



Whitewater Wildlife Management Area Master Plan, 2023-2033

January 31, 2023

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Notice is hereby given that the Whitewater Wildlife Management Area Master Plan, 2023-2033 for the Minnesota Department of Natural Resources has been completed and is now adopted.



Sarah Strommen, Commissioner

1/31/2023

Date

Executive Summary

A. DNR Mission Statement

The mission of the Minnesota Department of Natural Resources (DNR) is to work with Minnesotans to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.

B. WMA System Description and Purpose

Wildlife Management Areas (WMAs) are part of Minnesota's outdoor recreation system and are established to protect those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. They are the backbone of the DNR's wildlife management efforts in Minnesota and are key to protecting wildlife habitat for future generations by providing Minnesotans with opportunities for hunting, fishing, and wildlife watching, and by promoting important wildlife-based tourism in the state.

C. Whitewater WMA Vision Statement

The Whitewater WMA (WWMA) is one of the largest remaining contiguous expanses of habitat in southeast Minnesota. Because of its size, the WWMA significantly contributes to wildlife habitat and related wildlife populations on a landscape and regional scale. It is a hotspot for biological diversity. It harbors a high proportion of the state's special concern, threatened, and endangered species, and has one of the highest diversities of rare and unique native plant communities of state-owned land in Minnesota. Being close to major urban areas, including Rochester and the Twin Cities, also makes it a significant recreation destination for all types of users.

The WWMA will be managed to provide quality hunting, fishing, trapping, and wildlife viewing, as well as other outdoor recreational experiences compatible with the statutory purpose of WMAs. These opportunities will be provided in a way that recognizes WWMA's ecological significance. Management priority will be given to restoring, maintaining, and enhancing rare plants, animals, and native plant communities. More common plant communities and habitats will be managed to sustain ecological health and production of species sought by hunters, trappers, and anglers.

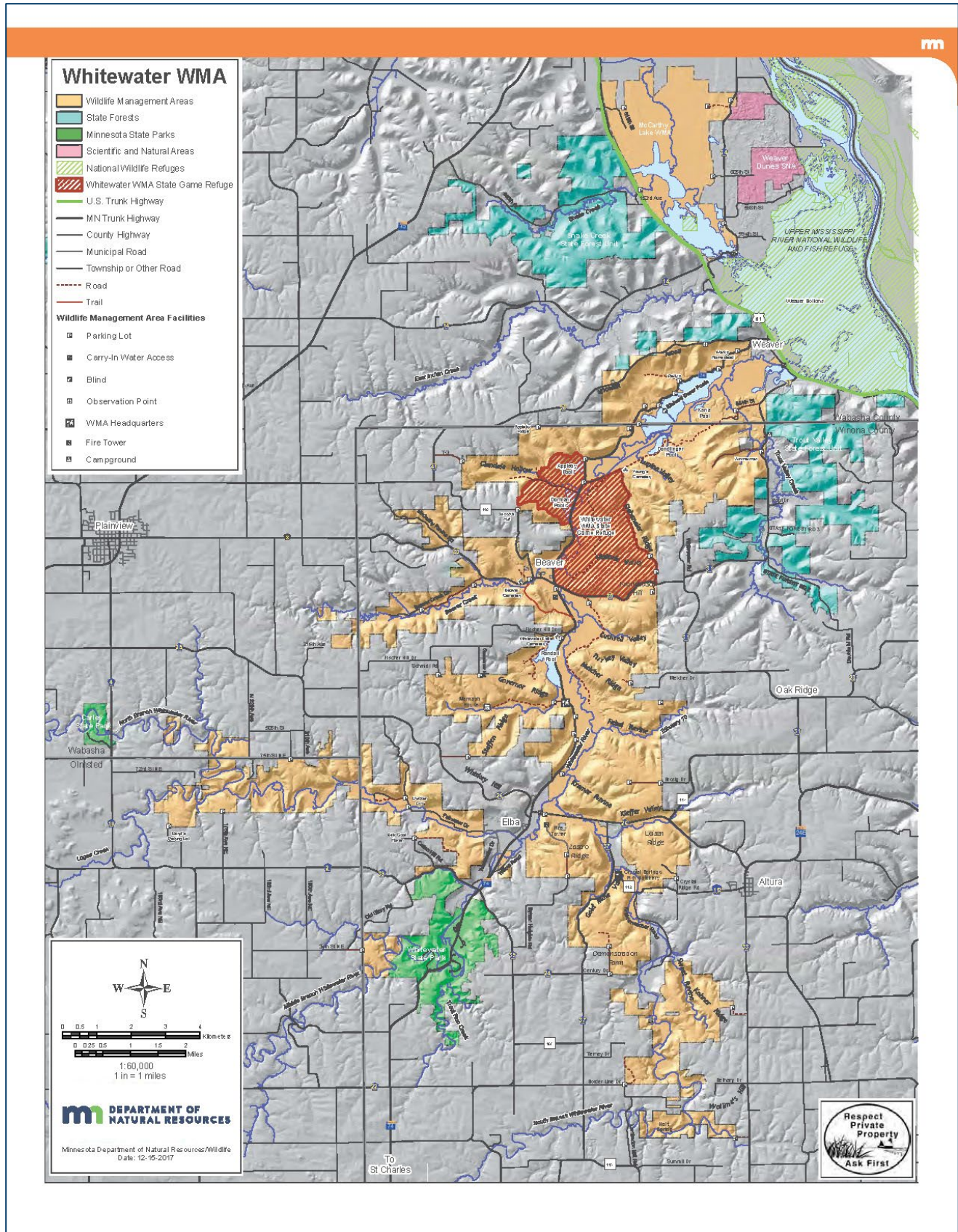
D. Whitewater WMA Master Plan Summary

This plan summarizes management activities for WWMA, an approximately 27,400-acre WMA in southeastern Minnesota. The last master plan for WWMA was written in 1977 and was intended to cover the period from 1977-1986. Significant planning of various management activities has occurred since that time, and there have been important advances in management approaches and technology for tracking management activities that put overall habitat management into a larger landscape context. This is the first formal updating of the master plan since 1977. Significant changes in this plan reflect a greater emphasis on restoring and enhancing native plant communities, changes in wildlife and public use of the area, new challenges like invasive species, changing user groups, changing climate, and new approaches to farming on the WWMA.

The plan provides extensive reference material, including the history of the WWMA and the surrounding area, the lands included in the WWMA, native plant communities, wildlife populations, and public use of the area. Strategic considerations, including emerging threats to the management area, are also discussed. Desired conditions, and management goals, objectives, and strategies needed to achieve them, are spelled out. Techniques for management of the different habitat types are presented, including prairie and savanna restoration, prescribed fire, brush treatments, forest habitat enhancement through harvest, and riparian,

wetland, and coldwater stream enhancements. An annual calendar of management activities is included, as is a discussion of current and potential research and monitoring activities.

Figure 1. Whitewater Wildlife Management Area



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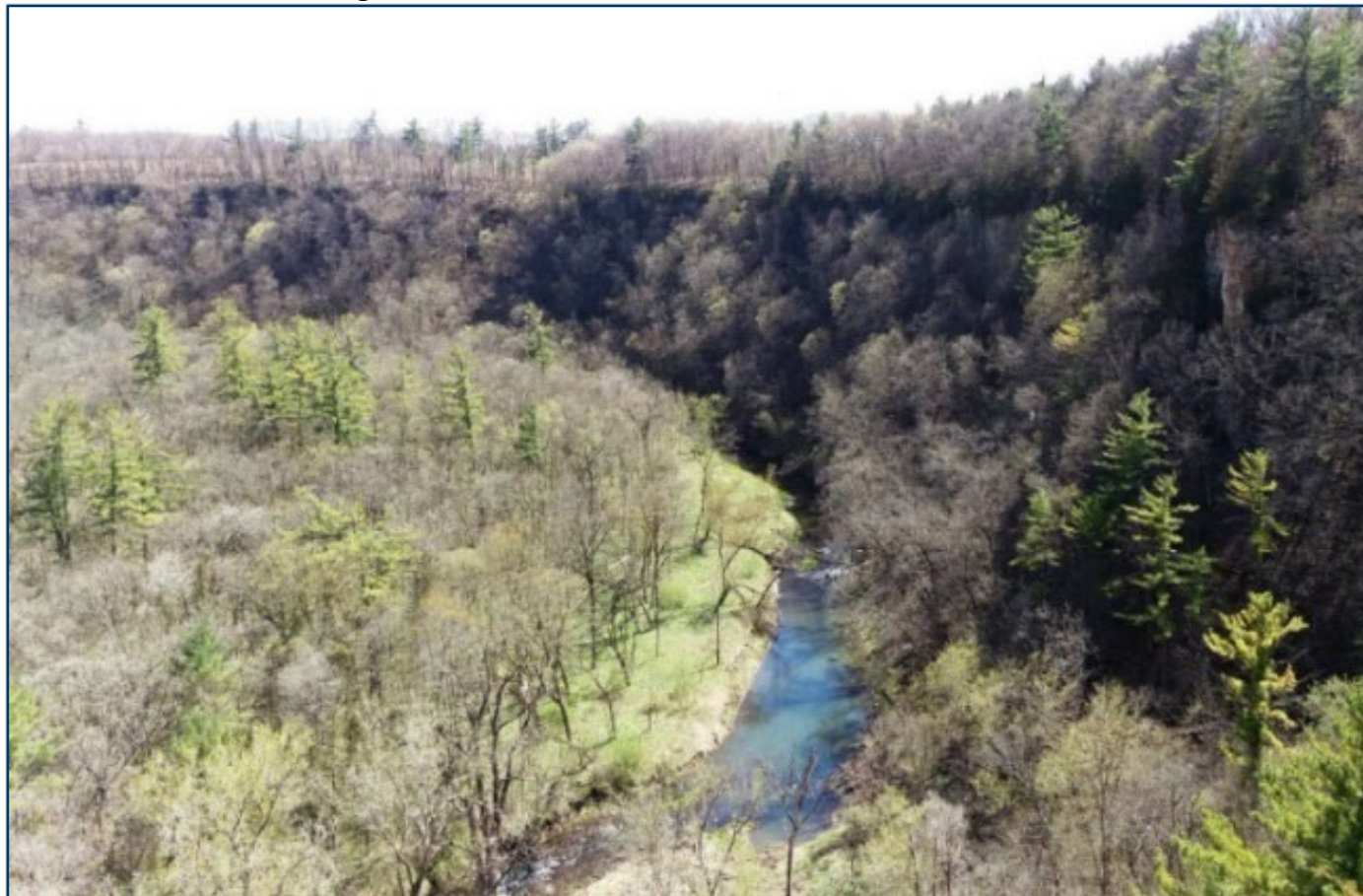
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Image 1. Overlook above the South Fork Whitewater River



Introduction

A. Major Unit Definition

Minnesota currently has 1,541 WMAs totaling more than 1.3 million acres distributed across the state. These WMAs are managed out of 37 local offices, eight of which are classified as “major units” due to the large acreages under management in that administrative area. Carlos Avery (24,133 acres), Lac qui Parle (32,981 acres), Mille Lacs (38,729 acres), Red Lake (324,699 Acres), Roseau River (75,206 acres), Thief Lake (54,957 acres), Vermillion Highlands (2,838 acres), and Whitewater (27,403 acres) are all considered major units. Each of the major units manages a primary WMA and may also manage other units within their work area. Major units are typically distinguished by having resident staff (Wildlife Area Supervisor and Assistant Wildlife Area Supervisor), although not all have resident staff. They also typically have greater acreage that is more intensely managed than most WMAs; larger fleet asset lists including heavy equipment such as dozers, tractors, and graders; larger staff complements; and more capital improvements, including resident housing, office and barracks, shops with higher capabilities for repair, maintenance, fabrication, visitor infrastructure amenities, a complement of other buildings or facilities, and unit roadways for public and operational use.

Major units are also more heavily used by the public. Users are primarily hunters and trappers, but they are also bird watchers, hikers, resource gatherers, and other recreational users. Major units function at a high level of self-sufficiency, using allotted area funding for ongoing and seasonal habitat management, maintenance, and operational needs, and staff and equipment assigned to the major unit. When practical, the additional staff and capital at major units are available to assist other areas in the vicinity, which greatly improves efficiency.

B. Purpose of Plan

This master plan outlines the management of Whitewater WMA (WWMA) through 2033, in accordance with the [Minnesota Outdoor Recreation Act of 1975](#). The plan’s purpose is to provide management guidance, a basis for allocating staff and fiscal resources, direction for annual work planning, and metrics for measuring management accomplishments.

The previous management plan was prepared in 1977, and many environmental and social changes have occurred since then. Minnesota’s population has grown, the climate has changed and continues to change, invasive species have proliferated, new state and federal policies have been enacted, recreation demands and preferences have changed, and many wildlife and plant populations have declined throughout the state. A revised management plan is needed to address and manage for these changing conditions. The plan update process also provides an opportunity to engage with a wide variety of Minnesotans using modern engagement tools and techniques. This plan is among six other comprehensive management plans the DNR is updating for the state WMA major units. They are 10-year management plans, which will continue to be revised as new management practices develop, resource philosophies evolve, and new challenges are encountered.

C. Long-range Goals

For Whitewater WMA, the overarching long-range goals outlined in this plan are:

- 1. To conserve, enhance, and restore a variety of forest, savanna, prairie, grassland, wetland, and agricultural habitats to benefit wildlife, with a special emphasis on rare species of plants and wildlife**
- 2. To provide quality public hunting, fishing, trapping, and wildlife-viewing opportunities, as well as other forms of compatible outdoor recreation**

D. Planning Process

In August 2016, the DNR hired a project consultant to coordinate the update of the WWMA Master Plan. An internal planning team was assembled of staff from multiple DNR divisions with various areas of expertise (Appendix A). The team members changed multiple times over the course of the project as staff retired, changed positions, and encountered capacity challenges, but the overall representation among divisions remained relatively stable.

During late August 2016, DNR staff were encouraged to provide feedback via an online questionnaire on what they perceived as the most pressing issues, largest untapped opportunities, greatest successes, and biggest challenges related to the management of WWMA.

In September 2016, at the onset of the small game hunting season, visitor use surveys were distributed to WWMA visitors either in person or by attaching the forms to vehicles. By early December 2016, over 300 surveys were distributed, with a return rate of about 21%.

On April 4, 2017, an online survey was provided for the public and announced via a DNR news release. The online survey was available from April 4 to May 4 for public input. In conjunction, the DNR held two open houses in St. Charles to present the WWMA planning effort and receive feedback.

By mid-December 2017, approximately 100 people had responded to the print and online surveys. The surveys revealed that the issue of greatest concern to visitors was littering. Other areas of concern were establishment and spread of invasive species, rare species conservation, farming, and timber management. Close to half of the WWMA visitors were from communities at least 50 miles away, a quarter from the local area (Elba, St. Charles, and Plainview), and the remainder from regional communities such as Rochester and Winona. The most popular activities named were hiking, squirrel hunting, deer hunting, photography, and fishing. Three quarters of respondents had a good to very good experience and stated that they would return to the unit.

The project was delayed for several years due to staff turnover and temporary shifts in departmental and divisional priorities related to the COVID-19 pandemic. In July 2021, the planning team was reconvened, and in December, the first complete draft of the plan was distributed internally for DNR staff review and comments. In response to the internal comments received, the plan underwent substantial revisions and was distributed internally again in June 2022. In July 2022, the draft plan went to U.S. Fish and Wildlife Service (USFWS) for review, and the planning team worked closely with USFWS staff to incorporate their feedback.

On December 2, 2022, the draft plan was published online for public review and input. The comment period remained open until January 9, 2023. During this period, Whitewater WMA staff hosted an online plan overview and question session, an in-person open house at Whitewater State Park, and an additional online open house during which attendees were encouraged to ask questions and provide input. Comments were also collected via the Engage with DNR website, U.S. mail, email, and personal communication directly to staff. All comments were analyzed thematically and reviewed by division leadership. A summary document describing the comment themes received and how they were addressed is included in Appendix B.

E. Guiding Documents

Management at WWMA is informed and guided by an array of statutes, rules, directives, and plans. A list of many of these documents is included in . The management objectives and strategies in this plan were developed within the context of these existing guidance documents; however, due to the interdisciplinary nature of DNR's work, individual management decisions are often context-dependent and require close and consistent coordination beginning at the local level and attention to multiple applicable guidance documents. When appropriate and relevant, the DNR considers plans developed by other agencies and

organizations. This coordination helps ensure that all management decisions and actions taken within WWMA will be made to the benefit of wildlife, wildlife habitats, and compatible outdoor recreation.

Select WMA Statutes and Rules

[Minnesota Statutes, Chapter 84 Department of Natural Resources, Section 84.942 Fish and Wildlife Resources Management Plan](#) states that the Commissioner shall prepare fish and wildlife management plans designed to accomplish the policy of section 84.941.

[Minnesota Statutes, Chapter 86A Outdoor Recreation System, Section 86A.05 Classification and Purposes](#) defines the purpose of state WMAs as “to protect those lands and waters that have a high potential for wildlife production and to develop and manage those lands and waters for the production of wildlife, for public hunting, fishing, and trapping, and for other compatible outdoor recreation uses.” It also states that WMAs need to be administered in a manner that will “perpetuate, and if necessary, reestablish quality wildlife habitat for maximum production of a variety of wildlife species.” Finally, “public hunting, fishing, trapping, and other uses shall be consistent with the limitations of the resource, including the need to preserve an adequate brood stock and prevent long-term habitat injury or excessive wildlife population reduction or increase. Physical development may provide access to the area but will be developed to minimize intrusion on the natural environment.”

[Minnesota Statutes, Section 86A.09 Development and Establishment of Units](#) describes the requirements that apply to the development of the master plan.

[Minnesota Statutes, Section 97A.135 Acquisition of Wildlife Lands, Subdivision 1 Public Hunting and Wildlife Areas](#) says that the Commissioner may designate land acquired under this subdivision as a wildlife management area for the purposes of the outdoor recreation system.

[Minnesota Rules, Chapter 6230 Wildlife Management](#) has general and specific rules that apply to WMAs.

Whitewater WMA habitat management and operations are typically funded through Pittman-Robertson Wildlife Restoration grants (16 U.S.C. 669 et seq.). These grants require that habitat management and operation activities serve wildlife management purposes (50 CFR 80.50). The WMA is also a license revenue asset and must be used for fish and wildlife purposes. Significant portions of the WMA were acquired with Wildlife Restoration grant funds and must comply with federal regulation 50 CFR 80.134. These grant-acquired properties must continue to serve the purpose for which they were acquired, and grant acquired real property may not be sold without USFWS approval.

Additional Documents

Table 1. Additional documents used to guide the development of the WWMA Master Plan

Plan Name	Plan Year	Plan Owner
Audubon Blueprint for Minnesota Bird Conservation	2014	Audubon Minnesota
Conservation Agenda	2015-2025	MNDNR
Minnesota’s White-tailed Deer Management Plan	2019-2028	MNDNR
Deer Population Goal Setting	2022	MNDNR

Plan Name	Plan Year	Plan Owner
Executive Order 11990, Protection of Wetlands	1977	Executive Order
FAW Directive No. 070605: Outdoor Recreation Area Unit Administrative Handbook	2010	MNDNR
Forest Resource Management Plan <ul style="list-style-type: none"> • Strategic Direction • 10-Year Stand Exam List (2021-2030) • Blufflands and Rochester (Paleozoic) Plateau Section Forest Resource Management Plan (2015-2024) • High Biodiversity Area Management Plans: Whitewater Upper Beaver Creek (2005), Whitewater North Fork Area (2004), Whitewater South Fork (2006), Whitewater Sand Savanna (2001) 	2018	MNDNR
Southeast Landscape Plan: A Regional Plan to Guide Sustainable Forest Management	2014	MN Forest Resource Council (FRC)
Long Range Plan for the Wild Turkey in Minnesota	2006	MNDNR
Long Range Duck Recovery Plan	2006	MNDNR
Minnesota Prairie Conservation Plan	2011	Minnesota Prairie Plan Working Group
Minnesota Southeast Landscape Current Conditions and Trends Assessment	2000	MN Forest Resource Council (FRC)
Mississippi River – Winona Watershed Landscape Stewardship Plan	2014	MN Forest Resource Council (FRC)
Natural Areas Register	2012	MNDNR
Ruffed Grouse in Minnesota: A Long-Range Plan for Management	2012	MNDNR
Surveillance and Management Plan for Chronic Wasting Disease	2019	MNDNR
Wetland Conservation Act	1991	BWSR

Plan Name	Plan Year	Plan Owner
Whitewater Wildlife Management Area Master Plan	1977-1986	MNDNR
Working with Partners for Wildlife Conservation: Minnesota's Wildlife Action Plan	2015-2025	MNDNR
Whitewater River Watershed Plans	2015-2025	Whitewater River Watershed Joint Powers Board

All acronyms and initialisms used in this plan are listed in Appendix C: Acronyms Used in the WWMA Master Plan.

Image 2. Prescribed cattle grazing on reed canary grass as part of floodplain forest restoration



Area History

A. Geographic History

Native American tribes have lived in Minnesota for thousands of years, and European colonization of Southeast Minnesota accelerated in the mid-1850s, with the villages of Beaver, Whitewater Falls, and Elba organized around 1858 (Winona County Historical Society, 2016). Most settlers hailed from New England and the middle colonies or were newer immigrants from Germany and Luxemburg. Immigrants typically came via Ohio, Illinois, and Wisconsin, residing in one or more of these states for a few years before moving to the Whitewater Valley (Johnson, 1956).

The fertile soils and ample water in the valley led to its rapid settlement and cultivation. The major crop at that time was wheat, which met the growing demand from increased local, regional, and European populations. By 1868, Winona was the fourth-largest grain market in the United States (Johnson, 1956). In the 1870s, the predominant type of agriculture shifted from wheat to hog and cattle farming and associated corn production.

Beginning in the early 1900s, intensive farming led to problematic flooding and soil erosion. Professor Hildegard Binder Johnson, Founder of the Geography Department at Macalester College, cited pioneer agriculture as a significant cause of erosion in the Whitewater Valley (Johnson 1957). Excessive land clearing, over-pasturing, and growing wheat and corn on steep hillsides negatively impacted the soil, and farmers began leaving the area. By the 1930s, emigration from the valley was almost complete, leaving the valley largely depopulated (Winona County Historical Society, 1962).

B. Whitewater Wildlife Management Area History

Conservation in the Whitewater Valley area began in 1921 with the establishment of a 2,560-acre State Game Refuge. In 1932, the State of Minnesota began acquiring land in the valley for the WWMA. The project was originally approved by the Department of Conservation (now the Minnesota Department of Natural Resources) after a petition from members of the Rochester Izaak Walton League requested a portion of the valley be acquired by condemnation, gift, lease, or purchase. The first plans proposed the acquisition of 10,000 acres. By 1939, approximately 3,000 acres were acquired. Acquisition efforts increased in 1940 with funds from a federal excise tax on sporting arms and ammunition (Pittman-Robertson Act). By 1942, 8,000 acres were acquired. To protect state-owned lands from severe soil erosion problems, additional land was needed. In 1947, the County Commission and the Governor of Minnesota approved a project expansion. Agreements between the DNR Section of Wildlife and local officials limited acquisition to approximately 39,180 acres in 1951. In 1971, the project was modified by removing 660 acres containing substantial cropland and buildings and adding 1,074 acres mostly of forest and marsh.

Between 1934 and 1936, Public Works Act laborers built ponds and fish raceways for a fish rearing station on the first parcel of land purchased for the management area. In 1938, the rearing station was transferred to the DNR Section of Fisheries for what is now known as the Crystal Springs State Fish Hatchery. Trout were and continue to be raised at this hatchery for stocking streams and lakes throughout Minnesota.

A 15-acre tree nursery was established on the WWMA in 1949 and produced spruce, pine, hardwood trees, and shrubs, including non-native Tartarian Honeysuckle, for wildlife plantings until 1958. The nursery equipment was given to the DNR Division of Forestry in 1957. The nursery was closed for production in the late 1950s.

As noted above, refuges and sanctuaries have always been a part of the WWMA. Except for land in the adjacent Whitewater State Park, this refuge was vacated by Commissioner's Order No. 303 in 1960. A second refuge, including approximately 9,700 acres, was established by Commissioner's Order No. 147 in 1948.

Within this refuge, two sanctuaries, including 2,200 and 830 acres, were established in 1951. The refuge and the smaller sanctuary were abandoned in 1968 by Commissioner's Order No. 350. The larger sanctuary, located in Winona County, T108N, R10W, was enlarged to about 2,500 acres at this time. This sanctuary was an inviolate no-trespass zone (no entry permitted by the public).

A second inviolate sanctuary of about 130 acres was established in 1972 in the same township and included a Canada goose propagation area. This second sanctuary has since been vacated. The 2,500-acre sanctuary still exists but has been reduced to 2,300 acres. It has also been changed from an inviolate no-trespass zone to a refuge that is closed only to waterfowl and deer hunting; however, deer hunting is currently allowed for the youth season and a special hunt during the B season. Otherwise, the refuge is open to small game and turkey hunting, trapping by special permit, shed hunting, wildlife watching, hiking, and foraging.

C. Archaeological Aspects

The earliest occupants of the Driftless Area of Southeast Minnesota lived adjacent to the region's deeply incised rivers – traveling, hunting, and gathering along the waterways, sheltering under rock overhangs, burying their dead on the bluff tops, and gardening on the fertile river bottoms. While pre-European settlement human presence along the Cannon, Zumbro, and Root rivers is relatively well understood, a lack of physical archaeological evidence hinders our understanding of Native American life along the Whitewater River.

The lack of archaeological evidence in the Whitewater Valley may be due to several factors. First, it is possible that population densities in the Whitewater River Valley were lower than along other southeast Minnesota rivers; the terrain is more rugged, and the river is not a reliable travel route. Moreover, archaeological evidence of people subsisting along the Whitewater and its tributaries would likely be difficult to find, as frequent, high-energy flooding displaces artifact deposits and buries them under several feet of accumulated alluvium; indeed, the Dakota name for the river, *Minneiska* – derived from water (*mini*) and white (*ska*) – was likely in reference to the stream being repeatedly clouded with pale flood-borne sediment.

Less than a dozen Native American archaeological sites have been documented along the Whitewater River and its tributaries. Of these, only three – all of them scatters of lithic (stone) artifacts – are located in WWMA. A few lithic artifact scatters have been identified within the adjacent state park. These artifact scatters are probably ancient campsites, or perhaps places where ancient people used stone tools for tasks such as hunting or butchering. The archaeological sites are on terraces elevated above the valley floor, protected from the destructive action of the meandering, sediment-laden river channel.

The archaeological sites in the Whitewater Valley are sparser and are comparable to others which have been documented along other southeast Minnesota river systems – Native American archaeological sites are generally located on terraces and features of positive relief on the valley floor. Like similar sites on neighboring rivers, Native American archaeological sites in the WWMA might also be expected to cluster around the heads of coulees and other natural passages out of the deeply incised valleys. While burial mounds have been recorded overlooking the Whitewater River valley, these sacred sites are all near the river's confluence with the Mississippi and are not within the WWMA.

Euro-American settlements in the area currently managed as the WWMA date to the middle of the 1800s. There is evidence of long-abandoned homesteads throughout the WWMA. However, any archaeological remains associated with homesteading in the river bottoms – including several mills and two entire settlements (Beaver and Whitewater Falls) – are unlikely to persist.

