerant oaks and native shrubs may be retained at low densities as habitat for rare shrub and savanna species. Remove planted conifers.
- Restore abandoned roads and other disturbed areas to sand prairie using seed collected on site.
- Follow Incidental Take Protocols for listed species.
- Other allowable activities include control of invasive plants and animals, augmentation of native prairie species after careful review, maintenance of existing facilities, and access to suppress wildfires.

Photo by Ann Freiwald, DNR

WOODMAN SAND PRAIRIE AND DEAD LAKE

Photo by Nate Fayram, DNR

MILLVILLE WOODLANDS AND PRAIRIES

Due to the site's rugged topography that ranges from the river to high, dry ridgetops a wide variety of native communities and habitats are represented here. The overall management strategy is to maintain the intact block of floodplain forest and the blocks of closed canopy forest (Southern Dry, Dry-mesic and Mesic Forest) stretching up the slopes. Further, management will strive to maintain oak as a viable forest component, and blend with and maintain adjacent areas of Oak Barrens, Oak Woodland, savanna and prairie. Some remaining cropland is slowly being converted to prairie, with prescribed fire, mowing and brushing used to maintain the open grassland. Populations of invasive species are controlled or eliminated by cutting, pulling, burning, herbicide treatment and/or bio-control. This area provides important habitat for a diverse array of native lowland and upland flora and fauna, particularly area-sensitive forest interior birds.

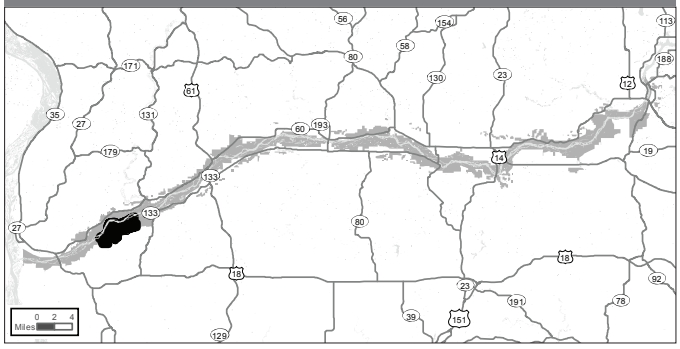
Recreationally, the management strategy is to provide opportunities for hunting, trapping and other low-impact outdoor recreation while protecting the qualities of the unique native communities and associated species found on the property.

Description of Site

This large and diverse site consists of over 3,500 acres of mostly wooded land along the Wisconsin River, and includes the 48-acre Adiantum Woods State Natural Area. Within the floodplain of the river lies over 500 acres of Floodplain Forest. Adjacent to this community on the upper sand terrace is a narrow band of Oak Barrens. Typical Driftless Area bluff-and-ravine topography overlooks the lower-lying communities and harbors a matrix of Southern Mesic Forest (lower slopes, ravines), Southern Dry-mesic Forest (upper slopes and ridge tops) and Southern Dry Forest/Oak Woodland (steep slopes with warmer, drier microclimates). Dry/Dry-mesic Prairies punctuate the woodland complex where soils are thin and rocky, typically on steep slopes in association with rock outcrops. Millville Creek, along with several other unnamed streams and seeps, flow through the upland ravines of this site down to the Wisconsin River.

The Floodplain Forest can be described as three disjunct blocks. The eastern block is of variable quality, with mostly low structural and floral diversity, but some large canopy trees (18-30 inch dbh sugar maple, American elm and eastern cottonwood). The western block harbors about 387 acres of good-quality forest. The sandy ridge-and-swale topography contributes to its high structural and floral diversity. The forest is mostly dominated by 18-30 inch dbh silver maple, though hackberry, swamp white oak, and green ash further contribute

AREA 29 LOCATOR MAP

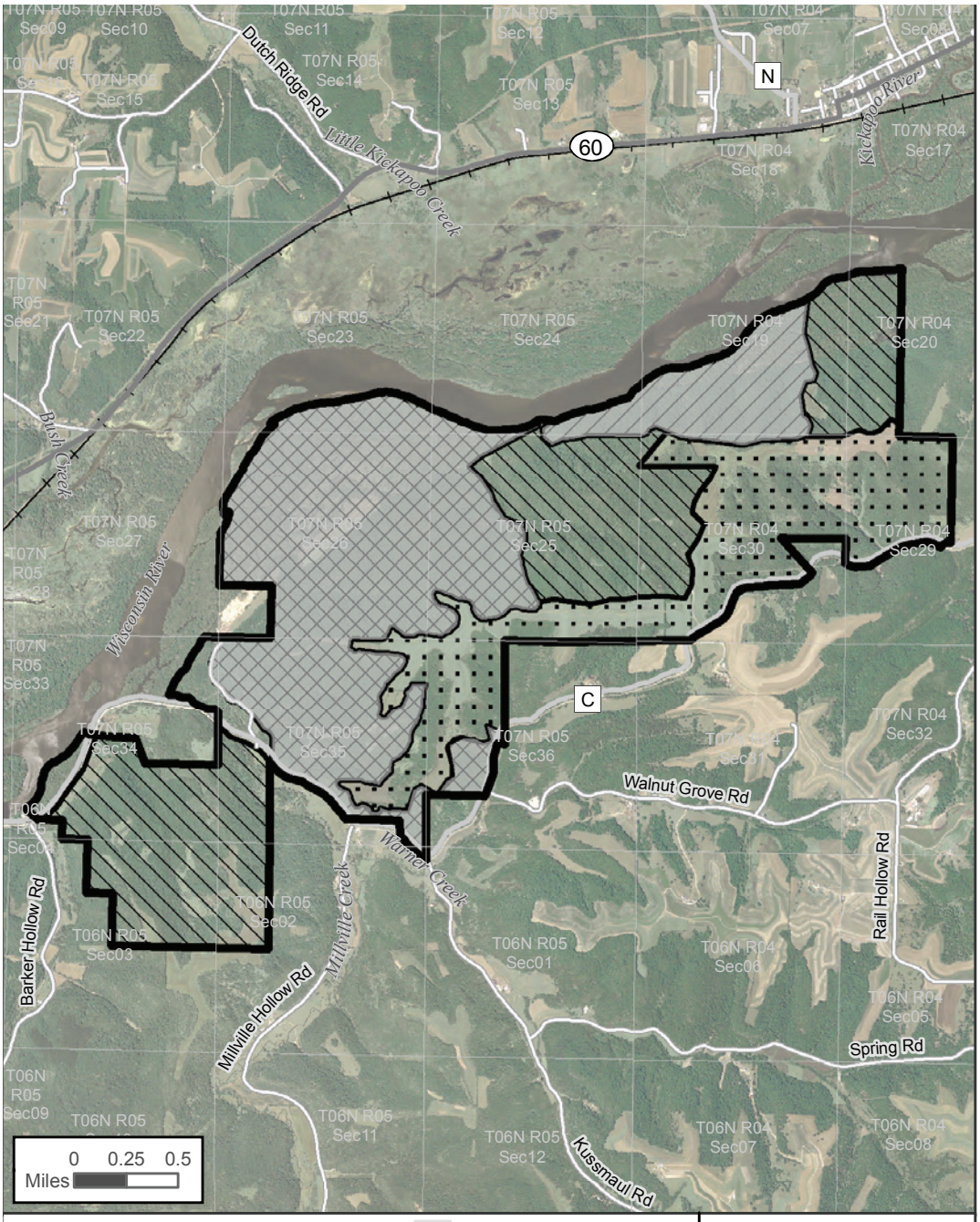


to the canopy on the ridges. The open sloughs are dominated by buttonbush. Typical ground layer species include wood nettle, cut-leaved coneflower, blue phlox, bristly buttercup, fringed loosestrife and common eastern wild-rye. The stream that crosses the site creates numerous deep ponds with bullhead pond-lily (*Nuphar variegata*), buttonbush, and rice cut grass growing in them. Along Millville Creek, a small section of disturbed, formerly logged and grazed, partially-closed Floodplain Forest represents the third and last block.

A narrow strip of fair- to good-quality Oak Barrens (28 acres) lies on the upper sand terrace between the western block of good-quality Floodplain Forest and the adjacent upland woods. Here, scattered small black oaks create 5-25% canopy cover, while the ground layer is dominated by native graminoids such as big bluestem, switch grass, little bluestem, June grass and Pennsylvania sedge. Typical forbs include bird's-foot violet (*Viola pedata*), western sunflower, dotted horsemint and annual bur-sage. The adjacent open area to the south has been planted to prairie. Small, Oak Barrens inclusions also occur on dry, sandy outcrops within the Oak Woodland matrix in the uplands above.

The vast upland forest complex exhibits great variability in stand quality and composition, probably reflecting different stages of recovery from past logging and grazing that occurred prior to state acquisition. The presence of open-grown oaks and savanna ground layer species amidst brushy cohorts of younger successional trees also indicates the long-term effects of fire suppression within this landscape. The invasive plant garlic mustard is ubiquitous throughout the upland forests, and poses a serious threat to their future. Southern Dry-Mesic Forest and Oak Woodland are the dominant communities in the uplands, their quality ranging from fair to good. Two stands of Southern Dry-mesic/Mesic Forest stand out as being good- to excellent-quality, and together total 476 acres; one stand includes the SNA and adjacent slopes, while

MAP 2.24 MILLVILLE WOODLANDS AND PRAIRIES



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the other stand occurs on the next bluff to the west. Adiantum Woods SNA represents the benchmark standard for these community types where, as one moves upslope, a continuum of vegetation from mesic to dry-mesic forest is evident. Here, the canopy is composed of white and red oak, basswood, bitternut hickory, black cherry, sugar maple, and bigtooth aspen. Eastern hop-hornbeam is present in the subcanopy. The shrub layer consists of American witch-hazel (*Hamamelis virginiana*), gray dogwood, ninebark (*Physocarpus opulifolius*), hazelnut, and poison ivy. The ground layer is rich in herbaceous species with American lop-seed (*Phryma leptostachya*), pointed tick-trefoil, bloodroot (*Sanguinaria canadensis*), hairy sweet cicely, maidenhair fern, interrupted fern (*Osmunda claytoniana*), large yellow lady's-slipper (*Cypripedium parviflorum var. pubescens*), preacher in the pulpit, wild sarsaparilla, white baneberry (A*ctaea pachypoda*), red baneberry (*A. rubra*) and poke milkweed (*Asclepias exaltata*). Throughout these high-quality stands, the canopy dominants (red and white oak, sugar maple) have diameters ranging from 10 to 30 inches.

Two stands of Oak Woodland exhibit metrics of good- to excellent-quality natural communities; these are on the south-, west-, and northwest-facing bluff slopes above the Oak Barrens and east of County Highway C. These Oak Woodlands harbor the rare chinquapin oak. The dominant canopy trees, some of which exhibit an open-grown character, create 51-75% cover, and include white, red and bur oak. The subcanopy is moderately dense, dominated mostly by white oak, along with lesser amounts of red and bur oak, and bigtooth aspen. A dense shrub layer is created by Virginia creeper, American hazelnut, poison ivy, gray dogwood and the invasive multiflora rose. The sparse ground layer is characterized by broad-leaf enchanter's-nightshade, bracken fern (*Pteridium aquilinum*), starry false Solomon's-seal, Culver's root and wild geranium.

Significance of Site

This site presents a significant opportunity for managing a large contiguous block of wooded communities at a landscape scale, including Floodplain Forest, Oak Barrens, Oak Woodland, and Southern Dry, Dry-mesic and Mesic Forest. These communities provide ample habitat for a diverse array of native lowland and upland flora and fauna, particularly area-sensitive forest interior birds. By maintaining examples of high-quality natural communities, this site can also serve as a reference area for ecological restoration throughout the LWSR.

The diversity and connectivity of habitats (bottomland forest to upland continuum) and connection to adjacent closed-canopy forests (Wauzeka Bottoms and Woodman Islands) make this site one of the best locations in the LWSR for a large number of rare bird species. Some birds present here are only known from this site (worm-eating warbler [*Helmitheros vermivorus*]) or in very low numbers within the LWSR (hooded warbler) and the entire state (Kentucky warbler). Other rare birds are found here in the best numbers of any location within the LWSR or entire state, like the cerulean warbler, with estimates of greater than 50 singing males defending territories (M. Mossman, personal communication, Feb. 18, 2011). Rare birds are found from the densely forested bottoms (red-shouldered hawk and prothonotary warbler) and mesic to dry-mesic slopes (acadian flycatcher), to the drier oak woodlands (yellow-billed cuckoo), savannas (blue-winged warbler), and grasslands (Henslow's sparrow [*Ammodramus henslowii*]) as you move toward the top of the slope or on west-facing aspects. This matrix of habitats appears to be crucial for developing the diverse and rich fauna present at the site.

This site represents a significant opportunity to preserve other rare and representative species in a continuum of mesic forests to bluff prairies, savannas, and barrens. The diverse landscape attracts numerous rare snakes (timber rattlesnake, gophersnake, prairie ringneck snake, and North American racer) meeting their various life history requirements, including providing critical areas for basking, overwintering den sites, staging areas for gravid females, and habitats for an abundant prey base. The barrens areas are an important nesting area for aquatic turtles like several species of map turtle, spiny softshell, and painted turtles (*Chrysemys picta sp.*) coming from the sloughs and river. There is potential for a number of other rare reptiles to utilize this site including gray ratsnake, six-lined racerunner, and Blanding's turtle.

The barrens and prairies of this site support several rare and Special Concern species including American fever-few, prairie Indian plantain (*Cacalia tuberosa*), yellow gentian, prairie ragwort, one-flowered broom-rape, and clustered poppy-mallow. Clustered poppy-mallow, a globally rare plant species that reaches its greatest abundance nationwide in Wisconsin, is known from the Oak Barrens. The LWSR represents nearly 50% of the state's known populations of prairie ragwort.

The Floodplain Forests of this site are very important to rare plants. Three rare plants are known from the Floodplain Forests, including snow trillium (*Trillium nivale;* State-Threatened), spreading chervil (*Chaerophyllum procumbens;* Special Concern), and sweet-scented Indian-plantain (Special Concern). For two of these species (spreading chervil and sweet-scented Indian-plantain), LWSR contains approximately 20% of the known populations in the state. This site also supports a population of purple rocket and represents one of only four extant sites in the state. The species was found on wet-mesic ridges dominated by swamp white oak in dense, mature Floodplain Forest.

Southern Mesic Forests are not common on the LWSR and this site represents the highest quality example. Two Special Concern plant species, putty root and great water-leaf, are found at this site. The LWSR supports significant populations (over 25% of the known populations in the state) of these two plants, making this site critical to the future of the state's populations.

Purple milkweed (*Asclepias purpurascens*; State-Endangered), a species of Oak Woodland and oak savanna, is known from several locations on this site.

The blufftop prairie at this site is a high priority for terrestrial invertebrates (Kirk 2009). Species observed include: sulphur-winged grasshopper and northern green-striped grasshopper (*Chorthophaga viridifasciat*), sidewalk tiger beetle, giant swallowtail (*Papilio cresphontes*), great spangled fritillary (*Speyeria cybele*), clouded sulphur (*Colias philodice*), pearl crescent (*Phyciodes tharos*) and a hummingbird clearwing moth (*Hemaris sp.*). On the prairie remnant of a small outcrop, Boll's grasshopper , the goldenrod soldier beetle (*Chauliognathus pennsylvanicus*), and several smaller beetles (Kirk 2009).

Management Considerations

This site offers significant management opportunities for maintaining and enhancing a continuum of representative communities: Floodplain Forest, Oak Barrens, Oak Woodland, and Southern Dry, Dry-mesic and Mesic Forest and the species that depend on them. Dry-mesic and mesic forests of this site support species that rely on an intact forest canopy with older trees and minimal disturbance. Threats to these areas include invasive species, especially garlic mustard. Monitoring and control of garlic mustard may represent the single most important management need, as it can outcompete native ground layer species and also limit regeneration of canopy trees. Other invasive plants that are present in the upland woods include exotic bush honeysuckle and common buckthorn. Planting old fields at this site into trees such as white oak, especially those narrow fields closely surrounding by forest, and reducing hard edges along the field/woodland interface would increase the habitat for the rare species that rely on the closed-canopy forests at this site.

Many of the rare species associated with Floodplain Forests require a mature forest canopy, and virtually all benefit from the relatively natural hydrologic regime and accompanying periodic flooding. Invasive species, including reed canary grass, are a threat to this community.

The Oak Barrens at this site are small, yet provide important habitat to many species. Management of this community for open sandy soil with sparse vegetation will benefit the reptiles, grasshoppers (Kirk 2009), and rare plants that rely on this habitat.

The isolated bluff prairies support a number of rare plants, offer excellent opportunities to manage for terrestrial invertebrates and could be maintained in the larger forested mosaic; they are located within a high-quality forest; are less likely to be impacted by roadside management, runoff, and ATV traffic compared to those along the sand terraces; and they likely function as refugia for invertebrate species not yet identified.

Within the prairies and barrens at this site, known invasive species include Kentucky bluegrass, spotted knapweed, multiflora rose, and Bell's honeysuckle. Of these, the spotted knapweed poses the greatest threat. The other species can be reasonably managed with brushing and fire.

Managing a diverse site such as this is challenging. Meeting the needs of species that require both open and closed-canopy habitat while having limited resources requires careful planning. Management that would limit habitat that currently supports rare species should be evaluated for its potential for success. Management activities that benefit all species, such as invasive species control, should be a priority. Portions of the site would benefit from passive management of the canopy trees and possibly minimal activities to mimic natural disturbance patterns. Caution should be used when applying prescribed fire to this site to ensure that the flame height and temperature are kept low and that ravines and rich slopes are excluded. The significant opportunities for supporting habitat for rare species here warrants special management designation. Management focused on attaining ecological reference area standards could enhance the significance of this site.

The Millville Woodlands and Prairies Native Community Management Area is divided into four management sub-units listed below and shown on Map 2.24:

- Millville Oak Woodlands State Natural Area
- Adiantum Woods State Natural Area
- Millville Managed Old Forests
- Millville Grasslands and Savannas

AREA 29.1

MILLVILLE OAK AND WOODLANDS SNA

The Millville Oak Woodlands State Natural Area has an exceptionally rich flora and it includes perhaps the best Oak Woodland in the state. An Oak Woodland is the natural community with a habitat composition and structure between an oak opening and a dense oak forest. The management area is a complex of natural communities due to varied topography. Oak woodland is the most prominent with open patches of dry prairie, sparsely forested savanna on the southwest ridge tops, densely forested coves on the northeast slopes, oak barrens on the terrace below, grading down to old growth floodplain forest with portions dominated by large swamp white oak. Several bird Species of Greatest Conservation Need nest in significant numbers. The area is also known to provide habitat for several reptile Species of Greatest Conservation Need.

A narrow strip of fair-to good-quality Oak Barrens (28 acres) lies on the upper sand terrace between the western block of good-quality Floodplain Forest and the adjacent upland woods. Here, scattered small black oaks create 5-25% canopy cover, while the ground layer is dominated by native graminoids such as big bluestem, switch grass, little bluestem, June grass and Pennsylvania sedge. Typical forbs include bird's-foot violet (*Viola pedata*), western sunflower, dotted horsemint and annual bur-sage. The adjacent open area to the south has been planted to prairie. Small Oak Barrens inclusions also occur on dry, sandy outcrops within the Oak Woodland matrix in the uplands above.

The Floodplain Forest includes about 387 acres of good-quality forest. The sandy ridge-and-swale topography contributes to its high structural and floral diversity. The forest is mostly dominated by 18-30 inch dbh silver maple, though hackberry, swamp white oak, and green ash further contribute to the canopy on the ridges. The open sloughs are dominated by buttonbush. Typical ground layer species include wood nettle, cut-leaved coneflower, blue phlox, bristly buttercup, fringed loosestrife and common eastern wild-rye. The stream that crosses the area creates numerous deep ponds with bull-head pond-lily (*Nuphar variegata*), buttonbush, and rice cut grass growing in them.

Two stands of Oak Woodland exhibit metrics of good- to excellent-quality natural communities; these are on the south-, west-, and northwest-facing bluff slopes above the Oak Barrens and east of County Highway C. These Oak Woodlands harbor the rare chinquapin oak. The dominant canopy trees, some of which exhibit an open-grown character, create 51-75% cover, and include white, red and bur oak. The subcanopy is moderately dense, dominated mostly by white oak, along with lesser amounts of red and bur oak, and bigtooth aspen. A dense shrub layer is created by Virginia creeper, American hazelnut, poison ivy, gray dogwood and the invasive multiflora rose. The sparse ground layer is characterized by broad-leaf enchanter's-nightshade, bracken fern (*Pteridium aquilinum*), starry false Solomon's-seal, Culver's root and wild geranium.

Inventory of plant communities and intensive bird surveys have documented the exceptional nature of this oak woodland. This oak woodland may be the premier oak woodland in the state. A statewide GAP analysis of the SNA Program indicated the need to establish oak woodlands as State Natural Areas. The oak woodland and adjacent dry prairie, oak savanna, oak forest, oak barrens, and floodplain forest form a contiguous ecosystem that meets the criteria for SNA establishment.

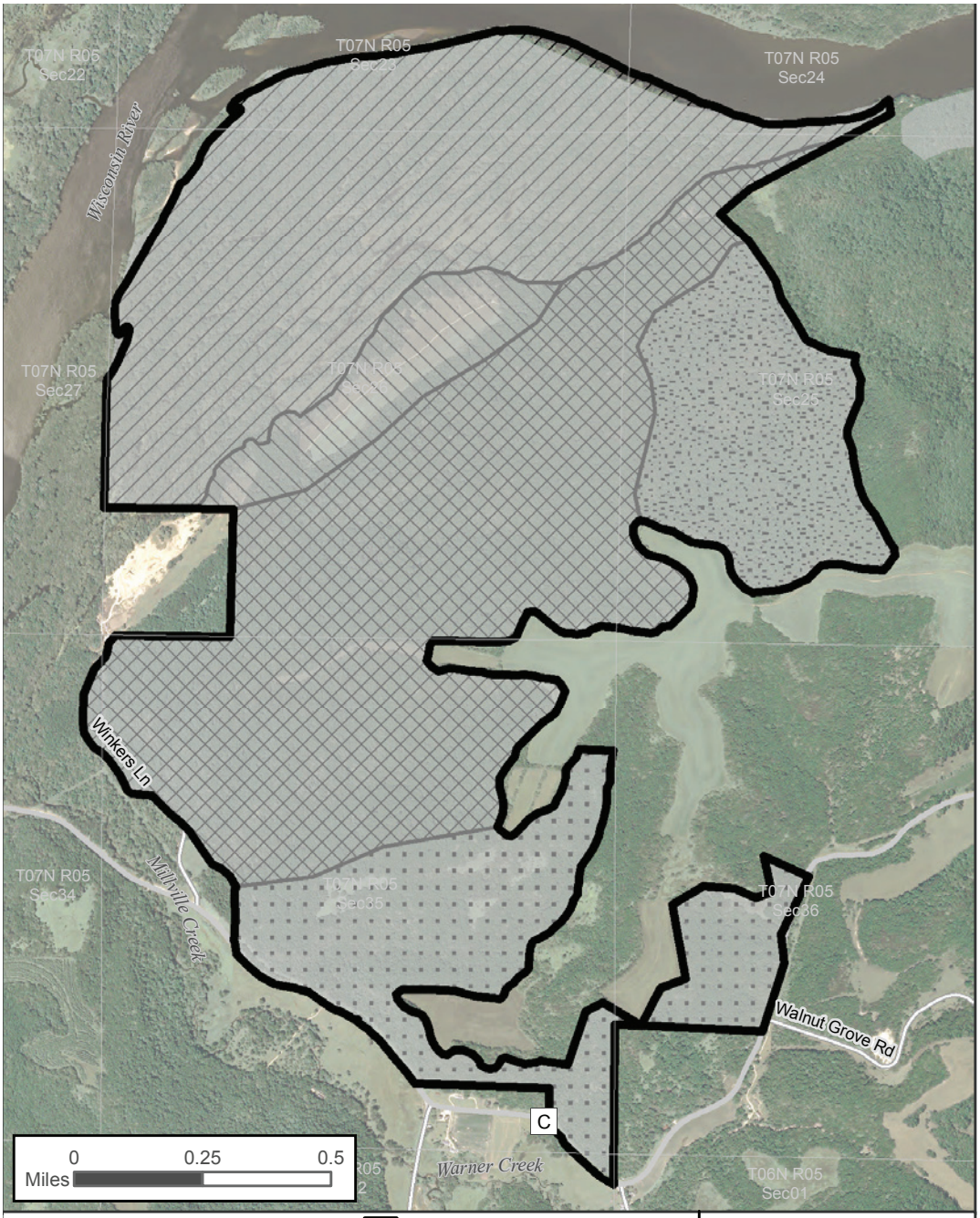
The SNA designation focuses management, research and educational activities on the area without compromising the traditional fishing and hunting uses. In addition, the designation accommodates joint management (Wildlife Management and Natural Heritage Conservation) to maintain the natural communities, restore habitat, and control invasive species.