D. Historic Sites

Four cemeteries, dating to Euro-American settlement of the valley, are located in or adjacent to the management area. The only cemetery completely on state land is Young's Cemetery. Two of the cemeteries

are on parcels that are inholdings. Beaver and Whitewater Falls (historically called Stoning) cemetery are surrounded by state land with no legal access to the public road. Civil War veterans are buried in both cemeteries, which places these sites under the purview of the State Archeologist's Office. Fairwater Cemetery is not part of the WWMA but is adjacent to the WWMA and has its own legal access. These cemeteries range from 1.5 to 2 acres in size.

The Section of Wildlife began assisting in the care of these cemeteries in 1956 after Minnesota residents expressed concern over the upkeep of the Whitewater Cemetery. In 1959, the Minnesota State Legislature enacted legislation requiring the Commissioner of Natural Resources to "keep and maintain in a proper and decent manner and keep free from weeds any cemetery in the Whitewater Management Area" (Minnesota Statutes, 1976). The DNR uses a private contractor to maintain these cemeteries.

Two old stone houses, the Marnach and Kieffer-Hemmelberg houses, are located within the boundaries of the WWMA. The Kieffer-Hemmelberg house is on Winona County Highway 26 between Elba and Altura and was part of the WWMA until 1991 when the house was sold to a private party. The Marnach house was built along a stagecoach route in 1857 by Luxembourg immigrants (documented by Winona County Historical Society correspondence). The house was restored in the early 1990s and is currently leased to the Luxembourg Heritage Society of Elba. This local group sponsors occasional tours of the house.

A fire tower, built in 1933, with public access is located off Highway 26 just east of Elba within the WWMA. The tower was decommissioned but was updated for public use in the 1990s. The parking lot, stairs, and structure are co-managed by WWMA and Whitewater State Park through a memorandum of understanding.

Image 3. Beaver Cemetery, one of four cemeteries at Whitewater WMA



Existing Conditions

A. Land Ownership

The type of land ownership and associated policies strongly influence natural resource management on state-owned lands. The management goals and designation type are affected by the acquisition history, present land ownership patterns, the sources of acquisition funds, and state and county policies.

Acquisition of Wildlife Lands

The Commissioner of Natural Resources, or their designee, such as the Director of the Fish and Wildlife Division, is authorized to acquire lands for wildlife management purposes (Minnesota Statutes, 1978). A regional Strategic Land Asset Management (SLAM) team meets twice a year to prioritize existing and new proposed acquisition projects. After approval through this regional process, the Division of Fish and Wildlife may attempt to acquire lands from willing sellers. The division must also obtain approval from the appropriate county board before land can be purchased for a WMA. Newly acquired WMAs are designated by the Commissioner and the public notified through the State Register.

Multiple funding sources are used for wildlife land acquisition, including the Game and Fish Fund, which is funded by proceeds of hunting and fishing licenses, and federal matching funds from the Pittman-Robertson Wildlife Restoration Act. In addition, wildlife land acquisition has been through state bonding funds, and through the Environment and Natural Resources Trust Fund as recommended by an administrative committee, the Legislative-Citizen Commission on Minnesota Resources (LCCMR). Since 2011, wildlife land acquisitions have also been funded through a Legislative appropriation known as the Outdoor Heritage Fund, through its administrative body, the Lessard-Sams Outdoor Heritage Council (LSOHC).

Lands purchased with federal dollars and most purchased with state dollars have use restrictions. The land must be bought for a wildlife conservation purpose and continue to be used for a wildlife conservation purpose. Examples of such programs include the federal Pittman-Robertson Fund (50CFR Part 80.134), the Outdoor Heritage Fund, and the state Game and Fish Fund. It is important these lands are not used for a non-conservation purpose, since doing so could put these funds at risk statewide. Any necessary, non-conservation uses of wildlife lands, for example, a road-widening easement through a WMA must be approved by the funding organization through an extensive divestiture process. Generally, approved wildlife conservation activities in the WWMA include the operation of public hunting grounds and the improvement of wildlife habitats.

Acquisition of the Present WMA

Land acquisition for the WWMA began in 1932. Today, the WWMA consists of approximately 27,400 acres, 2,179 acres of which have been added since the completion of the previous master plan in 1977. In the past, state-owned lands at WWMA were acquired through purchases, condemnations, land exchanges, and tax forfeiture.

More than \$105 million has been spent on land acquisition in the WWMA by the DNR. Approximately 86% of the land was purchased through Pittman-Robertson funding, approximately 14% with Game and Fish Fund monies, and less than 1% with Outdoor Heritage Funds. The WWMA contained 25,224 acres in 1977 with a projected 13,362 acres remaining to be acquired. The 1977 plan listed 5,188 acres of forested slopes and ravines as critical for acquisition and management of the WWMA. A priority for future acquisitions will be given to lands containing rare habitats, plants, or animal species. The purchase of additional lands is completed with willing sellers.

B. Area Description

Landscape Context

WWMA is located within the Blufflands Ecological Subsection of the Paleozoic Plateau Section of the Eastern Broadleaf Forest Province (Figure 2). It is part of the Driftless Area, a region in southeast Minnesota, southwest Wisconsin, northeast Iowa, and northwest Illinois that escaped glaciation during the last ice age. Over the last 10,000 years, the area became highly eroded and dissected by streams and rivers that are tributaries to the Mississippi River. Today, the bluffs and valleys are primarily covered with mixed hardwood forests, with some floodplain forests on the valley floor near the rivers. Some uplands contain savannas and prairies, with prairies most prominent on south- to west-facing slopes of the bluffs. These open grasslands are often referred to as “goat prairies.”

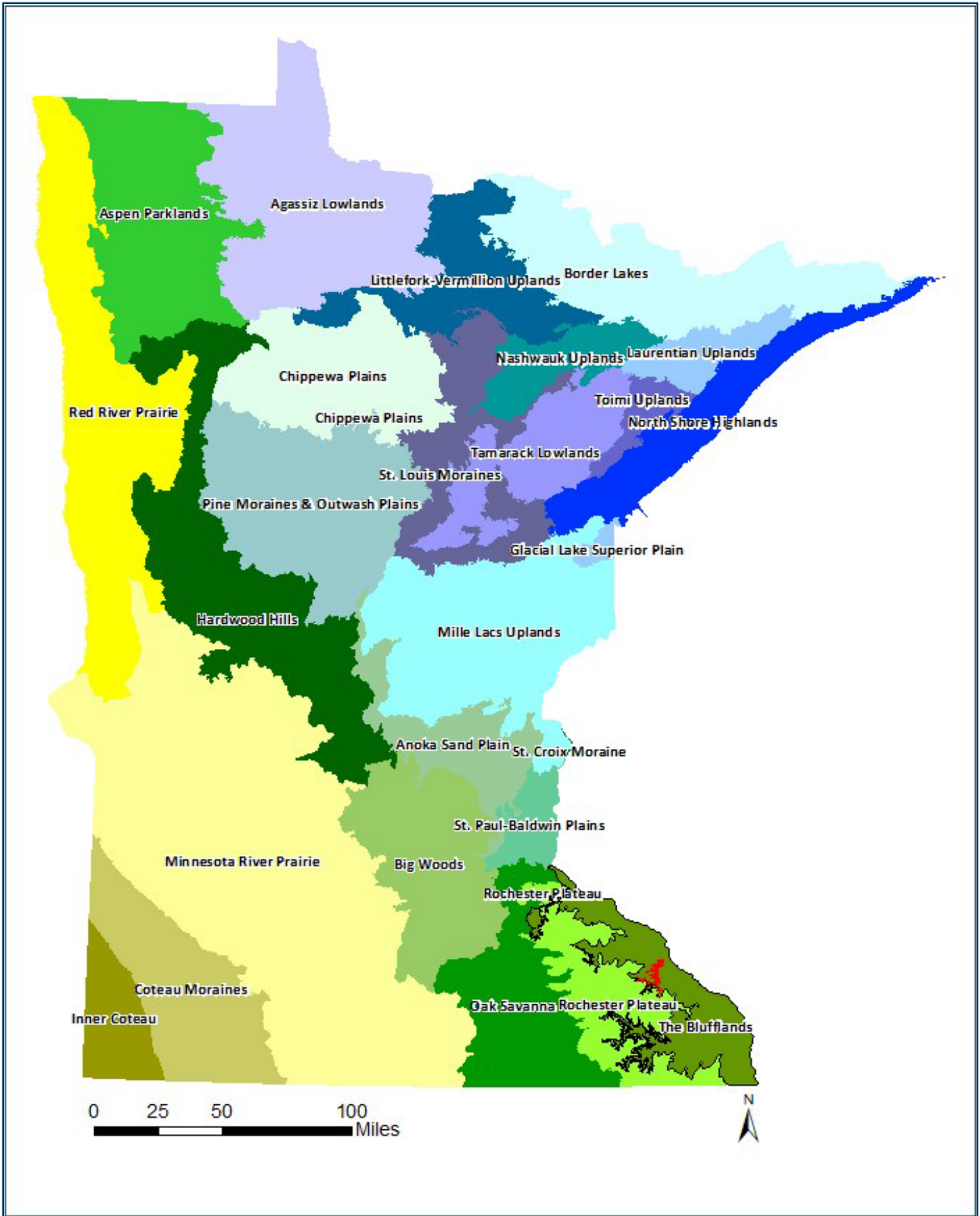
Within WWMA are three forks of the Whitewater River (South, Middle, and North) that converge near the City of Elba. The Whitewater River continues north through the WWMA and enters the Mississippi River near the town of Weaver. The Whitewater River is a productive trout stream due to the coldwater springs that feed it. Several impounded marshes are in the lower watershed, primarily in the floodplain. These shallow basins range in size from 12 to 137 acres; water levels for some basins fluctuate with seasonal conditions, and some are controlled through raising and lowering control structures. There are several natural marshes in the northern part of the unit.

Other public lands are near the WWMA, including the Whitewater State Park, to the south of the WWMA on the Middle Fork Whitewater River, and the Richard J. Dorer Memorial Hardwood State Forest, which surrounds WWMA to the northwest and southeast (see Figure 1 map). This land provides important habitat for rare species; the unique characteristics of this landscape have been recognized in several planning initiatives including Audubon Minnesota’s Important Bird Areas (IBA) and Minnesota’s Wildlife Action Plan (MNWAP).

IBAs identify critical habitat for birds. Each IBA protects species of conservation concern, range-restricted species, species found in only one habitat type or biome, or species or groups of species (e.g., waterfowl or shorebirds) that are vulnerable because they congregate in large numbers (Audubon, 2016). The Whitewater Valley IBA covers over 46,000 acres and includes both the WWMA and the adjacent Whitewater State Park. This IBA is an excellent stop-over region for migrating birds during spring and fall and provides nesting cover for rare species such as the Trumpeter Swan and the Red-shouldered Hawk. An estimated 242 bird species occur within this IBA.

According to MNWAP, this area has high quality habitats for its classification of Species of Greatest Conservation Need (SGCN). MNWAP also identified the Whitewater River Watershed as a Conservation Focus Area. In Conservation Focus Areas, habitat restoration and enhancement will be especially beneficial to these SGCH species. The selection of Conservation Focus Areas is based on mutual priorities of both the DNR and conservation partners active within them.

Figure 2. Ecological subsections of Minnesota



Socioeconomic Context

WWMA is located between the cities of Rochester and Winona and lies within the southeast Minnesota counties of Olmsted, Wabasha, and Winona. The population of these three counties is more than 229,000. The City of Rochester, located 25 miles west of WWMA, is Minnesota's third largest city with 117,000 residents. Additionally, because of the WMA's relative proximity to the Minneapolis-St. Paul metropolitan area, it is estimated that over 3 million Minnesotans reside within a two-hour drive of the WMA (MN State Demographic Center, 2018). In addition, the WMA's proximity to the Great River Road and other public lands add to its appeal as a tourism destination and driving tour route.

Because the Mayo Clinic is located in Rochester, healthcare and social assistance are the major industries in Olmsted County. Manufacturing and agriculture make up 30% of the jobs in Wabasha County, and manufacturing is the primary economic engine for Winona County (Southeast Minnesota Regional Economic Study, 2018). Between 2013 and 2017, the median household incomes for Olmsted, Wabasha, and Winona counties were \$72,337, \$61,973, and \$53,975, respectively (US Census Bureau, 2019).

Public lands and waters in and around the WMA are an important source of tourism revenue for the local economy. Trout fishing is especially important to the area. Only 5% of the land in southeast Minnesota is public, and access to private land is becoming more difficult. As such, the importance of the WWMA is anticipated to increase as one of the largest blocks of public recreational land available in the area.

The WWMA and surrounding public lands also play an important role in preserving forest, grassland, and aquatic ecosystems. Such ecosystems are extremely important to human well-being and related quality of life. Benefits of ecosystem preservation broadly includes clean air and water, carbon sequestration, biodiversity, preservation of pollinator populations, and soil stability, which prevents erosion and mitigates flood impacts.

Climate

The climate of the WWMA varies with the slope and aspect of the land. South- and west-facing slopes generally are warmer, drier, and have less snow cover than north- and east-facing slopes and bottomlands. These differences result in various microclimates in the area, creating unique plant communities (described later in the plan). Prevailing winds are from the northwest during the fall and winter and from the south and southwest in the spring and summer.

Average monthly temperature and precipitation from 1987 to 2016 in southeast Minnesota, along with comparisons to averages for the same area between 1921 and 1980, can be found in Appendix D. The area around WWMA has become both warmer and wetter. Nine of the 12 months show warming during the 1987 to 2016 observed period, with the largest temperature increases observed November through March. Annual precipitation has increased by 4.5 inches, or 15%, with the sharpest increases from April through August.

Statistics from Rochester, which is representative of the area and has a reliable snowfall record back to 1940, indicate the area has become snowier, despite rapid winter warming. Rochester's snowfall has increased by 5.8 inches, or 13%, with the greatest gains during the heart of winter, from December through February (Appendix E). Even though seasonal snowfall has increased, the number of days with at least an inch of snow on the ground has fallen from 95 days during the mid- to late-1900s, to an average of just 88.5 days during the most recent 30 years. Winter warming accounts for this loss of snow cover days. Similarly, the number of frost-free days has increased from 200 to 209 over the same period.

Global climate change is discussed in further detail in Strategic Considerations.

Surficial Geology

The WWMA is located within the North Central US Driftless and Escarpment Ecological Section and is part of the “Driftless Area” from the Wisconsin glaciation (Flint, 1945). In the late 1970s, the area began to be referred to as the Paleozoic Plateau because evidence of drift from the Illinois glaciation has been found within the Section in Minnesota, Iowa, and Illinois. More specifically, the WWMA is located within the Blufflands Ecological Subsection or Blufflands Landscape (see Figure 2). The Blufflands Landscape is characterized by comparatively level uplands ranging in elevation from 1,000 to 1,200 feet above sea level bisected by deeply eroded bedrock valleys 500 feet deep, or about 650 feet in elevation.

Unconsolidated surficial materials are dominated by highly weathered calcareous tills, windblown silts (loess), bedrock residuum and colluvium with sand and gravel deposits in the valleys. Loess, dating from the Wisconsin glaciation, is composed of silt winnowed from Mississippi River or tributary outwash plains and carried by wind to the Whitewater area. These loess deposits occur on the uplands and the valley slopes but often leave bedrock exposed.

Unconsolidated sediment deposits on the uplands and valley side slopes are very thin, generally ranging from 0 to 50 feet in thickness, so the topography closely mirrors the bedrock surface. Bedrock outcrops occur in the steep ravines, road cuts, and stream valleys. The valley floors are mantled with a layer of alluvium and valley fill approximately 50 to 100 feet thick and composed primarily of sand and gravel.

Bedrock Geology

Lithologic units are Paleozoic Era sedimentary rocks 450 to 500 million years old. The sedimentary rocks were deposited when shallow seas inundated the area. The rock units consist of carbonates (limestone and dolostone), sandstones, and shales (fine-clastics).

Throughout the Whitewater River valleys, the St. Peter Sandstone is largely eroded away with only small, isolated remnants approximately 100 feet thick in the western portion of the watershed. The dominant upland bedrock formations are composed of dolostone belonging to the Prairie du Chien Group (Shakopee and Oneota Formations) which are approximately 400 feet thick. In the lower portion of the Whitewater River valley, sandstones, dolostone and shale from the Jordan, St. Lawrence Formation, Tunnel City Group, and Wonewoc Formation are exposed and form the valley walls. The bedrock valleys have been eroded before, during, and since glacial times.

Soils

Soil formations in the WWMA were compiled from Winona, Wabasha, and Olmsted County soil surveys. Seven soil types have been identified on the WMA, and much of the variability comes from differences in such factors as vegetation, topography, and parent materials influencing soil development in the region. The drain class of these seven soil types range from excessively drained to very poorly drained (Figure 3).

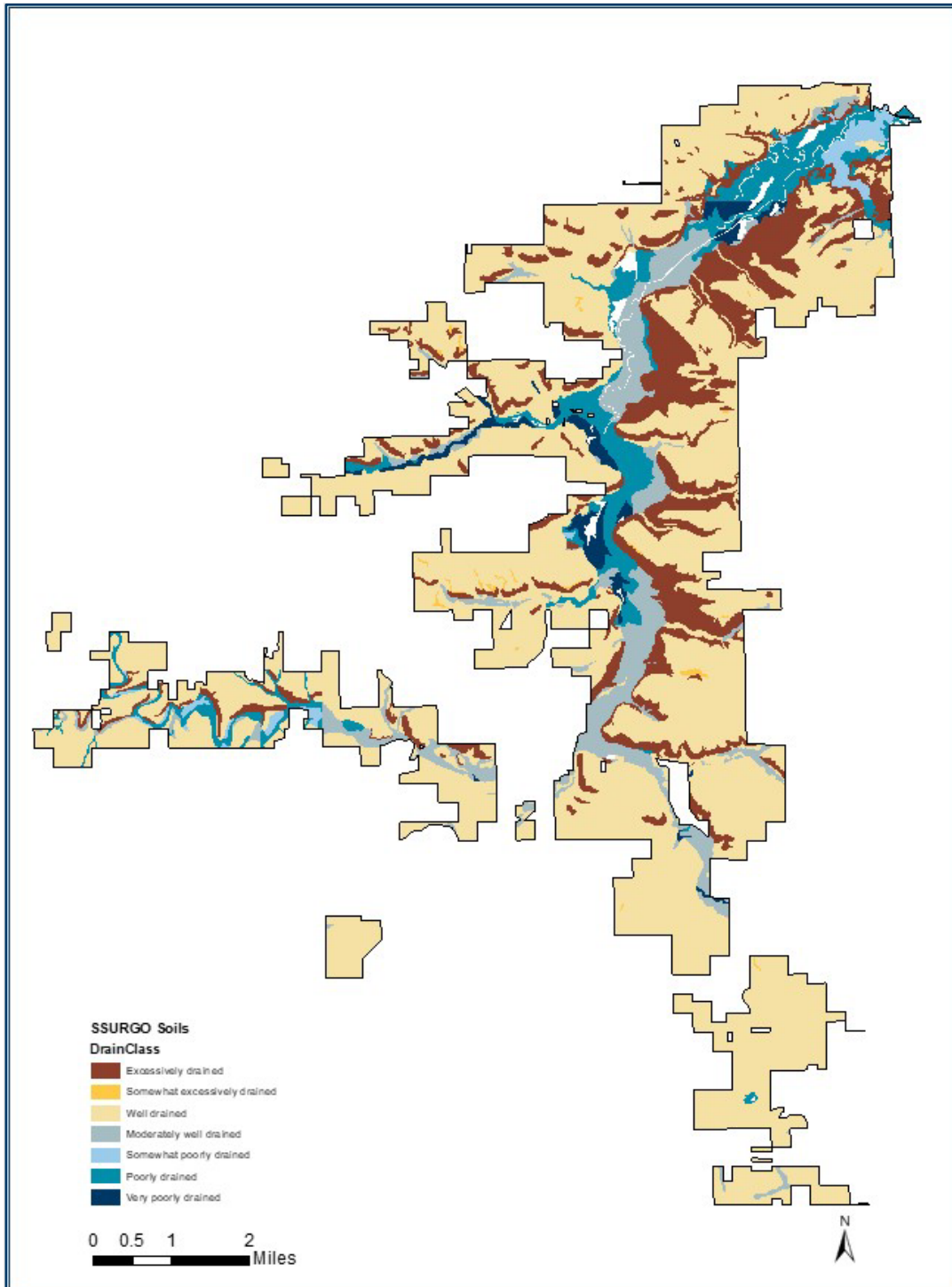
Groundwater

Aquifers are saturated geologic features comprised of rock or unconsolidated sediment formations that can transmit significant volumes of water to a well or stream. Aquifers can be unconfined (water table) – open to the atmosphere and thus influenced by atmospheric pressure – or confined (artesian) – located beneath an aquitard (a confining layer of tightly grained rock or clay) and thus influenced by hydrostatic pressure. Regionally, unconfined aquifers are recharged by precipitation infiltrating nearby upland areas and being discharged in stream valleys. Water in the water table aquifers tends to be young (recent) water. Confined aquifers are recharged where the rock formation is the first bedrock unit, and the surficial materials allow for percolation of water down to the groundwater. Recharge to confined aquifers underlying WWMA takes

place far to the west of the unit. Groundwater in the deeper confined aquifers is often estimated to be more than 10,000 years old.

Discharge of confined aquifers occurs in the deeply eroded bedrock valleys where the rock unit intersects the valley or the valley fill, often in the form of springs or seeps. The WWMA is a discharge area. Bedrock aquifers are important for maintaining cool water temperatures in trout streams. The surficial materials in the area do not typically yield significant volumes of water and water table aquifers are not used to obtain domestic well water except in the thicker and coarser alluvium and valley fill. A DNR observation well nest was installed in the WWMA Borderline Road parking area in 2016. Observation wells in the DNR network are designed to measure long-term trends in aquifer water levels.

Figure 3. Drain classes of soil types found at Whitewater WMA



Karst

Karst is a geologic feature formed when soluble rock is dissolved by slightly acidic rainwater. Bedrock units in the WWMA contain both vertical and horizontal fractures that facilitate karst development resulting in a unique landscape and groundwater system. Greater number and densities of fractures are found in the first bedrock units and near valley walls. Over many years, rainwater percolating through the soils and into the bedrock dissolves the carbonate rocks to form solution-widened fractures. These fractures have led to cave formation in some areas. These fractures (joints) and solution-widened fractures, coupled with very thin unconsolidated materials, can move water from the surface to the groundwater very quickly through fracture (secondary permeability) and conduit (tertiary permeability) flow.

Surface water karst features such as stream sinks and sinkholes are common in the area and can carry unfiltered surface water and pollutants directly into aquifers. Because of conduit flow throughout the karst landscape, the entire WWMA, except for the alluvium and valley fill aquifers, are rated high for pollution sensitivity. Water table aquifers, near surface confined aquifers, and aquifers near valley walls are most susceptible to pollution and often contain elevated nitrate concentrations. High nitrate concentrations have been detected in many domestic wells. Of the townships tested in Winona County in 2016 by the Minnesota Department of Agriculture, 19.1% of the wells had nitrate concentrations greater than the drinking water standard of 10 milligrams per liter.

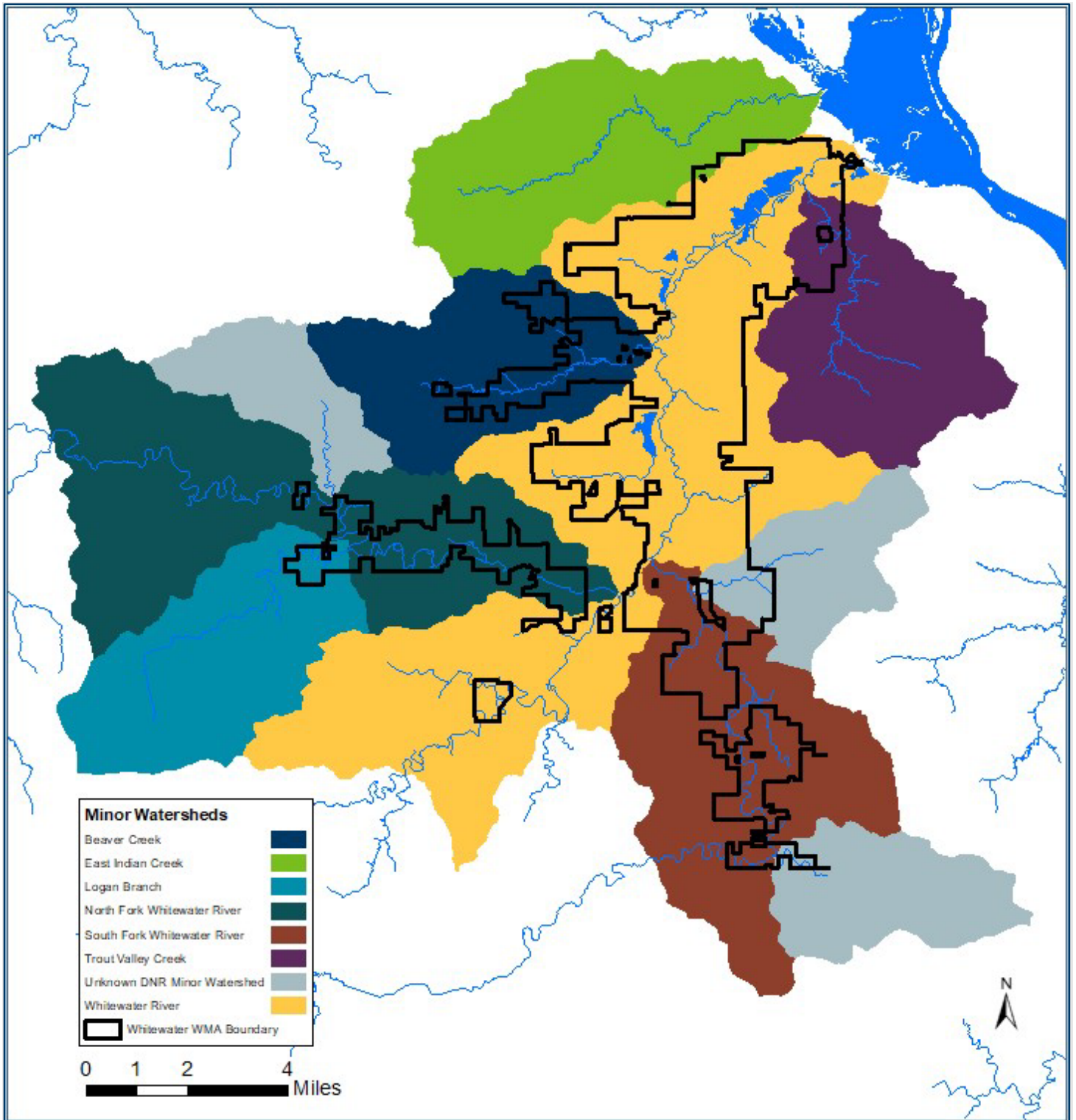
Watersheds

The WWMA contains the majority of the Whitewater River Watershed. This system drains about 300 square miles of land before emptying into the Mississippi River near Weaver. The watershed is composed of multiple minor watersheds and includes six streams: Beaver Creek, North Fork Whitewater River, Middle Fork Whitewater River, South Fork Whitewater River, Trout Valley Creek, and Whitewater River (Figure 4).

In addition to the streams, there are over 50 small retention ponds associated with agricultural land on the WWMA, 11 impoundments with water control structures, and several natural wetlands within the watershed. There are numerous other wet areas that may hold water year-round or seasonally. Near the Dorer Pools, the Whitewater River was routed out of ditches and back into the original stream channel. The karst topography of the area creates features such as cold-water inflows to streams. As a result, many of these streams have been designated as trout streams or trout stream tributaries and are protected by law.

Beaver Creek begins from springs in a narrow valley in Wabasha County (Section 24, Township 108N., Range 11W.). The stream flows east-northeasterly for seven miles before joining the Whitewater River at the old settlement of Beaver. The WWMA contains about 6.4 miles of this stream, and an additional 0.6 miles of intermittent stream. The Beaver Creek headwater valley is heavily wooded with a stream gradient of about 40 feet per mile. Tree cover in the lower valley is confined mainly to a narrow band bordering the stream, and stream gradient decreases to about nine feet per mile as the creek joins the Whitewater River. The hills forming the valley are wooded the entire length. Between 1955 and 1957, and in 1971, bank stabilization and channel alteration increased rates of flow and improved trout habitat in Beaver Creek. Much of this work is still evident.

Figure 4. Minor watersheds within and adjacent to WWMA



The North Fork Whitewater River begins in rolling farmland in Wabasha County (Section 26, Township 108N., Range 12W.) and flows east-southeasterly for 20.7 miles before joining the Middle Fork Whitewater River south of Elba. Approximately 10.5 miles of stream upriver from Elba are within the WWMA. The total watershed area is about 101 square miles (Broussard, Farrell, Anderson, Jr., & Felsheim, 1975). The stream flows for 6.2 miles from the source through rolling, lightly wooded farmland before entering a narrow, deep valley. The gradient along this part of the stream is about eight feet per mile. The remainder of the stream flows through a heavily wooded valley until reaching the old Fairwater settlement, after which much of the valley is open land. Stream gradients through the lower 14 miles of the river are more than 22 feet per mile in the upper portion, decreasing to about 13 feet per mile approaching the river mouth.

The South Fork Whitewater River begins in rolling farmland of Olmsted County near Eyota (Section 23, Township 106N., Range 12W.). The river winds east and north for 30.5 miles until it joins the Whitewater River near Elba. The lower 12.4 miles of the stream are in the WWMA. As much as 20 miles of the upper portion of the stream can be intermittent. The watershed area is about 77 square miles. The upper 17.4 miles of river flows through very open, rolling lands dominated by agricultural uses. The next 7.6 miles of stream run through a very deep, moderately wooded, and lightly pastured valley. The last 4.5 miles of the river flow through open land once pastured and cropped. This tributary to the Whitewater River is the steepest in the area. Stream gradients increase from about 13 feet per mile to about 25 feet per mile through the steep valley and then decrease to about 18 feet per mile near the mouth.

Trout Valley Creek begins in Winona County (Section 29, Township 108N, Range 9W). The stream flows 7.2 miles north before joining the Whitewater River. Approximately 3.5 miles of stream are within the WWMA. The upper stretches of the stream flow through open and wooded pastures; the lower portion of the stream flows through heavily wooded land. The stream gradient decreases from approximately 25 feet per mile near the headwaters to about eight feet per mile near the confluence with the Whitewater River.

The Whitewater River is the remaining stream in the area and flows north for 15.6 miles from the confluence of the North and Middle forks before leaving the area and joining the Mississippi River. The valley is wide and well defined along the upper 13.8 miles of the river. Both the valley floor and the hills are wooded. The river flows into the Mississippi River Valley east of Weaver and is unshaded from Weaver until it joins the Mississippi River. Due to erosion throughout the watershed, the Whitewater River is largely a shallow, uniform bottomed, shifting sand stream. This stream is navigable by canoe or small boat as far upstream as Elba, but the use of outboard motors is prohibited in the WMA.

The marshes and wetlands are located in the floodplain along the Whitewater River. Apart from the Randall, Miller and Green Pools, the major impoundments on the WMA are north of Beaver. The impoundments range in size from 12 to 137 acres of surface area. The natural wetlands range in size from 10 to 18 acres and are located in the northern part of the unit east of the Whitewater River and along the South Fork Whitewater River. The plant communities associated with these wetlands are described later in the plan.

MPCA has determined that in the Mississippi River (Winona) Watershed (which includes the WWMA) drinking water, aquatic recreation, and aquatic life uses are compromised by high nitrates, bacteria, and turbidity levels.

C. Habitats and Plant Communities

Introduction

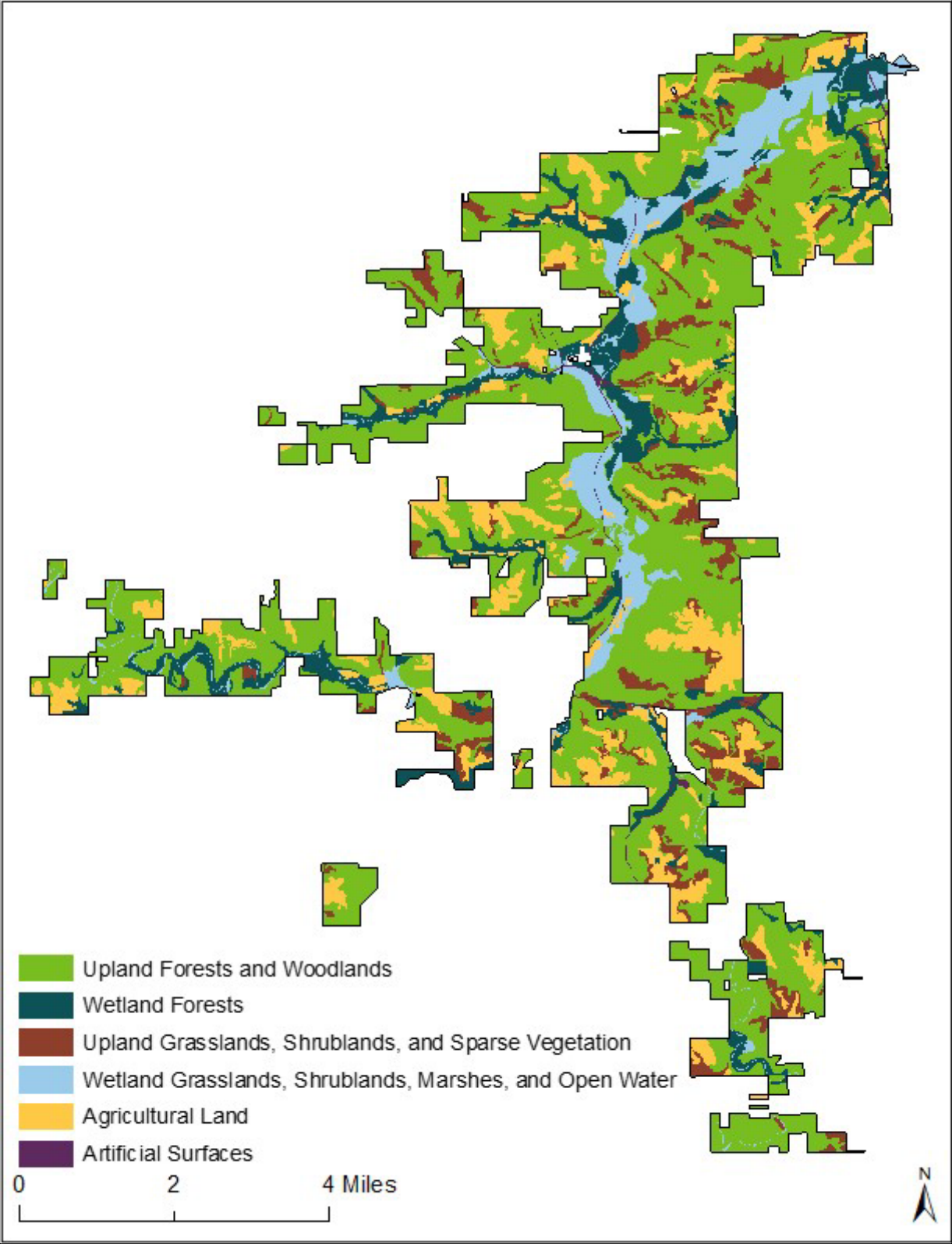
Native plant communities (NPC) provide habitat that supports fish and wildlife populations on the WWMA. These plant communities have been formed and shaped by climate, hydrology, geology, and other physical factors, along with anthropomorphic changes. The information and data available on WWMA native plant communities has grown exponentially since the last management plan was developed 40 years ago, with approximately 40% of the unit mapped for native plant communities to NPC type or subtype.

WWMA is a diverse site with several high-quality NPCs, many of which are rare or unique to the Blufflands Subsection. In this document, habitat types are categorized by the four NPC system groups: (1) Upland Forests and Woodlands; (2) Wetland Forests; (3) Upland Grasslands and Shrublands (including savannas); and (4) Wetland Grasslands, Shrublands, and Marshes (including open water); or as agricultural lands (Figure 5). Native plant communities are classified into these system groups based on vegetative and hydrological characteristics. Table 2 shows the relative percentage of system groups found at WWMA. Artificial surfaces are not included in the relative percentages.

Table 2. Relative percentage of native plant communities (NPC) system groups found at Whitewater WMA

NPC System Group	Approximate Acres	Percentage of WMA
Upland Forests and Woodlands	16,110	59%
Wetland Forests	2921	11%
Upland Grasslands, Shrublands, and Sparse Vegetation	2340	8%
Wetland Grasslands, Shrublands, Marshes, and Open Water	2148	8%
Agricultural Lands (Some agricultural lands have been retired or are in the process of being retired and restored to native wildlife habitat)	2500	14%
Total	27,400	100%

Figure 5. Overview of native plant communities (NPC) system groups found at Whitewater WMA



The Section of Wildlife further classifies land cover types within WMAs using the Wildlife and Aquatic Habitat Management Application (WAHMA). The WAHMA land cover types found within WWMA are shown in Figure 6. Table 3 shows the relative percentage of each land cover type found at Whitewater WMA.

Figure 6. WAHMA land cover types at Whitewater WMA

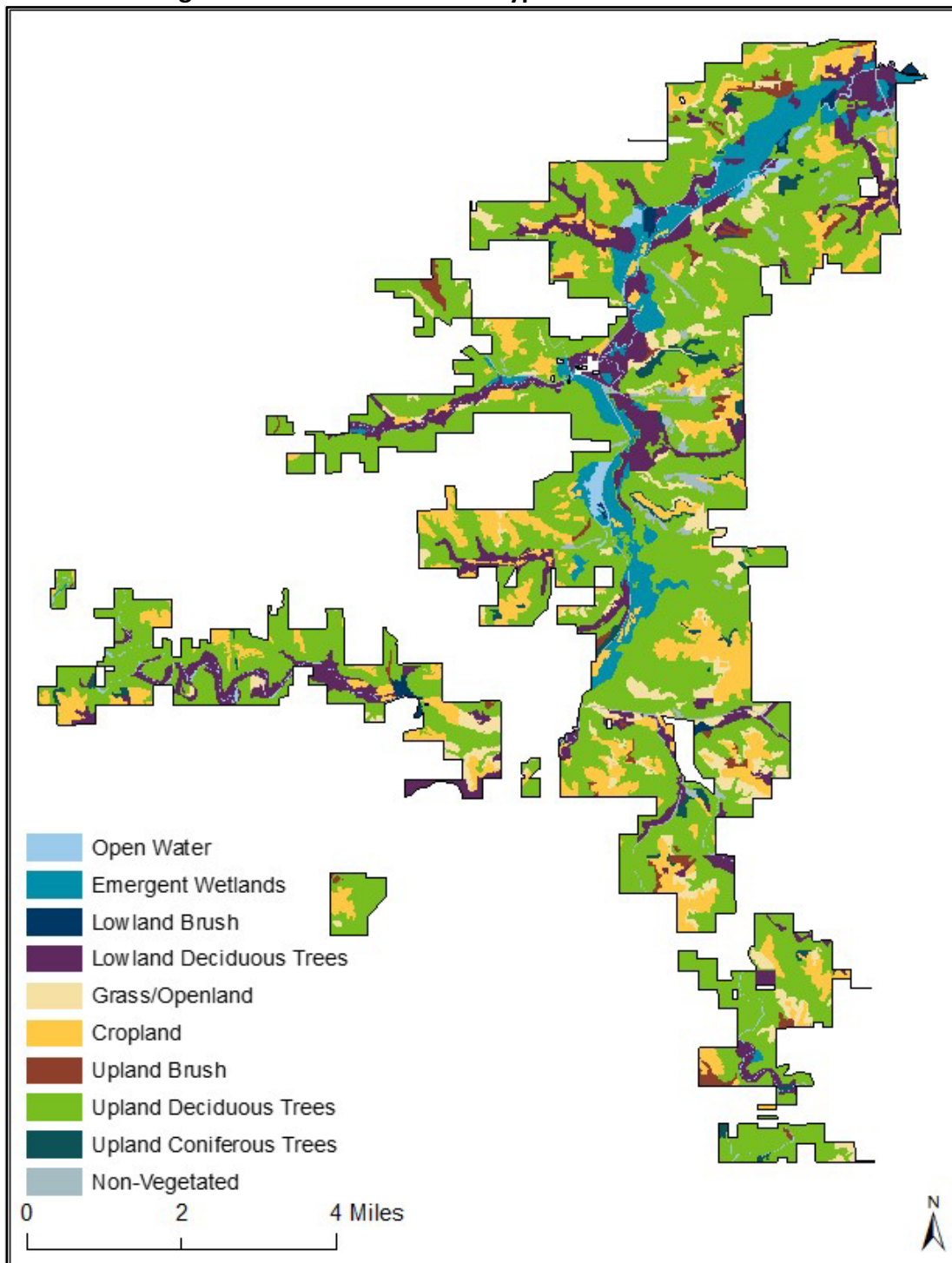


Table 3. Relative percentage of WAHMA land cover types found at Whitewater WMA

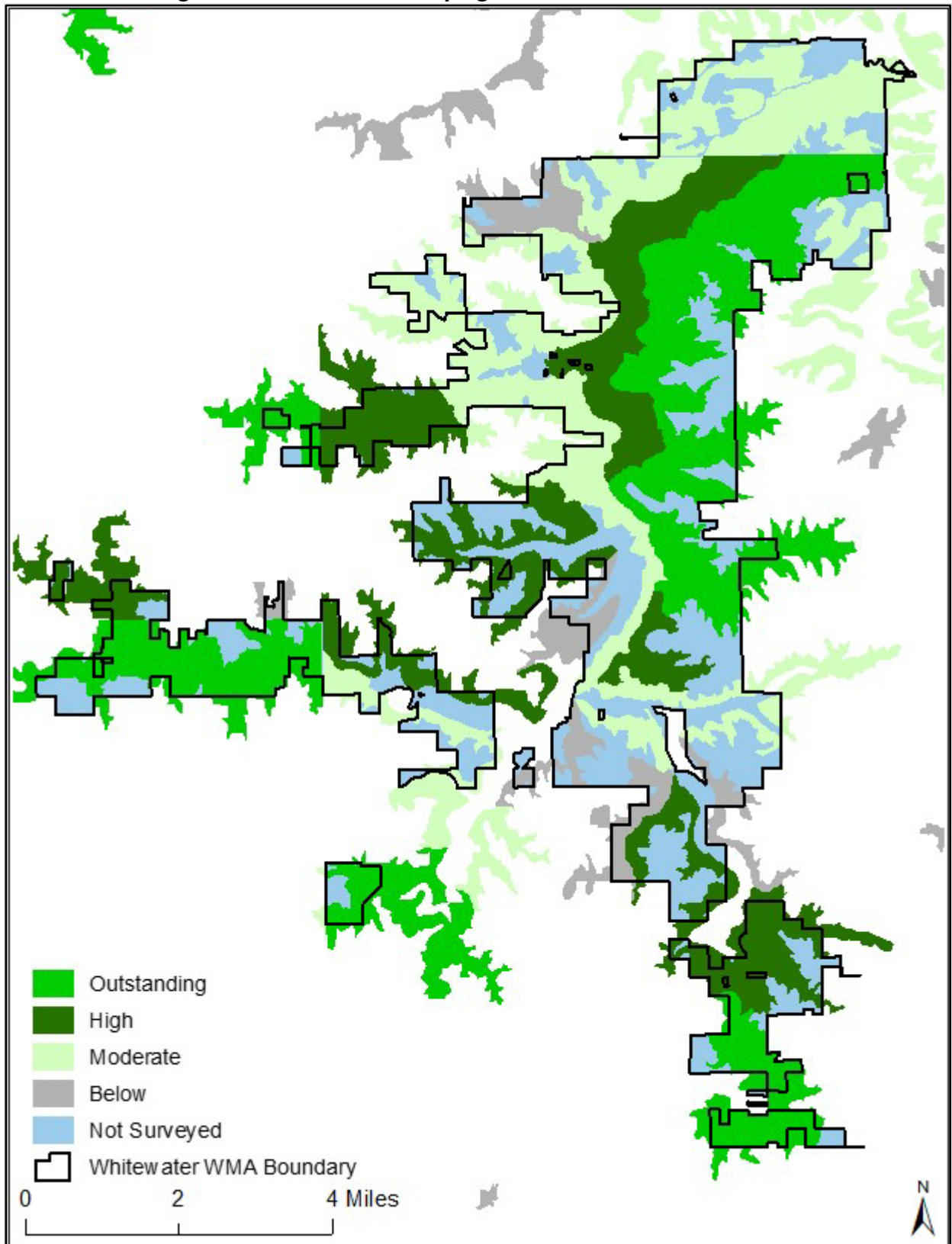
NPC System Group	Approximate Acres	Percentage of WMA
Open Water	377	1%
Emergent Wetlands	1617	6%
Lowland Brush	153	<1%
Lowland Deciduous Trees	2921	11%
Grass/Openland	1639	6%
Cropland	3715	14%
Upland Brush	471	2%
Upland Deciduous Trees	15724	58%
Upland Coniferous Trees	385	1%
Non-Vegetated	232	<1%
Total	27,400	100%

The DNR's Minnesota Biological Survey (MBS) completed a systematic survey of native plant communities and rare species within the WWMA in the mid-1990s. The results of this survey provided increased knowledge of the status and distribution of native and rare plant communities and animal species within the WWMA.

At the conclusion of work in a geographic region, MBS ecologists assign a biodiversity significance rank to each survey site of moderate, high, or outstanding (below threshold means the area was considered for survey work but did not appear to have enough diversity to warrant it). Within the WWMA, areas not considered for surveys were primarily agricultural lands. These diversity rankings indicate the statewide native biological diversity of each site and put into context the importance of an area compared to the rest of the state. This information helps guide conservation and management on the WWMA.

A site's biodiversity significance rank is based on the presence of rare species populations, the size and condition of native plant communities within the site, and the landscape context of the site (for example, whether the site is isolated in a landscape dominated by cropland or developed land, or whether it is connected or close to other areas with intact native plant communities). Figure 7 shows the extent of biodiversity within and adjacent to the WWMA.

Figure 7. Sites of Biodiversity Significance at Whitewater WMA



Rare Plants and Plant Communities

Some of the plant communities found at WWMA are very high quality and are rare for the area, for Minnesota, or even globally, as shown in Table 4. In the United States, many organizations use the Conservation Status Ranking system developed by The Nature Conservancy and maintained and presented by NatureServe in cooperation with the Natural Heritage Network, to rank and categorize the relative imperilment of plants, animals, other organisms, and native plant communities on a global, national, and state level. Minnesota uses this system. The two main Conservation Status Ranks frequently used when discussing native plant community management are referred to as S-ranks and G-ranks. S-ranks indicate how a native plant community ranks at a statewide level, and G-ranks are at the global level. The G-ranks at WWMA are similar to the S-ranks, therefore, S-ranks are more representative of management needs at the local scale. Descriptions of Conservation Status Ranks can be found in Appendix F. More information on Conservation Status Ranks and Condition Ranks and how they are determined can be found at <https://www.natureserve.org/conservation-tools/conservation-status-assessment>.

Rare plants found at WWMA are listed in Table 5. Detailed information on rare plant species can be found in the [DNR Rare Species Guide](#). Leedy's roseroot (*Rhodiola integrifolia ssp. leedyi*) is listed as a federally endangered species. There are seven known populations of subspecies *leedyi* known to be extant; four in Minnesota, two in New York, and one in South Dakota. The primary factor limiting this species is the specialized habitat it requires: shallow ledges on north-facing dolomite cliffs where groundwater seeps through the rock and is cooled by air coming from underground air passages in karst topography, which results in a constantly wet, dripping condition.

Table 4. Rare native plant communities known to occur at Whitewater WMA

NPC	Description	Status Rank
CTs12b	Dry Limestone-Dolomite Cliff (Southern) Type	S4
CTs43a1	Maderate Cliff: Limestone Subtype	S1
CTs43a2	Maderate Cliff: Dolomite Subtype	S1
CTs46a	Algific Talus: Dolomite Subtype	S1
CTs46a2	Algific Talus: Dolomite Subtype	S1
FDs27b	White Pine-Oak-Woodland (Sand) Type	S1

FDs27c	Black Oak-White Oak Woodland (Sand) Type	S2
FDs38a	Oak-Shagbark Hickory Woodland Type	S3
FFs59a	Silver Maple-Green Ash-Cottonwood Terrace Forest Type	S3
FFs59c	Elm-Ash-Basswood Terrace Forest	S2
MHc38a	White Pine-Sugar Maple-Basswood Forest (Cold Slope) Type	S1
MHs37	Southern Dry-Mesic Oak Forest Class	S3/S4
MHs37a	Red Oak-White Oak Forest	S3
MHs37b	Red Oak-White Oak-(Sugar Maple) Forest Type	S4
MHs38a	White Pine-Oak-Sugar Maple Forest Type	S3
MHs38c	Red Oak-Sugar Maple-Basswood-(Bitternut Hickory) Forest Type	S3
MHs39a	Sugar Maple-Basswood-(Bitternut Hickory) Forest Type	S2
MHs39b	Sugar Maple Basswood-Red Oak-(Blue Beech) Forest Type	S3
MHs49a	Elm-Basswood-Black Ash-(Hackberry) Forest Type	S3
MHs49b	Elm-Basswood-Black Ash-(Blue Beech) Forest Type	S2

Ups13c	Dry Bedrock Bluff Prairie (Southern) Type	S3
Ups14a1	Dry Barrens Oak Savanna (Southern): Jack Pine Subtype	S1
UPs14a2	Dry Barrens Oak Savanna (Southern): Oak Subtype	S1/S2
Ups23a	Mesic Prairie (Southern)	S2
WFs57b	Black Ash-Sugar Maple-Basswood - (Blue Beech) Seepage Swamp	S1
WMn82b	Sedge Meadow	S4/S5
WMs83a1	Seepage Meadow/Carr: Tussock Sedge Subtype	S3

Image 4. Prescribed burn on a bluff prairie being restored along Highway 74



Table 5. Rare plant species known to occur at Whitewater WMA

Species (Common Name)	Species (Scientific Name)	State Status
Nodding Wild Onion	<i>Allium cernuum</i>	SPC
Green Dragon	<i>Arisaema dracontium</i>	SPC
Seaside Three-awn	<i>Aristida tuberculosa</i>	THR
Clasping Milkweed	<i>Asclepias amplexicaulis</i>	THR
Ebony Spleenwort	<i>Asplenium platyneuron</i>	SPC
Fernleaf False Foxglove	<i>Aureolaria pedicularia</i>	THR
Plains Wild Indigo	<i>Baptisia bracteata var. glabrescens</i>	SPC
Smooth Rock Cress	<i>Boechera laevigata</i>	SPC
Prairie Moonwort	<i>Botrychium campestre</i>	SPC
Blunt-lobed Grapefern	<i>Botrychium oneidense</i>	THR
Carey's Sedge	<i>Carex careyana</i>	END
James' Sedge	<i>Carex jamesii</i>	THR
Smooth-sheathed Sedge	<i>Carex laevivaginata</i>	THR
Spreading Sedge	<i>Carex laxiculmis</i>	THR
Hill's Thistle	<i>Cirsium pumilum var. hillii</i>	SPC
Silvery Spleenwort	<i>Deparia acrostichoides</i>	SPC
Squirrel Corn	<i>Dicentra canadensis</i>	SPC
Narrow-leaved Spleenwort	<i>Diplazium pycnocarpon</i>	THR
Goldie's Fern	<i>Dryopteris goldiana</i>	SPC
Rattlesnake Master	<i>Eryngium yuccifolium</i>	SPC
Upland Boneset	<i>Eupatorium sessilifolium</i>	THR

Species (Common Name)	Species (Scientific Name)	State Status
False Mermaid	<i>Floerkea proserpinacoides</i>	THR
Black Huckleberry	<i>Gaylussacia baccata</i>	THR
Canada Frostweed	<i>Helianthemum canadense</i>	SPC
Long-bearded Hawkweed	<i>Hieracium longipilum</i>	WAL
Beach Heather	<i>Hudsonia tomentosa</i>	THR
Goldenseal	<i>Hydrastis canadensis</i>	END
Twinleaf	<i>Jeffersonia diphylla</i>	SPC
Glade Mallow	<i>Napaea dioica</i>	THR
Old Field Toadflax	<i>Nuttallanthus canadensis</i>	SPC
One-flowered Broomrape	<i>Orobanche uniflora</i>	THR
Cowbane	<i>Oxypolis rigidior</i>	WAL
American Ginseng	<i>Panax quinquefolius</i>	SPC
Rough-seeded Fameflower	<i>Phemeranthus rugospermus</i>	THR
Woodland Bluegrass	<i>Poa sylvestris</i>	WAL
Christmas Fern	<i>Polystichum acrostichoides</i>	END
Leedy's Roseroot	<i>Rhodiola integrifolia ssp. leedyi</i>	END (Federally Threatened)
Beaked Snakeroot	<i>Sanicula trifoliata</i>	SPC
Short's Aster	<i>Symphyotrichum shortii</i>	SPC
Yellow Pimpernel	<i>Taenidia integerrima</i>	SPC
Goat's Rue	<i>Tephrosia virginiana</i>	SPC
Edible Valerian	<i>Valeriana edulis var. ciliata</i>	THR

END = endangered, THR = threatened, SPC = special concern, WAL = watch list

Upland Forests and Woodlands

Fire-Dependent Forests and Woodlands. These communities occur primarily on relatively dry upland sites with a south to west aspect, and are dominated by oak, hickory, and walnut with some white pine, cherry, and other hardwood tree species. Fire is a driving factor for perpetuating these forest types.

Southern Dry-Mesic Pine-Oak Woodland (FDs27)

Dry-mesic (or dry) hardwood or pine-hardwood woodlands on sand deposits, primarily in the blufflands of southeast Minnesota.

Southern Dry-Mesic Oak-Hickory Woodland (FDs38)

Dry-mesic (or dry) deciduous woodlands on steep, exposed, south- to west-facing bluffs of southeast Minnesota, often adjacent to bedrock bluff prairies.

Mesic Hardwood Forest. These communities are typically closed canopy forests that occur on moist sites with a north to east facing aspect and are dominated by basswood and sugar maple trees.

Central Mesic Cold-Slope Hardwood-Conifer Forest (MHc38)

Hardwood-conifer forests on steep north-facing bluffs, often associated with algific talus slopes, where cold air vents enhance the cool, moist microclimate of the community. Characterized by northern species otherwise absent in southeast Minnesota.