This property adds to the SNA program's statewide representation of oak woodland, southern dry-mesic forest, oak opening, floodplain forest, oak barrens, and dry-mesic prairie.

Long Term Management Objectives (100 Years)
Restore and maintain a continuum of high quality native communities, comprised of oak woodland, oak opening, dry-mesic prairie, southern dry-mesic forest, oak barrens, and floodplain forest, at a large scale for ecological values and rare species habitat needs and to serve as ecological reference areas. Use natural processes, prescribed fire, and limited vegetation manipulation (prescribed below) to determine the structure of the communities and the ecological characteristics of the site. The overall management strategy is to also maintain an un-fragmented and undeveloped transition from bluff top to river's edge, which is rare in Wisconsin. An additional benefit is to provide opportunities for research and education on high quality native communities and rare species.

Short Term Management Objectives (50 Years)
- Restore structure of the oak savanna communities to mimic pre-settlement conditions where practical, restore the oak woodlands to ecological reference conditions, and monitor results to inform restoration efforts on other sites.
- Develop and maintain natural transitions between different plant communities. Reduce hard edges between different cover types.

MAP 2.25 MILLVILLE OAK AND WOODLANDS SNA



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Management Prescriptions

- Within fire dependent communities (see below) use frequent prescribed fire to restore ground layer composition, structure, and function; and to control invasive species at a large scale.
- Augment the ground layer only with species that historically would have been found on the site, using local genotype seeds or plugs.
- Contain and eradicate invasive and exotic species through the use of department approved chemical, biological, and mechanical practices.
- Other allowable activities include maintenance of existing facilities and access to suppress wildfires.

The Millville Oak Woodlands SNA (totaling 1,265 acres) is divided into five sub-management zones according to community type and desired management. They are shown on Map 2.24:

- Oak Woodland and Forest
- Oak Opening and Dry-mesic Prairie
- Old Growth Dry-mesic Forest
- Oak Barrens
- Floodplain Forest

Specific Objectives and Prescriptions by SNA Management Zone (See Map 2.25):

AREA 29.1.1

OAK WOODLANDS AND FORESTS ZONE (482 ACRES)

Management Objectives

- Allow natural processes to determine the structure of the dry-mesic forest and oak woodland, along with prescribed understory manipulation in the oak woodlands.
- Provide habitat for rare plants and animals, including those that reach their highest abundance in oak woodlands.

Management Prescriptions

- Use frequent low intensity fire to primarily shape the ecological characteristics of the site. Passively manage the native dominant savanna tree species (primarily oaks); however, some active thinning of the canopy, understory manipulation and shrub control via harvest, brushing may be used as needed to mimic natural disturbance patterns or to restore community structure and composition.
- Early in the restoration process, timber harvesting may be used to achieve structural and compositional native community goals.
- Monitor composition and structure changes to aid future management decisions.

AREA 29.1.2

OAK OPENING AND DRY-MESIC PRAIRIE ZONE (192 ACRES)

Long Term Management Objectives (100 Years)

- Maintain, restore, and expand Dry-mesic Prairie remnants and Oak Openings to provide habitat for native plants and animals.

Short Term Management Objectives (50 Years)

- Expand the size of prairie openings to enhance conditions favorable to native prairie vegetation.
- Increase the diversity and abundance of native prairie and savanna vegetation and associated animal species with emphasis on rare species.
- Increase connections between patches of native grassland vegetation.
- Develop and maintain natural transitions between different plant communities. Reduce hard edges between different cover types.

Management Prescriptions

- Maintain and expand Dry-mesic Prairie and Oak Opening natural communities through the use of mechanical and chemical treatments and prescribed fire.
- Use an intensive fire management program as the primary tool to shape the ecological characteristics of the site. Passively manage the native dominant savanna tree species (primarily oaks); however, some active thinning of the canopy, understory manipulation and shrub control via harvest, brushing may be used as needed to mimic natural disturbance patterns. Commercial timber harvesting may be used to facilitate the native community objectives of the area.
- Use combinations of timber harvest, brushing, tree planting, and prescribed fire to develop and maintain soft transitions between open, partial canopy, and closed canopy communities.
- Use existing DNR screening guidance to minimize impacts on sensitive species.
- Salvage of trees damaged by wind, fire, ice, disease, and insects may occur if consistent with the objectives of the area.

AREA 29.1.3

OLD GROWTH DRY-MESIC FOREST ZONE (138 ACRES)

Management Objectives
- Maintain the site as a Reserved Old Growth southern forest, and an ecological reference area, allowing the forest's structure and composition to respond to natural processes and range from Southern Dry-Mesic to Mesic Forest.
- Maintain old forest characteristics, including biologically mature trees, large diameter trees, structural diversity, standing and down course woody debris, and an uneven canopy.
- Provide a large area of structurally and functionally diverse, older forest as habitat for species associated with old growth forests,.
- Provide opportunities for research and education on the highest quality native southern forests.

Management Prescriptions
- Allow natural processes and passive canopy management to determine the structure of the forest. Retain snags and coarse woody debris to promote old growth characteristics.
- Active management may be used to control invasive species.
- Salvage of trees after a major wind event is not compatible with management objectives.

AREA 29.1.4

OAK BARRENS ZONE (69 ACRES)

Management Objectives
- Maintain and expand the site as an oak barrens reserve and ecological reference area, and for rare species habitat. Specifically promote open sandy soil with sparse vegetation to benefit barrens associated reptiles, invertebrates and rare plants.
- Allow natural processes, prescribed fire, and prescribed vegetation manipulation that mimics natural process, to determine the ecological characteristics of the site.
- Restore and maintain a natural transition from open barrens to adjacent communities.
- Manage according to DNR State Natural Areas Barrens Management Guide (DNR 2011)

Management Prescriptions
- Passively manage the native dominant savanna tree species (primarily oaks); however, some active thinning of the canopy, understory manipulation and shrub control via harvest, brushing may be used as needed to mimic natural disturbance patterns.
- Use combinations of timber harvest, brushing, and prescribed fire to expand open barrens habitat, and create a soft edge or transition into adjacent oak woodlands and floodplain forest.
- Develop or enhance sand prairie and oak barrens species habitat within disturbed and degraded portions of the site.
- Although removal of hazardous trees from over and near designated trails and management roads is allowed, manipulation/removal of vegetation and soil disturbance must be minimized, and have no impact on the rare species found at the site.
- Salvage of trees after a major wind event may be done if consistent with the site's management objectives.

AREA 29.1.5

FLOODPLAIN FOREST ZONE (482 ACRES)

Long-Term Management Objectives (100 years)

Provide and maintain a large area of structurally and functionally diverse, older, intact, connected forest comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species. Preserve coarse woody debris

Photo by Ann Freiwald, DNR

and standing dead snags for old growth habitat and structural diversity. Protect, manage, and enhance natural communities for ecological values and rare species habitat needs.

Short-Term Management Objectives (50 years)

- Develop and maintain an older, closed canopy forest of longer-lived species, such as swamp white oak, silver maple, and other bottomland hardwood species.
- Enhance forest structural diversity and development of old forest characteristics such as large diameter trees, uneven canopy, standing dead snags, and coarse woody debris.
- Develop and maintain habitat for species associated with old forest floodplain forest.
- Protect water quality through protection and maintenance of riparian habitat and seeps consistent with Best Management Practices (BMPs) for water quality.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River.

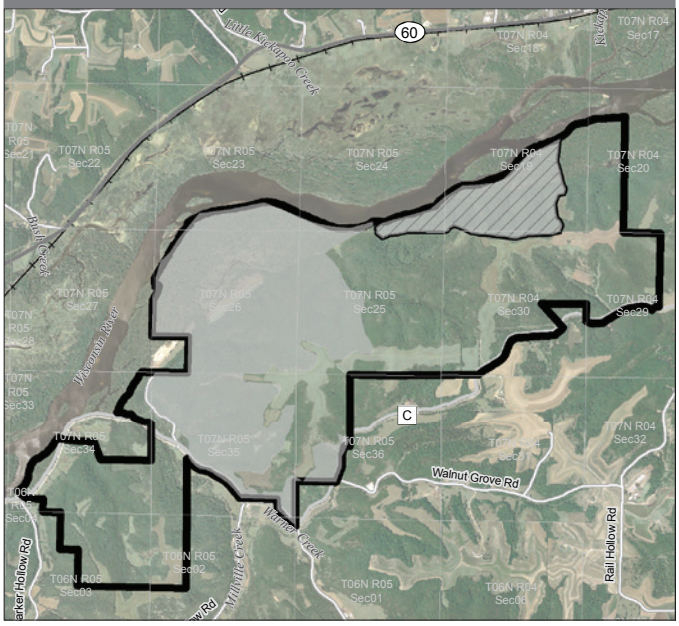
Management Prescriptions

- Use active management practices to promote the growth and retention of large swamp white oak and other bottomland hardwood species. Follow the prescriptions for Bottomland Hardwood – Managed Old Forest in the General Management by Habitat/Forest Type section of this plan.
- Manage specific stands in a way that maintains closed canopy conditions within a majority of the actively managed area.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Monitor composition and structure changes to aid future management decisions.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Salvage trees after a major wind event if management objectives are met and with consultation with affected DNR program staff.

AREA 29.2

ADIANTUM WOODS STATE NATURAL AREA

AREA 29.2 LOCATOR MAP



This is a 263 acre site featuring a rich, dry-mesic forest situated on a steep north-facing slope that rises from the south bank of the Wisconsin River, refer to Map 29.2. Adiantum Woods was designated a State Natural Area in 1991.

The forest canopy is composed of white and red oak, basswood, bitternut hickory, black cherry, sugar maple, and big tooth aspen. Eastern hop-hornbean and ironwood are present in the subcanopy. The shrub layer consists of witchhazel, gray dogwood, ninebark, hazelnut, and poison ivy. The understory is rich in herbaceous species with lopseed, tick-trefoil, bloodroot, sweet cicely, maidenhair, interrupted, and rattlesnake ferns, yellow lady's slipper, showy orchis, wild sarsaparilla, red and white baneberry, and poke milkweed. Limestone outcrops near the top of the slope harbor populations of smooth cliff brake, bulblet bladder fern, and slender lip fern. Moving upslope, a transition or continuum of vegetation is evident as the forest community shifts from mesic to dry-mesic and finally to dry forest.

Adiantum Woods provides nesting habitat for rare forest interior birds including Cerulean Warbler, Acadian Flycatcher, and Kentucky Warbler.

Adiantum Woods SNA represents the benchmark standard for Southern Dry-mesic/Mesic Forest where, as one moves

upslope, a continuum of vegetation from mesic to dry-mesic forest is evident. Here, the canopy is composed of white and red oak, basswood, bitternut hickory, black cherry, sugar maple, and bigtooth aspen. Eastern hop-hornbeam is present in the subcanopy. The shrub layer consists of American witch-hazel (*Hamamelis virginiana*), gray dogwood, ninebark (*Physocarpus opulifolius*), hazelnut, and poison ivy. The ground layer is rich in herbaceous species with American lop-seed (*Phryma leptostachya*), pointed tick-trefoil, bloodroot (*Sanguinaria canadensis*), hairy sweet cicely, maidenhair fern, interrupted fern (*Osmunda claytoniana*), large yellow lady's-slipper (*Cypripedium parviflorum var. pubescens*), preacher in the pulpit, wild sarsaparilla, white baneberry (*Actaea pachypoda*), red baneberry (*A. rubra*) and poke milkweed (*Asclepias exaltata*). Throughout these high-quality stands, the canopy dominants (red and white oak, sugar maple) have diameters ranging from 10 to 30 inches.

Management Objectives

- Maintain a Reserved Old Growth southern forest, and an ecological reference area, allowing forest structure and composition to respond to natural processes and range from Southern Dry-Mesic, to Mesic, and to Floodplain Forest.
- Provide a large area of structurally and functionally diverse, older, intact, connected forest to provide habitat for species associated with old growth forests with habitat characteristics such as biologically mature trees, large diameter trees, structural diversity, standing and down course woody debris, and an uneven canopy.
- Maintain an un-fragmented forest and undeveloped transition from bluff top to river's edge, which is rare in Wisconsin.
- Provide opportunities for research and education on the highest quality native southern forests.

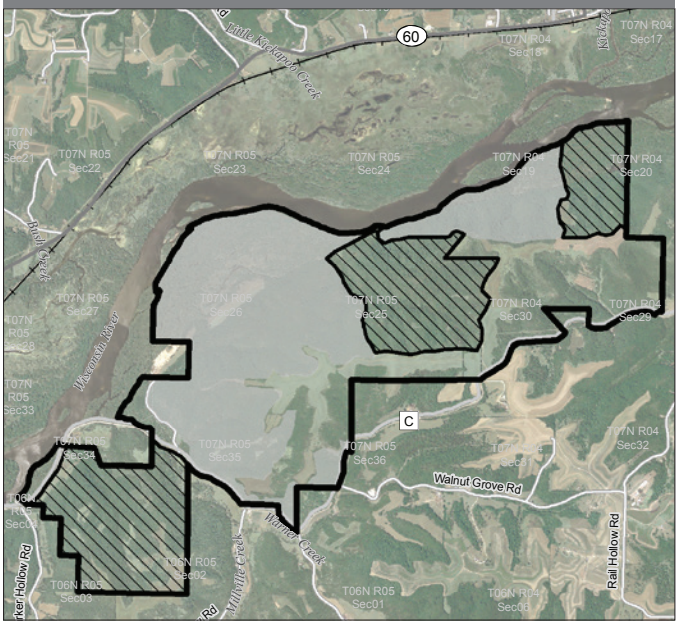
Management Prescriptions

- Allow natural processes and passive canopy management to determine the structure of the forest. The control of invasive species and low intensity prescribed fire may occur.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Salvage of trees after a major wind event is not compatible with management objectives

AREA 29.3

MILLVILLE MANAGED OLD FORESTS

AREA 29.3 LOCATOR MAP



This management area totals 1,174 acres in three blocks. Refer to Map 29.3.

Long Term Management Objectives (100 Years)

Sustain a managed old forest with characteristics including biologically mature trees, large diameter trees, structural diversity, standing and down coarse woody debris, and an uneven canopy. To this end, promote long-term research and demonstration projects that seek to balance the development of old forest characteristics with active forest management practices that maintain mid-successional species such as oak.

Short Term Management Objectives (50 Years)

- Develop and maintain old forest characteristics, including biologically mature trees, large diameter trees, structural diversity, standing and down course woody debris, and an uneven canopy using natural processes and active management that mimics natural disturbance.
- Develop and maintain natural transitions between different plant communities. Reduce hard edges between different cover types.
- Develop and maintain natural transitions with "soft edges" between different plant communities or cover types.
- Regenerate oak (along with other mid-successional tree species) in order to maintain the species within oak-dominated or mixed cover types. Improve the oak age class

distribution for long-term sustainability of the species. Maintain at least 50% in mature forest with closed canopy or near closed canopy conditions to benefit interior forest songbirds.
- Maintain the aesthetic qualities of old forest habitat.
- Support scientific research and silvicultural demonstrations that are compatible with and support the ecological objectives.

Management Prescriptions

Generally, the management prescriptions allow active management that mimics natural processes in order to sustain and enhance the old forest characteristics. Specific authorized management prescriptions are outlined below.

Oak
- Maintain oak through management techniques that mimic natural disturbance of limited size and scale relative to the size of the management area (i.e., see area canopy objectives above). Retain vigorous younger oak by thinning surrounding areas from below.
- Use natural regeneration systems for oak; overstory removal when sufficient advanced regeneration is present or coppice when stump sprout potential is adequate. Use shelterwood and group selection systems when advance regeneration or stump sprout potential is not adequate. Consider modifying these regeneration systems as necessary to accommodate the overall old forest objectives, such as through the retention of reserve trees for better stand structure or by limiting the size of regeneration patches to maintain canopy.
- Use prescribed fire with other management techniques to help regenerate oak, to restore ground layer composition, to control invasive species, and to restore ecosystem processes.

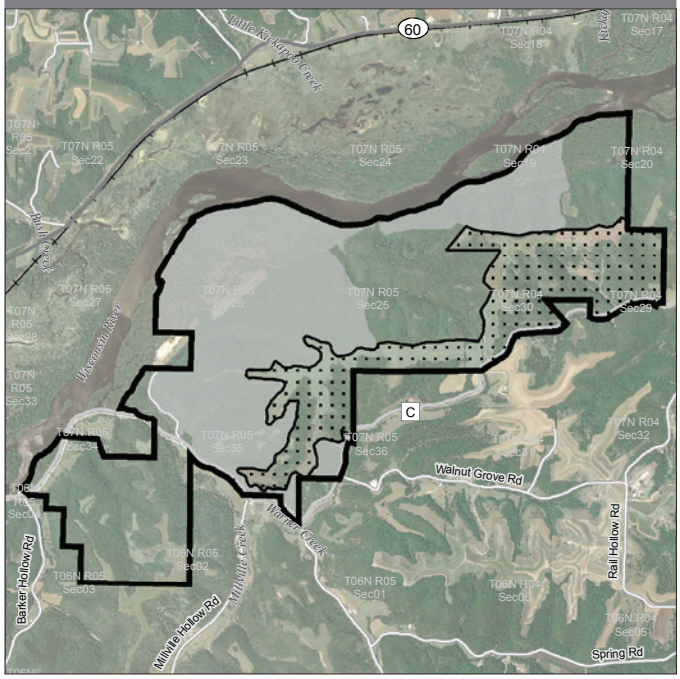
Northern Hardwoods
- Use natural regeneration systems for central and northern hardwoods. Both even and uneven-aged methods may be used; however, uneven-aged methods are preferred to create diverse stand structure and maintain canopy. Allowed regeneration systems include single tree selection, group selection, and patch clearcutting where appropriate.
- Use intermediate treatments, such as release or crown thinning, to manipulate composition, maintain vigor of selected trees, and accelerate old forest structural development.
- Assess the degree of succession to central or northern hardwoods. Retain oak where oak regeneration seems unlikely.
- Promote and retain standing and down coarse woody debris.

General management area prescriptions
- Follow the DNR Old Growth and Old Forest Handbook management guidelines, particularly related to "Managed Old Forest". Monitor composition and structure changes to aid in future management decisions.
- Use combinations of timber harvest, brushing, tree planting, and prescribed fire to develop and maintain soft transitions between open, partial canopy, and closed canopy communities.
- Salvage of trees damaged by wind, fire, ice, disease, and insects may occur if consistent with the objectives of the area. When conducting salvage operations, seek to retain course woody debris and "legacy" trees in order to improve old forest structural attributes.

AREA 29.4

MILLVILLE PRAIRIES AND SAVANNAS (878 ACRES)

AREA 29.4 LOCATOR MAP



This ridgetop area is comprised of approximately 300 acres of former and existing agricultural fields. The restored acreage was planted to native grass and forb prairie, or a combination of both (oak savanna). Approximately 100 acres remain in sharecropped and they will be restored to native plantings as resources become available. Map 29.4. This map also outlines the remnant prairie areas and restoration area, including the area projected to be restored to prairie and the area projected to be savanna.

Management Objectives

- Establish and/or maintain the former agricultural fields in prairie or oak savanna.
- Maintain and enhance the remnant native prairie openings (located primarily on south and west-facing slopes).

Management Prescriptions – Sharecrop and Restored Fields

- Plant the sharecrop fields to prairie as resources become available.
- Use regular, low intensity prescribed fire to stimulate prairie plantings and inhibit invasion by woody plants.
- Use mechanical and chemical treatments as needed to control invasive species.
- Plant and/or maintain scattered oaks.
- Depending on the resulting grass/forb ratio, supplemental inter-seeding with forbs may be done to maintain a diverse prairie.

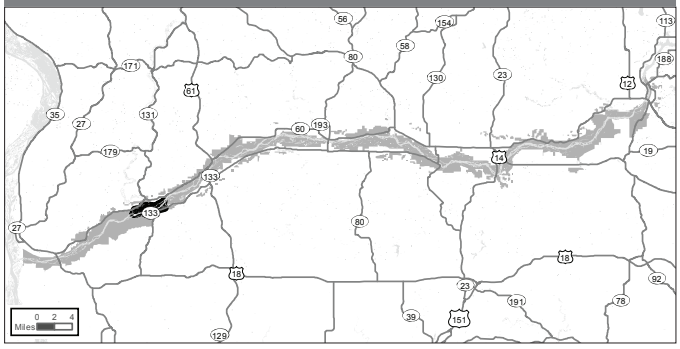
Management Prescriptions – Native Prairie Remnants

- As needed, remove trees and shrubs to restore the previous extent and quality of these sites.
- Use frequent prescribed fire to restore and maintain the native prairie community.

Photo by Ann Freiwald, DNR

WAUZEKA BOTTOMS AND WOODMAN ISLANDS

AREA 30 LOCATOR MAP



Description of Site

Wauzeka Bottoms (1,129 acres) contains an extensive stand of mature Floodplain Forest on the north side of the Lower Wisconsin River. The canopy is dominated by silver maple, swamp white oak, river birch, and green ash, with lesser amounts of hackberry, American elm, honey locust (*Gledistsia triacanthos*), eastern cottonwood, black willow (*Salix nigra*), bitternut hickory, and basswood. The structure varies from closed-canopy with an open understory to semi-open canopy with brushy understory of buttonbush, winterberry, elderberry. Prickly ash is common where the canopy is broken due to running sloughs, oxbow lakes, and beaver ponds. Lianas of poison ivy, wild grape, and Virginia creeper proliferate with a rich herbaceous layer of wood nettle, sedges, grasses, cardinal flower, green dragon, and false dragonhead (*Physostegia virginiana)*.

Woodman Islands (250 acres), located southwest of the village of Woodman, includes a large island in the LWSR bisected by a railroad right-of-way and a narrow strip of Floodplain Forest separated from the mainland by State Highway 133. The island has a high-quality Floodplain Forest with good topographical and structural diversity, which is higher on the east side of the island and lower on the west side as ridge and slough topography gives way to the flat first bottom. Canopy cover is dense silver maple and swamp white oak with basswood, river birch, eastern cottonwood, black walnut, green ash, and hackberry. The subcanopy cover is moderate to dense silver maple with American elm, swamp white oak, basswood, and river birch. The sapling layer cover is sparse to moderately dense and includes silver maple and swamp white oak. Some areas have a moderate seedling layer of silver maple. The shrub layer is sparse with buttonbush, poison ivy, and common winterberry. Ground layer is dense with wood nettle, bottomland aster, white grass, catchfly grass (*Leersia lenticularis*), Canadian clearweed (*Pilea pumila*), moneywort, and Muskingum sedge.