Southern Dry-Mesic Oak Forest (MHs37)

Dry-mesic hardwood forests occurring most often on thin, wind-deposited silt on crests and upper slopes of bedrock bluffs and less often on hummocky stagnation moraines in calcareous, partially sorted drift.

Southern Mesic Oak-Basswood Forest (MHs38)

Mesic hardwood or, occasionally, hardwood-conifer forests. Present on wind-deposited silt on bedrock bluffs, on calcareous till on rolling till plains, and, rarely, on weakly calcareous till on stagnation moraines.

Southern Mesic Maple -Basswood Forest (MHs39)

Rich mesic hardwood forests on loamy soils derived from calcareous till or wind deposited silt over bedrock. Present on sites that have been historically protected from fires on hummocky stagnation moraines, on till plains along the Minnesota River, and on middle or lower slopes of bedrock bluffs.

Southern Wet-Mesic Hardwood Forest (MHs49)

Rich, wet-mesic lowland hardwood forests on level silty alluvium in stream valleys and on level glacial till bordering lakes. Sites are protected from fire, and soils remain moist throughout the growing season.

Wetland Forests

Floodplain Forest. This plant community occurs in wet, lowland areas, particularly along streams. They are most often closed canopy, and are dominated by silver maple, cottonwood, ash, and other hardwood tree species.

Southern Terrace Forest (FFs59)

Wet-mesic deciduous forests on silty or sandy alluvium on level, occasionally flooded sites along small streams to large rivers in the southern half of Minnesota.

Wet Forest. This plant community also occurs in wet, lowland areas associated with groundwater seeps and river/stream terraces. Dominant tree species are ash, with some basswood and sugar maple.

Southern Wet Ash Swamp (WFs57)

Wet hardwood forests on mucky or peaty soils in areas of groundwater seepage, most often on level stream or river terraces at the bases of steep slopes. Community is uncommon and often present as small inclusions within larger forest areas.

Upland Grasslands, Shrublands, and Sparse Vegetation

Cliff/Talus. These plant communities occur on cliffs and talus slopes associated with steep-sided bluffs, along streams and on margins of bedrock ridges. These communities are typically open and dominated by lichens and mosses, with vascular plants sparsely occurring in crevices and on ledges.

Southern Dry Cliff (CTs12)

Open, lichen-dominated plant communities on dry, sunny south- to west-facing cliffs in rugged terrain, primarily in southeast Minnesota. Vascular plants are sparse and restricted to crevices and ledges.

Southern Mesic Cliff (CTs33)

Open lichen- and moss-dominated plant communities on dry-mesic to mesic, shaded, northwest- to east-facing cliffs in rugged terrain in southeast Minnesota. Vascular plants are largely restricted to crevices and ledges.

Southern Maderate Cliff (CTs43)

Cool, moist, moss dominated plant communities on shaded northwest- to northeast-facing cliffs of karst landscapes of southeast Minnesota. Characterized by cold microclimate maintained by cold air and groundwater emanating from subterranean ice. Community supports northern plants uncommon in southern Minnesota and Pleistocene land snails.

Southern Algific Talus (CTs46)

Cool, moist, open plant communities on steep northwest- to northeast-facing bluffs in karst landscapes of southeast Minnesota. Characterized by cold wet microclimate

maintained by cold air and groundwater emanating from subterranean ice. Community supports northern plants uncommon in southern Minnesota and Pleistocene land snails.

Upland Prairie and Savanna. The prairie communities are dominated by tall and short native grasses and forbs (flowers) with few to no trees. The savanna communities are similar to prairie in that they have native grasses and forbs in the understory, but also have a shrub and/or tree component. The most common tree species on savannas are bur and pin oaks. Both prairie and savanna plant communities are fire dependent.

Southern Dry Prairie (UPs13)

Grass-dominated herbaceous communities on level to steeply sloping sites with droughty soils. Moderate growing-season moisture deficits occur most years and severe moisture deficits are frequent, especially during periodic regional droughts. Historically, fires probably occurred every few years.

Southern Dry Savanna (UPs14)

Sparsely-treed communities with grass-dominated herbaceous ground layers on nearly level to steeply sloping sites with droughty soils. Moderate growing-season moisture deficits occur during most years, and severe moisture deficits are frequent, especially during periodic droughts. Trees are open-grown, typically small and gnarled.

Southern Mesic Prairie (UPs23)

Grass-dominated but forb-rich herbaceous communities on somewhat poorly drained to well-drained loam soils mainly formed in unsorted glacial till, sometimes in a thin loess layer over till, and locally in lacustrine sediments and outwash deposits. Communities in this class occur primarily on level to gently rolling sites. Drought stress is irregular in occurrence and usually not severe.

Wetland Grasslands, Shrublands, Marshes

Wet Meadow/Carr. These plant communities are typically open wetlands dominated by dense grasses, such as sedges, and/or tall shrubs, typically willow and red-osier dogwood. This community is often significantly impacted by the non-native reed canary grass.

Northern Wet Meadow/Carr (WMn82)

Open wetlands dominated by dense cover of broad-leaved graminoids or tall shrubs. Present on mineral to sapric peat soils in basins and along streams.

Southern Seepage Meadow/Carr (WMs83)

Open wetlands dominated by a dense cover of hummock-forming broad-leaved sedges or tall shrubs. Present in areas of groundwater seepage along streams and drainage ways, on sloping terraces, and at bases of slopes.

Marsh. Marshes are robust emergent plant communities along a moisture and often depth gradient dominated by cattail and hardstem bulrush.

Northern Bulrush-Spikerush Marsh (MRn93)

Emergent marsh communities, typically dominated by bulrushes or spikerushes. Present along lakeshore and stream borders.

Shallow, Open Water Communities

Shallow, open water plant communities generally have water depths of less than 6.6 feet, and are dominated by submergent and emergent vegetation, such as pondweeds, water milfoil, coontail, and duckweeds as well as cattails and reeds. Size can vary from a one-quarter acre pond to a long oxbow of a river or shallow bay of a lake. The presence or absence of floating vegetation depends upon the effects of the season, wind, availability of nutrients, and water level management (Eggers & Reed, 2015). Wetland impoundments controlled by dikes and water control structures make up most of the shallow, open water communities on the WWMA.

River Shore. River shore communities occur along the shorelines of rivers and streams in the zone between annual low-water level and the upper limit of impacts from currents and ice scouring.

Sand/Gravel/Cobble River Shore (RVx32)

Sparsely to densely vegetated plant communities on sand, gravel, or small cobbles on river shores. Characterized by annual herbaceous species, firmly rooted perennial species tolerant of inundation, and species dispersed by tubers and other floating propagules. Scoured annually during spring breakup and flooding, by ice and currents, and following heavy rains.

Clay/Mud River Shore (RVx54)

Sparsely to densely vegetated plant communities on clay or silt substrates on river shorelines that flood in spring but are exposed as water levels recede over summer. RVx54 includes plant communities on slumping river embankments as well as river shorelines.

Natural Streams

Streams include a degree of habitat and biological diversity along a longitudinal gradient, from the headwaters to the lower reaches. The structure of the stream and its biological communities evolve along the length of the river. In general, as the size of the stream grows, so does the diversity of habitat, invertebrates, and fish; however, migration barriers limit potential biotic diversity of aquatic invertebrates and fish. In the WWMA, most streams are cold-water and are designated as trout streams or are designated as tributaries to trout streams.

Ditches

Historically, a portion of the Whitewater River was modified into a ditch system to facilitate drainage when the valley was farmed. The river has been diverted back into its original stream channel, and plugs were put in the channels to create small wetland

areas that serve as habitat for migrating waterfowl as well as beaver, muskrats, and river otters.

Agricultural Lands

The WWMA has approximately 2,500 acres of cropland, managed through 44 Cooperative Farming Agreements (CFAs) with 36 cooperators. CFAs are legal contracts with local farmers to farm agricultural lands on the WMA on a sharecrop basis. The state typically receives a one-third share of the crops produced. There are a variety of options for disposition of the state's share including bartering with cooperators to provide services, but the primary one is leaving crops standing for wintering wildlife food resources. Crops are mutually agreed on and can include corn, soybeans, alfalfa, oats, hay, a wildlife mix, or other crops. More diverse rotations that include cover crops are preferred. About two-thirds of the farmland is planted to row crops (corn and soybeans) and one third is planted to oats, alfalfa, hay, or wildlife mix. Farming practices on all state lands are currently under review and moving toward more focus on soil health and other environmental impact considerations.

WWMA staff do not currently plant any agricultural crops on the unit, rather they rely on CFAs to provide winter food resources and some spring and summer nesting cover. A notable change in farming on the WWMA since the previous plan is the interest in providing organic certified crops for the local dairy industry. The certification process for land to become organic requires a three-year rotation without herbicides/pesticides prior to certification. After this three-year rotation, the crop is then certified as organic.

D. Wildlife

WWMA provides habitat for over 200 bird species and 50 mammal species during some part of the year. Of Minnesota's rare animals, 43 percent live in the Blufflands Ecological Subsection (Minnesota DNR, 2017). Abundant and diverse wildlife species are found in the Whitewater due in large part to the wide diversity and quality of habitats.

Birds

WWMA's diverse habitats attract a large variety and number of birds. A checklist of bird species known to occur or probably occurring on or near the unit can be found in Appendix G. Many species, especially migrants, may be uncommon or rare because preferred habitat on the WWMA may be lacking or because the unit lies near the normal limit of a species' range. Most bird species found on the WWMA probably occurred before settlement; however, human activities have altered the relative abundance of some species and have caused the introduction, extirpation, or range expansion/retraction of other species. As settlement progressed, populations of species able to utilize human-altered habitats increased, while other bird populations requiring specialized habitats decreased. Of the more than 240 bird species that may occur on the WWMA, some are permanent or summer residents and commonly nest on the WWMA, some are fall and spring migrants, and some are winter residents. Common species are found in Table 6. Eleven species are listed on Minnesota's Endangered, Threatened or Special Concern Species list that was updated in 2013. SGCN were identified in Minnesota's State Wildlife Action Plan. SGCN include all of Minnesota's species listed as

Endangered, Threatened or Special Concern, along with an additional 46 non-listed bird species that can be thought of as “watch list species.”

All migratory birds, except non-native species such as house sparrows, European starlings, mute swans, and rock pigeons, are protected under the federal Migratory Bird Treaty Act (16 USC 703–712; 40 Stat. 755, as amended), which prohibits the take of any migratory birds without authorization from USFWS. Minnesota also has state regulations that protect birds. Hunting regulations are developed and authorized by USFWS and DNR. Thirty-four bird species may be taken only during authorized hunting seasons.

Table 6. Common bird species found at Whitewater WMA and their associated habitats

Habitat	Game Species	Nongame Species
Lakes, Wetlands, and Waterways	Canada Goose, Wood Duck, Mallard, Blue-winged Teal, American Coot, Sandhill Crane, American Woodcock (SGCN)	Trumpeter Swan (SGCN, SPC), Tundra Swan, Pied-billed Grebe, Lesser Yellowlegs, Spotted Sandpiper, Great Blue Heron, Great Egret, Green Heron, Bald Eagle, Belted Kingfisher (SGCN), Purple Martin (SGCN, SPC), Tree Swallow, Northern Rough-winged Swallow (SGCN), Bank Swallow, Cliff Swallow, Barn Swallow, Gray Catbird, Common Yellowthroat, Swamp Sparrow, Red-winged Blackbird, Northern Waterthrush
Forests (Coniferous, Deciduous and Mixed)	Wild Turkey, Ruffed Grouse, American Woodcock	Barred Owl, Turkey Vulture, Cooper's Hawk, Broad-winged Hawk, Red-tailed Hawk, Bald Eagle, Peregrine Falcon (SGCN), Red-bellied Woodpecker, Yellow-bellied Sapsucker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Eastern Wood-Pewee, Eastern Phoebe, Great Crested Flycatcher, Least Flycatcher, Yellow-throated Vireo, Warbling Vireo, Red-eye Vireo, Blue Jay, Black-capped Chickadee, White-breasted

Habitat	Game Species	Nongame Species
		Nuthatch, House Wren, Blue-gray Gnatcatcher, American Robin, Brown Thrasher, Ruby-crowned Kinglet, Yellow-crowned Kinglet, Gray Catbird, Cedar Waxwing, Ovenbird, Blue-winged Warbler, American Redstart, Yellow Warbler, Tennessee Warbler, Nashville Warbler, Chestnut-sided Warbler, Yellow-rumped Warbler, Palm Warbler, Black-and-white Warbler, Scarlet Tanager, Northern Cardinal, Rose-breasted Grosbeak, Indigo Bunting, Baltimore Oriole, Orchard Oriole, Ruby-throated Hummingbird, Purple Finch (SGCN), American Tree Sparrow, Fox Sparrow, White-throated Sparrow, Dark-eyed Junco, Chimney Swifts (SGCN)
Brushlands	Ruffed Grouse, American Woodcock (SGCN)	Brown Thrasher (SGCN), Gray Catbird, Yellow Warbler, Swamp Sparrow, Northern Thrush
Prairies, Grasslands, Savannas	Ring-necked Pheasant	Killdeer, American Kestrel (SGCN), Eastern Kingbird, Horned Lark, Bank Swallow, Barn Swallow, Eastern Bluebird, Eastern Towhee (SGCN), Chipping Sparrow, Field Sparrow, Savannah Sparrow, Song Sparrow, Vesper Sparrow, Dickcissel (SGCN), Brown-headed Cowbird, Bobolink (SGCN), Western Meadowlark (SGCN), Common Nighthawk (SGCN), Red-headed

Habitat	Game Species	Nongame Species
		woodpecker (SGCN), Henslow's sparrow (END)
Agricultural Areas	Canada Goose, Mallard, Ring-necked Pheasant, Sandhill Crane, Mourning Dove	Killdeer, Rock Pigeon, Northern Harrier (SGCN), Red-tailed Hawk, Great Horned Owl, American Kestrel, European Starling, House Sparrow, Song Sparrow, American Goldfinch, House Finch, Common Grackle, Brown-headed Cowbird, American Crow

SGCN=Species of Greatest Conservation Need, SPC= Minnesota Special Concern Species, END=Endangered

Waterfowl and Game Birds

Waterfowl. Waterfowl hunting is available on most pools or impoundments, plugged ditches, and the Whitewater River. The only exception to this is that Dorman and Appleby Pools are closed to waterfowl hunting because they are located within the State Game Refuge. Heavy hunting pressure can result in waterfowl leaving the area shortly after the season opens; however, the diligent hunter may still find birds using backwater areas and hidden wet spots around the WWMA. Formal bag checks or car counts are not typically conducted during the waterfowl season, but mallards, wood ducks, blue-winged teal, and geese are the most prevalent waterfowl taken.

Wild Turkey. Oak forests provide preferred habitat for wild turkeys, but they use a variety of habitats throughout their life cycle. Mature forests provide roost trees and hard mast as food. Grasslands and hay fields are used as nesting cover and brood rearing habitat. Agricultural fields can be used for feeding, especially in winter.

Wild turkey reintroduction efforts using live-trapped and translocated wild turkeys of the Merriam subspecies were conducted in the 1960s (Minnesota DNR, 2006). Eastern subspecies of the wild turkey were released later in the early 1970s in Houston County, about 60 miles south of the Whitewater. The Merriam (subspecies) turkeys increased in the 1970s to a huntable population by 1978 but declined significantly in the early 1980s. As a result, the Eastern (subspecies) turkeys from Houston County were relocated to the Whitewater in the early 1980s, where they prospered. Eastern turkeys were used for all translocation efforts in Minnesota after the early 1980s (Minnesota DNR, 2006).

Ruffed Grouse. The ruffed grouse is an iconic upland gamebird of the southeast Minnesota forest. While they may occupy any of the deciduous or mixed forests of the WWMA, they typically reach their highest population densities in areas where recent disturbance creates blocks of several different age classes of forest in proximity to one another. Young forest with stands of high-density

saplings provides predation protection for females raising broods, older stands contain diverse shrub layers and ground vegetation for optimal foraging, and older forests for mast production including acorns and also buds for winter feeding. Aspen and oak provide good foraging opportunities for ruffed grouse on WWMA where they exist as do a variety of shrubs and ground layer vegetation. Drumming surveys indicate a variable population.

These population changes are consistent with changes in land use and land cover. As the number of farms and farmed acres in the region declined, pastures and fields converted to early successional forests that supported an increasing number of ruffed grouse (Walter, 2016). When these forests, which are not dominated by aspen, later matured, they did not have a dense understory, and the quality of ruffed grouse habitat declined. Grouse populations appear to be limited by nesting habitat and possibly brood-rearing habitat, which results in low survival of females during spring (Walter, 2016).

Pheasant. Pheasants are found on the Whitewater, associated with the grasslands and croplands; however, their numbers are not high. Harvest, while not tracked, is thought to be low. The DNR has implemented a Pheasant Plan that focuses mainly on western Minnesota. The key habitat needs for pheasants are grasslands, but they will also use shrublands, wetlands, hay fields and other crop land. Nesting and brood rearing habitat are critical for successful pheasant populations. Pheasants Forever recommends a minimum of 20 acres of grassland for successful nesting.

American Woodcock. American woodcock is the only shorebird that inhabits the forest floor. This species is typically found in moist woodlands and edges of marshes and fields. Woodcock habitat on WWMA is young forest stands, particularly aspen, or other brushy areas located near more open fields, which are used for courtship displays and night roosting. Woodcock are a migratory species in our region, and most likely use the Mississippi River Flyway for much of its migration. While American woodcock numbers are stable in Minnesota, numbers have declined by one-third across North America. There is some uncertainty about populations in Minnesota because the birds are secretive, and surveying is difficult. Threats to the species include habitat loss due to urbanization, agricultural development, degradation of wetlands, and succession of young forests to an older age class.

Sandhill Crane. Sandhill cranes are migratory birds, using wet meadows and open grasslands. This species only started nesting on the WWMA within the last 10 years. Sandhill cranes are a protected species in Minnesota, and although it is legal to hunt them in part of northern Minnesota during the sandhill crane hunting season each year, they currently cannot be hunted in southern Minnesota. Fluctuating water levels and disturbance are two factors that may hinder nesting on the WWMA. Impoundments on the WWMA are managed so as not to impact nesting for cranes and other waterfowl.

Nongame Birds

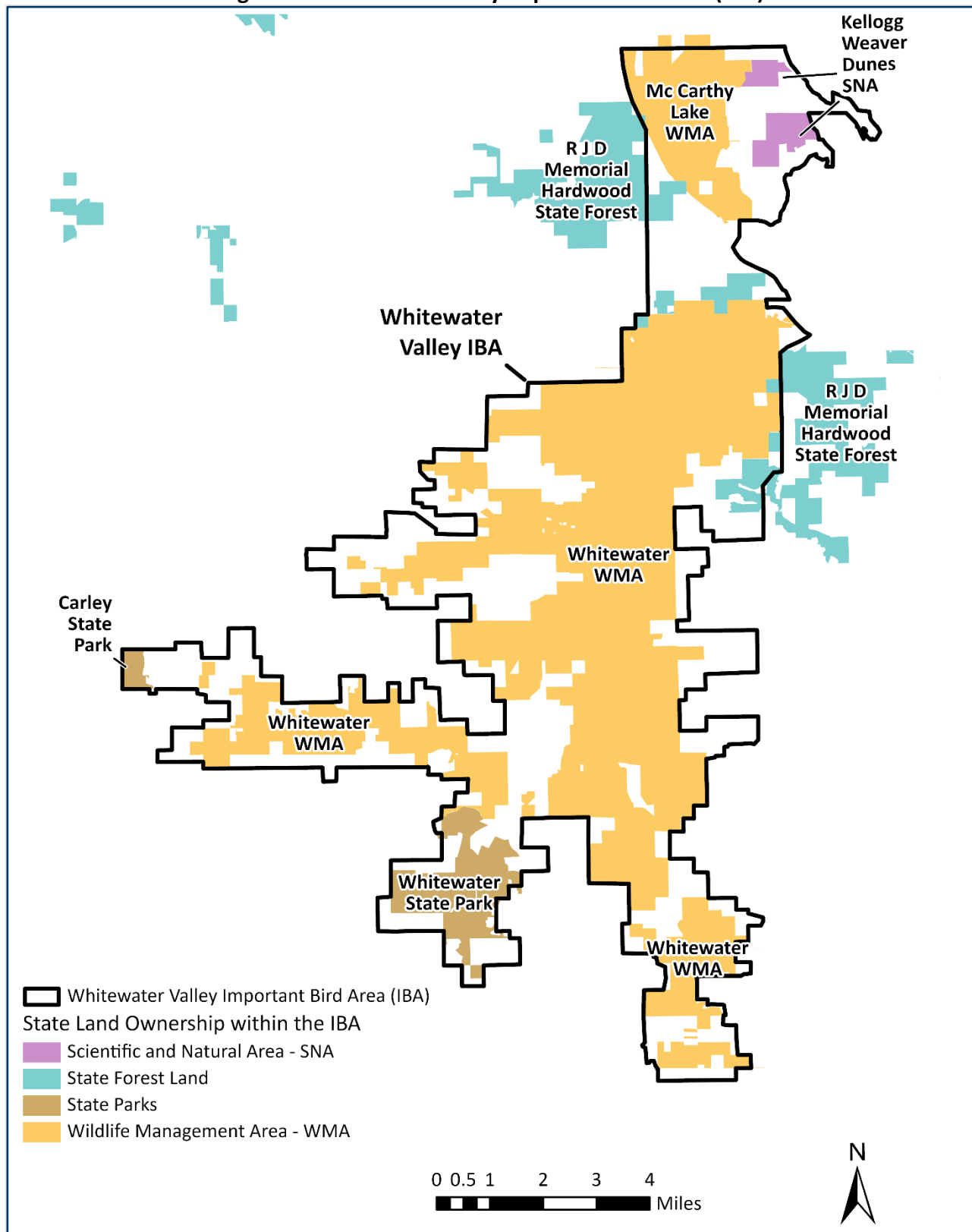
The rich diversity of native plant communities in the WWMA attracts a significant variety of migrating and locally breeding birds. The entire WWMA, along with the neighboring Whitewater State Park, Carley State Park, and Trout Valley State Forest unit, is included in the Whitewater Valley IBA (Figure 8). A total of 242 bird species have been recorded within the Whitewater Valley IBA, including 25 species of waterfowl, 22 species of shorebirds, 31 species of warblers, and 17 species of sparrows.

Trumpeter swan, red-shouldered hawk, cerulean warbler, Acadian flycatcher, and Louisiana waterthrush are state listed Species of Concern that have been recorded in this IBA and are important species for the WWMA as well.

Image 5. Swans at Randall Pool



Figure 8. Whitewater Valley Important Bird Area (IBA)



The Minnesota Breeding Bird Atlas (BBA) is a large-scale volunteer project designed to document every species that currently breeds in Minnesota. The BBA includes areas on WWMA, and eighteen sampling blocks were surveyed over the past seven years. Over 100 bird species were documented in each of the survey blocks. Due to proximity and similarity of habitat, it is reasonable to consider these results a list of breeding birds on the WMA.

Audubon Minnesota recently evaluated the importance of Minnesota habitats for selected bird species on a global scale. Minnesota is uniquely important for twelve bird species because the state contains 5% or more of the bird’s global breeding population and encompasses 5% or more of their breeding range. These birds are considered Minnesota’s Stewardship Species (Table 7). If their stronghold in our state were to diminish, it could potentially impact the global population of that species. The WWMA serves as nesting habitat for eight of the 12 species and migratory habitat for the remaining four species. More information on how the Stewardship Species were selected and management/monitoring recommendations can be found in the document “Blueprint for Minnesota Bird Conservation: Recommendations for Minnesota’s Prairie Hardwoods Transition Region,” written by Lee Pfanmuller for Audubon Minnesota in 2014.

Table 7. Stewardship Species in Minnesota and relationship to Whitewater WMA

Species	% Global Population	% of Range in Minnesota	Occurrence in WWMA	Habitat
American White Pelican	18	In combo with North Dakota – 40% of global population	Migrant	Uses wetlands during migration
American Woodcock	10	6% of its breeding range	Breeding	Young forests
Baltimore Oriole	5	8% of its breeding range	Breeding	Forest edges, open woodlands
Black-billed Cuckoo	10	10% of its breeding range	Likely Breeding	Forest edges and thickets

Species	% Global Population	% of Range in Minnesota	Occurrence in WWMA	Habitat
Bobolink	13	9% of its breeding range	Breeding	Open grassland/prairie
Chestnut-sided Warbler	6	6% of its breeding range, and highest U.S. abundance	Migrant	Young forests
Golden-winged Warbler	42	12% of its breeding range	Migrant	Shrub wetlands and young forests
Nashville Warbler	5	5% of its breeding range, and highest U.S. abundance	Migrant	Middle-aged forests (15-40 years old)
Rose-breasted Grosbeak	6	10% of its breeding range	Breeding	Mesic upland forests 20-40 years old
Sedge Wren	33	14% of its breeding range, and highest U.S. abundance	Likely breeding	moist grasslands with shrubby component /wet meadows
Trumpeter Swan	12	Largest population south of Alaska/Canada	Breeding	Marshes and shallow lakes

Species	% Global Population	% of Range in Minnesota	Occurrence in WWMA	Habitat
Veery	6	5% of its breeding range, and highest U.S. abundance	Breeding	Damp deciduous forests/riparian forests

Trumpeter swans use and nest in most of the wetlands within the WWMA. Minnesota supports the largest population of trumpeter swans south of Alaska and Canada, so maintaining nesting areas throughout the state is important for the long-term continental conservation of this species. Trumpeter swans eat primarily vegetation, so encouraging a diversity of aquatic plants such as pondweeds and bulrushes, is important. Trumpeters also eat fish, fish eggs, and small aquatic animals such as mussels and crayfish. In addition to needing adequate forage, swans are large birds requiring a minimum of 30 feet of open water to allow for a “running” start to become airborne. Nests are typically located closer to shore and are built on muskrat and beaver lodges, and floating vegetation mats.

Additional priority birds of interest known to nest within the WWMA include the red-shouldered hawk, cerulean warbler, prothonotary warbler, Acadian flycatcher, and Louisiana waterthrush. These species are typically found in mature, lowland deciduous forests, with some also occurring in upland deciduous forests. These species have large minimum habitat requirements, need closed canopy conditions, and are experiencing declines across their breeding range. They are also limited to the Prairie-Hardwood Transition Zone of Minnesota, and the WWMA contains some of the largest blocks of suitable habitat remaining in the region. These factors combined indicate these birds and their habitat requirements should be given special consideration during forest habitat planning and management on the WWMA. Table 8 identifies minimum habitat requirements and habitat characteristics necessary for successful breeding for these priority forest interior species.

Table 8. Priority forest interior bird species for the WWMA, their habitat requirements, and characteristics

Species	Minimum area required	Habitat	Forest Age	Forest Structure	Cavity Trees	Other
Cerulean warbler	>900 acres (400 ha)	Lowland and upland deciduous forests	Mature with trees >65' tall and 12"-24" dbh	Multi-layered canopy with small canopy gaps	Not needed	Area sensitive
Prothonotary warbler	>250 acres (100 ha)	Floodplain and lowland deciduous forests	Mature	Sparse understory and ground cover, 50-75% canopy cover with 12' to 120' trees	Cavity nester, needs trees 6"-8" dbh	Avoids waterways with less than roughly 100' wide wooded borders
Acadian flycatcher	>250 acres (100 ha)	Floodplain and lowland deciduous forests	Mature	Dense canopy cover >75%, open to semi-open understory	Not needed	Prefers riparian forests, often nests on branches hanging over water

Species	Minimum area required	Habitat	Forest Age	Forest Structure	Cavity Trees	Other
Red-shouldered hawk	>250 acres (100 ha)	Lowland and upland deciduous forests	Mature	Dense canopy (>75%) with some open wetland areas, semi-open to open understory	Not needed	Retain minimum of 15 live trees >15" dbh/acre
Louisiana waterthrush	>240 acres (100 ha)	Lowland and mesic upland deciduous forests	Mature	Downed logs and bank cavities for nesting	Not needed	Streams in steep-sided valleys, exposed rock within stream, water depths <2"

Data from "Blueprint for Minnesota Bird Conservation," Spring 2014, Audubon Minnesota, species accounts from Audubon Minnesota and Wisconsin DNR.

Mammals

Most mammal species found on the WWMA today were present during pre-settlement times. As settlement progressed, habitat destruction and unregulated hunting and trapping resulted in the decimation and, in some cases, the elimination of several larger mammals from the area. The historical distribution of small, inconspicuous species is unknown. Mammal species present or suspected to occur on the WWMA were determined from information supplied by Section of Wildlife records and observations from staff working at the WWMA (Appendix H). Approximately 40 mammal species are known or suspected to occur on or near the WWMA. Some of these 40 mammal species are thought of as game species, six are state listed as special concern, three are considered SGCNs,

and one species, the Northern long-eared bat, is federally listed as Endangered as of January 30, 2023.

Large Mammals and Big Game

WWMA supports a high population of deer and accommodates large numbers of deer hunters. Deer are habitat generalists and use almost all the habitats available at WWMA. They tend to feed in early successional and oak forests, and on agricultural crops. They use forested habitat for security and thermal cover. They prefer that these cover types are well interspersed with each other and favor edge habitat. The current approach to management of the Whitewater's deer habitat – retaining oak and protecting a diversity of plant communities – produces excellent deer habitat.

Mid-sized Mammals, Small Game, and Furbearers

WWMA is home to several mid-sized mammals, many of which are classified as “small game” in hunting regulations or as furbearers in trapping regulations. Common small game hunted on the WWMA include raccoons, coyote, red fox, rabbits, striped skunk, squirrels, and weasels. Furbearers include a variety of mammals trapped or hunted for their pelts. Important furbearers on WWMA include muskrats, mink, beaver, otter, and raccoon. Many furbearers are associated with water and wetlands (e.g., muskrats, otters, beavers, weasels). Rabbits, raccoons, and coyotes can be found in a wide variety of habitats, including croplands, open areas, and forests.

Fox and gray squirrels are found throughout the forested areas of the Whitewater. Gray squirrels have been used as an indicator species for mature and old-growth oak communities (Healy & Welsh, 1992). Gray squirrels use a greater variety of tree species for nests and use habitats with a greater range in structure and species, than fox squirrels (Edwards, Heckel, & Guynn, Jr., 1998). There is high squirrel hunting pressure on the WMA. The current approach to management of the Whitewater's habitat, especially the management of oak and older forests, results in good squirrel habitat.

Small Mammals

Small mammals are important to ecosystems, serving as food for predators, distributors of seeds, grazers, and consumers of invertebrates. Although generally inconspicuous, small mammals are representative of deciduous forest, wetland, bluff prairie, and grassland communities on the WMA. Several species of voles, mice, shrews, bats, and moles are common.

Fish

Fisheries management within the area is primarily directed towards trout streams. Fish species present in trout streams with at least part of their watershed on the WWMA are listed in Appendices I through L.

Fifty-one fish species have been sampled in the Whitewater watershed from the 1950s to present. Coolwater fish species are more common to the Main Whitewater River than warmwater species. Watersheds of the other streams have abundant springs and support a coldwater fish community. Overall, the fish community of the Whitewater watershed has become increasingly coldwater from the 1950s to present.

Herpetofauna

Due to the diversity of habitats and native plant communities and their landscape connections, the WWMA has a large diversity of reptiles and amphibians. Ten amphibian species and 17 reptile species are known to occur in WWMA. The Blanding’s turtle and the timber rattlesnake are listed as State Threatened. The North American racer and gophersnake are listed as State Species of Special Concern. The pickerel frog, six-lined racerunner, ring-necked snake, and eastern hog-nosed snake are listed as a SGCNs. Species of herpetofauna that occur in the WMA and their current status can be found in Appendix M.

Some general management guidelines to consider for reptiles and amphibians can be found in the document “Habitat Management Guidelines for Amphibians and Reptiles of the Midwestern United States,” developed by Partners for Amphibian and Reptile Conservation (PARC). For convenience, Table 9 provides basic habitat needs for SGCN and state listed herpetofauna.

Table 9. Habitat requirements for SGCN and state listed herpetofauna within Whitewater WMA

Species	Habitat	Important Habitat Requirements
Pickerel Frog	Wooded and open habitat along cold water streams	Wet meadows near streams
Blanding's Turtle	Wetland complexes adjacent to sandy uplands and riverine habitats	Upland habitat adjacent to a variety of wetland types
Six-lined Racerunner	Dry prairie, oak savanna, barrens, sand prairie	Exposed sandy areas, rock outcrops
E. Hognose Snake	Dry prairie, oak savanna, barrens	Sandy soils near aquatic habitat
North American Racer	Open woods, grasslands, bluff prairies, savannas	Exposed south to west facing bluffs for denning
Gophersnake	Dry prairies, bluff prairies, savannas, barrens	Dry sandy soils

Species	Habitat	Important Habitat Requirements
Timber Rattlesnake	Deciduous forest associated with bluff prairies	Exposed south to west facing bluffs for denning
Ring-necked Snake	Forest edges and openings, bluff prairies	Grasslands or barrens habitat near water

Invertebrates

The WWMA has a large diversity of invertebrate species ranging from dragonflies, to bumble bees, to butterflies and skippers. A plethora of common invertebrates, such as painted lady and Emperor hackberry butterflies, occur on the WMA and can be observed widely across the entire property. Several rare and/or listed invertebrates also occur on the WWMA, including the Karner Blue Butterfly (KBB), Rusty Patched Bumble Bee (RPBB), and Persius duskywing skipper. The invertebrates that are known to occur on the WMA likely only scratch the surface of what is present. Interest in invertebrate species has grown in recent years, and survey efforts and capacity to identify these challenging species have increased. This will likely lead to an increase in the number of invertebrates known to occur on the WWMA, some of which may be rare or unique to the Driftless Area.

Karner blue butterfly (*Lycaeides melissa samuelis*) is listed as a state and federal endangered species. This small blue butterfly occurs in sand barrens and sand prairie habitat where its larval host plant, lupine, is present along with other forb species for nectaring. KBBs historically occurred on the WWMA. The first documentation of KBBs on the WWMA occurred during a 1990 survey conducted by David Cuthrell as part of a status effort since the species was under consideration for federal listing due to range-wide declines. Those historical locations had no recent observations, so it was thought KBBs were extirpated from the state. However, the discovery of the Whitewater populations in 1990 showed there was a hold out for this species in the state. Two separate populations were found on the WMA, in Historic Valley and Cuthrell Valley. Despite management efforts to reintroduce fire and enhance lupine and native forb density and diversity, the KBB population disappeared first from Historic Valley and then from Cuthrell Valley. Annual monitoring transects were run by the Nongame Wildlife Program in five different valleys in the WMA (Cuthrell, Fable, Historic, Lupine, and Turkey Valleys). The goal was to get population data in the locations KBB was known to occur and hopefully document new specimens where there was good habitat. No new locations were documented, and monitoring data trended downward until no KBBs were found for several consecutive years on the monitoring transects. Two professional surveys were conducted in 2009 and 2011 and did not yield any KBB sightings. Shortly after those surveys, KBBs were determined to be extirpated from Whitewater. This lifted the management restrictions that were being followed in occupied areas. The areas once occupied by KBBs are still being managed for sand prairie and savanna habitat, as well as for lupine.

Rusty patch bumble bee (*Bombus affinis*) is a federally endangered species. It was first officially recorded on the WWMA in 2017 with an observation along Highway 30, in Winona County. Since

then, several targeted surveys for RPBB have documented them at four additional locations within the WWMA, with a fifth location that needs further confirmation. The habitats in which RPBB were documented include a bluff prairie undergoing active restoration and one with less active management, sand prairie, and roadside habitat at the base of a bluff prairie. All these habitats are in proximity to forested habitat. Because the RPBB occurs on the WWMA, two large areas have been identified as High Potential Zones for RPBB by the USFWS. This means that management activities in these areas must consider RPBB needs before implementation.

Persius duskywing (*Erynnis persius persius*) is listed as endangered in Minnesota. This small blackish brown butterfly has only been documented in the WWMA. No other locations are known in the state. This butterfly occurs in open, sandy savannas and barrens where its larval host plants occur, primarily wild blue lupine and yellow wild indigo. This species was documented on the WMA in 1990 by David Cuthrell while he was surveying for Karner blue butterflies. The skipper was only observed in one location. Surveys conducted in 2018 and 2019 indicate this species is still present in small numbers on the WWMA. Habitat work to enhance the openness of the savanna where this species occurs are currently underway.

Leonard's skipper (*Hesperia leonardus leonardus*) is listed as special concern in Minnesota. It is a small orange and black butterfly typically found in dry sand prairies and savannas, although it has also been found on bluff prairies. Native grasses are important for egg laying and shelter construction, while native blazing star (*Liatris*) species are highly sought after for nectar. Leonard's have been observed at several locations on the WWMA, all restricted to sand or bluff prairie and savanna habitat.

E. Public Use

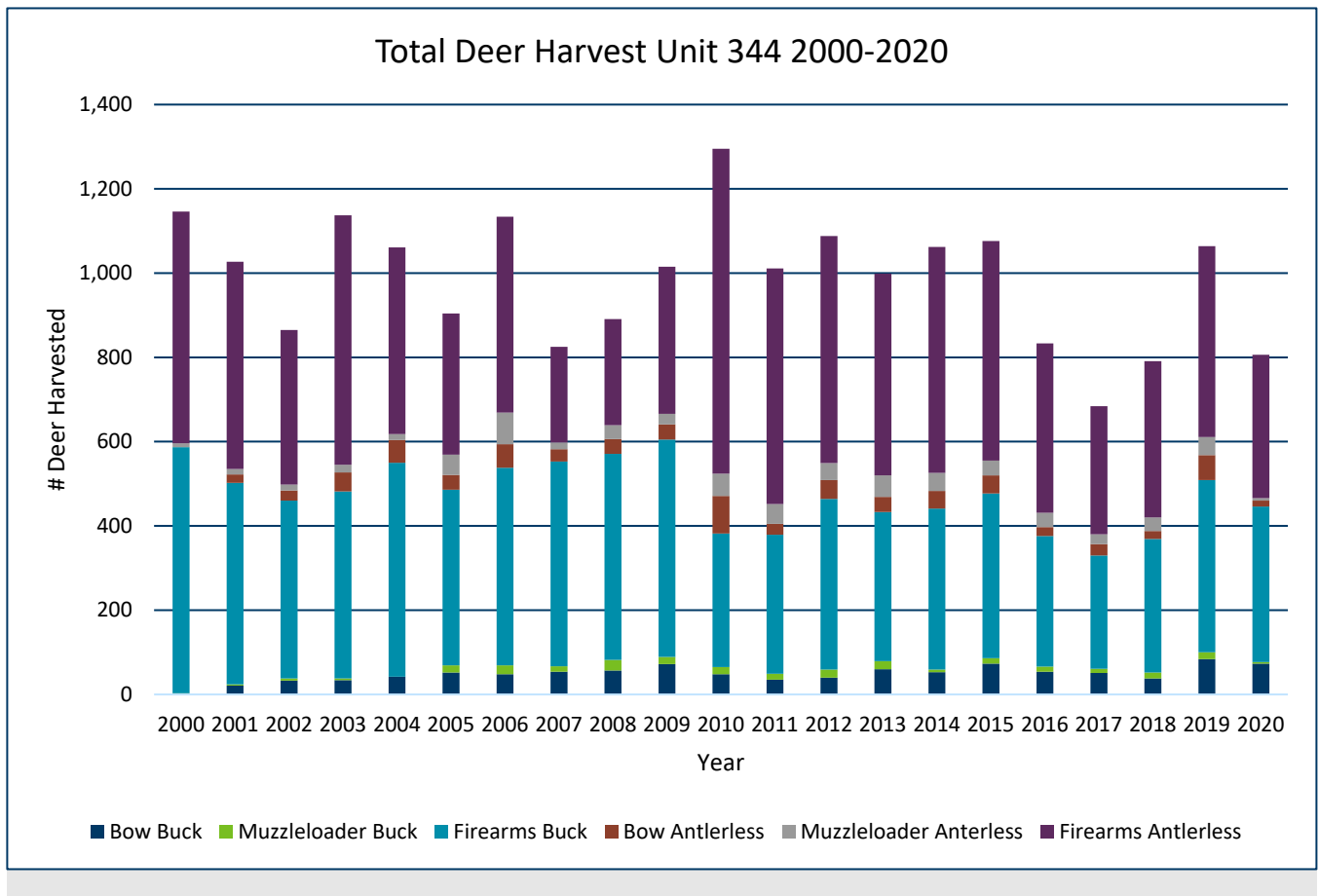
Minnesota's wildlife management areas are used for public hunting, trapping, fishing, and other activities compatible with wildlife and fish management. Hunting and fishing have always accounted for the largest share of public use on the WWMA, but the WWMA is also used for non-hunting or fishing activities such as wildlife watching, foraging, and hiking. Knowledge of the present use levels is necessary to predict the future demand for outdoor recreation and to guide management objectives and strategies.

Hunting

Deer Hunting. Deer hunting is the most popular activity on WWMA, thanks to both high deer numbers and the WWMA being the largest block of public land in southeast Minnesota.

Deer population density is managed almost exclusively through hunter harvest strategies. Annual assessment of population modeling and hunter harvest data by DNR staff leads to the annual hunter harvest strategy designation to help meet deer density goals, set through a process that includes extensive stakeholder engagement. Population goals were revisited and updated in 2022 through a public process.

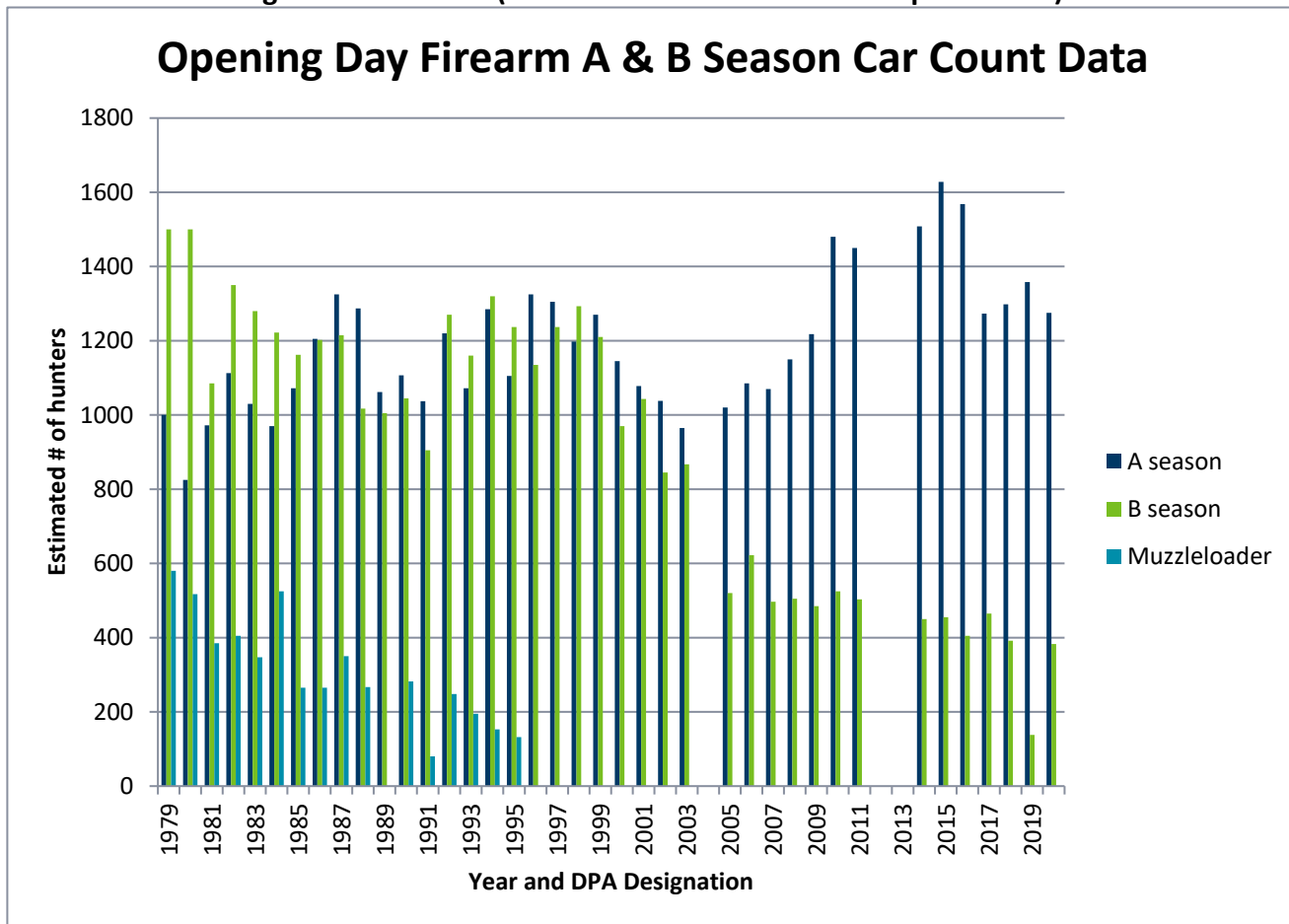
The fall deer harvest in Deer Permit Area (DPA) 344 (containing WWMA) averages around 990 deer per year, with 470 bucks and 520 antlerless deer. Figure 9 shows reported deer harvest by year and method.



In the 300 series of DPAs, the firearms deer season is divided into A and B season to distribute hunting pressure. When initially established over 30 years ago, the A season was a bucks-only season and the B season was either sex. Under this system, approximately 40% of hunters hunted the A season and 60% hunted the B season. In 2009, a decision was made to have identical season structures for both the A and B seasons. Since that decision, there has been a shift in hunters from the B to the A season, with approximately 70% of hunters now hunting the A season.

Since 1979, car counts have been conducted on WWMA on opening day of the firearms A and B seasons. These counts provide an estimate of the number of hunters using the WWMA and the distribution of hunters between the A and B firearms deer seasons. Figure 10 depicts the number of hunters per year and shows the distribution of hunters between the A and B seasons.

Figure 10. Estimated number of hunters per year based on vehicle counts on opening day of A and B gun deer seasons (estimate based on 2.5 hunters per vehicle)

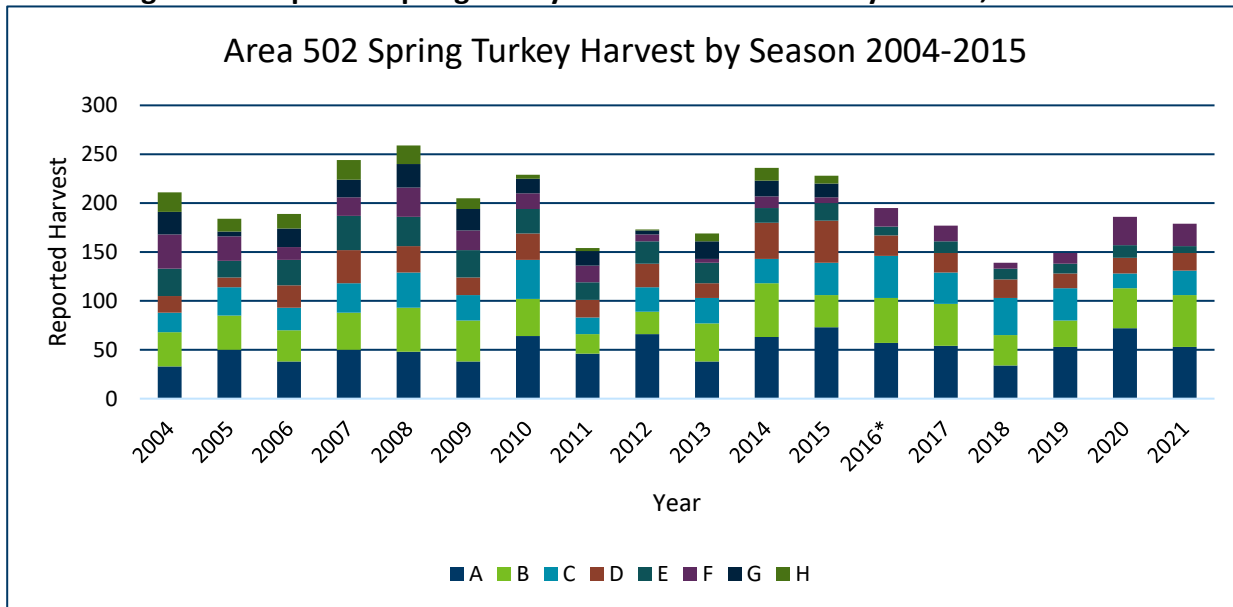


In 2018, WWMA staff initiated a survey of refuge deer hunters to collect opinions and observations about deer populations, refuge management, and hunter satisfaction. A summary of the survey results is available upon request.

Waterfowl Hunting. Waterfowl hunting is available on most of the pools and impoundments, except for the Dorman and Appleby Pools, which are within the Whitewater State Game Refuge. Waterfowl hunting is popular and heavy hunting pressure typically results in waterfowl leaving the area shortly after the season opens. Formal bag checks or car counts are not conducted during the waterfowl season, but mallards, wood ducks, and geese are likely the most prevalent waterfowl taken.

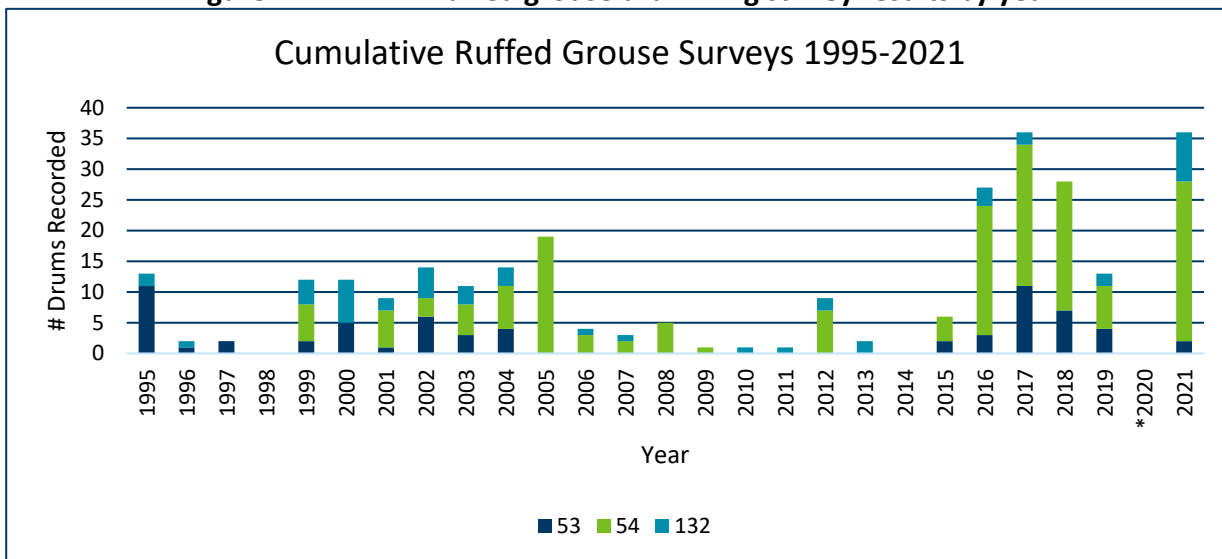
Wild Turkey Hunting. The spring tom turkey harvest in the WWMA averages 200 turkeys a year. Figure 11 shows the harvest in Permit Area 502 by seasonal hunting periods. Hunter success and hunting pressure are greater during early seasons and gradually decrease into the later seasons. Fall either-sex turkey harvest is not as popular with hunters, with an average of 20 turkeys total harvested by hunters each year in this season.

Figure 11. Reported spring turkey harvest for Area 502 by season, 2004-2021



Ruffed Grouse Hunting. Ruffed grouse harvest data for WWMA is not available, but ruffed grouse drumming surveys are conducted in the spring. The survey results are provided in Figure 12 (surveys were not conducted in the spring of 2020 due to Covid19 pandemic work restrictions). WWMA has three predetermined survey routes, and each route has 10 stops. Survey results on the WMA mirror results of greater southeast Minnesota and the cyclical nature of a grouse population.

Figure 12. WWMA ruffed grouse drumming survey results by year



Squirrel Hunting. Squirrels are one of the most popular game species on the unit (deer being the most hunted species). Current regulations allow for a daily bag limit of seven, with the season running from mid-September through February. Concern over squirrel numbers and hunting pressure was raised by squirrel hunters during a 2009 survey. The perception was that the number of squirrels

is declining, and that hunting was the cause. However, there was a lack of research to support this perception.

In 2015, DNR initiated a research study to compare squirrel populations in two areas – one hunted (WWMA) and one not hunted (Whitewater State Park). Objectives of the study were to assess mortality rates across multiple seasons and determine whether regulation changes were warranted.

Reduced survival rates due to hunting mortality were clear in this study, but exploited populations are known to respond favorably to high levels of harvest with increased recruitment following removal of a large segment of the population. Large tracts of land with good squirrel habitat, like Whitewater, may be able to harbor sub-populations of squirrels that act as source populations for more heavily harvested areas of the property. Research findings can be found on the DNR's research webpage.

Trapping

Many furbearers on WWMA are dependent on aquatic habitats. Muskrats use the various pools on the WMA as well as the river and backwater areas. The WMA has a healthy muskrat population. Trapping is necessary to help minimize damage to dikes, as burrows can result in holes in the dikes that pose equipment hazards or create leaks in the dikes that result in blowouts during times of high water.

All trappers on WWMA are required to obtain a special use permit. This permit provides managers the ability to monitor trapping pressure and harvest within the WMA boundary. Roughly 20-30 trappers apply for special use permits annually. Permits are also issued for hunters to hunt raccoon with hounds. Coyotes are an unprotected species so hunting is allowed during any other open season with no special permit required for this activity.

Trapping within the State Game Refuge is limited to two to five trappers each year selected through a random drawing for beaver, otter, and muskrats.

Harvest numbers declined after peaks in 2004 and 2006, but it should be noted the number of harvest reports turned in also declined, despite an increase in the number of trappers. Thus, it is unclear if the rapid harvest decline was influenced by the previous peak harvests or reflects a lack of data. Data reporting has fluctuated, and better consistency in reporting is a goal. Based on the data we do have, the average annual muskrat harvest on the WWMA is 650, and 192 in the State Game Refuge (Figure 13).