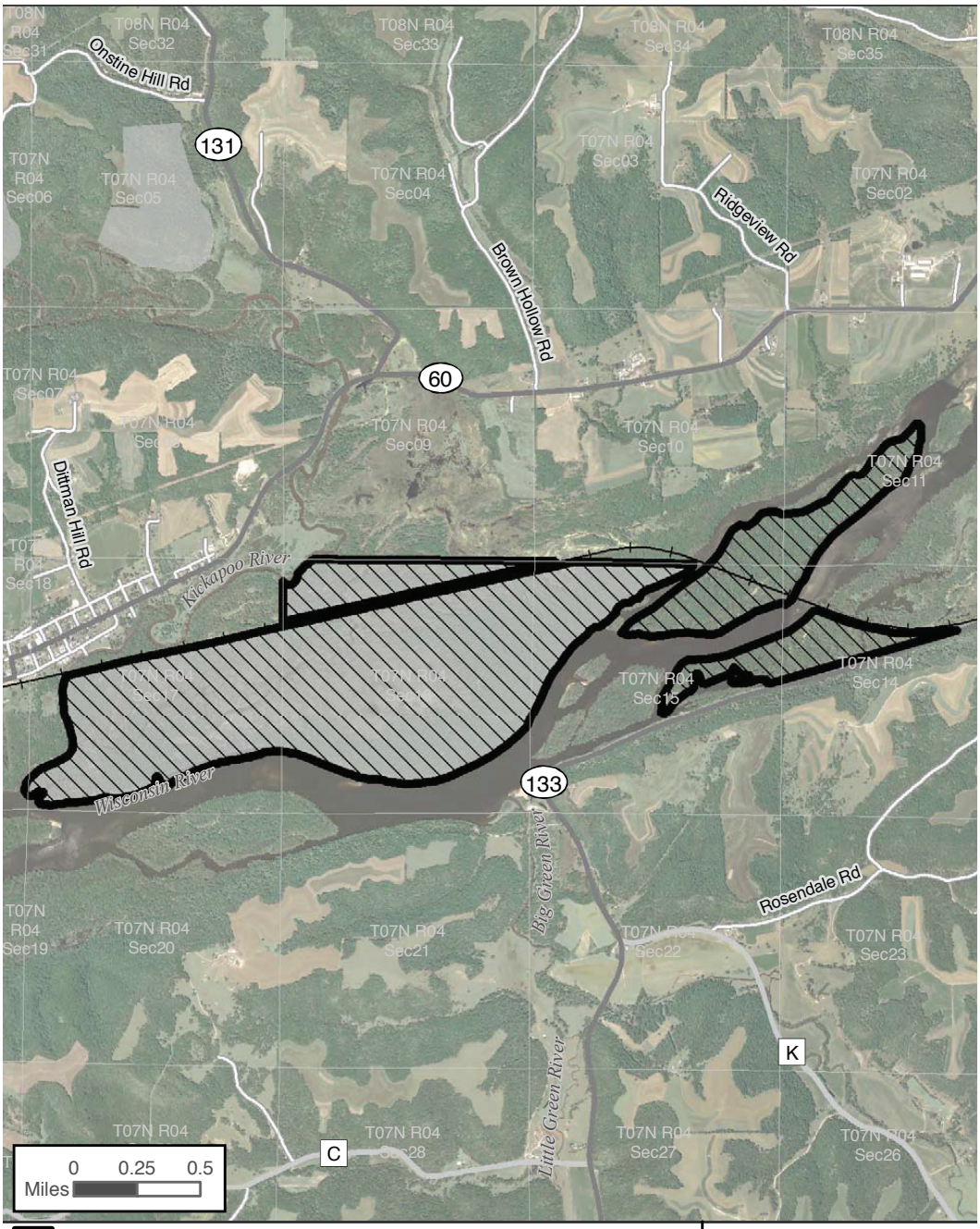
The Floodplain Forest on the east bank of the Lower Wisconsin River has a moderately dense canopy of silver maple (12-18 inch dbh) with hackberry, swamp white oak, black walnut, green ash, and basswood. The subcanopy cover is moderately dense to dense silver maple with swamp white oak, hackberry, American elm, green ash, basswood, and bitternut hickory. The sapling layer cover is moderately dense and includes silver maple, American elm, swamp white oak, green ash, and bitternut hickory. Shrub and vine layers are moderately sparse prickly ash and poison ivy with elderberry, bristly greenbrier, wild yam, and Canada moonseed. The ground layer is dense with wood nettle, bottomland aster, sensitive fern, cut-leaved coneflower, and moneywort.

Significance of Site

Wauzeka Bottoms represents one of the very best examples of a large, mature floodplain forest in southern Wisconsin and supports an important number of rare forest interior birds. This includes some of the best populations in the entire LWSR of cerulean, prothonotary, and Kentucky warbler, yellow-billed cuckoo, and red-headed woodpecker, along with two active bald eagle nests and at least two red-shouldered hawk breeding territories. The site represents one of the few known breeding locations for yellow-crowned night-heron (*Nyctanassa violacea*) in Wisconsin. In addition, the site is important for marsh bird conservation. Priority marsh birds noted at the site and just to the north are least bittern, pied-billed grebe (*Podilymbus podiceps*), Virginia and sora rail, willow flycatcher, sedge and marsh wren. Blanding's turtles are also noted from the marsh areas at the site. The marsh area between the existing State Natural Area and State Highway 60 has high importance for marsh birds, reptiles, aquatic invertebrates, and for connecting Wauzeka Bottoms SNA with the nearby Kickapoo Wild Woods SNA.

Woodman Islands contains additional expansive, mature, closed canopy Floodplain Forest that provides excellent habitat for a number of rare birds, including the red-shouldered hawk, yellow-billed cuckoo, prothonotary warbler, and cerulean warbler. The connection of the Floodplain Forests at this site with the adjacent large blocks of bottomland forest at Wauzeka Bottoms SNA and upland forested bluffs is critical for these area-sensitive forest interior birds.

MAP 2.26 WAUZEKA BOTTOMS AND WOODMAN ISLANDS



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AREA 30

NATIVE COMMUNITY MANAGEMENT AREA

WAUZEKA BOTTOMS AND WOODMAN ISLANDS

The Floodplain Forest, sloughs, and backwater channels of the Lower Wisconsin River at and adjacent to this site were identified during summer resident bat surveys as supporting good numbers of northern long-eared bats. This State Threatened species was found to be rare in the LWSR and largely restricted to the very lower reaches of the LWSR near the confluence with the Mississippi River.

The State of the Lower Wisconsin River Basin report (WDNR 2002) identified Wauzeka Bottoms State Natural Area and the Woodman Unit as some of the best opportunities for management and restoration of forests in the basin. This site is critical to the future of forest interior birds in the LWSR and management activities should promote mature, intact Floodplain Forest.

Bat-foraging activity is often concentrated in riparian zones and in gaps in older, more-diverse forest stands. Riparian habitat is especially important because it provides drinking water and high-quality foraging habitat, as well as high-quality roosting habitat (Taylor 2006). Protecting these more mature and diverse forest stands along riparian corridors is critical to protecting the basic requirements of bat habitat.

Wauzeka Bottoms was designated a State Natural Area in 1989.

Long Term Management Objectives (100 years)

Provide a large area of structurally and functionally diverse, older, intact, connected forest comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species. Preserve coarse woody debris and standing dead snags for old growth habitat and structural diversity. Protect, manage, and enhance natural communities for ecological values and rare species habitat needs.

Short-Term Management Objectives (50 years)

- Develop and maintain an older, closed canopy forest of longer-lived species, such as swamp white oak, silver maple, and other bottomland hardwood species.
- Promote forest structural diversity and development of old growth characteristics such as large diameter trees, standing dead snags, and coarse woody debris.
- Protect multiple scenic and aesthetic qualities of the Wisconsin River.

Management Prescriptions

- Follow the general management prescriptions for Reserved Old-growth and Reserved Old Forest for Bottomland Hardwoods, which allows natural processes to determine the structure of the forest (passive management). Control of invasive species may occur.
- Do not salvage trees after a major wind event.
- Plant appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Provide opportunities for research and education on the highest quality native floodplain forests.

Wauzeka Bottoms State Natural Area

Management Objectives

- Maintain the site as a floodplain forest reserve, and an ecological reference area, allowing natural processes to primarily determine the structure of the forest community.
- Provide a large area of structurally and functionally diverse, older, intact, connected forest that is comprised of large diameter silver maple, swamp white oak, and mixed bottomland hardwood species.
- Maintain structural, compositional and functional characteristics associated with old growth forest such as course woody debris and standing dead snags to provide habitat and structural diversity.
- Maintain and develop habitat for species associated with old growth floodplain forest.
- Provide opportunities for research and education on the highest quality native floodplain forests.

Management Prescriptions

- Manage as a Reserved Old Growth Bottomland Hardwood Forest, following the prescriptions in the general habitat management section of this plan. Passive management of native vegetation being the primary approach, which allows nature to determine the ecological characteristics of the site.
- Actively control non-native invasive species or aggressive natives/naturalized vegetation such as box elder, buckthorn, and reed canary grass.
- Plant appropriate native trees to fill in gaps where reed canary grass dominates, or is threatening to dominate.
- Retain snags and coarse woody debris to promote old growth characteristics.
- Salvage of trees after a major wind event is not considered compatible with management objectives.
- Railroad corridor management occurs sporadically within the railroad easement area.
- Restore former cabin site to native floodplain forest vegetation.

WAUZEKA BOTTOMS AND WOODMAN ISLANDS

Photo by Tom Watkins, DNR

WYALUSING FORESTS

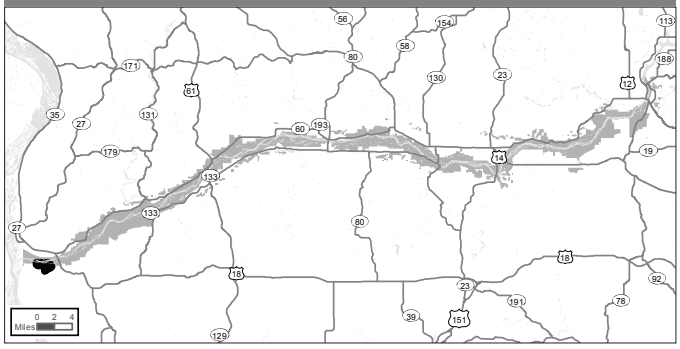
This is a 311 acre site that is situated adjacent to and east of the Wyalusing Hardwood Forest State Natural Area within Wyalusing State Park.

The Floodplain Forest on this site has very wet soils on flat terrain, and is dominated by silver maple and some swamp white oak, both 14-30 inch dbh. The subcanopy has 2-6 inch dbh silver maple, with ground cover species including mayapple, wood nettle, blue phlox, cut-leaved coneflower and green dragon. A bluff rises 400 feet above the floodplain below, and has Southern Dry-mesic Forest on the ridgetop, Southern Mesic Forest on steep slopes and in ravines, massive dolomite cliffs, an intermittent stream with waterfalls, and several small, degraded Dry Prairie remnants. About 40 acres of old field on the bluff top is the only anthropogenic feature in this otherwise high-quality upland habitat matrix.

The mesic forest is of excellent quality, and extends to the west onto the 200 acre Wyalusing Hardwood Forest State Natural Area within Wyalusing State Park. This forest's canopy trees (12-24 inch dbh sugar maple and basswood) attain 76-95% canopy cover. The subcanopy has similar cover and composition, creating deep shade and limiting brush growth (Bladdernut creates only sparse cover). A dense ground layer harbors typical species such as Virginia waterleaf, false rue anemone (*Isopyrum biternatum*), ostrich fern (*Matteuccia struthiopteris*), interrupted fern, blue phlox, spring-beauty, Dutchman's breeches (*Dicentra cucullaria*), hairy sweet cicely, giant wood fern, plus rare species as well (great water-leaf, canada yew, and putty root). This community is relatively undisturbed, though some logging occurred in the past and a few invasive species have been detected.

On the steeper slopes, the Southern Dry-mesic Forest canopy dominants are reproducing, and the quality is good to excellent. Canopy cover here is high (76-95%), and dominated by 10-20 inch dbh white and red oak, with lesser amounts of sugar maple and basswood. The subscanopy is also dense, and brush is moderate. A diverse ground layer includes wild geranium, mayapple, Canada anemone (*Anemone canadensis*), bloodroot, and large yellow lady's-slipper. The shallower slopes grading up to the bluff top have lower quality dry-mesic forest that was recently logged.

AREA 31 LOCATOR MAP



At the top of the steep north-facing cliff that rises from the river valley lies a glade with red oak, red cedar, basswood, bristle-leaf sedge, northern bedstraw (*Galium boreale*), sand cress, harebell (*Campanula rotundifolia*), fragile fern, walking fern (*Asplenium rhizophyllum*), wild columbine, mosses, lichens, and leafcup (*Polymnia canadensis*), as well as two rare species (Richardson's sedge and shadowy goldenrod).

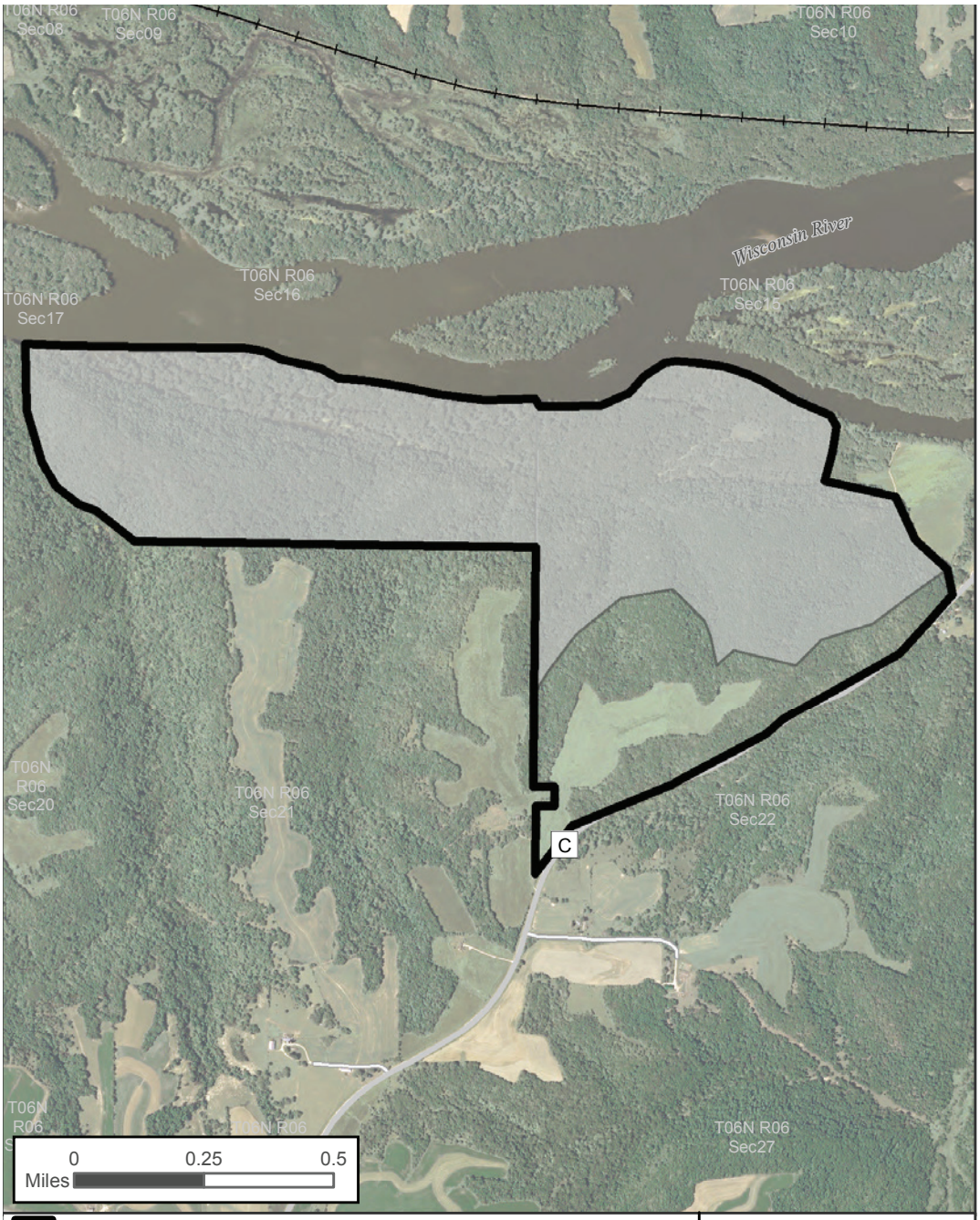
Significance of Site

The quality of natural communities represented here are exceptional, thus they can serve as important ecological benchmarks for Floodplain Forest, Southern Mesic Forest, and Southern Dry-mesic Forest. This habitat matrix has high topographical and structural diversity, serving important habitat needs for a commensurately diverse cohort of native plants and animals.

The forested matrix and proximity to Wyalusing Hardwood Forest SNA makes this site an important area for a number of rare and declining forest interior birds, including red-shouldered hawk, prothonotary warbler, Kentucky warbler, cerulean warbler, Acadian flycatcher, and yellow-billed cuckoo. Records of numerous rare reptiles are known from the site or in close proximity and are likely to utilize this area as well. Important habitat components for these uncommon reptiles include open sandy areas for nesting turtles (smooth softshell, Blanding's, and possibly wood) and a mix of bluff prairies and dry-mesic forests for gray ratsnake and timber rattlesnake.

Southern Mesic Forests of the LWSR support significant populations (over 25% of the known populations in the state) of putty root and great water-leaf, both of which are present at this site. Jeweled shooting star (*Dodecatheon amethystinum*) is found at this site where Moist Cliffs and outcrops occur on shaded, north-facing slopes.

MAP 2.27 WYALUSING FORESTS



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WYALUSING FORESTS

The bottomland forests, sloughs, and backwater channels within this primary site were identified during summer resident bat surveys as particularly rich in abundance of northern long-eared bats. This Federally Threatened species was found to be rare in the LWSR and largely restricted to the very lower reaches of the LWSR near the confluence with the Mississippi River. The State Threatened eastern pipistrelle bat (*Perimyotis subflavus*) is also abundant in these same areas. Both species forage and roost within mature forested areas, edges of forests, and along waterways. Tree cavities, loose bark, and foliage are known to be important features for daytime roosts. A roadside opening along the southern border of this site supports a population of the State Endangered purple milkweed.

This NCMA is divided into two tracts, the 199 acre Wyalusing Hardwood Forest SNA Addition and the 112 acre Oak Opening - Southern Dry Forest tract. The management objectives and prescriptions for each of these tracts are described separately below. The existing adjacent 200 acre Wyalusing Harwood Forest SNA tract is not within the LWSR, it lies within Wyalusing State Park and is not covered by this plan.

Wyalusing Hardwood Forest SNA Addition (199 acres)

Management Objectives

- Maintain a southern forest ecological reference area with a continuum from dry, to dry-mesic, to mesic, down to floodplain forest; and as a significant archaeological site. Allow natural processes to determine the structure of the mesic and floodplain forest, and natural processes plus limited prescribed understory manipulation to determine the structure of the southern dry and dry-mesic forest communities.
- Maintain old forest characteristics, including biologically mature trees, large diameter trees, structural diversity, standing and down course woody debris, and an uneven canopy to provide habitat for species associated with old growth forests. Additionally, maintain an un-fragmented forest and undeveloped transition from bluff top to river's edge.
- Provide opportunities for research and education on the highest quality southern forests.

Management Prescriptions

- In the southern dry-mesic forest and southern dry forest, passively manage the native dominant tree species (primarily oaks); however, understory manipulation and shrub control via timber harvest, brushing or fire may be used to mimic natural disturbance patterns as needed. The ecological characteristics of these areas are to be determined primarily by passive canopy management with understory manipulation. In all other areas, native species are to be managed passively, which allows nature to determine the ecological characteristics.
- Prescribed fire may be used across the entire site, but fire intensity should be kept low in the mesic forest, and rare herbaceous plants should be considered when planning timing of prescribed burns.
- Control invasive plants and animals, especially garlic mustard.
- Do not salvage trees after a major wind event, it is not compatible with the site's management objectives.

Oak Opening -Southern Dry Forest (112 acres)

Management Objectives

- Restore and maintain a continuum of oak dominated native communities based on aspect and soils, from Oak Opening on South facing slopes, to Oak Woodland and Southern Dry Forest on ridge tops.
- Reduce hard edges between different cover types.

Management Prescriptions

- Use combinations of timber harvest, brush and tree clearing, timber stand improvement, chemical application, and prescribed fire to restore a continuum of Southern Dry Forest, Oak Woodland, and Oak Opening communities.
- Primarily passively manage white and bur oak.
- Create and maintain soft edges between different cover types using combinations of timber harvest, tree and brush control, and prescribed fire.
- Consider adding oak trees to existing prairie planting to convert to oak opening, and create a transitional habitat between adjacent areas.
- After initial timber harvests and other native community restoration techniques, allow natural processes to determine the structure of the forests, with prescribed fire used to simulate pre-settlement ecological processes, and additional control of trees and brush as necessary.
- Salvage of trees after a major wind event may occur where consistent with native community objectives.
- Control invasive species, especially garlic mustard near the parking area.

Photo by Thomas Meyer, DNR

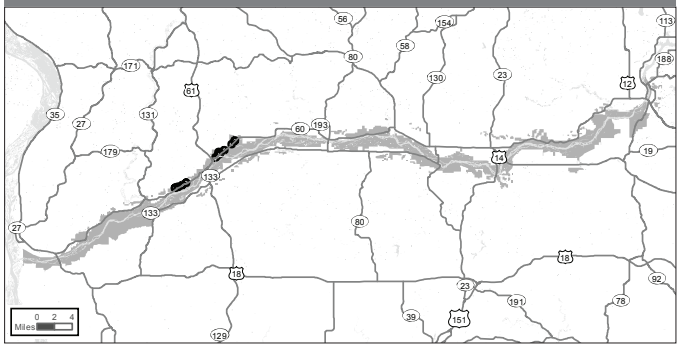
DOWN RIVER REMNANT BLUFF PRAIRIES AND SAVANNAS

This Management Area includes a series of sites Northwest of State Highway 60 across the river from Boscobel. These sites contain remnant prairies and restorable oak openings and oak woodlands with documented rare species. They occur on Lower Wisconsin River bluff-and-ravine topography on limey sandstone within a complex of diverse uplands: Southern Dry and Dry-mesic Forest as well as Oak Woodland on slopes, rich Southern Mesic Forest in large ravines, and Dry Prairies on cliffs that tower above steep, rocky slopes. Southwest and West-facing slopes have a fairly open canopy with large white oaks and smaller (8-12 inch dbh) red oaks, bitternut hickory, and basswood. Upslope from these areas are areas of overgrown Oak Woodland that are now closed-canopy. Rock outcrops, small cliffs, and loose rock are scattered throughout the uplands.

The Dry Prairies are somewhat degraded from past grazing, woody species invasion, and invasive species, but have a rich and diverse native flora, including conservative and rare species such as lead-plant, Richardson's sedge (*Carex richardsonii*), purple prairie-clover, western sunflower, one-flowered broom-rape, hairy wild-petunia (*Ruellia humilis*), prairie ragwort, and compass-plant (*Silphium laciniatum*). The rare chinquapin oak (*Quercus muhlenbergii*) and Kentucky coffee-tree (*Gymnocladus dioca*) both grow on the drier rocky slopes. The Dry Cliffs are in good condition, and support several rare plant species, plus a number of typical ones, including dwarf cliff brake, wild columbine, sand cress, bittersweet nightshade (*Solanum dulcamara*), bristly greenbrier, Virginia creeper, fragile fern, mosses, and lichens. Demonstration sites for potential management include Ferry Bluff, Spring Green Preserve, and Blue River Bluffs SNAs. Remnant prairie and savanna sites are management dependent, or they will continue to degrade and cease to exist.

Savannas: Oak openings, oak woodland, oak barrens are some of the most endangered ecosystems on the globe. These natural communities support species that do best in the partial shade provided by the scattered oaks (especially, bur oak, white oak and Hill's oak) under a disturbance regime of periodic fire. At the time of European settlement, these oak savannas were one of Wisconsin's most common ecosystems, and are now one of the rarest. Most savannas were converted to intensive agricultural use. Other stands became more forested, primarily due to the exclusion of fire from the savanna ecosystem. Existing identified savannas should be recognized and managed to maintain characteristic savanna composition, structure and function. Managers are encouraged to utilize the savanna indicator species lists found in Pruka, Brian. Restoration and Management Notes, Vol13:1, pg 124-126. Savanna restoration sites should have some of the indicator species present or have plans for augmenting the savanna with local genotype speeds. Management usually involves thinning and use of fire (to rejuvenate the ground layer species and suppress woody understory species). Savannas have factors that make them vulnerable to extirpation from the state. These communities should be given high levels of recognition and management to maintain or increase their size in the state.

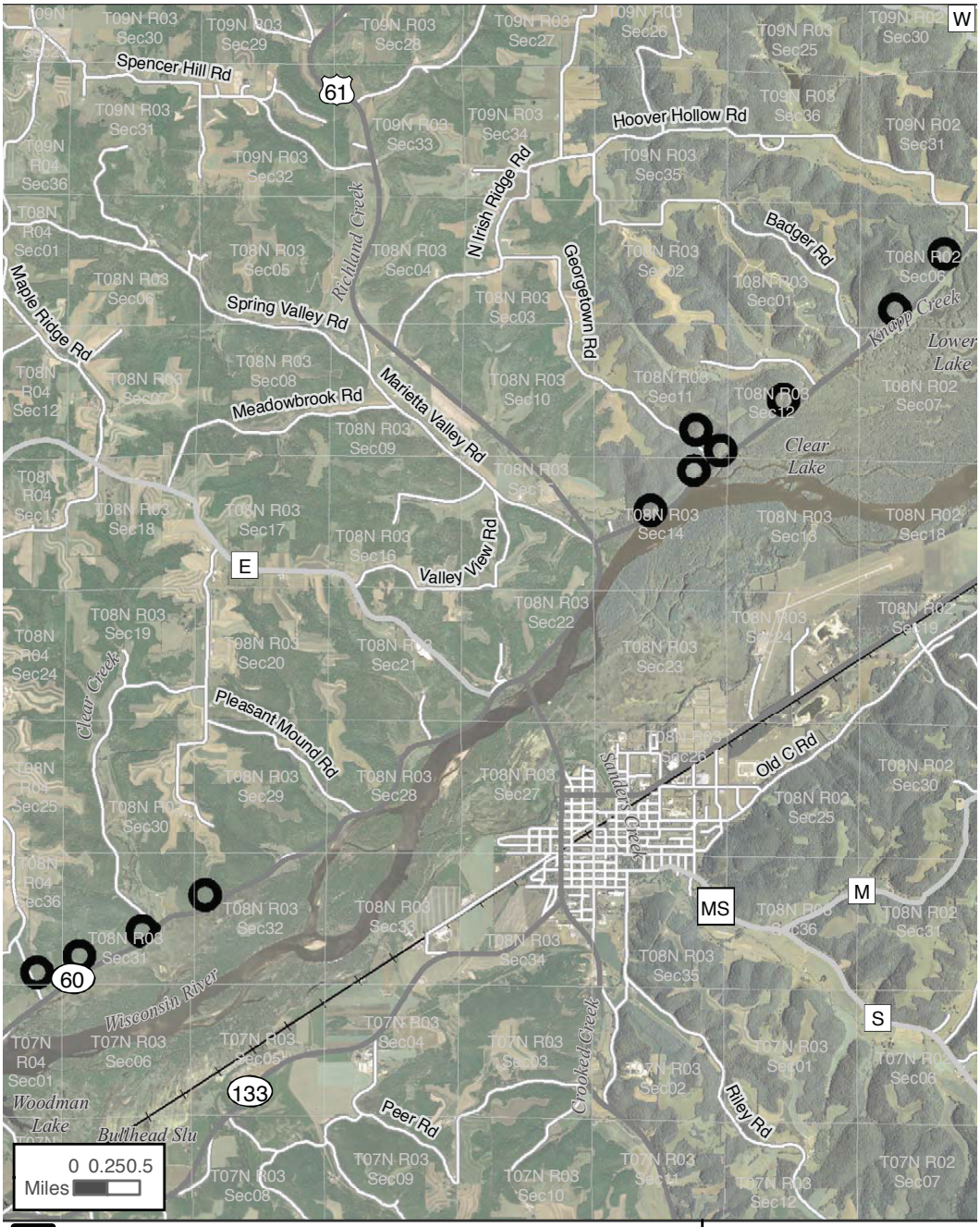
AREA 32 LOCATOR MAP



Remnant Prairies: These open herbaceous communities with distinctive plants and animals have suffered dramatic losses since European settlement. One hundred and fifty years ago over 2 million acres of prairie were found in Wisconsin. An exhaustive survey of prairie experts determined that approximately 8,000 acres remain. Most of the larger sites and over ½ of the acres are under protective department ownership. The department should recognize and manage all remnant patches of native prairie.

Because Dry Prairie occurs on sites that are not well suited to other uses, it is better represented in today's landscape than any other prairie community. It is still a relatively rare natural community that is more abundant in Wisconsin than anyplace else because of the many steep-sided bluffs in the extensive Driftless Area. These topographic attributes provide suitable sites for the development and persistence of this prairie type.

MAP 2.28 DOWN RIVER REMNANT BLUFF PRAIRIES AND SAVANNAS



Down River Remnant Bluff Prairies and Savannas

Section Line

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Bureau of Facilities and Lands

November 13, 2015

WR-LWSR-MP-7925-Map 2.19 kmh

AREA 32 NATIVE COMMUNITY MANAGEMENT AREA

DOWN RIVER REMNANT BLUFF PRAIRIES AND SAVANNAS

Management Objectives

- Restore, maintain, and expand a continuum of fire-dependent native communities including dry prairie, dry cliff, oak opening, and oak woodland.
- Restore and maintain natural transitions from open to closed canopy communities.
- Promote open prairie and savanna to provide habitat for rare species.
- Maintain existing populations of herptiles and remnant prairie dependent invertebrates.
- Restore and maintain oak opening and oak woodland to provide mast food sources and habitat for game species such as turkeys.

Management Prescriptions

- Use timber harvests, brush/tree clearing, prescribed fire, and chemical application to restore native community structure, composition, and function.
- In previously unmanaged areas, use combinations of timber harvest, brush/tree clearing, and prescribed fire to reduce woody cover, expand open habitat, and create a soft edge or transition into adjacent communities.
- In the oak openings and woodlands, passively manage the native dominant tree species (primarily oaks), however, some thinning of the canopy, understory manipulation and shrub control via timber harvest, brushing or fire may be used if needed to meet community structural objectives and mimic natural disturbance patterns.
- In the prairies, actively manage the native species through tree/shrub control using tree harvest, brushing and especially fire to mimic natural disturbance patterns. Occasional fire-tolerant oaks, hickories, and native shrubs such as hazelnut may be retained at low densities.
- Retain snags as important habitat features, unless they conflict with other objectives (such as hazard trees near roads, or prescribed fire hazards).
- Use frequent prescribed fire to restore and maintain these fire-dependent communities. Consider appropriate unburned refugia for fire sensitive, prairie dependent invertebrates when planning prescribed burn units. Also, consider impacts to reptiles regarding timing of prescribed burns.
- Follow Incidental Take Protocols for listed species.
- Prairie and savanna plant species should be seeded as needed. Use local genotype seed sources.
- Control invasive species, specifically red cedar, spotted knapweed, honeysuckle, and other non-native brush.

Photo by DNR

DOWN RIVER REMNANT BLUFF PRAIRIES AND SAVANNAS

Photo by Rich Staffen, DNR

GENERAL MANAGEMENT BY HABITAT TYPE

FORESTED HABITATS

All forest management activities will follow the guidelines in the DNR Silviculture and Forest Aesthetics Handbook. The prescriptions listed below are for the primary forest types found on the LWSR. The prescriptions include an overview of the general management methods and guidance from the Silviculture Handbook as well as some additional considerations to be applied to this property. Consult the Silviculture Handbook for additional details and management considerations. Where special management prescriptions alter or eliminate harvest rotations, the forest reconnaissance data base (WISFIRS) should be adjusted accordingly.

GENERAL PRESCRIPTIONS FOR ALL FOREST TYPES

- Follow Wisconsin's Forestland Woody Biomass Harvesting Guidelines, Best Management Practices for water quality, and Best Management Practices for Invasive Species when conducting forest management.
- Retain snags and coarse woody debris whenever their retention does not conflict with other management objectives.
- Leave long-lived reserve trees as individuals or in groups to provide timber, wildlife, and aesthetic value when their retention does not conflict with regeneration and other forest management objectives. Such trees provide denning/nesting sites, cover, and foraging opportunities for wildlife.
- Salvage trees damaged by wind, ice, fire, insects, and disease as long as the salvage meets the overall objectives for the area.
- Where appropriate, the rotation age for some stands of oak, white pine, bottomland hardwood, central hardwoods, and northern hardwoods may be extended or shortened. This practice would be done in order to increase the abundance of older-age forest habitat or balance a cover types property- wide age distribution. The Wisconsin DNR Forestry Old-growth and Old Forests Handbook provides a reference for extended rotation management.
- Intermediate forest treatments, such as release or thinning, may be used where appropriate to develop young stands and improve composition and timber quality.

PRESCRIPTIONS BY FOREST TYPE

Central and Northern Hardwoods

Central hardwood tree species include oak, hickory, elm, black cherry, red maple, ash, walnut, and hackberry. This cover type grouping would signify a mix of species not numerous enough individually in a stand to be typed alone – example: where 50% or more of the trees in a stand are identified as oak it would result in typing as an oak stand.

Central hardwoods tend to grow in partial shade to full sun, whereas northern hardwood tree species, such as sugar maple, basswood, and white ash, tolerate more shady conditions. This variation in shade tolerance means that either even-aged or uneven-aged regeneration systems may be used depending upon the tree species being favored. Even-aged silvicultural methods, such as overstory removal or shelterwood, maintain all the trees approximately at the same age by harvesting the entire stand at 80-150 year intervals. Uneven-aged methods, such as single-tree or group selection, tend to create a stand with trees of multiple distinct age classes.

Photo by DNR

Some central hardwood stands in the LWSR are in a degraded state created by past management or land use. Timber harvesting that selectively cut only the high quality trees and not those of poor form or vigor, grazing within forested stands, and compacted soils or otherwise challenging site factors have left some stands in a stagnant state. Individual central hardwood stands will be evaluated to decide if enough quality crop trees or desirable future potential is present, otherwise degraded stands may be regenerated early through even-aged methods to establish a higher quality stand.

Management Objective
Maintain the health, vigor, and diversity of central and northern hardwood stands to provide wildlife habitat, recreational value, and forest products.

Management Prescriptions
- Take forest conditions on the surrounding landscape into consideration when planning stand level management prescriptions. A variety of age classes and stand sizes across the landscape is beneficial for wildlife and aesthetics.
- Assess the degree of succession to central or northern hardwoods prior to prescribing regeneration systems for the stand.
- Natural regeneration systems of central and northern hardwoods can utilize both even and uneven-aged methods, including overstory removal, shelterwood, clearcut, group selection, and single-tree selection. Follow the DNR Silviculture and Forest Aesthetics Handbook guidance on selecting the appropriate regeneration system based on stand composition, advanced regeneration, site, and other factors.
- Use intermediate treatments, such as release or thinning, to develop young stands and improve composition and timber quality.
- Artificial regeneration from seed or seedlings may be used to establish desirable trees where existing seed source and advanced regeneration is lacking.
- Other management techniques may also be used to help regenerate stands. They include soil scarification, herbicide treatments, and prescribed fire where feasible and appropriate.

Oak
Typical upland oak species in the LWSR include white, bur, northern red, black, and northern pin/Hill's. Oak forests historically developed or regenerated following significant disturbance such as stand replacing fires or even-aged timber harvesting. Oak also claimed open grassy areas that were farmed or pastured, then allowed to convert to forest. Oak is highly valuable for a wide variety of game and non-game wildlife species.

Generally, site disturbance is required to regenerate existing stands and to maintain an oak component in mixed stands. Management will typically involve even-aged harvest practices of various types and sizes occurring at rotation lengths of 70-140 years depending on species and site characteristics. Management approaches used on individual parcels will vary based on the management potential and opportunities for the site, which in turn are derived from site-based factors such as soils, topography, hydrology, and cover type, parcel size and surrounding land uses and landscape scale considerations.

Management Objective
Establish, maintain, enhance, and expand oak stands and oak as a component of other stands to provide wildlife habitat, recreational value, and forest products.

Management Prescriptions
- Maintain oak through management techniques appropriate for the stand and site conditions. Natural regeneration systems for oak that mimic historic disturbance patterns include even-aged management techniques such as clearcutting and shelterwood harvesting. Artificial regeneration from seed or seedlings may be used to establish oak reproduction prior to or after timber harvests when natural regeneration is not adequate. Other management techniques that may be used to help regenerate oak stands include soil scarification, herbicide treatments, and prescribed fire where feasible and appropriate. Use intermediate treatments, such as release or thinning, to develop young stands and improve composition and timber quality.
- Assess the degree of succession to central or northern hardwoods, existing advanced regeneration available, and expected vegetative competition prior to prescribing oak regeneration harvests. Natural conversion to central hardwood or northern hardwood species may be prescribed if oak regeneration seems unlikely. If successful regeneration of an existing oak stand is questionable, consider retaining the overstory trees for wildlife and ecological benefits and allow the stand to convert to another type, as it may be more feasible to establish oak on a new site through planting.
- Oak acreage may be expanded by planting suitable sites adjacent to forested uplands. On non-forested sites that are naturally succeeding into oak, consider allowing them to develop into oak forest naturally or by prescribed fire treatment or additional planting.
- Research prescriptions are allowed and they may vary somewhat from the standard silvicultural practices.

Conifer Plantations

Red pine, white pine, scotch pine and white spruce were planted within the last 70 years in various small plantations or shelter belts to stabilize soils and provide other benefits. It has been recognized since then that monotypic and non-native plantings are more susceptible to insect and disease outbreaks, and have less biological value than mixed native cover types. Future plantings should consider multiple species mixes that are appropriate for the landscape and provide wildlife value.

Management Objective

Gradually phase out single species conifer plantations over time by converting them to multiple species stands through harvest or other treatments.

Management Prescription

Naturally or artificially convert single species plantations to another forest or other suitable cover type. During the time these stands are retained, use even-aged management practices to maximize forest health, vigor, and quality. Conifer plantations with declining forest health (increasingly seen in red pine on the LWSR), or non-native species are to be prioritized for earlier conversion.

Native Conifers

The native distribution ranges of red pine, white pine, eastern hemlock and jack pine include parts of the LWSR but are at their southern limits here. Tree species that are at the edge of their normal range distributions tend to experience increased damage from insects, disease, and weather impacts. Red pine in the LWSR is currently showing decreased vigor and increased insect and disease problems. Jack pine in the LWSR is considered to have a shorter rotation age than populations farther north, and seems prone to stem breakage.

Management Objective

Encourage expansion of white pine and jack pine acreage in the appropriate landscape context as long as they appear to be viable forest cover types in the LWSR.

Management Prescriptions

Jack Pine

- This is an early successional forest type that requires disturbance and full sunlight conditions to regenerate. Historically, jack pine stands regenerated following fire and/or insect infestation events. A large percentage of jack pine in the LWSR has non-serotinous cones, which must be taken into account during regeneration harvesting. Harvesting and ground disturbance not only provide for good regeneration of jack pine but also support the development of a diverse mix of grasses, forbs and shrubs, which are important during successional stages of this forest community.
- Use even-aged systems such as seed tree, or shelterwood to regenerate stands at rotation ages of 45-60.
- Re-establish or expand jack pine stands through natural regeneration, planting, and pre and post-harvest treatments. Use direct seeding as needed to supplement natural regeneration. Selection of local or southern genetic seed or seedling stock would be most desirable. Herbicide, mechanical ground scarification, or prescribed fire treatments, before or after establishment, may be necessary to maintain this type.

White Pine

- The LWSR has opportunities to maintain or expand white pine both in planted and natural growth forms where it won't preclude management of other priority cover types. This may be implemented through maintenance of natural regeneration to expand white pine on the landscape, managing existing or future plantations for wildlife habitat and wood products, or managing existing stands under extended rotation for old growth characteristics.
- Encourage natural regeneration when possible by retaining white pine standards or reserve trees where appropriate. Natural conversion occurs when white pine has been a significant component in the understory and the overstory trees are removed during a commercial harvest at maturity.
- Depending on origin, composition, and site, several management activities may be used to manage the white pine forest toward the desired objectives. Intermediate thinning increases quality, health and vigor. Use even-aged harvest techniques for regeneration, including systems such as shelterwood, seedtree, and overstory removal.

Bottomland Hardwoods

Standard Management - Bottomland Hardwoods

The bottomland hardwood forest type is associated with wet soils in flood plains, depressions, and stream/river bottoms. The major commercial bottomland hardwood tree species are silver maple, swamp white oak, green ash, river birch, elm, basswood, and hackberry.

Management Objectives

- Maintain the extent and quality of bottomland hardwood stands, and expand acreage where appropriate. Work towards a balanced age class distribution on the landscape.

Management Prescriptions

Bottomland hardwood forests are ever-changing, complex ecological systems. Their species richness and variability is due to many natural forces, such as annual flooding and ice impacts, complex drainage patterns, and the continual deposition and development of soils. Given the almost infinite variability of bottomland hardwood site conditions, as well as the species mix and silvicultural characteristics, no single silvicultural system will function adequately on all bottomland sites. Selection of the most appropriate silvicultural system to use on these stands is very site-specific and it must be determined based on the judgment and experience of management personnel.

- Guidelines for management found in the Division of Forestry Silviculture and Forest Aesthetics Handbook are to be followed in most cases. Normal forest management prescriptions to consider would be intermediate thinning to maintain stand health and vigor; and shelterwood, coppice, overstory removal, or patch/group selection for regeneration harvests.
- Research prescriptions are allowed and encouraged. These experimental harvest prescriptions may vary somewhat from the standard silvicultural practices.
- Keep forest block size should as large as possible, emphasizing a continuum of habitat from lowland to upland for maximum ecological benefit.
- Restore and expand floodplain forest by planting seedlings of appropriate species (silver maple, river birch, hackberry, swamp white oak, basswood, etc). The threat of emerald ash borer will effect decisions made regarding the planting of ash species.
- Silvicultural and other management activities must strive to avoid the introduction and/or spread of invasives (especially reed canary grass) in the understory of this community.

Managed Old Forest - Bottomland Hardwoods

Relatively old managed forests provide a range of social and ecological benefits. Selective management offers the potential to manipulate ecological processes to achieve specific benefits. Ecological complexity of these forests is expected to be intermediate between young, managed forests and old, unmanaged forests. Many of the benefits associated with old, unmanaged forests can be provided while still maintaining the ability to manipulate developmental processes and also provide additional social benefits. These adaptive management schemes offer the opportunity to provide a unique suite of ecological and social benefits. (Old-growth and Old Forests Handbook)

Photo by Ann Freiwald, DNR

GENERAL MANAGEMENT BY HABITAT TYPE

The primary management goal is the long-term development and maintenance of some old-growth ecological attributes within environments where limited management practices and product extraction are allowed. Management can be employed to perpetuate old forest or old-growth age and structural characteristics. These uneven-aged forests will contain old and large trees for the species and site represented. Silvicultural manipulations are primarily intended to influence forest development to achieve specific structural and compositional objectives. Timber harvests can be an important tool in this endeavor.

Managed Old Forests will have, or develop, an uneven-aged structure with many different size classes of canopy trees and some large diameter, standing and downed coarse woody debris. Uneven-aged silvicultural systems can be adapted and applied to grow relatively larger and older trees, develop and maintain reserve trees, develop and maintain large standing and downed coarse woody debris, and encourage compositional and structural diversity. The application of specific silvicultural treatments depends on management goals and objectives, species composition, stand condition, and site capability.

Silvicultural treatments that could be adaptively applied include:

- Manipulation of species composition and simulation of the effects of natural disturbance via site preparation, timber stand improvement, various cultural treatments, and group selection or irregular shelterwood regeneration harvesting.
- Release may be used to manipulate species composition and foliar height diversity, and to accelerate the growth of desired individuals.

Photo by Travis Anderson, DNR

- Thinning and improvement cutting may be used to manipulate species composition; size distribution; growth rates; foliar height diversity; size, number, and distribution of canopy gaps; and the development of coarse woody debris. Periodic thinning can be employed to maintain individual tree diameter and stand basal area growth rates at levels higher than normally expected in old unmanaged stands.
- Regeneration methods:
  - Even-aged regeneration methods can be used within a managed landscape context. Irregular shelterwood or larger clearcut patches are even-aged treatments that can be used.
    - In most even-aged stands, adaptive conversion techniques should be applied to develop uneven-aged conditions.
    - In specific cases, even-aged management could be conducted for ecological reasons. Areas of vegetation that are of the same age or that require full sunlight to regenerate may be valuable to wildlife for habitat or forage purposes. Some tree species that grow only in an even aged condition such as willow and cottonwood were once more common along the Wisconsin River. Swamp white oak provides many wildlife benefits including acorns for forage. Resource managers may wish to try and facilitate more acreage of such species.
  - All-aged or uneven-aged – Group gap selection and group patch selection regeneration methods offer the opportunity to manipulate stand structure, composition, and regeneration. Applying variability in timing and intensity of single-tree selection, group and patch selection, and thinning could simulate disturbances that result in spatial diversity.
- Sanitation practices enable the management of potential forest health problems.
- Salvage enables the realization of economic returns after damage by wind, fire, extended flooding, etc.

Allowable management activities in Managed Old Forests:
Vegetation management to manipulate compositional, structural, and functional development; maintain the vigor of selected trees; and manipulate reproduction is permitted.

- Partial timber harvesting as a tool for vegetation manipulation is permitted. Examples of potentially valid reasons to cut trees include: maintaining the vigor of selected trees; enhancing composition, structure, or function; manipulating reproduction; simulating natural processes;

or attempting to accomplish other management objectives (e.g. create a scenic viewpoint or firebreak). When merchantable trees are cut, up to 75% of the cut volume, by species and size class, may be harvested. Generally, economically low-value cut trees will be left as coarse woody debris. Creating patches of variable size and distribution to simulate natural disturbance is permitted. In special cases, where significant negative impacts to forest health, forest fire protection, or forest aesthetics can be demonstrated, additional harvesting could be approved through consultation with resource managers.

- Intermediate treatments for forest improvement or habitat enhancement are permitted. Thinning is a permitted tool to manipulate composition (e.g. increase percentage of swamp white oak), accelerate structural development, and maintain vigor of selected crop trees. Other intermediate treatments may include non-commercial thinning to release reproduction;; planting tree seedlings in patches and underplanting in other areas to target the regeneration of specific tree species; and site preparation in patches to develop the natural regeneration of specific tree species.
- Partial salvage is permitted. Up to 50% of salvageable materials, by species and size class, may be salvaged. In special cases where significant negative impacts to forest health, forest fire protection, or forest aesthetics can be demonstrated, additional salvage harvesting could be approved through consultation with resource managers.
- Increasing structural complexity of forested stands through use of the following techniques is desirable:
  - Increase the range of tree sizes, including managing for some large trees >30".
  - Promote the development of multistoried canopies.
  - Increase the abundance and range of sizes for canopy gaps and even-aged patches.
  - Retain and increase coarse woody debris. Manage for large diameter cavity trees, snags, and downed woody debris.
  - Increase the recruitment of tree species other than silver maple.