Mink use a wide variety of aquatic habitats on the WWMA. Trapping for mink is mostly incidental with muskrat trapping. Beaver are found on almost all of the streams on the WWMA, and in the pools. Their construction of dams can result in aquatic habitat for a suite of species, but they can also plug water control structures and damage dikes. See Figure 14 for recent beaver harvest data.

Figure 13. Muskrat harvest at WWMA and within the Whitewater State Game Refuge, 2002-2020

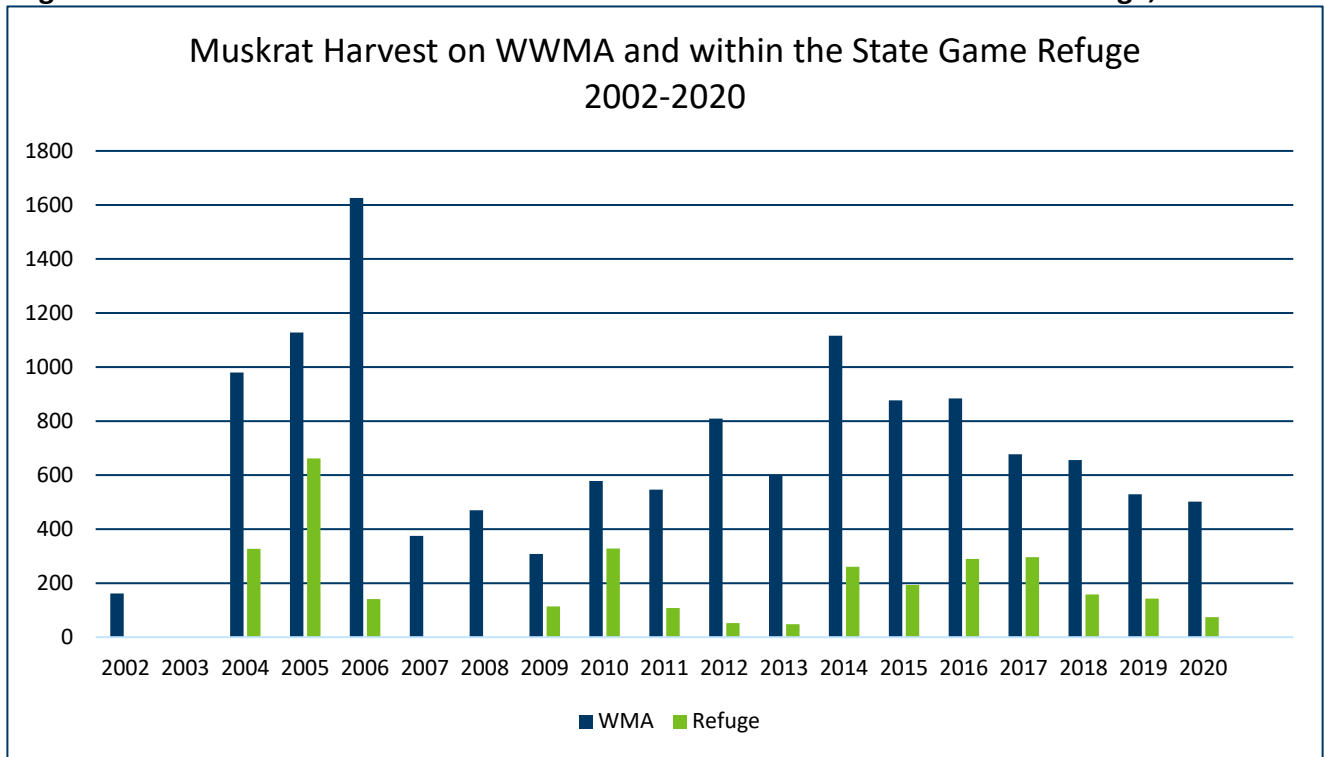
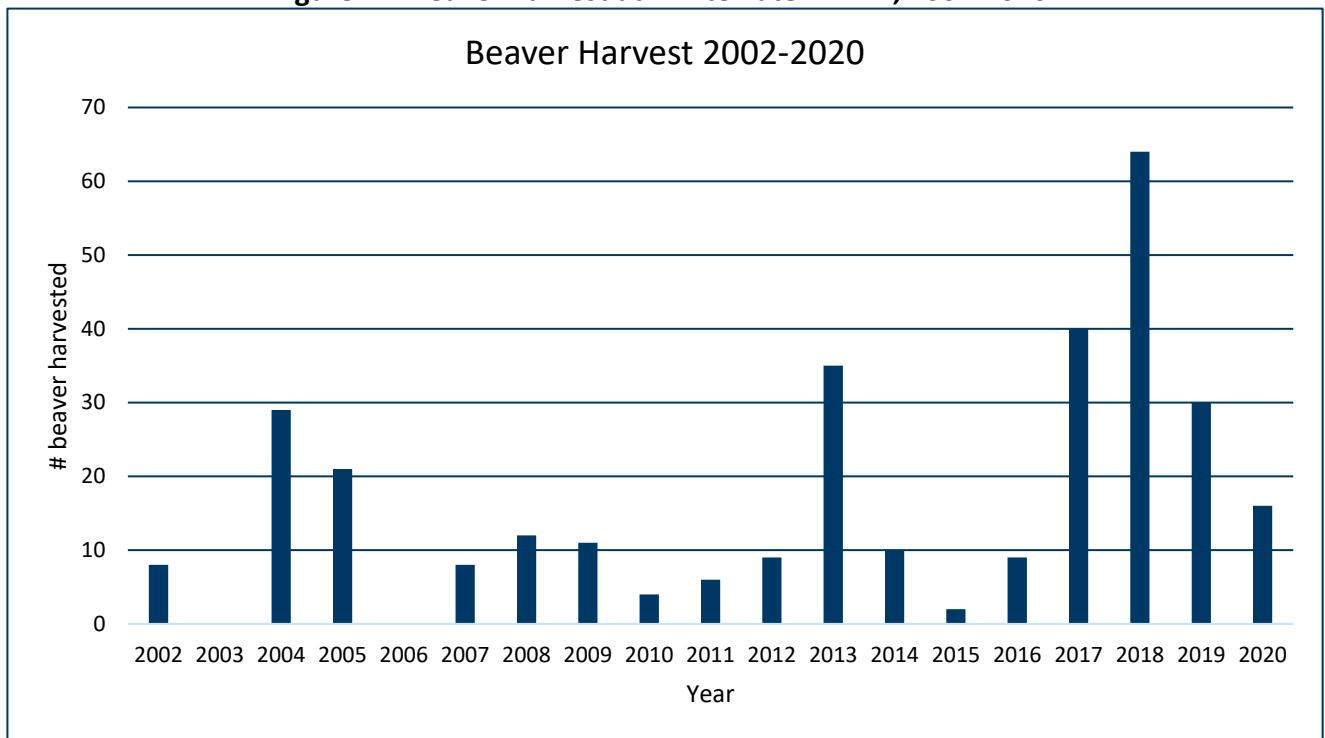
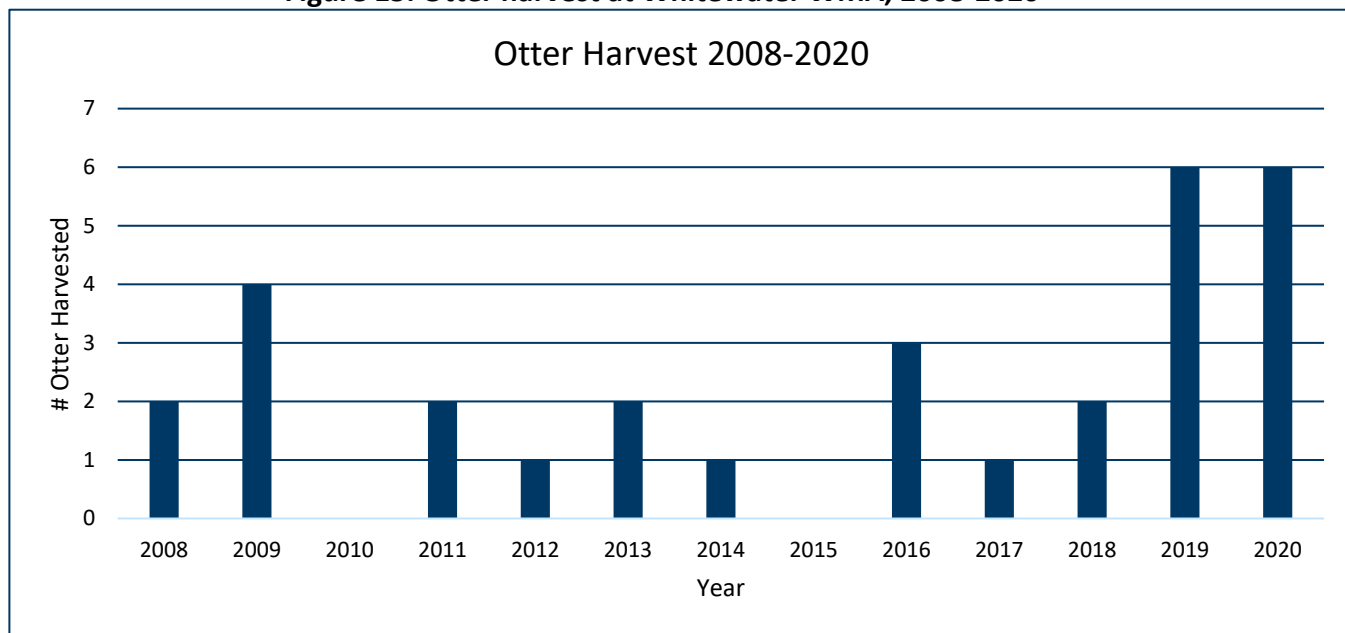


Figure 14. Beaver harvest at Whitewater WMA, 2002-2020



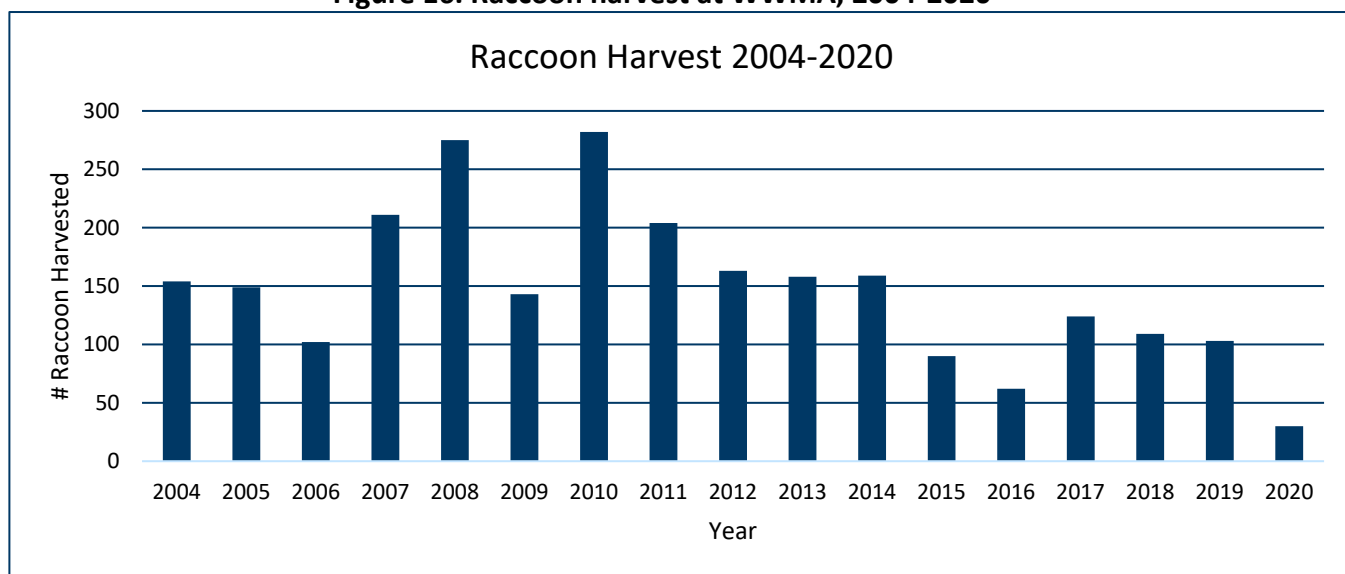
Otter have re-established themselves on the WMA in the past 20 years. They primarily use streams where they feed on fish but will use pools as well. Their harvest is regulated both by limiting the number of permits and by a statewide bag limit, which is currently four otter per trapper per year. See Figure 15 for recent otter harvest data.

Figure 15. Otter harvest at Whitewater WMA, 2008-2020



Raccoons use a variety of upland and wetland habitats including forests, agricultural fields, and riparian areas. There is an abundant raccoon population on the WWMA, offering plenty of hunting and trapping opportunities. Raccoon trapping has declined in the last seven years largely due to very low pelt prices. See Figure 16 for recent raccoon harvest data on the WWMA.

Figure 16. Raccoon harvest at WWMA, 2004-2020



Wildlife Observation

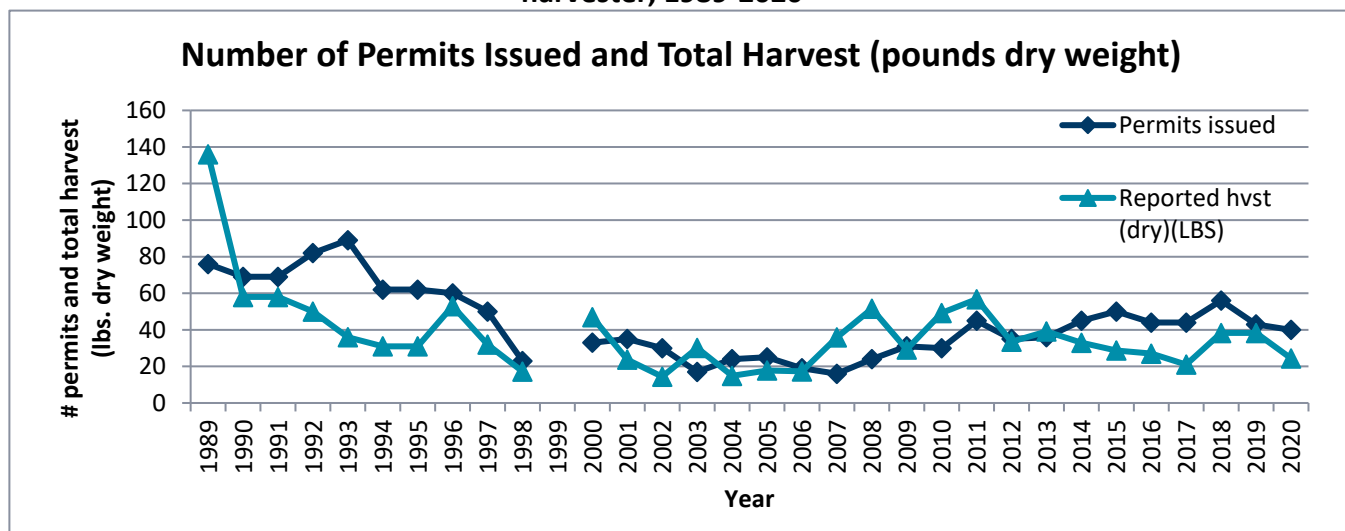
Wildlife observation is an activity that occurs widely, but it is often difficult to quantify. Nearly all visitors to the area are looking to observe wildlife whether they are hunting or not. Birding is especially popular at Whitewater WMA.

Resource Gathering

Resource gathering, also known as foraging, is an activity where edible foods are harvested for personal use. No commercial harvest of any plants (except trees) or animals is permitted on the WWMA. A variety of wild foods commonly collected for personal consumption include black raspberries, blackcaps (smaller black raspberries), morel and other mushrooms, fiddleheads, nettles, and possibly walnuts. Many people harvest leeks, also known as ramps. [Minnesota Rule 6230.0250 Subp 20](#), states harvest of whole plants is not permitted on the WWMA, except for American ginseng (with a permit). The tops of leeks are edible, thus that portion of the plant may be harvested, but the bulb may not.

As mentioned, the one exception for whole plant harvest on the WWMA is American ginseng (*Panax quinquefolium*). This plant, including the root, may be harvested with a permit on the WWMA only. Ginseng harvesting is currently not allowed on any other WMA in the state. Ginseng harvest has been recorded on the WWMA since 1989. From 1989 through 1993, harvester numbers averaged over 60, with a peak in 1993 at 89 harvesters. Peak reported harvest occurred in 1989, with 136 dry pounds of ginseng being harvested. Harvest rates dropped dramatically after 1989, with annual harvest averages below 50 pounds. The number of permitted harvesters has steadily declined over recent years, hitting an all-time low of 16 harvesters in 2007. Since then, harvester numbers have steady grown to a current average of 47 harvesters per year. This may reflect the increasing prices being paid for ginseng. Actual ginseng harvest reported per harvester has stayed fairly steady over the years, with an annual average of 1.2 dry pounds per harvester (Figure 17). DNR does not currently directly monitor ginseng populations, but harvest data and hunter information are collected.

Figure 17. Number of ginseng harvest permits issued and total harvest in dry pounds per harvester, 1989-2020



Strategic Considerations

This section outlines overarching considerations that influence how management actions at WWMA are planned and implemented. Some factors, such as those listed under operational context, are ongoing considerations; other factors, such as chronic wasting disease (CWD) and climate change, are new and emerging threats to WWMA.

A. Climate Change

Climate change is impacting Minnesota's wildlife, plants, waters, historic resources, infrastructure, and available outdoor recreation activities. Within WWMA, predicted changes in climate could influence native plant communities and the wildlife habitat they provide in many ways. The changes are expected to affect plant and animal distributions; however, the specific impacts are uncertain at this time. Flooding from more frequent and heavy rains has impacted infrastructure like roads and dams. Higher intensity rainfall events may impact stream temperatures or result in release of minimally treated wastewater or of pollutants through increased runoff. We will use an adaptive management approach using best available science, and adaptations to changing climatic conditions will need to be embedded into planning, budgeting management, and maintenance in a comprehensive way.

B. Invasive Species

There are many invasive plants and animals within and adjacent to WWMA that pose significant risks to native species. Educating users, early detection, and aggressive treatment of invasive species can be effective tools in minimizing new introductions and their further spread.

Animals

Zebra mussels (*Dreissena polymorpha*) are known to occur in WWMA. Limiting factors include consistent cold stream water temperatures originating from Karst springs and stream seeps. The lack of appropriate filter feeding material for mussel populations in headwater streams is also limiting. Populations of zebra mussels could increase macrophyte abundance and diversity in the Dorer Pools by increasing water clarity. This would result in changes to the fish populations in those pools. Any equipment used in waters where zebra mussels occur should follow DNR invasive species cleaning protocol.

Common carp (*Cyprinus carpio*) are a non-native species considered naturalized in Minnesota. No specific effort has been made to survey the impoundments within WWMA; however, it is known that common carp are present on the WMA during certain times of the year, including spring spawn. Consistent cold stream water temperatures originating from Karst springs and stream seeps likely act as a limiting factor for this species as well. Water control structures also have fish barriers to prevent migration from streams into pools during spring spawning. Carp have been removed from several pools during periods of drawdown. Appleby Pool is the most vulnerable to carp infiltration.

Invasive terrestrial earthworms are present within WWMA, although their extent and abundance is unclear. These worms first arrived in North America from Europe, likely through soils and plants that were transported by Europeans. The worms alter the composition of the forest floor by consuming

the fallen leaves that make up the duff layer. This leads to a lower survival rate of tree seedlings and other forbs and can facilitate the establishment of invasive plants. Unfortunately, there are currently no known management tools to mitigate the worms or their impacts.

Spongy moths (*Lymantria dispar*) and emerald ash borers (*Agrilus planipennis*) are well documented at WWMA. More information on these species can be found in the Forest Insects and Disease section of this plan.

Non-native animals not yet known to be present within the WWMA but with the potential to be in the future include mute swans (*Cygnus olor*) and feral swine (*Sus scrofa*).

Terrestrial Plants

Woody Plants. There are ten woody invasive species known to occur within the WWMA: European buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), exotic honeysuckles (*Lonicera spp.*), black locust (*Robinia pseudoacacia*), Japanese knotweed (*Polygonum cuspidatum*), Japanese barberry (*Berberis thunbergia*), multiflora rose (*Rosa multiflora*), Amur maple (*Acer ginnala*), Siberian peashrub (*Caragana arborescens*) and oriental bittersweet (*Celastrus orbiculatus*).

Non-native buckthorn species, honeysuckles, barberry, and multiflora rose pose similar management concerns by outcompeting native plants for sunlight and other resources. These invasive species produce berries that are attractive food for wildlife, particularly birds, which contribute to their widespread occurrence. These invasive woody species were brought to the U.S. as ornamental plants and windbreak/hedge row shrubs and escaped into the wild. Buckthorn and honeysuckle are pervasive on the WWMA, found in almost all habitat types. Because these two shrubs are so widespread on the WWMA, control is prioritized to larger project areas and high-quality sites with limited invasion. Known occurrences of barberry and multiflora rose are limited on the WWMA, so control is being prioritized with a goal of eradication. Unfortunately, buckthorn and honeysuckle will never be eradicated from WWMA.

Black locust is a species native to the U.S., but not Minnesota. It is a clonal species, forming dense colonies that preclude other tree and shrub species and can invade grasslands. It is a challenging species to control due to its suckering nature and heartiness. There are a handful of known locations on the WMA. These sites are monitored for spread. If there is no threat of disturbance, such as timber harvest, in areas with black locust, a hands-off approach has been taken simply because it is so challenging to treat. As control techniques improve, control of this species will increase as staff and funding permit.

Amur maple was historically planted as a hedgerow in a few locations on the WWMA. This species was often included in shrub plantings that occurred on the WWMA in the early 1990s. Amur maple has spread in the hedgerows where they were planted, but it does not appear to have spread widely across the WWMA.

Siberian peashrub is known to occur in a few locations on the WWMA. Where it occurs, it forms dense colonies that preclude other species. It does not appear to spread widely from where it first takes root, but it poses an invasive threat in other parts of the state. Several small pockets on the WWMA are slated for treatment in the next two years to prevent them from expanding.

Oriental bittersweet is a non-native vine that is often mistaken for the native American bittersweet. Unlike the native vine, Oriental bittersweet can rapidly invade an area. This plant grows rapidly and produces bulky vines that strangle and weigh down large trees, eventually causing them to fall. The plant also produces more fruits than the native vine, which makes it attractive not only to wildlife, but also crafters who use the colorfully fruited vines for decorations. It is not known to occur widely on the WWMA; known locations have been mapped, and all have received some treatment to reduce spread.

Japanese knotweed, also called Mexican bamboo, is a shrub-like, semi-woody perennial with bamboo-like stems growing up to nine feet tall. It was brought to the U.S. as an ornamental shrub and for erosion control and has since escaped. It easily spreads by rhizomes, allowing it to form dense colonies, as well as by plant sections that break off. Each section that has a node can develop into a new plant. In the wild, this species most commonly grows along streams, moister areas, and road ditches. Knotweed is known to occur in a handful of locations on the WWMA, all of which are being actively managed as part of an early detection, rapid response invasives program. The densest knotweed colony location is along the South Branch Whitewater River near Crystal Springs Hatchery. This species is very difficult to eradicate and requires specialized herbicides and specific application timing for effective control. This species is a priority to prevent from spreading as it degrades riparian habitat.

A list of invasive plant species known to occur on WWMA and their associated plant communities can be found in Appendix N. Locations of known invasive plant species are also documented and all treatments are recorded in Early Detection and Distributions Mapping System (EDDMapS).

Herbaceous Plants. There are many herbaceous invasive non-native plant species on the WMA. Many have been present for decades, such as reed canary grass and brome. This plan does not address all known herbaceous invasives but will focus on actively managed species. These include Canada thistle (*Cirsium arvense*), garlic mustard (*Alliaria petiolata*), wild parsnip (*Pastinaca sativa*), poison hemlock (*Conium maculatum*), Sericia lespedeza (*Lespedeza cuneata*), spotted knapweed (*Centaurea maculosa*), and Amur silver grass (*Miscanthus sacchariflorus*).

Garlic mustard is widespread on the WWMA. The species has been present on the WWMA for a number of years, but its density and distribution has grown significantly in the last 10 years. This species typically occurs in woodland settings, particularly moist woods; however, it has adapted and can be found in a variety of habitats. It spreads rapidly after disturbance, easily spread by wildlife and human foot travel. Because this invasive is pervasive on the WWMA, treatment priority is given to high quality sites as funding allows.

Wild parsnip is also widespread on the WWMA. This species occurs commonly in grassland, riparian, roadsides, and agricultural areas. Poorly timed mowing is the most likely culprit for spread of this species; however, its papery seeds can easily move in wind and water. This species is a target for control not only because it can outcompete native vegetation, but also because it can cause a photosensitive rash on humans who encounter the plant's juices. Control of this species is targeted at grasslands on the WWMA.

Poison hemlock is a relatively new invasive species to the WMA, showing up in the past 10 years. It occurs primarily along the South Branch and Main Branch Whitewater River on the WMA. This species has been targeted as part of an early detection, rapid response invasives program on the WMA. New locations along the same areas continue to pop up each year, but still as single plants to small clusters. This plant is poisonous if consumed by humans and some wildlife. This species is a priority for control and potential eradication on the WMA.

Sericia lespedeza is a perennial herbaceous plant in the pea family. It occurs on sites with poor soil such as disturbed areas and sandy sites, including sand prairies and barrens savannas where it can form dense colonies crowding out native prairie plants. This species is known to occur in three sand prairie locations on the WWMA, which have been under active treatment for several years. These pockets are declining but have not been eradicated yet. It is unclear how this species arrived on the WMA.

Spotted knapweed is also a perennial herbaceous plant that is typically found on sites with poor soil such as sandy and rocky areas. This species is known to occur in one location on the WMA in a sand prairie. It was likely brought in on equipment. This plant can spread quickly in disturbed areas and sandy habitat. The north end of the WMA should be monitored for new occurrences of spotted knapweed due to recent disturbance to a knapweed population adjacent to the WMA.

Amur silver grass, also incorrectly referenced as pampass grass, is a warm season ornamental grass used primarily in landscaping. This species spreads by rhizomes to form very dense pockets that preclude all other plants. There is also little wildlife value to this plant. This plant is known to occur in three locations on the WMA, one of which was a mailbox planting. The other two are escapes. All three sites have been treated, and are part of an early detection, rapid response program.

Canada thistle is on Minnesota's prohibited noxious weed list and must be controlled. It invades disturbed natural areas such as prairies, savannas, wet prairies, and sedge, and once established, outcompetes native plants and forms dense stands. The seeds are tufted for dispersal by the wind and remain viable in the soil for over 20 years. Canada thistle is currently widespread throughout the work area. Efforts are being taken to prevent its spread, maturation, and dispersal of propagating parts.

Oxeye daisy (*Chrysanthemum leucanthemum*) may be present along roadsides but is not posing an immediate threat to habitats within the WMA. Leafy spurge (*Euphorbia esula*) has been found near the WMA but has not yet been detected within the WMA boundaries.

Aquatic Plants

There are four known invasive aquatic plant species occurring within the WMA: curly-leaf pondweed (*Potamogeton crispus*), purple loosestrife (*Lythrum salicaria*), hybrid cattail (*Typha x glauca*), and reed canary grass (*Phalaris arundinacea*). Each of these species has the potential to negatively impact the quality of wetlands.