Reserved Old-growth and Reserved Old Forest - Bottomland Hardwoods

(Adapted From WDNR Old-growth and Old Forests Handbook Chapter 18 – Bottomland Hardwood)

For Reserved Old-growth and Reserved Old Forest, the primary management goal is the long-term development and maintenance of old-growth compositional, structural, and functional attributes within a minimally manipulated environment.

Ecosystem Benefits

Some bird species like cavity-nesters are most abundant in old unmanaged bottomland hardwood stands (Mossman, 1988). High bird densities, high species richness, and distinctive assemblages have been associated with floodplains [e.g. prothonotary warbler, yellow-crowned night-heron and red-shouldered hawk] (WDNR, 2005; Hoffman, 2002). Additionally, certain species of insects have been shown to be preferentially associated with American elm (Hoffman, 2002).

Wisconsin species of greatest conservation need include 18 species of bird, 8 species of herptiles, and 9 species of mammals that are significantly or moderately associated with floodplain forest (WDNR, 2005). In addition, many fish species are associated with large rivers and require the interactions of floodplain forest dynamics and water quality functions to provide habitat. Finally, numerous invertebrates, possibly several hundred species of conservation need are found in floodplain systems. Although, these species are found throughout the bottomland hardwood system, ten species that do best in cavities and large tree crowns are assumed to have optimum habitat in old-growth (Mossman, 1988). Bottomland hardwoods slow floodwater, thus lessening the erosive effects of concentrating the flow. Backwater areas hold run-off for extended periods thus providing habitat for many aquatic creatures.

Old-growth forests have larger boles and thus larger standing live tree cavities for animal homes. In old-growth bottomland hardwood forests, some kinds of fungi and lichens demonstrate greater species richness and greater abundance (Hoffman, 2002). Old-growth bottomland hardwoods constitute important habitat for many carnivores, and some endangered species; they are places for ecological research and for recreation and enjoyment. Science has shown that management as well as protection, is necessary and can improve conditions (Tanner and Hamel, 2001).

Allowable Management Activities in Reserved Forests (Relict, Old-growth, and Old Forests)

Once designated as reserved forest, direct human disturbance is limited to:

- Fire presuppression and suppression
  - Protection of lands adjoining the reserve.
  - Protection of the reserve; activities that protect the reserve from human caused fires and from externally ignited fires are acceptable. Fires that are ignited within the reserve through natural processes (i.e. lightning strikes) could be allowed to burn if there is no threat to human life or property.

- Prescribed Fire
  - Oak stands and designated savanna communities could have a plan for use of prescribed fire to maintain the full range of ecological processes.
- Control of native insects and diseases
  - Native insects and diseases are functional parts of natural processes. However, human modification of ecosystems can result in aberrant behavior. Unacceptable thresholds, relative to populations and impacts, could be defined.
  - Protection of lands adjoining the reserve.
  - Protection of the reserve; activities that attempt to protect the reserve from aberrant damage are acceptable.
- Exotic organisms may be controlled and/or eliminated to the greatest extent feasible, while causing the least damage possible to the system being protected.
- Herbivore populations may be limited to reduce negative ecological impacts. Populations and impacts should be monitored.
- Deposition of dredge spoils should not occur, although functional restoration of channels and backwater areas may require some level of dredging to reestablish flow patterns.
- Research and monitoring activities may be facilitated. Monitoring can be utilized to document ecosystem responses to environmental change. Research should not significantly alter forest composition, structure, or function. Destructive sampling should not be conducted or if allowed, kept to a minimum.
- Recreation management should be implemented. Impacts on forest composition, structure, and function should be controlled and limited. Limited foot trail systems are acceptable. Dispersed primitive camping could be acceptable in large reserves and certain types of recreation could be encouraged for educational purposes. Motorized recreation should be limited.
- Infrastructure within reserves should be kept to a minimum. In most cases, structures should be discouraged; when necessary, they should be primitive. In most cases, roads should be discouraged; when necessary, they should be narrow dirt or gravel tracks.

Specific Prohibited Management Activities

- Timber harvesting and salvage are not permitted.
- Vegetation management to manipulate compositional, structural, or functional development or to simulate disturbance processes is not permitted beyond acceptable practices previously identified.

Aspen

Aspen provides food and cover for wildlife species, such as woodcock and ruffed grouse, that favor early successional forest types. Ruffed grouse are of particular interest as they have been declining in southwestern Wisconsin for the past 40 years as forest stands have matured. Aspen requires disturbance and abundant sunlight to regenerate. It is typically managed using complete even-aged harvests at intervals of 45-60 years.

Management Objectives

Expand or retain aspen stands and aspen as a component of other forest habitat types where practicable, except where it negatively impacts sedge meadow, grassland and savanna habitats.

Management Prescriptions

- Achieve natural regeneration of aspen primarily through coppice (i.e. root sprouts).
- Where the objective is to develop or maintain a stand of mixed tree species, retain individual longer-lived trees, such as oak. These trees can improve stand structure, wildlife habitat, aesthetic beauty, and increase the diversity of the stand.
- Natural conversion to other forest types, such as central hardwoods, may be prescribed if adequate aspen regeneration is unlikely or other hardwood goals are in place. Harvest aspen and other short-lived species, leaving the long-lived species to develop.

WETLAND HABITATS (NON-FORESTED)

Sedge Meadow, Wet Prairie and Wet-Mesic Prairie

Sedge meadow, wet prairie, and wet-mesic prairie habitats support many species such as Bobolink, Blue-winged Teal, Willow Flycatcher and rare herptiles. Today, these open wetlands are much less abundant than they once were. Historically, fire played a key role in maintaining these open habitats. The lack of fire in the present landscape has allowed the encroachment of woody species. Many of these grasslands have been lost or severely degraded by drainage, flooding, lack of fire, or invasive species.

Degraded sedge meadow/wet prairies can be described as dominated by reed canary grass as a result of grazing and/or ditching, or as areas are being invaded by woody vegetation due to the lack of disturbance e.g. fire on the site. Canary grass is not desirable for wildlife because it replaces native plant species and creates a monotype with lower habitat value. Especially in the case of reed canary grass dominated sedge

meadows, restoration can be a monumental task given the tools currently at hand. Continuing research on cost-effective, environmentally safe methods for removing canary grass from sedge meadows may provide future tools to accomplish these restorations.

Management Objective
Whenever possible, maintain and restore the extent and quality of the sedge meadow/wet prairie and wet-mesic prairie community types on all sites where it occurs.

Management Prescriptions
- In areas undergoing conversion from open sedge meadow/wet prairie to shrubs and brush use prescribed fire, mechanical mowing, grazing, bio fuel harvest and herbicide to remove the woody vegetation.
- On sites dominated by monotypic stands of reed canary grass, where feasible, use prescribed fire, mowing, and herbicide treatment to reduce competition to the native vegetation.
- Restore the site's original hydrology, where possible and compatible with the other primary objectives and practicable given adjacent ownership, land uses and agency resources.

Shrub-carr (shrub wetlands)
Shrub-carr wetlands provide important wildlife habitat, especially as winter cover for ring-necked pheasants and white-tailed deer. Typical shrub-carr wetlands are habitat types that are in a state of succession due to a lack of fire. In the absence of this natural disturbance, maintenance of this habitat type requires periodic management treatments to maintain this type.

Management Objective
- Maintain existing shrub-carr wetland in areas that do not have high potential for management as sedge meadow, wet prairie, or wet mesic prairie.

Management Prescriptions
- Use prescribed fire, tree cutting, herbicide treatments, and mowing to maintain shrub-carr habitat.

Emergent Marsh
Emergent marsh areas have persistent to permanent water with maximum depths exceeding 5 feet and typically with low flow of water. The habitat type is dominated by both emergent and submergent vegetation. Some of the common species present often include wild rice, cattail, Bulrush, burr reed and water lilies. These deep water marshes are permanent wetlands. If the wetland is artificially maintained and water levels manipulated through the use of a combination of berms, dams, or other water control structures then the wetland is considered a flowage. Flowage management is discussed separately in another section.

Emergent Marshes of the LWSR
- Avoca Lake
- Goodwiler Lake
- Woodman Lake
- Bullhead Slu

Management Objective
- Maintain and restore if necessary the extent and quality of deep water emergent marsh habitat.

Management Prescriptions
- Maintain, or restore if necessary and practicable, the original hydrology of the wetlands.
- Primarily passively manage the native aquatic communities and allow natural processes to determine the ecological characteristics (i.e., composition and structure of the communities); except, where possible, use prescribed fire to maintain vegetative health and vigor. Planting native vegetation may be done if the existing native plant community and/or seed bank in restoration areas does not provide the desired diversity and density of native species.
- Remove riparian trees to maintain "soft edges" and open canopy as appropriate.
- Aquatic vegetation may be cut and course woody debris may be trimmed or moved as necessary to provide a minimal navigation channel. Course woody debris should not be removed from the system but relocated in the same water body. Note: over-clearing a channel can have a detrimental impact on the recreational experience as well as aquatic habitat.
- Dredging of sediments and fish stocking is not permitted. Stocking to restore or reestablish native species is allowed.
- Recreational or supplemental fish stocking is not allowed. Stocking or translocation to restore or reestablish a native species is allowed.

Flowages

Flowages, although artificial, are much like natural emergent marsh areas, having persistent to permanent water with depths exceeding five feet and typically with low flow of water and both emergent and submergent vegetation present. The difference is that a flowage is a created wetland and the water levels are managed to accomplish a range of habitat objectives. These artificial impoundments give managers the ability to provide optimal habitat for migratory waterfowl and shorebirds. Flowages also provide important waterfowl and shorebird nesting habitat as well as habitat for a variety of furbearer species.

Flowages of the LWSR

- Fisher Lake
- Bakkens Pond
- Long Lake
- Cruson Slough Flowage
- Fish Trap Flowage

Management Objective

- Provide and enhance wetland habitats for waterfowl and shorebirds, and support other wetland wildlife and communities.

Management Prescriptions

- Conduct periodic partial and/or complete drawdowns every five years, or as needed, to promote the resurgence of desirable wetland species like smartweeds, arrowheads and bidens as a food source for wildlife; and to aid in the control of woody vegetation, to reduce monotypic vegetation and enhance plant diversity.
- Where practicable and desirable, coordinate water level management with late spring cutting, crushing, shearing and disking; winter prescribed fire; timely herbicide applications; and grading on sites dominated by invasive species (e.g., cattails). Further, time the drawdown to have the least negative impact to fish and aquatic invertebrates spawning, breeding or overwintering in the impoundment.

The long-term viability of the lower Wisconsin River corridor as a premier natural and recreational resource is dependent on maintaining or improving current water quality conditions in the backwaters and sloughs. The department intends to continue using best management practices on DNR lands, monitor the situation and work cooperatively with other governments and partners to protect and improve the water quality of the backwaters and sloughs.

- Attempt to establish wild rice in flowages with appropriate site conditions to enhance available food resources for waterfowl and other wildlife.
- Seed and plant native forbs and grasses as needed.
- Stock fish if needed to maintain or reestablish a game fishery.
- Conduct annual dike and water control structure inspections, repair as necessary. Conduct regular dike maintenance activities, including mowing, and patching.
- Plan and implement major maintenance of dikes on approximately 20-year rotations.
- Control beaver and muskrat populations to mitigate dike damage and the blockage of water control structures.
- Remove or control non-native organisms, and of nuisance vegetation; specifically aquatic invasive species (AIS) and terrestrial invasives. Mowing, cutting, burning, herbicide, bio control or a combination thereof may be used.

Sloughs, Oxbow Lakes and Floodplain Lakes

Sloughs are naturally formed backwaters connected to the main channel; ox-bow lakes (cut-off sloughs) and floodplain lakes are isolated from the river or are only seasonally connected to it. While sloughs, oxbows and floodplain lakes are distinct from the river's main channel, they form important hydrological and ecological connections between the river and the uplands. They are a unique native community not commonly found in the state. They are highly diverse in submergent, floating and emergent plants, not seen in the main river. Their waters provide critical nursery and refuge habitat for riverine fishes, waterfowl, shorebirds, game birds, songbirds and mammals. The sloughs and lakes are also important for rare fish, mussels and other aquatic life. Species inventories of these waters are not complete. Of the approximately 55 sloughs and lakes that have been inventoried so far, NHI species have been found in 27.

Recent studies of several backwater sloughs scattered throughout the Riverway show the water quality of these sloughs has declined, in some cases, significantly (Marshall 2013). The habitat of oxbow lakes is often dependent on the quantity and quality of the groundwater discharging into them. Increasing nitrogen concentrations in the oxbows and subsequent habitat degradation is most evident where river terrace groundwater discharges into them. The highest groundwater nitrate concentrations coincide with greatest oxbow environmental degradation. Degradation consists of toxic nitrate concentrations, extensive free floating plant (FFP) cover, and anoxia.

The studies show the primary contributor is high nitrogen loading from groundwater discharged from cropped fields on adjacent upland sand terraces (Marshal, et al., 2016). Conser-

vation buffers are needed along with nutrient application reductions to improve the groundwater and reduce oxbow pollution.

The long-term viability of the lower Wisconsin River corridor as a premier natural and recreational resource is dependent on maintaining or improving current water quality conditions in the backwaters and sloughs. The department intends to continue using best management practices on DNR lands, monitor the situation and work cooperatively with other governments and partners to protect and improve the water quality of the backwaters and sloughs.

Management Objective

- Protect, maintain, or restore the hydrology and water quality of these waters to safeguard the long-term health of this important aquatic ecosystem. Do this by implementing protective management actions on department managed lands; and by working collaboratively with local conservation organizations and county and local governments and adjacent landowners on issues that relate to the quality and quantity of surface and groundwater entering from surrounding lands.
- Maintain high quality habitat for fish, aquatic invertebrates, waterfowl, shorebirds, and furbearers.

Photo by Dave Marshall

Management Prescriptions

- Identify priority conservation areas near environmentally sensitive cut-off channels, sloughs and oxbows where focused efforts may be applied to reduce groundwater nitrate and phosphorus loading.
- Control or manage runoff where drainage on DNR managed land is negatively impacting water quality or aquatic habitat. As part of this effort, in consultation with department experts, establish and maintain native prairie or grassland buffers for water quality benefits on appropriate sites near sloughs and lakes.
- Identify and prioritize for purchase (fee or easement) lands within the Riverway boundary that are critical for maintaining or improving water quality of sloughs, oxbows and floodplain lakes.
- Work collaboratively with local conservation organizations, county and local governments and private landowners to develop a conservation strategy and plan to protect the quality of the surface and groundwater flowing into sloughs, oxbows and floodplain lakes. The plan may include such things as adopting nutrient management and storm-water runoff best management practices or other conservation practices. Seek funding opportunities and build partnerships to assist in these conservation efforts.
- On shorelines bounded by bottomland hardwoods, follow Wisconsin's Forestry Best Management Practices for Water Quality field manual. The riparian management zone (RMZ) in this case would be 100' from the ordinary high water mark, and would require using selection harvests and promoting long-lived tree species appropriate to the site. Do not harvest fine woody material or cut any dead standing trees (snags) within the RMZ. Promote creation of future snags to fall into and introduce woody debris into sloughs by leaving 3-5 trees per acre as uncut legacy trees. Trees may be cut to develop, maintain, or improve water access and other near-shore public use sites. At these sites, follow the site-specific prescriptions described in other sections of this plan.
- On sloughs and floodplain lakes having canoe, kayak or boat public access, as needed apply best management practices to reduce erosion of the shoreline, such as gently sloping the shoreline and applying gravel, or a log roller structure, or vegetated sand mats.
- In-water habitat improvement may include installation of woody habitat and brush bundles or other natural vegetation structures.
- In sedge meadow areas that are converting to shrubs and brush, use tools such as prescribed fire, mechanical mowing, and herbicides to maintain open habitat.
- Where feasible, on sites dominated by monotypic stands of Phragmites, reed canary grass, or non-native cattails, use prescribed fire, mowing, and herbicide treatment. Planting native wetland vegetation is not normally necessary due to existing seed banks, but may be done where needed to enhance the wetland plant community.
- Course woody debris may be trimmed or moved as necessary (and left in the water) to provide a minimal navigation channel for the typical water craft using the waterbody to pass, e.g. about four feet for paddle craft. (Note: over-clearing a channel can have a detrimental impact on aquatic habitat as well as the recreational experience.)
- Additionally allowed management activities:
  - Mowing and vegetation management to allow for waterfowl banding (population monitoring);
  - Chemical or mechanical removal of non-native organisms, specifically AIS and terrestrial invasives;
  - Use dredging only for the purpose of restoring habitat loss where agricultural or storm-water runoff has accelerated sediment deposition in waterbodies.
- The following activities are not allowed:
  - Motorized vehicle crossings (trails or roads), except temporary crossings for timber harvest and management;
  - Dredging for navigation;
  - Fish stocking.

Springs, Spring Ponds, Seeps and Ephemeral Ponds

Another unique aquatic resource present in the LWSR are springs, spring ponds, spring runs and seeps and ephemeral ponds. Along with the sloughs, oxbow lakes and floodplain lakes, the springs and seeps support a unique blend of species, containing perhaps the most abundant populations of rare and endangered aquatic species in southern Wisconsin. Functionally, this broad and extensive network of aquatic features is ecologically significant for rare fishes, bryozoans, aquatic insects, reptiles and amphibians.

Spring ponds and seeps in the LWSR are particularly important as habitat for a number of rare fish. These groundwater influenced water bodies typically have high water clarity, colder water temperatures, higher dissolved oxygen levels, low sedimentation, and are relatively stable with very little change in water temperature, water flow, or chemical composition. These features are highly susceptible to damage, and land use practices that lead to soil or hydrological disturbance should be avoided.

Management Objective

- Protect springs and seeps recharge areas from disturbance that would negatively impact there hydrology.

Management Prescription

- Follow forest management BMPs to protect from disturbance.

- Maintain the natural hydrology of the area.
- Impoundments are not permitted.

River and Stream Riparian Corridors

This section applies to the main-stem of the river and to feeder streams within the Riverway. The riparian corridor is that area within 75 feet of the river or stream bank.

Management Objective

- Maintain the Wisconsin River's shoreline in a largely undeveloped, natural appearing condition to maintain the natural scenic beauty of the river.
- Maintain high quality riparian habitats for the wide variety of terrestrial and aquatic species.

Management Prescriptions

- Allow natural river and stream processes to erode and deposit sediments naturally, with recruitment of woody debris into the water for aquatic habitat.
- On shorelines bounded by bottomland hardwoods, follow Wisconsin's Forestry Best Management Practices for Water Quality field manual. The riparian management zone (RMZ) in this case would be 100' from the ordinary high water mark, and would require using selection harvests and promoting long-lived tree species appropriate to the site. Do not harvest fine woody material or cut any dead standing trees (snags) within the RMZ. Promote creation of future snags to fall into and introduce woody debris into sloughs by leaving 3-5 trees per acre as uncut legacy trees. Trees may be cut to develop, maintain, or improve water access and other near-shore public use sites. At these sites, follow the site-specific prescriptions described in other sections of this plan.
- When conducting forest management activities, meet the aesthetic performance standard requirements of NR 37, Wis. Adm. Code.
- Retain all downed, coarse woody debris in the channel.
- Stabilize the river bank only to protect existing infrastructure. Use engineered wood and bio-engineered structures over riprap and hard armoring whenever possible.
- Dredging is limited to improving navigation at boat access sites.
- Cut hazard trees as necessary in designated public use areas as necessary. For other recreational facility development and management activities, follow the prescriptions in the recreation management section of this plan.

Grasslands, Prairies, and Oak Opening (savanna) Habitats

Once common, native grasslands and oak openings are now rare communities statewide, however this area contains a high percentage of the remaining native grassland and oak openings found within the state. In addition to the remnant native habitat types, there are prairie reconstructions sites. While prairie reconstructions provide only a portion of the rare biodiversity present in a native prairie, in the appropriate context, they provide important habitat for many wildlife species including many SGCN such as Grasshopper, Field and Henslow's Sparrow as well as waterfowl, deer and turkeys.

Management Objectives

- Maintain and enhance prairie restorations and other grasslands with an emphasis on excluding non-native and invasive species.
- Restore or enhance oak openings (savanna) with an emphasis on excluding non-native and invasive species.

Management Prescriptions

- Land management in areas of prairie and oak openings (oak savanna) primarily focuses on simulating the natural disturbances (primarily fire) that historically functioned to maintain structure and diversity in these communities. The management approach used on individual parcels will vary based on the management potential and opportunities for the site, which in turn are derived from site-based factors such as soils, topography, hydrology, and cover type, parcel size and surrounding land uses and landscape scale considerations.
- The following management practices are to be applied, as appropriate, on grassland, prairie, and oak opening restoration sites:
- Where possible, use prescribed fire and or grazing to invigorate grasses and forbs and suppress the encroachment of woody species, and in some cases to control invasive plants.
- Use cutting, mowing, brushing, and herbicides, bio control or some combination (when necessary) to remove invading trees and shrubs. Bio-fuel harvest could be used as markets develop.
- On prairie and savanna reconstruction sites, plant a diversity of native prairie grassland and savanna species.
- Oak may be planted to increase or establish oak on oak opening restoration sites.
- When it meets other objectives for the site, remove hedgerows, fence lines, small conifer plantations, and small low quality forest patches to increase the size of unbroken grassland/prairie area. Retain oak that may be present at the appropriate density for savanna. (While these activities may have minimal effects on increasing grassland acreage on the landscape, they will effectively improve the size and functional quality of the habitat). Management should recognize that virtually all grassland species will tolerate a small amount of woody vegetation and limited brush patches benefit early successional

species such as Bobwhite, Bell's Vireo and Brown Thrasher.
- Follow DNR Grassland/Savanna Protocol to minimize impact on sensitive species.

BARRENS NATURAL COMMUNITIES

Barrens communities are present on the broad sandy river terraces of the Lower Wisconsin River and include Pine Barrens, Oak Barrens, and Sand Barrens. Pine Barrens and Oak Barrens of the LWSR are very similar, except that the Pine Barrens are dominated by jack pine (Pinus banksiana) in the overstory and Oak Barrens are dominated by black oak with bur oak and occasionally white oak. Based on current knowledge of the study area Pine Barrens are only known from one high quality example, Gotham Jack Pine Barrens SNA, and Oak Barrens are known from four primary sites, Mazomanie Oak Barrens, Blue River – Muscoda Sand Barrens, portions of Millville Woodland and Adiantum Woods, and Smith Slough. Many of the highest quality barrens sites are being managed for these types through prescribed burning and brush and tree removal. Generally these barrens sites have scattered trees over a ground layer typical of Sand Prairies with lichens common. Sand Barrens are potentially anthropogenic in origin and may have developed from attempts to farm the unstabilized or semi-stabilized sands along the Lower Wisconsin River. Unvegetated "blow-outs" are characteristic features. Barrens, Dry Prairie and Sand Prairie plants such as false-heather (*Hudsonia tomentosa*), bearberry (*Arctostaphylos uva-ursi*), sedges (*Cyperus filiculmis and C. schweinitzii*), sand cress, three-awn grasses (*Aristida spp.*), rock spikemoss (*Selaginella rupestris*), and the earthstar fungi (*Geaster spp.*) are present in this community.

This complex of community types is globally rare. Long-term conservation will depend on a combination of protection and restoration, and Wisconsin has some of the best management opportunities in North America.

Management Objective
- Maintain, restore, and enhance the ecological function of the LWSR barrens communities with specific emphasis on rare plants; and rare birds, herptiles and invertebrates.

Management Prescriptions
- Wherever possible, use prescribed fire to maintain this community complex. Develop educational tools and demonstration areas that promote the benefits of prescribed fire, and address liability concerns.
- Mechanical brushing and some forestry practices may be used and are compatible with maintaining this type, especially where the use of fire is difficult or impossible. Follow existing WDNR screening guidance to minimize impacts on sensitive species.
- Where possible, manage this type in complexes with pine barrens, sand prairie, southern dry forest, and surrogate grasslands to achieve economies of scale and better ensure that all phases of the community and its associated species are maintained over time. Use surrogate habitat following logging to buffer barrens openings, allow for species dispersal, and connect existing habitat. Manage this type as a moving mosaic of habitat, ensuring that habitat for the many species that require open conditions is not diminished or degraded. Tree harvesting and thinning and sowing of native seed may be used where appropriate.
- Connect and expand open barrens, prairie, and wetlands to provide grassland bird habitat and safe passage for reptiles to utilize barrens for nesting.
- Restore and maintain an open landscape to benefit sand barrens-dependent plants and animals.
- Retain occasional oaks and native shrubs for shrubland bird species and to provide shady retreats for herptiles.
- Identify and control any existing invasive plants. Control the spread of new invasives by attempting to identify populations when they are small and eliminate them before they spread. Continue and support research to find biocontrols for invasives.
- Protect turtle nesting sites.
- Strive to reduce deer density.
- Restrict off-road vehicle, equestrian, and other soil-disturbing activities in sensitive areas.

Sand Terrace High Bank Restoration – Open Nesting Habitat

Primarily applied to sites in the following management areas: Arena Sands, Bakkens Pond, Smith Slough, Gotham, Blue River Barrens, Muscoda Barrens, Woodman, and Millville.

Management Objectives
- Improve habitat for nesting turtles and other reptiles, restore sand prairie, oak barrens, and oak opening habitats along sand terrace 'high bank' areas that are adjacent to open water, emergent marsh, and other wetlands.
- Maintain a shifting mosaic of prairie and savanna habitats, while promoting habitat for species that require open conditions.
- Maintain existing populations of reptiles and other Species of Greatest Conservation Need.
- Provide open prairie and savanna habitat for rare species, expanding into previously unmanaged areas.
- Promote areas with open sandy soil and sparse vegetation to benefit the reptiles, invertebrates and rare plants that rely on this habitat.

- Restore and maintain natural transitions from open to closed canopy communities.

Management Prescriptions

- Use timber harvests, brush/tree clearing, prescribed fire, and chemical application to restore native community structure, composition, and function.
- Provide appropriate unburned refugia for fire sensitive barrens and prairie dependent invertebrates when planning prescribed burn units, and consider impacts to reptiles regarding timing of prescribed burns.
- In previously unmanaged areas, use combinations of timber harvest, brush/tree clearing, and prescribed fire to reduce woody cover, expand open habitat, and create a soft edge or transition into adjacent communities.
- Leave scattered oak, jack pine, and other native trees depending on community structural objectives.
- Retain snags and course woody debris as important habitat features, unless they conflict with other objectives (such as hazard trees near roads, or prescribed fire hazards).
- Leave course woody debris in sloughs and other water bodies to meet aquatic community objectives.
- Seed prairie and barrens plant species as needed, using local genotype seed sources.
- Conifer plantations are not native to this landscape and will be thinned, harvested, and converted to native cover types where they conflict with management objectives.
- Follow Incidental Take Protocols for listed species.
- Control invasive species, specifically black locust, spotted knapweed, and non-native brush.

AGRICULTURE AND FOOD PLOTS

Many of the Riverway properties contained active or abandoned crop lands when originally purchased. Historical records indicate that these areas were frequently intact native prairies in pre-settlement times, and maintained through the use of fire by Native Americans. The restoration goal for most of these fields is conversion back to native vegetation communities. Following purchase, many of the larger fields are left in crop production through the Sharecrop Program until time and resources allowed the conversion to native vegetation communities. Continued crop production is a stop-gap measure to prevent invasion by weeds and woody plants until the field can be planted to native vegetation. Sunflower fields are planted to attract and harvest mourning doves.

Management Objectives

- Provide brush control by farming land before converting to grasslands, prairies or oak opening.
- Provide a winter food source for wildlife.
- Provide opportunities for mourning dove hunting.
- Enhance opportunities for pheasant hunting.

Management Prescriptions

- Continue to administer sharecrop, grazing and hay cutting permits in the Riverway as a method to prevent woody succession and control invasive species until restoration efforts can begin.
- Utilize sharecrop agreements to prepare a site for reconstruction of native habitat.
- On agricultural lands maintained over a period of time, allow a brushy edge to develop to transition from forested to open lands.
- Plant food plots or leave agricultural crops (share crop acreage) standing to provide winter food and cover for wildlife.
- Annually plant approximately 100 to 150 acres (in scattered plots of five to ten acres) of sunflowers or other agricultural crops.

GENERAL AUTHORIZED MANAGEMENT ACTIVITIES OR TOOLS

All activities listed above in the management prescriptions and those listed below are authorized on the LWSR as may be appropriate, unless restricted by a general habitat type prescription or any property-specific management prescription.

- Prescribed fire
- Chemical application
- Mechanical/mowing
- Hand cutting – chainsaw
- Bio-fuel harvest
- Timber harvest – even aged and uneven-aged silvicultural systems, including clear-cutting
- Construction of dikes, ditch plugs and scrapes
- Water level manipulation – in impounded wetland restoration sites
- Tree and grassland planting
- Agriculture practices
- Placement of nest boxes, platforms or similar devices to enhance reproduction of desired wildlife species
- Bio-control measures

VI. GENERAL PROPERTY ADMINISTRATION AND MANAGEMENT POLICIES AND PROVISIONS

The following section describes general property administration and management policies and provisions that apply to all state managed lands in the Riverway.

FUNDING CONSTRAINTS

There are a number of administrative and legislative processes beyond the master plan that will determine the rate at which this master plan will be implemented. Many aspects of the master plan are dependent upon new staffing or funding allocations or construction approval processes that are subsequent to, and separate from, the master planning process. For example, operational funding and staffing levels for the department are established by the state legislature. Development projects follow a separate administrative approval and funding allocation process.

GENERAL AUTHORIZED USES AND FEE AREAS

Five statutorily defined nature-based outdoor recreation activities – hunting, trapping, fishing, hiking and cross-country skiing – as well as many other outdoor recreational activities, are authorized on the LWSR without payment of a fee.

Several sites and trails on the LWSR will be designated fee areas. The exact locations of the areas are described on pages 32 and 37.[2] A state park admission fee or state park pass may be required for these sites and trails. As per NR 45.12(3), while pedestrians and snowmobile riders would not need a state trail pass to use designated trails, equestrians would need a state trail pass.

FACILITY DEVELOPMENT STANDARDS

All facilities, roads and structures providing either public recreation or support public recreation activities or other administrative services will be designed and constructed in compliance with state building codes and DNR design standards including NR 44.

DISABLED ACCESSIBILITY

All new construction and renovation of infrastructure will follow guidelines set forth within the Americans with Disabilities Act (ADA) and will be done in a manner consistent with NR 44 standards of the land use classification of the site where the development is located.

The LWSR property manager has the authority to make reasonable accommodations, including motorized vehicle access, for people with disabilities, but shall be consistent with the access

2 The department will pursue a change to NR 45.12 adding specific sites on the LWSR to the list of properties for which a state park admission fee is required.

Classifications of LWSR Roads defined

The roads managed by the department on the LWSR fall into three different development level classifications. The classifications reflect a range of development and maintenance standards. Roads within the LWSR will be maintained as primitive, or lightly developed, or moderately developed.

These road classifications are defined by NR44.07(3) and are as follows:

Primitive road: A primitive road shall be a temporary road, a permanent seasonal road or a permanent all-season road which is primarily a single lane with a maximum sustained cleared width normally not exceeding 12 feet, it has no or little grading, with limited cut and fill, is surfaced with primitive or native materials and has a maximum speed design of 15 mph. Due to the variability of roadbed conditions at different times and places, some primitive roads might not be negotiable by ordinary highway vehicles.

Lightly developed road: A lightly developed road shall be a temporary road, a permanent seasonal road or a permanent all-season road which is primarily a single lane with a maximum sustained cleared width normally not exceeding 16 feet, is lightly to well-graded with minimal cut and fill, is surfaced with primitive, native or aggregate materials except in limited special use situations where asphalt may be used, and has a maximum speed design of 15 mph. Due to the variability of roadbed conditions at different times and places, some lightly developed roads might not be negotiable by ordinary highway vehicles.

Moderately developed road: A moderately developed road shall be a permanent seasonal road or a permanent all-season road which typically is 2-lane, but may be one-lane, have a maximum sustained cleared width normally not exceeding 45 feet for 2-lane and 30 feet for one-lane, a well-graded roadbed and may have moderate cuts and fills and shallow ditching, has a surface of aggregate, asphalt or native material, and a maximum design speed of 25 mph.

standards of the management area's recreational use setting sub-classification, if one applies (see Land Management Classifications). Since 1990, DNR has maintained a permit system to allow individuals with disabilities to use power-driven mobility devices (PDMDs) on DNR lands as a mode of personal conveyance. Permits for the use of PDMDs are issued by property managers and based on individual requests and property conditions. Use of PDMDs may be limited in operation (e.g., speed limit) or location to ensure visitor safety, environmental protection, or to minimize impacts to visitors that do not require PDMDs.

PUBLIC HEALTH AND SAFETY

All facilities will comply with federal, state, and local health and sanitation codes. Designated public use areas, such as developed day-use areas and designated trails, are inspected semi-annually for safety hazards per Wis. Statutes s. 23.115. The LWSR property manager has the authority to close trails and other facilities on the property when necessary due to health, safety, or environmental damage concerns.

RESPONSE TO NATURAL EMERGENCIES

Natural emergency events include severe flooding, ice, wind storms, insect and disease infestations, and major wildfires or other significant catastrophic occurrences that threaten forested lands owned by the state and under jurisdiction of the department. As outlined in NR 45.075, the chief state forester may declare a natural emergency and manage the response. Emergency actions may be taken to protect public health and safety, or as directed by the State Forester to prevent a catastrophic incident from spreading to adjacent forest lands. The appropriate management responses to catastrophic events are determined on a case-by-case basis with consideration of the property's purpose, the objectives of the management area(s) and any authorized response outlined for the management area in the plan. At a minimum, salvage of trees damaged by wind, fire, ice, disease, or insects may occur if consistent with the objectives of the management area or as prescribed in the plan for the management area. A master plan amendment to establish revised management objectives may be required if the event altered the forest conditions to the point that the existing management objectives are no longer achievable.

FACILITY MANAGEMENT AUTHORITY

The LWSR property manager may temporarily close or relocate trail segments or other public use facilities as deemed necessary, after following any applicable department approval processes. (A plan variance may be required for significant, permanent relocations.) The newly relocated trail or facility location and design must be consistent with the land classification requirements (NR 44) and the management objectives for the management area in which it is located.

ROAD MANAGEMENT VEHICLE ACCESS PLAN

The Lower Wisconsin State Riverway has a network of primitive, lightly and moderately developed roads and parking lots that are used for management purposes and public access. Most roads that are open for public vehicle access lead to parking lots or boat access sites. Management roads closed to public vehicles are gated or signed.

All department maintained roads that are not open to public vehicles will be maintained as primitive or lightly developed roads [NR 44.07(3)]. On primitive roads, which are seasonal and not regularly maintained, ruts and downed trees may be present. Maintenance is done on primitive roads as needed. Public access roads and parking lots managed by the department shall be constructed and maintained as either lightly developed or moderately developed. However, the following roads, Hay Lane, Hill Slough and High Bank Road, will be maintained as primitively or light developed. The property manager may determine which of these road standards to apply on a case by case basis.

Management and public access roads provide access for such activities as managing timber, improving fish and wildlife habitat, fighting fires, and recreation. Access to and within the Riverway is on a variety of road types, including state and county highways, town roads and DNR managed roads. Roads managed by other units of government, such as town, county or state highways, are outside the scope of this master plan.

Approximately 26 miles of DNR managed roads are open to public vehicles. There are also 42 miles of roads that are closed to public vehicles and used for management access. These roads also provide foot access for hunters and hikers. Map E shows the road network.

Road Management Objectives

- Provide a network of roads and parking lots on the LWSR that meet land management and recreational access objectives, while minimizing environmental impacts and management costs.
- Maintain property roads and parking lots to the designated and in a sustainable condition.

Management Prescriptions

The following management prescriptions apply to department managed roads and parking lots:

- Maintain the network of public access roads and parking lots and the closed management roads shown on Map E.
- Maintain roads in a sustainable condition and at their designated development level. Assure roads meet

Wisconsin Forestry's Best Management Practices for Water Quality standards.
- Regularly inspect active roads and parking lots, especially after heavy storm events. Clear debris as needed from the road surfaces, culverts and ditches to decrease unsafe conditions and prevent damage.
- Maintain stable surfaces to facilitate proper drainage and reduce degradation from traffic during wet or soft conditions; or close the road when these conditions exist.
- Monitor soil disturbance and take measures to prevent excessive damage.
- Restore roads used in timber harvests to non-erosive conditions, in accordance with Wisconsin Forestry's Best Management Practices for Water Quality.
- Establish appropriate speed limits for public access roads based on the road's development classification and the type and level of use.
- Where parking lot size or development level is not specified in the master plan the lot shall be constructed to the lightly-developed standard with native soil or aggregate surface and accommodate up to 20 vehicles.

Road and Parking Lot Management Authority
The LWSR property manager has the following authorities for managing roads and parking lots:

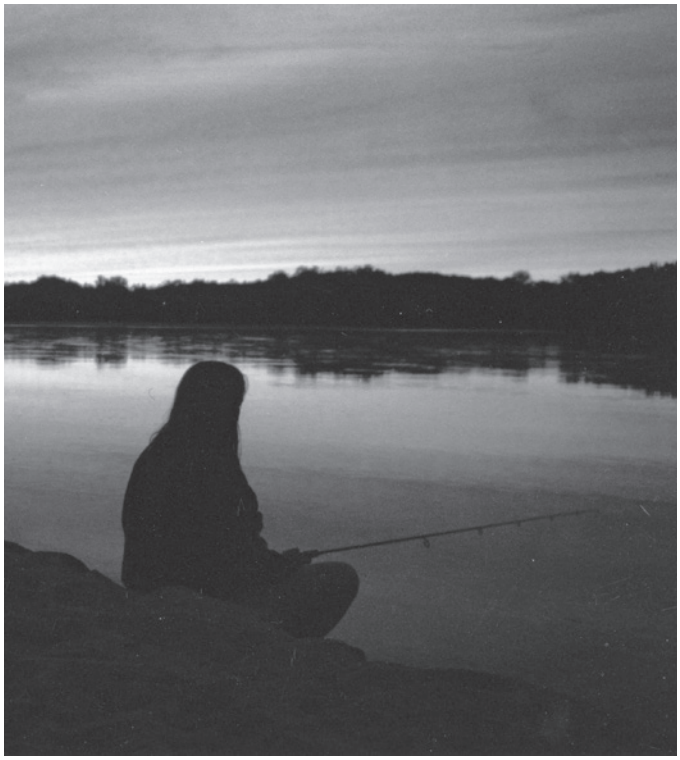


Photo by Jan Hake

- In areas designated as Recreational Use Management Areas - Type 3 Setting and in all management areas that have a classification other than Recreational Use Management Area the LWSR property manager may:
  - Temporarily close management or public use roads due to safety or environmental concerns. When applicable, follow department approval processes.
  - Permanently relocate or close an open public use road following the department's master plan variance process.
  - Permanently close or relocate a closed management road when it is no longer needed for management purposes. When applicable, follow department approval processes.
  - Close a parking lot, relocate it, or adjust its size (up or down) as deemed necessary, with a maximum of 20 vehicles.

- In areas designated as Recreational Use Management Areas - Type 4 Setting:
  - Temporarily close a management or public use road or parking lot due to safety or environmental concerns.
  - For permanent road or parking lot changes that are inconsistent with the master plan (i.e. require a change in the prescriptions in the master plan), follow the department's master plan variance approval process.

- On newly acquired land parcels:
  - When appropriate, develop new or maintain existing roads and parking lots to provide for management access and public access. Abandon all pre-existing roads not needed for management or public access. All roads and parking development must be compatible with the management classification and objectives of the area.

Note: Following any permanent change to property roads or parking lots all applicable maps must be updated.

TEMPORARY SANITARY FACILITIES

The property manager may install portable (temporary) sanitary facilities at any sites when they determine there is a need.

EMERGENCY ACTION PLAN

The property maintains on file an emergency action plan that describes staff response and coordination with other agencies to natural disasters as they affect public safety and facilities. It is reviewed annually.

REFUSE MANAGEMENT

Except at public use facilities where refuse collection containers are provided by the department, property visitors are required to carry out any refuse they bring in. Burying of refuse is not allowed anywhere on the property.

FOREST CERTIFICATION

Since 2009 Wisconsin State Forests and all other DNR managed lands have had dual, independent third-party Forest Certification from the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI). Independent, third-party certification means management of Wisconsin's forests meets strict standards for ecological, social, and economic sustainability. The status of any certification corrective actions will be shared annually.

BEST MANAGEMENT PRACTICES FOR WATER QUALITY

All management activities within the LWSR will follow, as a minimum standard, the guidelines in Wisconsin's Forestry Best Management Practices for Water Quality: Field Manual for Loggers, Landowners and Land Managers (DNR PUB-FR-093-03).

ENDANGERED, THREATENED AND SPECIES OF SPECIAL CONCERN PROTECTION

Implementation of all management prescriptions in the master plan will be carried out with consideration of the needs of endangered, threatened, and species of special concern and the potential impacts to the species and their habitat. Management actions carried out during plan implementation will be checked against a database of listed species to assure that no department actions results in the direct taking of any known endangered or threatened resource.

The LWSR is well-known for its bald eagles. Large populations of bald eagles often congregate below the Prairie du Sac dam when the river freezes elsewhere. Numerous wooded bluffs along the Riverway, including Ferry Bluff, Lone Rock Bluffs and Sugarloaf are important roost sites for wintering bald eagles (Mossman and Steele In prep.). Bald eagles were removed from the federal list of threatened and endangered species in 2007; however, bald eagles remain protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

The Bald and Golden Eagle Act prohibits anyone from taking, possessing, or transporting a bald eagle or golden eagle, or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. Take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. Activities that directly or indirectly lead to take are prohibited without a permit.

CULTURAL RESOURCES MANAGEMENT

- The protection and preservation of areas, objects, and records of cultural importance will be coordinated with the department Archaeologist. As appropriate and consistent with extant legislation, the department will further consult with other interested individuals, organizations, and communities. This consultation will typically include (but is not necessarily limited to) notification to interested parties of activities and potential impacts in areas of known concerns.
- Protection of cultural resources will be coordinated with the Wisconsin Historical Society (WHS) as required by applicable state and federal historic preservation laws and regulations.
- Protection of burial sites will follow Section 157.70 of Wisconsin Statutes, and the department's "Burials, Earthworks, and Mounds Preservation Policy & Plan" (WDNR 2008).
- Consistent with the above legislation and to the extent practicable, accommodations will be made to avoid or minimize adverse impacts on cultural sites that may be affected by management and development activities.
- Cultural resources may be developed for scientific and educational purposes to the extent that the integrity of the resource is maintained.

FOREST PEST CONTROL

Wisconsin Statute 26.30 states; "It is the public policy of the state to control forest pests on or threatening forests of the state…" Any significant forest pest events will be evaluated

Photo by Nate Fayram, DNR

with consideration given to the property management goals and the potential threat of the pest to other landowners. Infestations of the non-native gypsy moth caterpillar will be managed according to the DNR Gypsy Moth Management Plan. Responses to significant infestations from other forest pests may include timber salvage or pesticide treatments. Any response to a significant pest outbreak will be evaluated by an interdisciplinary team of scientists and communicated through press releases and notices to interested parties.

CONTROL OF INVASIVE SPECIES

The threat of exotic and/or invasive species, both terrestrial and aquatic, including plants, animals, insects and diseases represent a significant and growing threat to our native plant and animal communities. To address this concern, invasive species inventory, monitoring and control actions shall be included in the annual property planning for each property. The inventory, monitoring and control efforts shall follow the guidance provided in the department's Property Managers Handbook. Key activities include:

- Inventory properties annually to detect new infestations. Property-wide inspections are ideal, but not always practicable. At a minimum, inspections should be conducted at entry points such as trails, roads, waterways, rights-of-way, and areas where soil has been disturbed.
- Control new or existing invasive species as practicable.
- Mowing should avoid dispersal of invasive plant seeds and equipment should be cleaned.
- Monitor control activities to assess effectiveness and determine if follow-up is needed.

Invasive plants may be controlled using appropriate and effective methods, including but not limited to the use of bio-control, herbicides, cutting, hand removal, fire or bio-control. Control methods may be restricted in certain sensitive management areas.

CHEMICAL USE

Herbicides and pesticides may be used for various purposes such as the control of invasive plants or to control plant competition in vegetation regeneration areas and insect control except as restricted in the management prescriptions in this master plan. All department procedures and herbicide and pesticides label requirements will be followed.

PRESCRIBED FIRE

Prescribed fire may be used as a management tool where feasible and safe, unless restricted by management area prescriptions. It is often used to restore and maintain fire dependent natural communities, and help regenerate forest cover types, such as oak types, or to create and maintain grassland/prairie/savanna habitat, to reduce fuels to lessen fire hazard and to control undesirable vegetation.

WILDFIRE SUPPRESSION

As stated in Wisconsin Statutes 26.11, "The department is vested with power, authority and jurisdiction in all matters relating to the prevention, detection and suppression of forest fires outside the limits of incorporated villages and cities in the state except as provided in sub (2), and to do all things necessary in the exercise of such power, authority and jurisdiction." Forest fire suppression actions will consider the property management goals and the threats of the fire to life and property. Appropriate techniques will be used in each event to provide effective fire suppression while minimizing resource damage.

TIMBER CONSIDERATION

When managing State-owned properties, property managers are obliged to consider the ecological, social and economic impacts of their management decisions. The manager's role is to balance these concerns, if at all possible. Whenever the future objective for a site or a stand is to eliminate trees or reduce the level of forest cover, consideration should be given to opportunities to commercially harvest forest products as a means to that end. The economic value of trees is part of the public's investment in these lands. A return on that investment in the form of income to the State for stumpage, and to society in the form of jobs and products, is prudent stewardship of the public trust. Where the commercial harvest of timber is deemed unviable, impractical or contrary to ecological priorities, these considerations shall be discussed, and the reasons for the decision documented for the record.

NON-METALLIC MINING POLICY

The department may use gravel, sand, fill dirt or other fill material from department-owned lands for department use. Under certain circumstances other government bodies or agencies may also have access to these materials. Section 23.20 of the Wisconsin Statutes states, "the department may permit any town, county, or state agency to obtain gravel, sand, fill dirt or other fill material needed for road purposes from any department-owned gravel pit or similar facility if this material is unavailable from private vendors within a reasonable distance of the worksite. The department shall charge a fee for this material commensurate with the fee charged by private vendors."

Nonmetallic mining is regulated under the requirements of NR 135 Nonmetallic Mining Reclamation, Wis. Adm. Code, except for sites that do not exceed one acre in total for the life of the mining operation. Site reclamation under NR 135 is administered by the county. NR 135 requires mining sites to be located appropriately, operated in a sound environmental

manner, and that all disturbed areas be reclaimed according to a reclamation plan. department of Transportation (DOT) projects are exempt because DOT projects have their own reclamation requirements. New sites will not be considered where they would impact geological or ecological features of significance or within any designated State Natural Area.

RESEARCH

The Lower Wisconsin State Riverway provides an operational and strategic location for experimental trials and research, especially with regard to migratory birds, and forest interior birds. The research conducted by department managers, scientists, and educational partners can be beneficial for the Riverway, the department and the general public. Scientific research that is compatible with the ecological and aesthetic attributes of the site is generally supported. The LWSR property manager has the authority to approve or deny requests for research projects in the LWSR.