Purple loosestrife invades marshes and replaces native species such as sedges, broadleaf cattails, and other wetland plants. It forms dense stands, and infested areas become unusable to native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads, and turtles. Beetles used for

biocontrol of purple loosestrife have been released on the WMA in the last five to seven years and have helped keep the loosestrife density to a few individuals or isolated patches.

Hybrid cattail has been present around and within WWMA for decades. It forms dense stands and outcompetes native species. Aerial herbicide treatment for reducing cattail encroachment into open water was performed on all three Dorer Pools, and parts of County Line and Appleby Pools during the summer of 2020.

Reed canary grass is present throughout the WMA in many wetlands. It is a major threat to wetland habitats as it often outcompetes native species by forming dense stands.

Didymo (*Didymosphenia geminata*), sometimes referred to as “rock snot,” is microscopic algae that can threaten aquatic habitats, stream biodiversity, and recreational opportunities. Didymo is not known to occur within WWMA at this time; however, it has recently been confirmed along the North Shore of Lake Superior and could be at risk for spread in the future.

Image 6. Prescribed grazing using goats on bluff prairie



C. Fish and Wildlife Disease and Parasites

A variety of wildlife diseases threaten wildlife populations that use WWMA. A variety of disease and parasite outbreaks have the potential to impact wildlife populations on the WWMA. Disease responses will vary depending on the scale and causative agent of the outbreak; all actions are closely coordinated with other DNR divisions, FAW's Health Programs, and partners (state, federal, and tribal agencies) as appropriate.

Viral Hemorrhagic Septicemia

Viral hemorrhagic septicemia (VHS) is an OIE (World Organization for Animal Health) reportable viral disease of concern, which has caused catastrophic fish mortality events in Europe as early as the 1930s. VHS is distributed throughout the world and affects many different species of both marine and freshwater fish, including rainbow trout and brown trout. The disease was first found in North America in 2005 when it was collected from the Great Lakes and has since then spread outside the Great Lakes to other isolated water bodies in the U.S.

VHS has the potential to mutate and continue to spread through various human activities into new geographic areas and affect new fish populations. There is no treatment for VHS, so the only practical way to avoid this harmful disease is prevention. Continued spread of VHS can be prevented by using the control measures implemented by fish health organizations and the DNR, and by providing information to the public.

Bacterial Kidney Disease

Bacterial Kidney Disease (BKD) is caused by *Renibacterium salmoninarum*, a bacterium that is commonly found in the Great Lakes region, and occurs primarily in salmon, trout, and char. The disease has caused significant mortality events in these species. However, the bacteria also often occur in the host fish without causing symptoms or mortality due to the disease. Due to the risk of severe mortality, annual fish health inspections as well as importation applications must test for the presence of *R. salmoninarum*. Positive test results place limits on the importation and stocking of fish. The bacteria have been found in the Whitewater River which runs through the WWMA but have not been found in many other water bodies in Minnesota, so it is important to take steps to avoid the spread of bacteria to those locations.

Gill Lice

Gill lice are a type of parasitic copepod, *Salmincola edwardsii*, that can attach to the gills and opercula of brook trout, impact respiration and various performance metrics, and lead to mortality. Relatively little is known about the impact of Gill lice on southeast Minnesota fish populations, but there has been some evidence that Gill lice have caused significant (77-89%) declines in brook trout recruitment (Mitro & Griffin, 2017). Gill lice are indigenous to Minnesota and only affect brook trout; gill lice do not affect rainbow trout or brown trout (Hoxmeier & Dieterman, 2011). Gill lice have been found and documented in many southeast Minnesota/Driftless Area streams (Hoxmeier & Dieterman, 2011). Gill lice infestations have been known to vary from year to year in the same stream. Increased problems with Gill lice seem to be associated with warming stream temperatures, and climate change may add to their widespread negative impacts (Dauwalter & Mitro, 2019).

Waterfowl Diseases

Waterfowl are susceptible to several infectious diseases that cause mortality including avian cholera, avian botulism, avian tuberculosis, avian salmonellosis, chlamydiosis, duck plague, aspergillosis, and avian influenza. A common denominator among outbreaks is a concentration of waterfowl, and often poor water quality. Avian salmonellosis and aspergillosis also infect songbirds, but the source of these outbreaks is usually moldy, contaminated food at feeders, which also serve as the requisite concentration point.

Chronic Wasting Disease

Chronic wasting disease (CWD) is a contagious neurological disease affecting cervid species, including deer, elk, and moose. It causes a characteristic spongy degeneration of the brains of infected animals resulting in emaciation, abnormal behavior, loss of bodily functions, and death. As of the writing of this plan, no CWD has been detected on WWMA or within DPA 344. Management actions will be guided by DNR's Surveillance and Monitoring Plan for CWD.

Mange

Mange, particularly sarcoptic mange, is a disease transmitted by mites, and affects mainly canids (wolves, foxes, coyotes), but also bears, raccoons, porcupines, and some rabbits and squirrels. The mites are transferred from one individual to another through direct contact or transfer at den sites. The disease causes hair loss, and in some cases the exposed skin becomes encrusted or oozes fluids, often resulting in death. Red foxes are particularly susceptible to mange, and thousands can die during an outbreak.

Rabies

Rabies is an acute infectious disease of the central nervous system caused by a virus that is transmitted in saliva through bites. Rabies is most common in raccoons, skunks, bats, and foxes, but can occur in any mammal. Once signs of the illness manifest themselves, rabies is 100% fatal; however, proper post-bite treatment is nearly 100% effective in preventing onset. As with mange, rabies outbreaks in the wild can be controlled by oral vaccinations in food items left out for consumption, but this is difficult and expensive.

White Nose Syndrome

In 2017, White Nose Syndrome (WNS), a fungus affecting hibernating bat species, was confirmed in multiple locations in Minnesota. This fungus causes significant mortality in bats. All sites surveyed in southeast Minnesota in 2017 were positive for WNS. The extent of the impact to all bat species occurring in Minnesota is unknown, but dramatic declines are expected based on population trends in other states where WNS has been confirmed. Northern Long-eared Bats have been hit particularly hard by WNS. As a result, the USFWS designated this species as threatened in April 2015 and it is listed as Special Concern in Minnesota.

The Lake States Forest Management Bat Habitat Conservation Plan (Bat HCP) was created to provide flexibility to the DNR to manage forests while addressing federal Endangered Species Act regulations related to federally threatened and endangered bat species. An HCP is required by the USFWS as part

of an application for an incidental take permit. The DNR's incidental take permit for bats covered by the Bat HCP will ensure covered activities in bat habitat can continue without additional consultation with the USFWS.

Currently, there are no known bat hibernacula on the WWMA. If any were to be discovered, entry would be restricted so as not to introduce WNS or cause undo disturbance to hibernating animals and Division of Ecological and Water Resources (EWR) staff would be consulted.

Faucet Snail

The faucet snail (*Bithynia tentaculata*) is an aquatic snail native to Europe, introduced to the Great Lakes in the 1870s. The snail is an intermediate host for three intestinal trematodes, or flukes, (*Sphaeridiotrema globulus*, *Cyathocotyle bushiensis*, *Leyogonimus polyoon*) that cause mortality in waterfowl. These parasites have a complex life history and require two intermediate hosts to develop, the first of which must be a faucet snail. When waterfowl consume the infected snails, the adult trematodes attack the internal organs and cause lesions and hemorrhage. Infected birds appear lethargic and have difficulty diving and flying before eventually dying.

D. Forest Insects and Disease

The DNR forest health team is charged with monitoring forest health conditions of the state's forests. They accomplish this through annual aerial surveys, extensive ground-based investigations, and analyses of various threats. Surveys and analyses are compiled in their annual reports, published [online](#), and aerial survey results are placed in the Minnesota Geospatial Commons. Following are significant threats to WWMA's forests. Some serious and present tree health problems are not included (e.g., Dutch elm disease, butternut canker, white pine blister rust).

Heterobasidion Root Disease

Heterobasidion root disease (HRD) is a fatal and persistent disease of conifers. It is a major concern for plantation pine and spruce growers and users in Minnesota. There is no evidence that it threatens natural (non-plantation) conifer stands. HRD was discovered in Minnesota in 2014 on state forest land one mile from the boundary with the WWMA.

Due to the importance of this threat to Minnesota's conifer plantations and users, the DNR eradicated the infestation in 2017 and converted the stand to hardwoods. The DNR and University of Minnesota continue to survey for the disease and its spores in the area.

The DNR recommends that any pine stands within several miles of confirmed HRD be thinned in the winter. See the [DNR's HRD webpage](#) for updates and additional information.

Emerald Ash Borer

Emerald Ash Borer (EAB) is an invasive, destructive cambium borer of ash trees. It was discovered in WWMA in November 2015 and was found to be widespread in the northern half of the WMA in 2016. It was discovered in the nearby state park in 2016. EAB has noticeably infested most ash trees within the WMA, and a large portion will be dead by 2030. A tiny fraction of mature ash may survive.

Oak Wilt

Oak wilt is a non-native disease of all oaks in Minnesota. It was identified in Minnesota in 1944. Currently, it is spreading north and covers up to about 40% of the natural range of northern red oak in the state. It spreads by infecting fresh wounds (e.g., natural wounds from wind, pruning cuts, damage from machinery) made from April through early- or mid-July. After initial infection, it spreads from oak to oak through root grafts.

In a review of 2013 imagery, the DNR found 67 probable oak wilt centers, covering nine acres of the WWMA. Due to the difficulty of detecting oak wilt in mixed forests and on slopes, this is likely an underestimate of the total area impacted by oak wilt in the WMA.

Oak wilt is a threat to both timber production and oak regeneration. Openings in the canopy made by oak wilt allow buckthorn and maples to take over the pocket and outcompete oak seedlings and saplings. Preliminary research in Minnesota and published research from Wisconsin show that actively cutting out oak wilt pockets can promote oak regeneration more so than not managing oak wilt.

Since oak wilt is not native, its presence in the WMA will likely continue to increase slowly. If a severe blowdown were to occur in May or June in the WMA, the quantity of oak wilt would likely increase.

Several oaks were pruned along a hunter path in the WMA in May or June 2020 at Siebenaler Ridge. This resulted in several oaks wilting. DNR staff are attempting to control these pockets through an experimental cut-stump and herbicide treatment. The Division of Forestry plans to monitor the success of these treatments through 2027 and publish results.

Oak wilt can be effectively prevented if oaks are not wounded from April through mid-July.

Lymantria dispar

Lymantria dispar is an invasive moth and defoliator of many trees, although populations are not yet at threatening levels to WWMA's forests. Eventually *L. dispar* will become an additional stress for trees, kill some occasionally (particularly stressed trees), and slightly alter forest composition. *L. dispar* alone (i.e., without other stress agents like drought) can kill trees if they heavily defoliate them for two to four consecutive years. Amongst *L. dispar*'s favorite trees found in the WMA are oaks, basswoods, and aspens. *L. dispar* will also defoliate white pines.

The federal Slow the Spread program has operated for years in the U.S. with a goal of slowing the westward expansion of *L. dispar*. Program employees trap *L. dispar* males. When male moths reach a population where 300 moths are caught per trap in an area, populations generally are at levels where defoliation is possible, but not guaranteed. Since 2004, the 300-moth per trap level has spread west across Wisconsin, directly east of the WMA, at about seven miles per year (with great variations from year to year). That 300-moth level was about 100 miles east of the WMA after the 2020 trapping season. Therefore, it is possible that the WMA could experience potential defoliation from *L. dispar* around 2035. However, the WMA may not experience defoliation until many years after 2035.

The parts of the WMA that will likely experience some mortality from *L. dispar* are ridge tops with oaks. As a comparison, in mountainous regions of Virginia where *L. dispar* heavily defoliated trees for

five consecutive years, about 30% of them died. That sort of mortality in the WMA in the long run may result in a slight forest composition shift away from oak. Other mast producing trees like hickories and walnuts could replace those oaks while maintaining the ecological value that oaks provide on those ridges. Therefore, a slight forest composition shift away from oak is presumed to not be a significant ecological problem.

Twolined Chestnut Borer

Twolined chestnut borer (TLCB) is a native insect pest of stressed oaks. After significant droughts, blowdowns, and defoliation events, TLCB populations increase and kill oaks in a scattered fashion across the landscape. Since outbreak populations result from typical natural disturbances, outbreaking populations of TLCB cannot be managed. Managers can avoid exacerbating TLCB by not thinning oak stands (including establishing seed tree and shelterwoods) for three years after drought or significant defoliation, if possible.

E. Human Activities

The WWMA is an important public land unit in southeast Minnesota and provides opportunities for a growing population. The WWMA will continue to support its mission of protecting and managing the land for wildlife production and for hunting, fishing, and trapping opportunities; however, it is anticipated that other users may seek to use and enhance the area for other recreational activities. These activities may be allowed or implemented when deemed compatible with the primary purpose of the WMA. Fortunately, other state lands are present locally and have facilities or capacity to address additional interests. For example, Division of Forestry lands have facilities for snowmobiling, ATV, and horseback trail riding. The Whitewater State Park has outstanding camping, hiking, swimming, and nature interpretation facilities and services. Bird watchers, hikers, and canoeists can use WWMA roads, dikes, parking lots, and other facilities for compatible uses.

Hunting, fishing, and trapping are regulated activities and are not a threat to habitat or wildlife populations when done in line with regulations. Taking of animals or plants beyond the legal allowances could threaten habitat and wildlife.

Wildlife using agricultural fields on and surrounding WWMA (especially corn and soybean) are exposed to herbicides and pesticides. Drift or spills of agricultural chemicals are a threat to terrestrial and aquatic habitat and wildlife. Minnesota Department of Agriculture Incident Response Unit maintains records of agricultural chemical contaminants (pesticides and fertilizers).

F. Unit Access Limitations

In addition to public highways and roads, access to the WWMA is provided by private, abandoned, and minimum maintenance township roads. These routes allow for maintenance and management activities and provide important public access. WWMA staff work to maintain this internal WMA road network; however, the potential loss of private field road access and deteriorating or poorly maintained township roads that provide important access to WWMA property is an ongoing concern. A strategic approach to identifying key accesses needs to be taken and opportunities to formalize access arrangements should be explored.

G. Operational Context

Administrative and Fiscal

The WWMA is managed by the Section of Wildlife, within the DNR's Division of Fish and Wildlife, and is in the DNR's Central Region, also known as Region 3. WMA operations are funded primarily through the Game and Fish Fund, which is supported by the sale of hunting, fishing, and trapping licenses and federal aid from surcharges on hunting and fishing equipment. Game and Fish funding is used primarily to cover salary and operational costs, such as maintenance. Some wildlife management projects on the WWMA are funded through dedicated wildlife accounts (wild turkey, waterfowl, and pheasant stamp), and the majority of current project funding is through the Minnesota Outdoor Heritage Fund, or other grant funding, such as the Competitive State Wildlife Grant and Legislative-Citizen Commission on Minnesota Resources. Additional project funding is brought to the WMA through partnerships with NGOs such as The Nature Conservancy, National Wild Turkey Federation, Audubon Minnesota, Ruffed Grouse Society, and others. These organizations apply for grants and help administer habitat projects on the WMA to achieve combined organizational and resource goals.

Staffing

The WWMA staff consists of one Area Manager, one Assistant Area Manager, one Technician, and one General Repair Worker. A Seasonal Laborer position is jointly shared with the Rochester Area wildlife office and located out of Whitewater. Staffing is and will become an increasingly limiting factor in implementing plan strategies and priority work.

Operational Orders, Policies, Guidelines, and Directives

The DNR has Operational Orders, which define the internal management of the department. Policies, guidelines, and directives are tools used to further define the ways that specific work is undertaken on state lands. Periodic review and updating of existing guidance documents occur, and new documents are developed as new policy needs are identified.

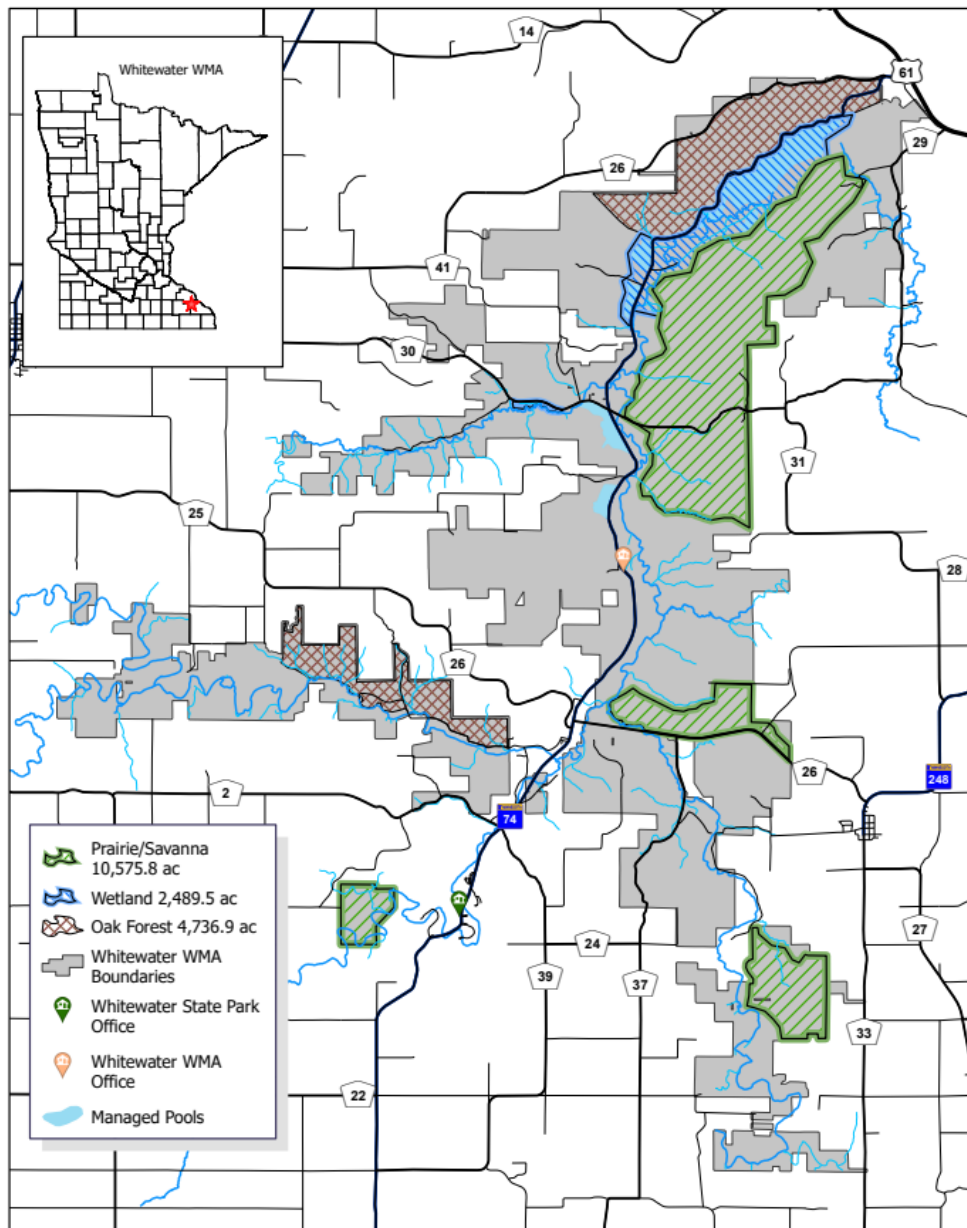
Interdepartmental Coordination

The division of Fish and Wildlife's Whitewater WMA staff participate in annual coordination meetings with the divisions of Forestry and Ecological and Water Resources. In addition to these annual standing meetings, WWMA staff work in close coordination with other divisions continuously throughout the year. WWMA staff also communicate with the DNR Regional Management Team on WMA issues as they arise.

Desired Conditions

The desired conditions for Whitewater WMA are grouped under two goals: Goal 1) Maintain or enhance wildlife habitat and biodiversity, and Goal 2) Maintain or enhance sustainable recreational opportunities for public enjoyment. Goal 1 is further categorized by habitat type, and priority management areas have been identified for prairie/savanna, wetland, and oak forest habitat types (Figure 18). Each habitat type contains measurable management outcomes, followed by specific management objectives and the strategies for achieving these desired outcomes. Priority strategies under each management objective are indicated by **bold text**.

Figure 18. All Priority Management Areas at WWMA



Goal 1: Maintain or enhance wildlife habitat and biodiversity

A. All Habitat Types

Habitats in WWMA are recognized as vitally important for sustaining wildlife populations and biological diversity in southeastern Minnesota. The habitats of today owe much to a rich and diverse landscape, but they are not pristine; they represent a recovery from early 1900s land clearing and farming that contributed to exhausted soils and devastating floods. Conservation measures begun in the 1930s, land use history, and management since the establishment of the WWMA have interacted to yield the habitat conditions on the WWMA today.

All habitats in the WMA will require active attention and management to maintain appropriate amounts and successional states of habitat types and to sustain them in a healthy condition. Without attention and interventions, wetland impoundments will become choked with hybrid cattails, mesic north-facing hardwood stands will become infested with buckthorn, oak forests and woodlands will undergo succession and become dominated by sugar maple and basswood, and prairies and savannas will convert to forest. Treatments require an adaptive management approach as prescriptions are developed, results are evaluated, and follow-up treatments are designed.

Typical interventions will include invasive species mapping and treatments using tools like herbicides, mechanical cutting, prescribed burning, and grazing. Forest stands on the WWMA are included in DNR's forest modeling and planning processes so that timber harvest may be used as a tool to advance wildlife management objectives such as restoration of prairie or savanna, or regeneration of oak-dominated forests. Prescribed fire and prescribed grazing are tools that may be used to maintain grassy, open habitats or to reduce invasive species presence and prevalence.

Management Objective 1.1: Enhance native plant communities and watersheds to ensure a sustainable landscape that can support healthy fish, wildlife, and plant populations

- **Monitor the effect of management activities like prescribed fire and timber harvest on wildlife populations, particularly rare and SGCN, to inform future management**
- **Coordinate with other divisions to ensure appropriate activities are included in FAW annual work plans**
- Complete and update wildlife inventories
- Document any new rare animal and plant occurrences using accurate mapping and fieldwork and update the DNR's Natural Heritage Information System accordingly
- Conduct resource assessments, including a Natural Heritage Information System review, before implementing projects, operational actions, or special events
- Per DNR policy, follow the Forest Management Guidelines established through the Sustainable Forest Resources Act of 1995
- Pursue and apply for grants, such as State Wildlife Grants, when available
- Work with partners to secure funding and administer and manage cooperative projects on WWMA
- Work with neighbors, both private and public, on cross-boundary projects that support this objective

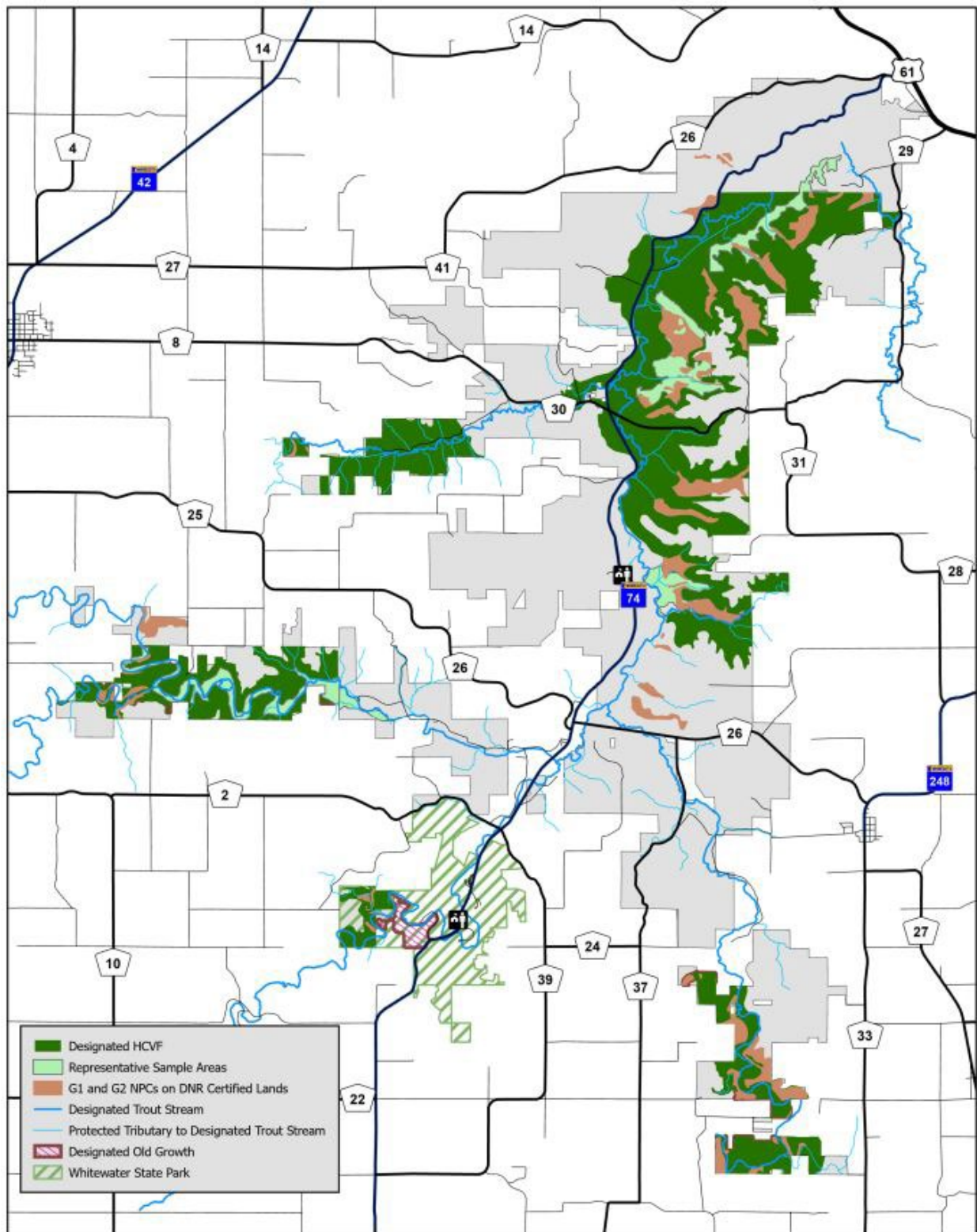
Management Objective 1.2: Protect, maintain, and enhance natural resources with special designations within the WWMA, such as old growth forests and designated trout streams

- Complete Ecological Classification System (ECS) evaluations for the WWMA, with special focus on areas with Outstanding and High biodiversity as ranked by MBS
- Manage areas identified as High Conservation Value Forests (HCVF) to maintain or enhance those conservation values
- Follow guidelines outlined in the [Strategic Plan for Coldwater Resource Management in Southeast Minnesota](#) and the Fisheries Long-Range Plan for Trout Stream Resource Management in Southeast Minnesota 2010-2015 and Progress Report
- Preserve and manage designated old-growth forest stands and manage adjacent forests according to the DNR Old-Growth Policy

Image 7. DNR staff discussing site-specific habitat management goals at WWMA



Figure 19. Designated Natural Community Features at WWMA



0 2 3 5 6 Miles

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Management Objective 1.3: Manage for climate change impacts by enhancing ecosystem resilience and reducing the impacts to WWMA resources

- **Foster resistance and resilience through species, compositional, and successional diversity within and across habitat types, considering native plant community information and climate change best management practices (BMPs)**
- Follow DNR Operational Order 131: Climate Adaptation and Mitigation in Natural Resource Management by incorporating best available science and recognized climate change adaptation methods (e.g., resilience, resistance, and facilitation) into management activities and project planning
- Rehabilitate degraded structures and create retention ponds to reduce runoff and erosion and evaluate remaining hydrologic infrastructure needs due to increasing extreme weather events

Management Objective 1.4: Preserve and perpetuate the rare plant species known to occur in the WMA and any other rare plant species that are discovered in the future

- **Evaluate the effect of management activities, like prescribed fire, on rare species populations where they are known to occur and adapt management activities as appropriate**
- Document and verify rare plant locations, assess threats to each population's viability, and develop long term monitoring protocols
- Conduct resource assessments, including NHIS review, before implementing any projects, operational actions, or special events

Management Objective 1.5: Prevent the introduction, establishment, and spread of terrestrial invasive plants, insects, and diseases; monitor high quality native plant communities to ascertain whether they are being invaded or degraded by terrestrial invasive species

- **Target early detection invasive species, focusing on ones that can be either eradicated or significantly controlled, including Japanese barberry, Japanese knotweed, poison hemlock, Oriental bittersweet, Siberian peashrub, and Amur maple**
- **Prioritize invasive species management in conjunction with other high priority habitat projects as identified in this plan and further identified in upcoming annual work plans**
- Continue monitoring for presence of new invasives
- Follow DNR Operational Order 59: Pesticide Use, Operational Order 113: Invasive Species Prevention and Management, and divisional guidelines, to prevent the introduction and spread of terrestrial invasive plants, insects, or diseases
- Document terrestrial invasive populations using EDDMaps and monitor the effectiveness of control measures using accurate mapping and fieldwork
- Use proven chemical, mechanical, or biological control techniques appropriate for the site and species
- Conduct resource assessments, including NHIS review, before implementing any invasive species control measures

B. Upland Forests and Woodlands

Before European colonization, forests and woodlands in southeast Minnesota were heavily influenced by fire. Humans frequently used fire to move game, manage habitats, and maintain habitation areas. These fires burned with low intensity and, in combination with the area's dissected topography, created a rich mosaic of oak-dominated habitats that ranged from open savanna to dense forests.