PROPERTY WIDE MANAGEMENT OF DAMS AND FLOWAGES

The Lower Wisconsin State Riverway contains 5 man-made impoundments and flowages constructed by damming small streams and spring flows. The dams were created in the 1960s and 1970s by the DNR Wildlife Management Program to create large shallow water impoundments within the wetland areas of the Lower Wisconsin floodplain. All of the impoundments created during the 1960s and early 1970s are still present and functional today.

Existing dams and flowages will be maintained through tree and brush removal, mowing, and visual inspections of structures in accordance with requirements of Wisconsin State Statute Chapter 31 and Wisconsin Administrative Code Chapter NR333. Consultation with the Dam Safety Engineer will occur prior to making any major changes to the dike and dam system.

MANAGEMENT RESTRICTIONS RELATED TO FEDERAL FUNDING

Funding for much of the acquisition of land in the Lower Wisconsin Riverway came from a variety of federal funding programs. The three main programs are the Land and Water Conservation Fund (LAWCON), the Federal Aid in Wildlife Restoration Program (Pittman-Robertson), and the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson). Each of these programs requires that the land purchased with federal funds be used for its original public purpose in perpetuity. Because these properties are subject to perpetual federal restrictions, it is important to review the acquisition funding history to determine consistency with federal post-grant funding regulations prior to engaging in any major land management/ recreational development or changes in use. The department is committed to working with our federal partner agencies to ensure compliance with the regulations governing these lands.

REAL ESTATE MANAGEMENT

ACQUISITION POLICIES

It is the policy of the Natural Resources Board and the DNR to acquire lands from willing sellers only. As required by state and federal laws, the department pays just compensation for property, which is the estimated market value based on an appraisal. At times, it is in the interest of the department and the landowner for the department to acquire only part of the rights to a property, or an easement. The department has a number of easement options available to address these situations.

Staff may periodically contact landowners within the property boundary to explain the department's land acquisition program and to see if they have an interest in selling their property. Acquisition priorities for the properties vary from year to year and are based on a number of factors, such as resource management or recreation needs and available funding, which may be from a variety of sources.

AIDES IN LIEU OF TAXES

For all State properties purchased after 1992, the department makes an annual payment in lieu of property taxes to replace property taxes that would have been paid if the property had remained in private ownership. More detailed information on how the department pays property taxes may be found in a publication titled, Public Land Property Taxes, PUB-LF-001 and can also be found at:

For detailed information on how the department pays property taxes, visit dnr.wi.gov and search for keyword "PILT".

FUTURE BOUNDARY ADJUSTMENT PROCESS

From time to time adjustments in property boundaries are needed. In some cases parcels of land are removed from the boundary to allow alternative, necessary public uses by local governments. In other cases it may be desirable to add small parcels adjacent to the property so they can be purchased for resource protection or to meet expanding recreational needs. Property boundary changes of 40 acres or more require approval by the Natural Resources Board. Wisconsin Administrative Code Ch. NR 44 provides a plan amendment process that may be used to make adjustments property boundary adjustments.

EASEMENTS, ACCESS PERMITS, AND LAND USE AGREEMENTS

Easements provide access across state property for utilities, town roads, or county highways. Easements are permanent and will continue to be upheld under the master plan. Access Permits provide access across state property to private ownership within the property boundary. Land use agreements provide for a variety of uses on a department property, such as snowmobile trails.

MONITORING THE IMPLEMENTATION OF THE MASTER PLAN AND ANNUAL INTEGRATED MANAGEMENT ASSESSMENT

The implementation of this master plan will be monitored on an annual basis to determine progress made in meeting the plan's management objectives. On-going monitoring is a requirement of Forest Certification Requirement and by Manual Code 9314.1.

Master plans set specific goals and objectives describing a future desired state. An on-going monitoring program is essential to track whether the plan is achieving the desired results and if funding and staff resources are being allocated most effectively. A well-constructed monitoring program also provides essential data for adaptive management. That is, checking results and making management corrections when needed so as to stay on the best path to achieve the desired result and minimize adverse or undesirable impacts. On a broader scale, some master plan related monitoring data will also contribute to the department's statewide and regional ecosystem and environmental monitoring programs.

Monitoring and evaluation can be used to improve management results or efficiency, build and maintain credibility with public, validate past decisions and build better decisions in the future , and build certainty where uncertainty exists regarding the impact of management actions or uses. A solid monitoring program will allow the plan to be kept up to date through adaptive management and substantially reduce the need for a major plan revision process every 15 years. Monitoring reports will be available on the department's webpage, at the property, and during annual public meetings.

The property manager will coordinate, schedule and lead a yearly meeting with appropriate staff to document and assess progress on the management actions accomplished during the previous year and plan management activities for the upcoming year. A file is kept with these yearly assessments in compliance with of the Manual Code 9314.1(III), which calls for formal plans to determine progress on implementation and whether the plan is accomplishing intended results. Annual progress report will be prepared and made available to the public (see Public Communications Plan below).

PUBLIC COMMUNICATIONS PLAN

The public and other governments may be provided opportunities to have on-going involvement in the implementation of this master plan. This communication plan describes how the public will be periodically informed about activities and developing issues on the Lower Wisconsin State Riverway, and it provides information on how the public will be notified of opportunities for involvement when significant, new issues related to management of this property arise. Annually the department will issue a report that summarizes the following:

- For the past year, the primary management and development activities that were completed and other significant issues that were addressed.
- For the up-coming year, outline any planned management and development activities and any changing management actions or approaches.

The annual report may also include other information of interest to the public on various topics related to management and use of the property. Some of the additional types of information that may be included from time to time are: the status of forest insect or disease problems, storm damage, new information on endangered or threatened species, recreational management problems or new opportunities, and recreational use changes or trends. The annual report will be available on the WDNR Internet Web site.

In the event the department considers a change to the master plan (plan variance or amendment) the public will be informed of the proposal and the review and comment process. As appropriate, news releases will be used to announce master plan amendment/variance proposals and review procedures. The department will also maintain a contact list of persons, groups, and governments who have requested to be notified of potential plan changes.

DNR CONTACT

The following department staff may be contacted regarding questions about the Lower Wisconsin State Riverway or the master plan. At the time of this publication, the contact information is:

Matt Seguin
Phone: 608-588-7723
Email: matthew.seguin@wisconsin.gov

VII. PROPERTY BOUNDARY ADJUSTMENTS

Current Project Boundary: 95,893 acres
Current Approved Acquisition goal: 78,855 acres
Acres owned (2015): 50,220 acres

- Fee: 45,617 acres
- Easements: 4,602 acres

Public access to a number of large or otherwise important state owned parcels within the Riverway is limited or essentially non-existent. Providing improved public access in these cases is an important objective of this plan. Access frequently can be achieved by the acquisition of a key parcel or parcels. To this end, authority is sought to acquire "public access parcels" in fee or easement in the future as opportunities occur and to adjust the property boundary accordingly.

Photo by Ann Freiwald, DNR

PROPERTY OVERVIEW

Photo by Travis Anderson, DNR

PROPERTY OVERVIEW

The following section provides an overview picture of the Lower Wisconsin State Riverway property and its resources and recreational opportunities and facilities. An extensive review of the Riverway's regional context, natural resources and recreational resources, management history and current management opportunities and challenges may be found in the DNR's publication; Regional and Property Analysis, Lower Wisconsin State Riverway (DNR 2014). http://dnr.wi.gov/topic/Lands/MasterPlanning/LowerWisconsin/

I. OVERVIEW AND BACKGROUND

The Riverway extends 92.3 miles along the lower Wisconsin River in southwestern Wisconsin, beginning at the Prairie du Sac dam and ending with the Wisconsin River's confluence with the Mississippi River. The Riverway boundary encompasses about 95,000 acres of public and private land. In 2016 the department owned around 45,000 acres of land and had slightly over 3,400 acres of scenic easements and about 1,200 acres of hunting and fishing access easements within the Riverway boundary. Tower Hill and Wyalusing State Park provide additional developed recreational offerings that complement the Riverway. See Map A.

The Lower Wisconsin State Riverway is a unique property and designation established by the legislature for the purpose of protecting, maintaining and managing the rich and unique natural and cultural resources and outstanding natural scenic and recreational qualities of the lower river corridor. The original Riverway master plan was approved by the Natural Resources Board in December 1988. The following year, 1989, Governor Tommy Thompson signed Wisconsin Act 31 which created the Lower Wisconsin State Riverway project (ss. Chapt. 30.40).

Lower Wisconsin Riverway Board

The Lower Wisconsin Riverway Board is an important Riverway partner; they play a special role in protecting scenic quality. The Board administers a permit system for certain activities identified in SS 30.40 and Administrative Code Chapters RB 1, RB 2, and NR 37 designed to minimize visual impacts of development and other land disturbing activities. Adherence to specific standards and a permit is required from the Board for building or remodeling structures, utility facilities and other development, and for timber harvesting within the State Riverway (on both private and public land). For more information about the Board and the regulations see the LWSRB website: http://lwr.state.wi.us/

As is typical with most properties, the Riverway's state owned lands are managed by the Department of Natural Resources (department). The responsibilities are varied and include planning, constructing and maintaining public use facilities, improving habitat, maintaining and inspecting use areas to protect the public, realty management activities including acquisition, maintenance of archeological and cultural sites and disseminating information about property facilities and recreational opportunities to increase visitor awareness and enjoyment of the property. River users also reap the benefits of the work of our partner state agency, the Lower Wisconsin Riverway Board. Although their responsibilities do not include the actual management of department owned lands, or the recreational activities of property users, their role as articulated in Statute and Adm. Code is specific and focused on protecting the scenic quality of the lands within the viewshed of the main stem of the river.

The river's outstanding natural beauty and the generally undeveloped character along its course are primary elements of the river's attraction and value to visitors and nearby residents alike. The technical ability today to build on almost any site, together with the growing attractiveness of the area to people from regional population centers, underscores the need for a coordinated plan to manage alterations to the landscape in a manner consistent with the valley's natural beauty and rural character. In addition to the protections gained through implementation of the Riverway Board Laws, visual protections are also afforded by the department's emphasis on low impact recreation on the property and facility development and forest management which adhere to the Riverway law's performance standards/permitting requirements. Additionally, scenic easements purchased by the department within viewshed areas of the river also help contribute to the "wild" feel of the landscape surrounding the river.

PROPERTY OVERVIEW

THE LOWER RIVER

The stretch of the river from the last dam to the confluence with the Mississippi River, about 92.3 miles, lies within the LWSR. The lower Wisconsin River within the State Riverway boundary is listed as an Exceptional Resource Waterway by statute (ch. NR 102, Wis. Adm. Code), affording increased water quality protection. It's one of the longest free-flowing stretches of any river in the Midwest. Here the river is a broad, braided stream with many islands and sandbars. The channel averages an eighth to a quarter of a mile wide and carries sediment dominated by medium to coarse sand and small pebbles (Dott and Attig 2004).

The river slowly descends at a rate of 1.5 feet per mile on its way toward the Mississippi River. The current is only one to two miles per hour (measured at Muscoda), and there are no falls or rapids below the dam at Prairie du Sac. At seasonal low flows, the river is scarcely deep enough in some places for canoes, but at flood stage it spreads over a floodplain in places that are several miles in width.

The meandering characteristics of the river have allowed shallow, "oxbow" lakes and ponds to form in backwater areas. Some are cut-off from the river with their water levels being primarily supported by the water table. Many of these backwater bodies are quite shallow and have a very limited flow through them during non-flood periods. In many, the original depth between the sand on the bottom and the water surface was 10 feet. However, now less than four feet of maximum water depth is typical, as most of their basins are filled with loose sediment. These shallower lakes closely resemble bog lakes with dense aquatic vegetation and sedge mats, and are often oxygen deficient. Some of the larger floodplain lakes are named, including Avoca Lake (48 acres) and Woodman Lake (20 acres), and are connected to the river during high water.

SLOUGHS, LAKES AND SPRING PONDS

Some sloughs and ponds are connected to the main channel flow much of the year and share much of the water quality characteristics with the main channel and support both riverine and lake species.

Other ponds and cut-off oxbows are largely supported by springs and groundwater. Studies suggest that upland groundwater plays an important role in sustaining off-channel fish habitats. Pfieffer et al. (2006) describe the groundwater surrounding the lower Wisconsin River as a dynamic river aquifer consisting of deep, intermediate and shallow groundwater flow systems. Elsewhere, upland or hillslope groundwater has been recognized as an important factor in the survival of many fish species (Amoros and Bornette 2002).

The highest quality floodplain lakes, sloughs and oxbows surveyed were biologically productive, but were relatively clear due to a combination of upland groundwater inputs and rooted aquatic plant suppression of planktonic algae (Marshall 2008, 2009, 2010). Many of these unique waterbodies are ecologically diverse, supporting an unusual blend of both lake and riverine fishes, aquatic plants, mussels and other aquatic animals not commonly found in the main channel of the river. They contribute greatly to the overall ecological diversity of the Riverway.

Five wetland flowages (impoundments) are maintained in the LWSR for wildlife habitat.

Water levels in them are managed by periodic draw-downs to accomplish a number of objectives: to enhance waterfowl food production, to maintain a 1:1 ratio of open water and emer-

Federal Wildlife Restoration Funding and History on the LWSR

The U.S. Fish and Wildlife Service Wildlife and Sport Fish Restoration Program (WSFR) administers several grant programs which fund department activities. Among the largest of these funding programs is the Pittman Robertson Wildlife Restoration (Wildlife Restoration, Pittman Robertson or PR) program informally known as "federal aid." This funding program has been in place since the 1930s. Wisconsin's total apportionment of Wildlife Restoration funds for federal fiscal year 2016 is $20,982,254. The department uses these monies along with the required non-federal match for wildlife management, land acquisition, hunter education and shooting range development projects. Land acquired with PR funds must be used for its original purposes of wildlife habitat, public hunting and wildlife associated recreation (Code of Federal Regulations at 50 CFR 80).

The department has used Wildlife Restoration funds to acquire large blocks (over 30,000 acres) of land along the Lower Wisconsin River. Many of these acquisitions were in the following wildlife areas (prior to their being absorbed into the LWSR):

- Avoca WA - Iowa County,
- Bakkens Pond WA - Sauk County,
- Blue River WA - Grant County,
- Lone Rock WA - Richland County,
- Mazomanie WA - Dane County,
- Lower Wisconsin WA - Crawford, Grant, Iowa and Richland Counties.

gent vegetation, to control plant community succession and to allow for periodic dam inspections. Small wetland scrapes have also been created to increase open water in lowlands and floodplain forests (DNR 2010a).

HYDROLOGY

The hydrology of the Wisconsin River has been manipulated by humans for the past 180 years (Durbin 1997). Today, the continued focus on manipulating the river's hydrology for water storage and power generation has resulted in a shift in the timing of floods and a decrease in the natural extremes of the river flow. Since the construction of large reservoirs on the Wisconsin River, minimum flows on the lower Wisconsin River have decreased by as much as 17% and maximum flows have decreased by 10 to 15% (Pfeiffer 2001).

The hydrology of the lower river is significantly influenced by the lower watershed as well as the flows from the river's upper reaches. There is little water storage capacity in the flowages on the lower river; the flowages lying downstream of the Castle Rock Flowage (the Dells and Lake Wisconsin). The dams on the lower river are "run of the river" operations, meaning that for the most part the flow entering the flowage is passed on downstream. Water levels in the lower river can change dramatically in response to regional weather conditions.

WATER QUALITY

The Wisconsin River has suffered a long history of water pollution, including sedimentation since the first paper mills became established in Wisconsin during the late 1800s. By the early 1970s combined daily pollutant loads from 29 major industrial and municipal wastewater discharges resulted in frequent fish kills, unpalatable fish flesh, and severe aquatic nuisance bacteria, fungi and protozoans. A combination of distance from industrial waste sources and upstream impoundments partially spared Lake Wisconsin and the lower Wisconsin River from impacts of wastewater discharges, but not entirely. The lower Wisconsin River is classified as a warm water sport fish community. Contaminants such as mercury and polychlorinated biphenyls (PCB) still persist, resulting in a PCB and mercury advisory for safe eating guidelines for carp, lake sturgeon, and other fish species in the lower Wisconsin River.

Water quality of the lower Wisconsin River is greatly influenced by Lake Wisconsin. The lake is a hyper-eutrophic impoundment plagued by recent excessive cyano-bacteria (blue-green algae) blooms, excessive phosphorus and frequent oxygen depletion. These water quality problems are transferred to the Lower Wisconsin River. Nonpoint-source water pollution is now considered the most significant threat within the Lower Wisconsin Basin. The porous sandy soils allow nitrogen and phosphorus from adjacent farms to move though groundwater to sloughs, oxbow lakes, and the river. Water quality sampling in 2007 in the tailwater area below the Prairie du Sac (Alliant Energy) dam indicated frequent high levels of total phosphorus, and dissolved oxygen levels below the standard of 5 mg/l as outlined in ch. NR 102, Wis. Adm. Code.

For many years, mainstream thinking was that the Lower Wisconsin State Riverway management had reached the apex for ecosystem protection (DNR Land Legacy Report 2006, Marshall and Lyons 2008). The Land Legacy analysis determined that the lower Wisconsin River attained the highest rating for conservation and recreational significance and therefore additional protection and management opportunities were limited. However, more recent information collected since 2008 (Marshall 2009, 2010, 2012, 2013, Marshal and Jopke 2010, Marshal, Wade, Unmuth, Schlaudt 2016, and Marshal and Jopke 2010) has demonstrated significant growing threats to many oxbow lakes and their sensitive species pointing to the need to develop additional strategies to help protect and improve water quality. Studies indicate that due to a lack of buffers between the highly permeable sandy soils of the river valley and the river's backwaters, nutrient loading (from both surface and groundwater sources) have degraded numerous cutoff channel oxbows that historically displayed pristine conditions.

Historically, the backwater areas and oxbows of this river system were primarily thought of as areas that provided a buffer or filtering role in protecting water quality in the main channel. However, the numerous sloughs and cut off channel oxbows along the LWSR represent some of the most biologically diverse large river off channel habitats in the state and support numerous rare and endangered species such as the State Endangered starhead topminnow, State Special Concern species: least darter, mud darter and the lake chubsucker. This list is modest compared to the vast diversity of fishes that inhabit LWSR off channel habitats. The numerous fish populations found within the LWSR sloughs are just part of a much larger ecologically complex river ecosystem that also includes rare mussels, herptiles, insects and migratory birds. In addition to the resource value, the recreational value of the sloughs and backwaters cannot be overstated. They provide excellent waterfowl hunting, trapping, fishing, boating, bird and wildlife watching opportunities to Riverway visitors.

SOCIAL CONTEXT

The river corridor is largely rural, with rugged terrain and a mix of agricultural and forest land. A number of villages and small cities front the lower river along its 92 mile length. Local residents have personal connections to the river. It forms a strong

thread in the local identity. Most of the local region (Southwestern Wisconsin) is comparatively sparsely populated, Dane County being the one exception. However, looking at a slightly broader scale, there are an estimated 13 million people living within a three hour drive of some portion of the LWSR. Many of them come to the Riverway area to recreate and are a vital part of the local economy.

Population levels of the western half of the region are projected to stagnate over the next 10 to 20 years. In the eastern counties; Dane, Sauk, and Iowa; growth is expected to be strong. In fact, Dane County has been the fastest growing county in the state.

RECREATION: USE, DEMAND AND SIGNIFICANCE

As are most DNR managed properties, the Riverway's lands are open for traditional outdoor uses including hunting, fishing, trapping, walking, nature study, and berry picking. Other compatible recreational uses may be allowed by the property's Master Plan if those uses do not detract from the primary purpose of the property.

The Riverway contains a highly diverse resource with a wide variety of historical and archaeological sites, wildlife, fisheries, and scenic beauty found nowhere else. The Riverway lies within a landscape dominated by privately owned lands where public recreation is extremely limited. In contrast, the river, backwaters, and uplands within the Riverway provide diverse recreational opportunities including boating, hiking, fishing, wildlife viewing, hunting, trapping, cross- country skiing, snowmobiling, horseback riding and nature study. With many miles of trail, river, prairie and forest, the Riverway is an important recreational resource for the state and is one of the more important recreational resources for people of the southern half of Wisconsin and northern Illinois. Locally, the river and its associated natural lands are a key defining element for the residents of the communities dotting its banks. River recreation, such as canoeing and sandbar camping and fishing, are a major draw for people from across the state and upper Midwest, contributing important dollars to the local economy.

For hunters and anglers the LWSR is the predominant hunting and fishing resource in the region. The Riverway provides

Photo by Ann Freiwald, DNR

nearly 50,000 acres of land open for hunting, the majority of public hunting lands in southwest Wisconsin. Except for the Mississippi River, the Lower Wisconsin River provides the only opportunity in southwestern Wisconsin to fish larger waters and go after a range of game species found in few other places. Fishing and hunting license sales in the six counties bordering the Riverway is one measure of the importance of hunting and fishing in the region. In 2014 over 100,000 fishing licenses were sold in these counties. In 2014 gun deer license sales totaled more than 48,600 and turkey licenses were nearly 10,200. More than 36,000 deer were harvested.

According to Riverway managers, there is demand for additional boat access sites along the entire length of the river, and many existing sites are in need of improvement as well. There is demand for more developed picnic sites and more developed shore fishing sites and accessible piers and hunting blinds. The existing equestrian trails need improvement as well. Also, there have been requests for the development of a hiking trail running the length of the property from Sauk City to the Mississippi. Providing for recreational uses sustainably on the Riverway is not without its challenges due to the steep bluffs, wetlands, sandy soils, and abundant sensitive resource sites. While the Riverway already provides for many of these opportunities, there may be opportunities for increases in some categories. The regional shortages include backcountry and walk-in camping, boat launches and other water access, natural areas, picnic areas, horse trails, and hiking trails.

Population trends will also help shape future recreational use demand. Overall, hunting and fishing pressure and recreational opportunity demand will grow with the expanding population of southern Wisconsin. Additionally, the ballooning over-65 population will put pressure on demand for more passive recreational opportunities, like wildlife viewing, and easier access to some sites.

FUNDING SOURCES

Funding for acquisition and management of the Lower Wisconsin State Riverway and the state wildlife areas that existed prior to the establishment of the Riverway came from a variety of sources:

- State Stewardship funds;
  The general land acquisition component of the Stewardship Program is the backbone of Wisconsin's public lands program. It provides the funds for all Wisconsin Department of Natural Resources land acquisition not funded specifically by other Stewardship Program components. This mandate is extensive and includes acquisition in 547 existing state parks and trails, flowages, fishery, wildlife, state forest, and rivers projects.
  As of 2016, $23 million in Stewardship funding has enable the DNR to acquire over 23,000 acres within the Lower Wisconsin State Riverway.

- Land and Water Conservation Fund (LAWCON), the Federal Aid in Wildlife Restoration Program (Pittman-Robertson), and the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson).

LWSR RECREATIONAL FACILITIES AND OTHER INFRASTRUCTURE

Recreational users of the Riverway enjoy a wide variety of activities. Supporting facilities are provided by a combination of the department and other governmental units, including many local villages and towns, as well as private cooperators. A summary of the primary public use infrastructure serving Riverway users is shown in Table 3.1. A more detailed breakdown is provide in the Regional and Property Analysis, Appendix D (DNR 2014)

In addition to recreational facilities, there is other department managed infrastructure on the Riverway. These include seven permanent buildings/structures, 26 miles of public roads and 42 miles of management roads, as well as numerous signs and boundary markers. Existing infrastructure is shown on Map D.

TABLE 3.1 RECREATION FACILITIES OF THE LWSR

Facilities	Number	Managed By
Public Access		
River Boat Landings	22	7 DNR, 13 by Others*
Pond or Slough Landings	26	DNR
Hunter and Fishing Parking Lots	79	DNR
Other Parking Lots	8	Others*
Trails		
Hiking Trails	3.3	DNR
Nature Trail Miles	0.6	DNR
Snowmobile Trail Miles	7	Club Managed
Equestrian Trail Miles	20	DNR
Fishing Piers	2	DNR
Picnicking	15	4 DNR, 11 by Others*
Highway Waysides	3	Others*
Dog Trial Areas	1 (200 Acres)	DNR

**Others include WisDOT, towns, villages & counties*

PROPERTY OVERVIEW

VEGETATION

Current vegetation of the LWSR is greatly influenced by historical disturbance patterns and recent changes to those patterns. Land use changes over the last 150 years have greatly impacted the current vegetation and habitat quality and availability. Turner et al. (2004) also found that within the Wisconsin River floodplain, landform and flood regime were particularly important in predicting occurrence, community composition, and abundance of trees. The current cover types and their relative abundance on the LWSR are shown on Figure1 and Map C.

The forest component is broken down further in the pie chart in Figure 2. It shows the dominance of the bottomland hardwood and oak cover types. They comprise 88 percent of the forested acres. Additional information, beyond what is presented in these pages, on the Riverway's vegetation, natural communities and rare species may be found in the Biotic Inventory and Analysis of the Lower Wisconsin State Riverway (DNR 2011) and also in the Lower Wisconsin Property and Regional Analysis (DNR 2014) .

FIGURE 3.1 COVER TYPES OF THE LWSR

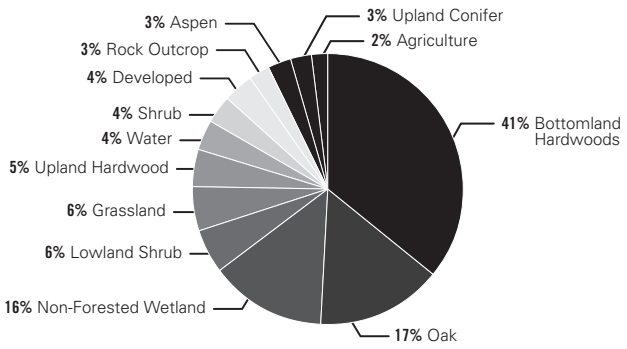
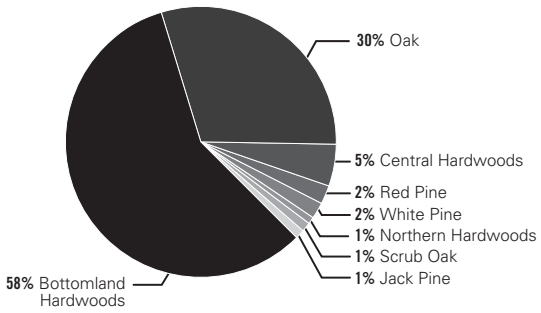


FIGURE 3.2 FORESTED COVER TYPES



RARE SPECIES, ECOLOGICAL RESOURCES AND THEIR SIGNIFICANCE

The Lower Wisconsin and its adjoining lands are of continental ecological significance; having one of the most significant assemblages of natural communities and habitats for rare species in the Upper Midwest. Wisconsin's 2006 Land Legacy Report (DNR 2006a) found the Riverway to be one of Wisconsin's most significant conservation and recreational areas. The Nature Conservancy recognizes the area as a critical "functional landscape". Further, the department's Wildlife Action Plan[2] (DNR 2006b) identifies the river corridor as one of the highest priority areas for conservation and long-term protection of many of the state's Species of Greatest Conservation Need, terrestrial and aquatic. It places the LWSR within three Conservation Opportunity Areas of continental significance. The property lies within the Lower Wisconsin River Important Bird Area by the Wisconsin Bird Conservation Initiative, for the critical habitat it provides for many forest, grassland and marsh birds of conservation concern. Additionally, the lower Wisconsin River is listed as an Exceptional Resource Waterway by statute (ch. NR 102, Wis. Adm. Code), affording increased water quality protection.

2 The Wisconsin Wildlife Action Plan identifies ecological priorities in each Ecological Landscape. Ecological priorities focus on the natural communities in each Ecological Landscape that are most important to the Species of Greatest Conservation Need.

Kathryn Kirk
February 5, 1951 – January 9, 2016
Statement of Appreciation

We recognize and honor the work of Kathryn Kirk, whose dedicated conservation work with terrestrial invertebrates has enriched our understanding of the Lower Wisconsin State Riverway and many other properties across the state. Kathy's expertise in Wisconsin's grasshoppers, butterflies, beetles and other invertebrates was an asset not commonly found. More rare still was her ability to find these countless small animals in the habitats they require, and to appreciate their prominent role in our natural communities. Thanks to Kathy's dedication to sharing her findings and knowledge, we have a deeper awareness of the great varieties of life sharing our natural world.

Of particular ecological significance here is the large river system with a diversity of exceptional associated natural communities providing a continuum of habitats from river; to wetland; to open, dry habitats; to woodland; to moist cliffs. The Riverway is well known for eagles, but it is a significant refuge for many other rare animal species as well. The property harbors over 37% of animals on the state Threatened & Endangered list. Included are 121 rare animal species (LWSR Biotic Inventory and Analysis, DNR 2011), three are Federally listed or are candidates for listing, 15 are State Endangered species and 21 are State Threatened species.

The Riverway is one of the state's most important properties for reptiles and amphibians; forest and grassland birds, rare fish, mussels, and other aquatic invertebrates. Of special note is that the Riverway holds one of the most extensive Floodplain Forests in the state. Because of the unique circumstances on the LWSR, conservation opportunities to support Floodplain Forest communities and rare plants are perhaps greater here than anywhere else in the state. The Riverway offers a significant opportunity to manage a landscape mosaic of diverse habitats at a level found on few other state-managed properties. Of particular importance for conserving rare plant and animal species on the Riverway is maintaining or restoring older forests, open wetlands, aquatic features (such as springs, oxbow lakes, and sloughs), Floodplain Forests, Southern Mesic Forests, Oak Barrens and Dry Prairie, oak woodland and Oak Openings. The connection of upland forests with bedrock outcrops of Dry Prairie to the expansive lowland forests and wetlands of the river valley bottom are an exceptional opportunity for landscape level management.

II. CONCLUSION

The Riverway contains a highly diverse resource with a wide variety of historical and archaeological sites, wildlife, fisheries, and scenic beauty found nowhere else. The Riverway lies within a landscape dominated by privately owned lands where public recreation is extremely limited. In contrast, the river, backwaters, and uplands within the Riverway provide diverse recreational opportunities including boating, hiking, fishing, wildlife viewing, hunting, trapping, cross- country skiing, snowmobiling, horseback riding, and nature study. For hunters and anglers especially, it is the predominant hunting and fishing resource in the region. With many miles of trails, river, prairie and forest, the Riverway is an important recreational resource for the state and is one of the more important recreational resources for people of the southern half of Wisconsin and northern Illinois.

The lower Wisconsin and its adjoining lands are of continental ecological significance; having one of the most significant assemblages of natural communities and habitats for rare species in the Upper Midwest, and opportunities for protection and enhancement.

A team of people from various agencies and non-profit conservation organizations, as well as citizens, are working with the Wisconsin Wetlands Association to develop a nomination package to have the LWSR wetlands designated as a Ramsar Site of International Significance. The designation provides a framework for international cooperation for the conservation and wise use of wetlands and associated resources. It also provides greater access to financial resources for wetlands research. The designation in no way imposes national, state or federal restrictions or regulatory authority.

Photo by Ann Freiwald, DNR

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Photo by Ann Freiwald, DNR

APPENDICES

APPENDIX A: BOAT LANDINGS ON THE MAIN-STEM OF THE LOWER WISCONSIN RIVER

TABLE A.1 BOAT LANDINGS ON THE MAIN-STEM OF THE LOWER WISCONSIN RIVER

Name of Landing	River Mile	Managed By	Trailer or Carry In
VFW Boat Landing	1.3	City of Prairie du Sac	Both
STH 12 and 60 Landing	3.6	City of Sauk City	Trailer
Sauk Canoe Access/Statz Memorial Landing	5	City/DNR	Carry-In
Mazomanie Boat Landing	6.5	Town of Mazomanie	Both
Arena Boat Landing	15.6	DNR	Carry-In
STH 14 Landing	23.5	DOT/Iowa County	Both
Tower Hill State Park Landing	25	DNR	Carry-In
Pecks Landing	25.5	DNR	Carry-In
Firemen's Park Landing/Lone Rock	33	Village of Lone Rock	Carry-In
Otter Creek Landing	33	Iowa County	Both
Buena Vista Landing	40.1	Village of Gotham	Both
Victora Riverside Park	47.3	Village of Muscoda	Both
Muscoda Landing	47.8	DNR	Both
Eagle Corner Landing	50.1	Town of Eagle	Both
Port Andrew Landing	54.2	Town of Richwood	Both
Blue River Landing	54.5	Village of Blue River	Both
Boscobel Landing	63.3	DNR	Carry-In
Floyd Von Haden Landing/Boscobel	63.5	Other	Both
DOT Boat Landing/Boydtown	68.2	DNR	Both
Woodman Landing/Big Green River	72.3	Grant County	Both
Millville Landing	80	Grant County	Both
Bridgeport Landing North	85	Wisconsin DOT	Both
Bridgeport Landing South	85	Wisconsin DOT	Both

APPENDIX B: SHOOTING RANGE DEMAND AND OPPORTUNITIES ON THE LWSR

BACKGROUND

The DNR is promoting expansion of public rifle and handgun shooting ranges at locations in the state that lack or have a shortage of opportunities for target and recreational shooting. The department's goal is, to the degree possible, provide public target shooting opportunities within 30 miles of all residents. Part of the shooting opportunity may be provided by private gun clubs or conservation clubs that provide open public shooting periods, with the remaining demand filled by public ranges located on public property.

In southern Wisconsin there are only a few target shooting ranges open to the public and demand is high. Target shooting on state wildlife, fishery and other DNR managed properties is prohibited in many southern counties. In those restricted counties, Section NR 45.09 (5) (Wis. Adm. Code) prohibits discharging firearms on department managed lands, except while hunting, or when dog training or trialing with a permit, or when at a designated shooting range.

The reasons the department is promoting the development of easily accessible and properly designed shooting ranges are to:

- Improve and increase public awareness of and access to safe shooting opportunities at established ranges,
- Reduce indiscriminate target shooting at non-range sites on state lands, and
- Implement sound environmental stewardship by establishing publicly owned and funded ranges.

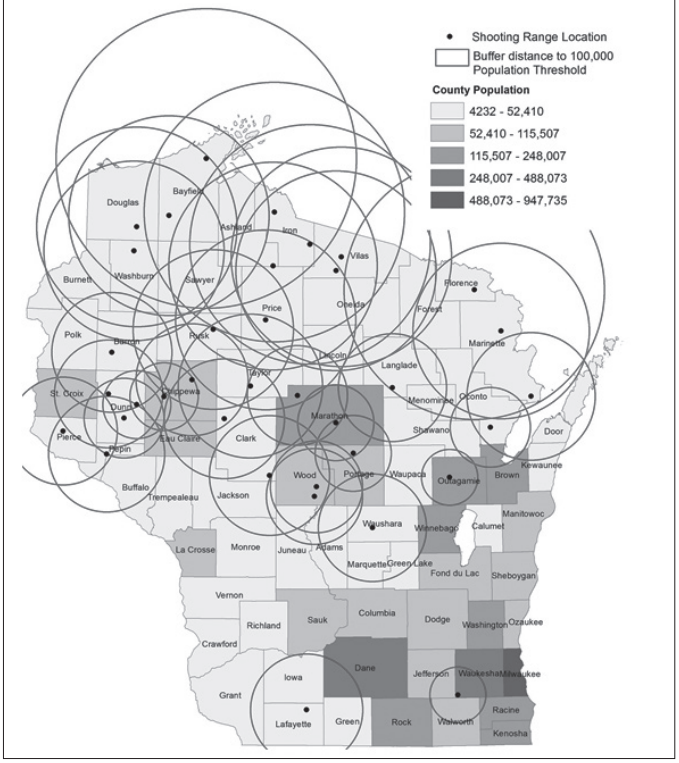
Recreational target shooting at established facilities is an allowable use on many types of department properties. In an effort to help meet the department's goal of providing more public shooting range opportunities in areas of the state identified as having a need, DNR managed properties are being screened for potential shooting range sites during property master planning processes. Dane and Sauk have been identified as having a need for more public shooting target shooting opportunities.

HOW AREAS WITH A NEED FOR A SHOOTING RANGE IN DANE AND SAUK COUNTIES WERE IDENTIFIED

The DNR's shooting range site evaluation guidance indicates that there is a need for expanded shooting opportunities in the highly populated southern 1/3 of the state (Figure B.1). This map indicates that shooting opportunities in Dane and Sauk Counties are limited, and there is a high need for additional ranges to be developed in this area. The closest public shooting ranges are McMiller Sports Center in Waukesha County, Yellowstone WA in Lafayette County and the soon to be developed Mud Lake range in Columbia County. Several private and one publicly owned (i.e. the Dane County Law Enforcement Training facility) shooting ranges provide some public access on a limited basis.

As part of the master plan revision process department owned LWSR land in the Dane and Sauk County area have been screened for general suitability for range development. The shooting range screening component in this planning process only identifies sites with the potential for further consideration. Because of the high level of public interest surrounding a decision to build a shooting range, a separate, public process will be established to select the preferred site. This in-depth process will involve the department, local government officials, stakeholders, and the public. Additional information is provided in the section below titled; "Shooting Range Site Selection and Decision Process".

FIGURE B.1 SHOOTING RANGE DISTRIBUTION



Three potential sites for a new shooting range have been identified within the Dane/Sauk County portion (Mazomanie/Sauk City area) of the LWSR. These sites are shown on Figure B.2. This screening primarily identified sites based on their physical suitability to accommodate a range. The LWSR master plan only authorizes the development of a shooting range on one of these sites. Many other factors will be considered in the final siting process. That will occur in a detailed, public process following approval of the LWSR master plan.

The criteria used to identify potential range sites in the upper LWSR are:

- a minimum of four acres and on DNR owned land,
- soils are suitable for construction, and
- meets the department's general shooting range siting criteria listed below.

General criteria for evaluating sites for potential for a shooting range facility

- Minimize the number of residences within a 1,000 yard radius to reduce noise concerns.
- Compatibility with surrounding land uses.
- Sites with access off major highways and county roads are preferred.

FIGURE B.2 POTENTIAL SHOOTING RANGE SITES

- Sites with favorable terrain to minimize potential noise and safety concerns, minimize site disturbance, provide on-site soil for berm construction and enhance lead recovery.
- Avoid wetlands, hydric soils, soils with hydric inclusions and floodplains. Backstops and shot-fall zones may not be in a wetland or over water.
- Avoid State Natural Areas and archeological sites.
- Minimize impacts on other recreational users and large, higher quality habitat blocks (e.g., do not disrupt large blocks of wildlife habitat or sensitive areas such as refuges).
- Proximity to population centers in the region (i.e., Madison, Janesville and Beloit) is preferred.
- Potential for collaboration with other units of government (e.g., town, county or federal) and local partners.

THE SHOOTING RANGE SITE SELECTION AND DECISION PROCESS

The above criteria were used to screen state owned lands in the LWSR lands in Dane and Sauk county area for their general, physical suitability for a shooting range facility. As previously stated, the shooting range evaluation component of a property master plan is only intended to identify sites that have potential for further evaluation and consideration in the separate, public decision making process, outlined below.

A detailed public shooting range site evaluation and selection process will occur outside of this property master planning process. The range assessment committee will be comprised of representatives from DNR, local governments and other stakeholders. General public involvement will be instrumental throughout the process.

This group will evaluate each site identified in the master planning process and select a preferred site. They also will make recommendations on the specific shooting opportunities to be offered, as well as the range's size, infrastructure, and operational elements. A detailed environmental impact review, a NR 150 EIS, will be done as part of this separate shooting range siting/decision making process.

A range constructed on one of the LWSR sites will meet or exceed the following design and operations guidelines.

GUIDELINES FOR THE DESIGN AND OPERATION OF SHOOTING RANGES ON DNR MANAGED PROPERTIES

- Range shall be open at least 5 days a week with hours of operation to be determined, generally assumed to be 8 AM to sundown.
- At a minimum, the range has at least a 50-yard rifle shooting range and a 25 foot handgun range. Additionally, 100 yard and 200 yard rifle ranges, a shotgun patterning range, and archery and crossbow ranges may also be considered.
- At a minimum, the range has four shooting stations (which may include shooting benches). Optional enhancements include: overhead structures for shooter shade and rain protection, sound reduction devices (baffles), and side-berms for safety and sound reduction.
- Supporting infrastructure includes: parking and toilets. Parking lot lighting, entrance gates, and fencing may also be installed. The facility will be fully ADA accessible.
- The footprint of the range is determined by the amount and size of target ranges offered. Typically, 4-5 acres is the minimal size of the developed area, with an additional five acres surrounding that to provide a buffer zone.

Funding: the DNR has some funding from Federal Pittman-Robertson excise tax revenues that can be used to construct and maintain target shooting ranges.

Photo by Ann Freiwald, DNR

APPENDIX C: CULTURAL HISTORY OF THE LWSR

The cultural sequence in this region begins with PALEOINDIAN peoples (ca. <10,000 to 8000 BC). As glaciers receded from the Upper Midwest, migratory groups of people settled throughout the area's open woodlands and succeeding grasslands, hunting native herding animals such as bison and mastodon, and exploiting available small-game, fish and plant resources as well. Tool kits of the time included spear-like projectile points (Clovis, Folsom and Plano types), flaked knives, simple choppers, and large scrapers. The well-known Boaz Mastodon site, an apparent PaleoIndian kill site, is located a few miles north of the LWSR.

The succeeding ARCHAIC period (ca. 8000 to 500 BC) was characterized by a continued reliance on large game hunting (e.g., bison) and increasingly diversified technologies associated with hunting, trapping, fishing, foraging, woodworking and plant processing – reflecting adaptation to local environmental conditions as climatic trends shifted to a cooler, wetter configuration, a pattern which continues to this day. Chipped stone tools such as stemmed and notched projectile points dominate the tool kit, but the use of pecked and ground stone implements (e.g., axes) also became widespread, and use of copper is apparent late in the period. Related habitation sites in the LWSR tend to be located along the bluff-line, as well as along tributaries of the River.

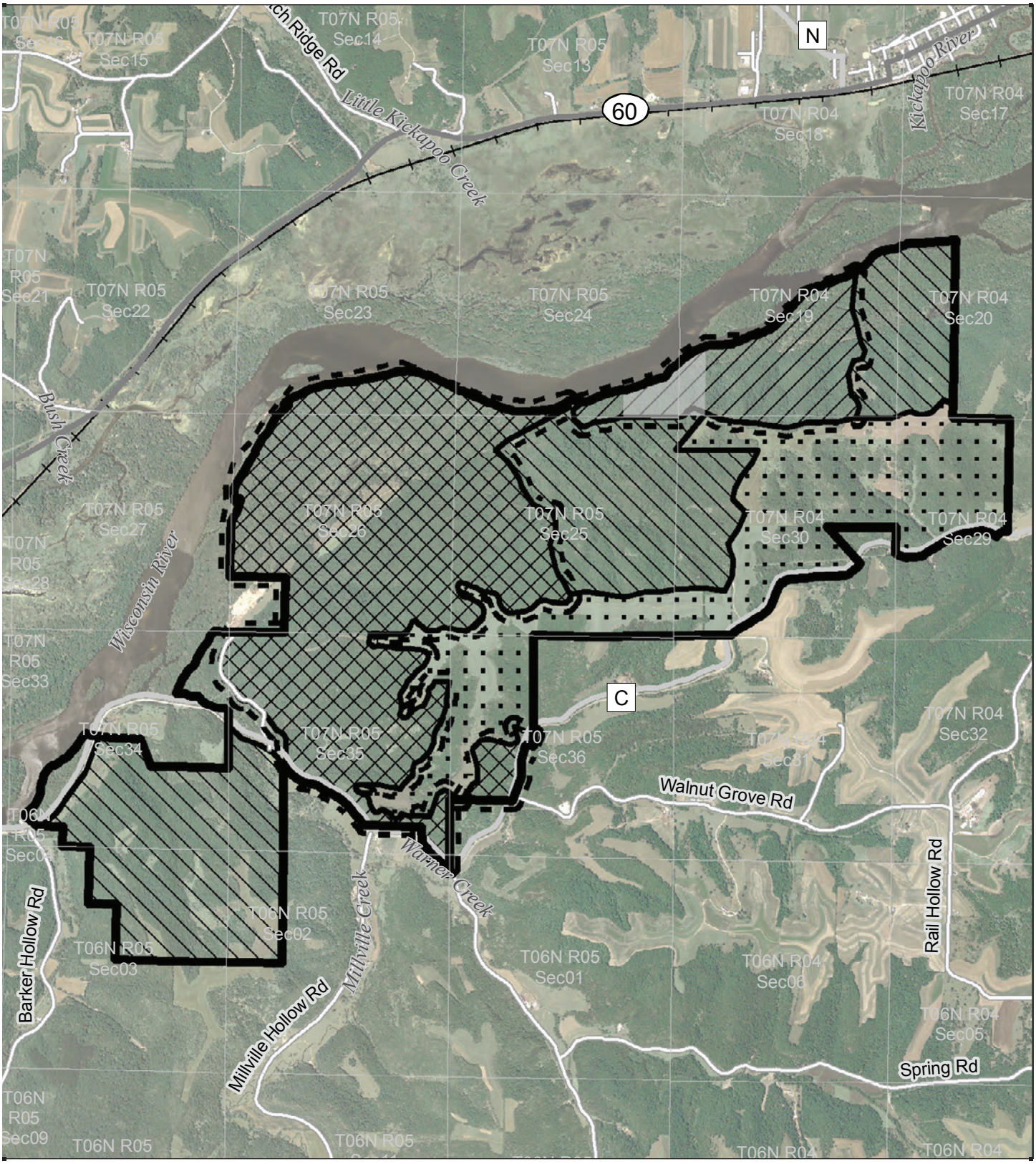
The WOODLAND period (ca. 500 BC to 1000 AD) in the region appears to have been associated with early plant domestication, but intensive gathering provided the bulk of subsistence needs. Settlement patterns resembled those appearing previously. An especially significant technological innovation of the Woodland peoples is the development of pottery. Earthwork (mound) construction, frequently associated with mortuary activity, also developed at this time, although earlier peoples buried their dead as well. Because of the especially dense concentration of animal-shaped effigy mounds in the state, Wisconsin is considered the center of what is referred to as "effigy mound culture". The LWSR evidences large numbers of mounds, including effigy mounds - many of which are located in areas open to public use. Burial mounds are protected from unauthorized disturbance by State law.

Evidence of ONEOTA occupation (ca. 1000 AD to historic contact) is reported for areas of Wisconsin, with the largest identified sites located along the margins of major river valleys or their tributaries. These peoples appear to have developed a blended subsistence strategy based on simple agriculture (including corn, beans, and squash), gathering and bison hunting, and extensive trade. Wisconsin's first farmers!

Early in the HISTORIC period (ca. 1650 to present), European fur traders had moved into the region by the late 1600s, to be succeeded, in turn, by American traders. EuroAmerican settlement of the area accelerated in the early 1800s, while Indian Nations such as the Ho-Chunk were displaced from ancestral lands (these removal attempts often proved ineffective as many Indian families returned to Wisconsin to rebuild their communities). The area saw a rapid expansion of agriculture during the mid- to late 1800s, and many historic-era sites presently dot the landscape as archaeological sites, historic buildings (many still in use), or as other historic features. Tower Hill State Park is the site of early historic structures associated with the heyday of Wisconsin's lead mining and lead shot production industries.

People have settled here, raised families here, worked here, and died here for thousands of years. But the story of Lower Wisconsin State Riverway is not just a story of the past; it is our story as well, for the story of this place continues.

Photo by DNR



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PRINTED ON RECYCLED PAPER

PUB LF 093 2016