Frequent, low intensity fire is largely absent from this landscape today. Fire-intolerant, shade-loving species like ironwood, sugar maple, and red maple are beneficiaries of this lack of fire, and oak forests and woodlands are converting to closed canopy maple forests. Maintaining oak-dominated communities in southeast Minnesota is widely recognized as an important conservation goal.

Because of the importance of oak, a portion of WWMA has been identified as a priority area to focus on maintenance and restoration of oak-dominated communities over the next 10 years. In fire-dependent native plant communities, we will use prescribed fire and management strategies that mimic fire to favor large-gap oak communities. This will benefit mast-utilizing game species like turkey, deer, and wood ducks, as well as nongame species including woodpeckers, small mammals, reptiles, amphibians, and insects. We will use NPC data and silvicultural strategies developed for fire-dependent oak communities to create ecologically sound prescriptions to meet wildlife habitat goals.

Within the oak-dominated forest priority areas in WWMA outlined in this plan, we aim to:

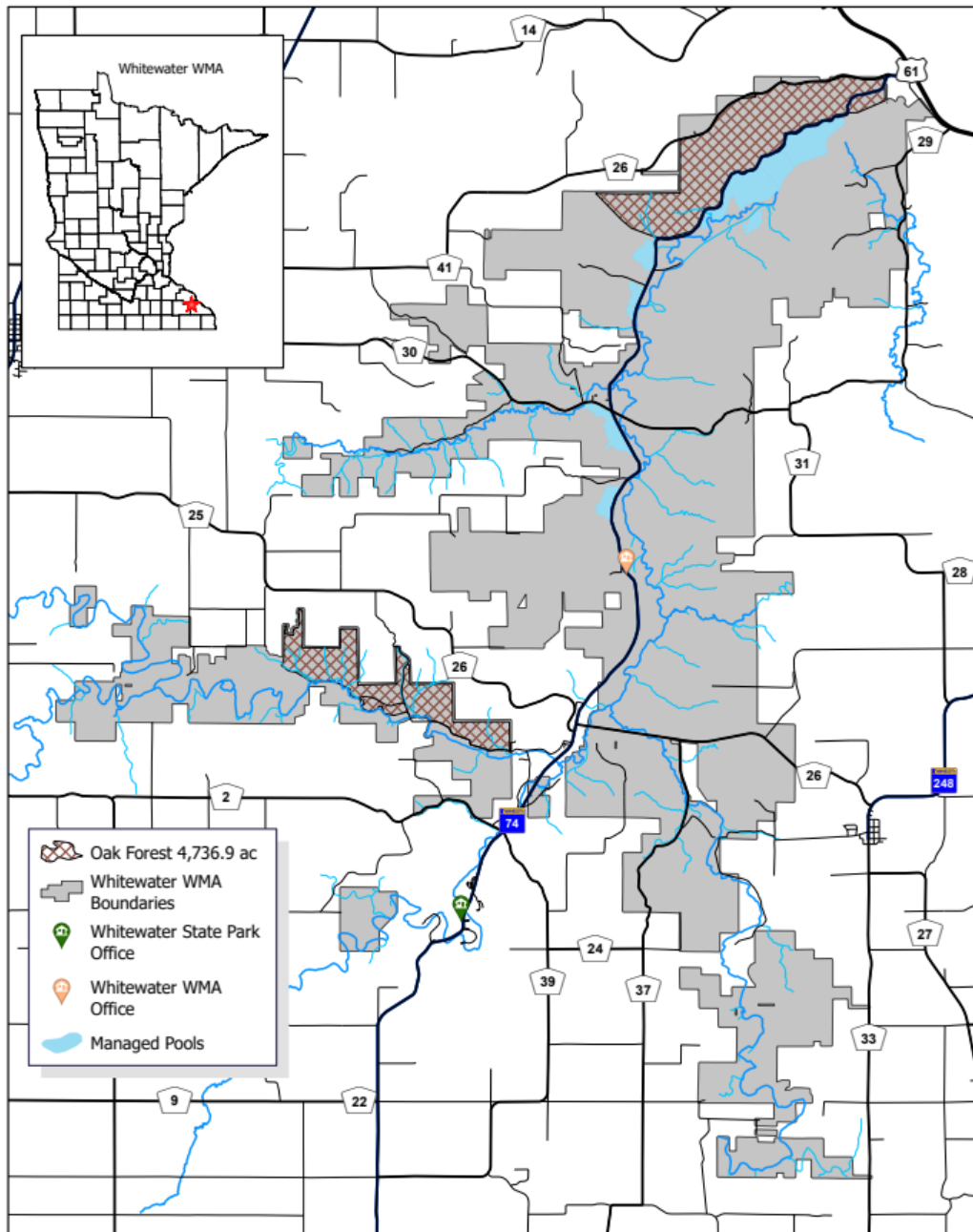
- Retain the 2,435 acres of oak-dominated forest within the identified priority areas
- Strive for mixed age class distribution using management tools, including timber harvest, that are informed by improved inventory
- Improve oak regeneration on harvested acres within the priority area using management tools such as invasive species control and underplanting
- Reduce woody invasives such as buckthorn and honeysuckle by 20%, treating a minimum of 500 acres
- Conduct prescribed burns over a minimum of 2,000 oak-dominated forest acres to stimulate regeneration and reduce undergrowth
- Restore 30 acres of oak forest by retiring cooperative farming agreements and establishing oaks through seeding or planting

Throughout the forested areas in WWMA, wildlife objectives include maintaining and enhancing species habitat, establishing a more balanced forest age class distribution, adapting to changing climate, and treating invasive species. We will also make management decisions in forested areas that support the species and habitats identified in areas of high and outstanding biological significance.

One of the tools used to develop yearly WWMA-specific work plans in forested areas is DNR's annual stand exam list process. The annual stand exam list uses DNR's forest inventory, as well as

landscape-level species- and age-class goals, to identify areas of the forest that should be visited by field staff to inform decisions about site-level management. The sites are identified based on cover type (a broad description of forest type) and age. Site-level decisions need to align with wildlife species and landscape goals. Management actions selected may include timber harvest, but other forest management actions such as no treatment, prescribed burning, understory planting, thinning, or scarification may also be used. In selecting among potential management actions, considerations will include effectiveness in achieving relevant goals, available resources, and specific local conditions and spatial considerations.

Figure 20. Oak Forest Priority Areas at WWMA



Management Objective 1.6: Utilize prescribed fire and mechanical processes in fire-dependent forest plant communities to achieve restoration and management goals

- **Use appropriate silvicultural practices and BMPs with an adaptive management approach to encourage successful oak regeneration**
- Review and update ECS determinations and Forest Inventory Module (FIM) datasets for future stand management
- Utilize prescribed fire as one tool to maintain and restore WWMA’s mesic hardwood and fire-dependent forest plant communities
- Conduct invasive species management as warranted prior to timber harvests
- Identify funding sources for pre- and post-timber harvest habitat work including invasive species reduction/removal, underplanting, and other methods needed to successfully regenerate desired species

Management Objective 1.7: Manage conifer plantations to promote their succession to native plant communities; reduce red cedar monocultures

- **Reduce or remove non-native conifer plantations that harbor an understory of invasives and provide limited wildlife cover through the use of commercial thinning or other means**
- **Use ECS interpretations to guide restoration activities in conifer and cedar areas appropriate to the native plant community**
- Offer red cedar stands within or adjacent to timber sales
- Use prescribed fire to manage cedar advancement on bluff prairies

Management Objective 1.8: Maintain or increase within-stand species and structural diversity to benefit wildlife

- Increase tree and shrub species diversity for underplantings and direct seedings that are consistent with climate change BMPs to restore and establish structural diversity
- Consider supplemental seeding and planting to increase species diversity in stands with high restoration potential

C. Floodplain Forests

Floodplain forests are disturbed through flooding events, which vary both spatially and over time. As a result, the floodplain forests at WWMA tend to consist of mixed forest rather than be dominated by one or a few species. Management strategies for this habitat type focus mainly on preservation, restoration, and invasive species management.

Within the floodplain forests in WWMA, we aim to:

- Retain 3,074 acres of floodplain and lowland forests on the WWMA
- Restore 100 acres to floodplain/lowland hardwood forest through retiring cooperative farming agreements
- Reduce woody (buckthorn/honeysuckle/barberry) and herbaceous (reed canary grass, garlic mustard, knotweed, poison hemlock) invasives on 150 acres of floodplain and lowland forest

- Increase shrub diversity on 75 acres of lowland forest on the WWMA
- Conduct prescribed burns in lowland and floodplain forests at least once over the next 10 years, conditions permitting; fire regime for this habitat type is once every 10-20 years

Management Objective 1.9: Preserve and maintain existing floodplain forest

- **Plant and direct seed tree and shrub species, in line with climate change best practices, when restoring forested floodplain habitat**
- Where practical, reduce reed canary grass in floodplain forests
- Reduce expansion of reed canary grass in floodplain
- Retain the ecological function of all the existing floodplain forests

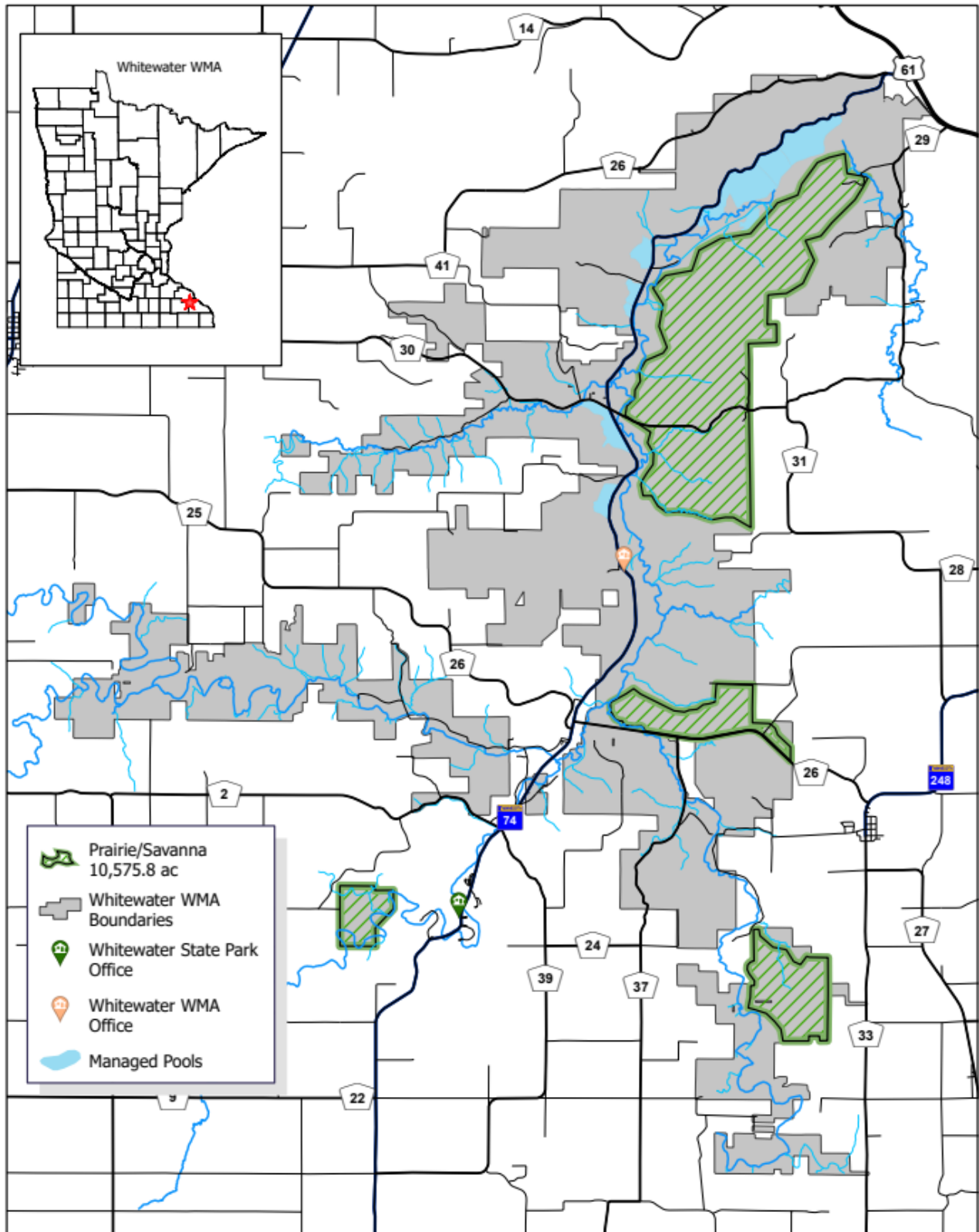
D. Upland Grasslands, Shrublands, and Sparse Vegetation

Prairies and savannas at WWMA are dependent on frequent disturbance, mainly through fire, to prevent trees and shrubs from dominating and shading out the herbaceous understory. Savannas are highly sensitive to fire suppression and will succeed to woodland and eventually to forest in the absence of fire. Dry prairies are slightly more resistant to this type of succession due to xeric conditions that help inhibit tree and shrub growth; however, regular disturbance is still needed to maintain the native composition that benefits grassland wildlife species such as pheasant, deer, red fox, and squirrels. These sites also provide habitat for a wide array of grassland specific nongame species ranging from songbirds and small mammals to herpetofauna and pollinators. Prescribed fire is main disturbance tool used in this habitat at WWMA, but regular disturbance can also be mimicked through grazing, mowing, and/or mechanical removal of trees. Management triggers are brush density, duff layer density, oak wilt management, new or expanding invasive species.

Within the prairie and savanna priority areas at WWMA, we aim to:

- Enhance approximately 5,400 acres, or 19%, of the remnant prairie and savanna habitat on the WWMA through active management, including prescribed burning, invasive species removal, and interseeding
- Increase restored prairie by 200 acres primarily through retiring cooperative farming agreements
- Plant a minimum of 50 species of grass, forb, and sedges with new plantings
- Increase species diversity by 10% on 150 acres of existing planted prairies through interseeding
- Decrease invasive species presence in existing planted and remnant prairies by 25%
- Reduce woody encroachment in both prairies and savannas by 25%
- Reduce non-native invasive species cover by 20% in savanna and shrublands
- Disturbance regimes include prescribed fire, brush mowing and tree removal, herbicide treatment, and prescribed grazing with goats and possibly cows and sheep

Figure 21. Prairie/Savanna Priority Areas at WWMA



Management Objective 1.10: Maintain, enhance, and restore grassland habitat

- **Expand and connect small and isolated prairies to create larger expanses of grassland, where ecologically appropriate**
- Incorporate set-aside habitat into CFAs to provide short-term cover and foraging habitat for grassland wildlife
- Restore and/or enhance bluff prairies by reducing red cedar and invasive brush density, or eliminate where feasible
- Strive for high diversity local genotype native seed mixes that will provide food resources throughout the growing season
- Use prescribed fire to maintain and enhance prairie habitat

Management Objective 1.11: Protect and enhance known locations of rare native plant communities, as well as rare plants and animals and their associated habitats

- **Account for Leedy's roseroot in management actions conducted uphill from known locations in order to sustain cool, mesic growing conditions and prevent erosion**
- **Address erosion issues and ATV trespass near the Leedy's roseroot population and in other sensitive native plant communities**
- **Prioritize invasive species management in rare native plant communities, and areas with concentrations of rare species**
- Conduct resource assessments, including NHIS review, before implementing any resource management activities
- Alter timing of prescribed burns in areas with fire sensitive species
- Allow for refugia when conducting prescribed burns
- Reduce or eliminate the use of herbicides in areas with sensitive features

Image 8. Monarch butterfly on dotted mint



E. Wetland Grasslands, Shrublands, Marshes, and Open Water

The WWMA wetland habitat is comprised primarily of impoundments. Aside from impoundments, wetland habitat may be found along the many streams that traverse the WWMA. Overall, a total of 13 impoundments are maintained on the WWMA including: Dorer Pools 1, 2 and 3, Dondlinger Pool, County Line Pool, Appleby Pool, Dorman Pools North and South, Goose Pool, Miller Pools North and South, and Randall Pool. Randall Pool holds water in spring, but typically dries out by fall unless it is a wet year. Miller Pool south only holds water during high water events and very wet years. The remaining impoundments provide a mixture of pool depths for dabbler and diving waterfowl.

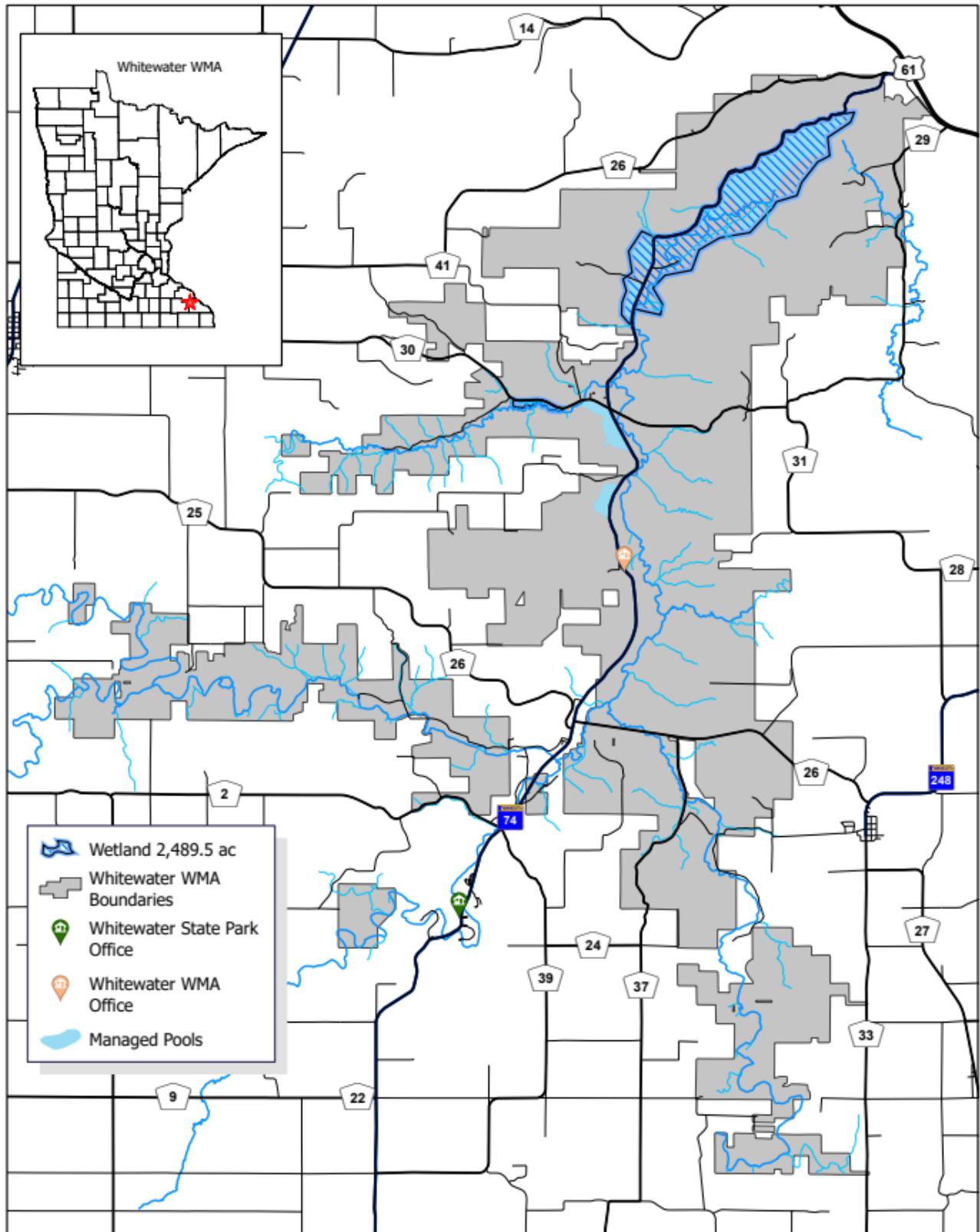
Within our wetland priority areas, we aim to:

- Restore the infrastructure for both Dorman Pools; this is the top priority for wetland management on the WWMA over the next 10 years
- In each pool, maintain a minimum of 10% open water; for larger pools, retain up to 20% open water
- Reduce reed canary grass and cattail dominance in all pools
- Draw down connected pools respectively to ensure all pools are not in draw down status at one time
- Drawdowns will be triggered by vegetation levels, open water amount, need for repair
- When conducting water level management, drawdowns will be gradual to produce shorebird habitat

Image 9. Prescribed burn on a wetland to reduce cattail cover



Figure 22. Wetland Priority Areas at WWMA



Management Objective 1.12: Protect, maintain, enhance, and restore riparian areas and wetlands

- **Maintain and/or enhance habitat complexes that enable successful nesting by wetland species, including waterfowl nesting and brood-rearing habitat**
- Maintain and/or enhance healthy watersheds through healthy, diverse habitats
- Reduce reed canary grass and cattail invasion of wetlands, particularly if retention of open water expanses is threatened, with special consideration given to areas used by trumpeter and tundra swans
- Maintain or improve water control structures and dikes, and manage water levels to promote habitat use by waterfowl, waterbirds, and shorebirds

Management Objective 1.13: Protect, maintain, or enhance coldwater streams and riparian habitat

- **Enhance altered stretches, particularly on the Main Branch Whitewater River, and reconnect incised rivers and streams to their floodplain**
- Work with other organizations with landscape and watershed management responsibilities to reduce runoff and erosion affecting streams in WWMA
- Manage per the [Strategic Plan for Coldwater Resource Management in Southeast Minnesota \(2004-2015\)](#) and [Fisheries Long-Range Plan for Trout Stream Resource Management in Southeast Minnesota](#)
- Enhance brook trout habitat

F. Agricultural Lands

Agricultural lands on WWMA are managed through cooperative farming agreements with local producers.

Within the agricultural lands at WWMA, we aim to:

- Reduce the overall farmed acreage on the WWMA by 330 acres over the next 10 years; some of these acres will be restored to prairie and some to forest depending on location and soil type
- Increase the number of cooperators using cover crops on the WWMA by 75%
- Increase soil health on agricultural acres for at least 10% of our cooperators

Management Objective 1.14: Maintain agricultural fields through CFAs to provide for wildlife and WWMA user benefit

- **Evaluate agricultural lands within the WWMA's landscape to determine continuation or retirement based on access, maintenance requirements, wildlife utilization, ecosystem function and connection, and user benefits**
- Manage farmed acres in accordance with Operation Order 135: Cooperative Farming Agreements and Operation Order 137: Annual Cropping on DNR Lands
- Manage agricultural fields to provide and enhance nesting and foraging opportunities

- Diversify crop rotations, require cover crop usage, and encourage perennial wildlife mix plantings to simultaneously benefit soil health and wildlife use, and reduce soil runoff
- Monitor CFAs for compliance with terms of agreements
- Continue to work with cooperators on approved bartering options to maintain parking lots, repair gates and access roads, rehabilitate retention ponds, install grass waterways, and for services identified in the agreements

Goal 2: Maintain or enhance compatible recreational opportunities for public enjoyment

Management Objective 2.1: Maintain and enhance diverse quality hunting, trapping, and angling opportunities in the WWMA

- **Survey WWMA hunters and trappers about how they do/will use the WWMA and their experience(s)**
- **Complete feasibility study for increasing accessible facilities such as hunting blinds, gate systems, and parking lots**
- Seek funding to rehabilitate the dike system supporting Dorman Pools
- Maintain and/or enhance waterfowl habitat by evaluating the structures for Appleby Pool, Green Pool, and Miller Pool and repair as necessary
- Conduct a feasibility study of Randall Pool for wetland restoration and waterfowl habitat
- Establish and expand grassland areas to create larger, contiguous fields for enhanced upland bird hunting
- Where ecologically appropriate, increase aspen suckering on the WWMA to generate younger aspen stands for ruffed grouse
- Provide high quality grassland and forested habitat on ridgetops surrounding agricultural fields as these areas are the most accessible to the public for hunting

Management Objective 2.2: Provide opportunities for compatible recreation including birdwatching, wildlife viewing, photography, hiking, and foraging

- **Collect information from WWMA users about how they do/will use the WWMA and their experiences**
- **Complete feasibility study for increasing accessible facilities for outdoor activities such as bird watching**
- Identify potential funding sources for low-impact infrastructure that would support compatible outdoor recreation
- Occasionally post to the DNR's social media outlets highlighting low impact recreation, phenology at the WWMA, etc.
- Provide diverse, high-quality habitats on the WWMA that support a wide array of wildlife

Management Objective 2.3: Reduce the impacts from illegal activity and trespass on the WWMA

- **Work with local township authorities to vacate minimum maintenance roads that lead to illegal ATV and other off-road uses**
- **Address agricultural and private land trespass on the WWMA**
- Collaborate with the Division of Enforcement to prioritize education and enforcement activities
- Work with the Division of Forestry to ensure that temporary forest access routes are constructed and decommissioned per DNR policy and FRC site-level management guidelines
- Improve WWMA boundary, parking lot, and rules signage

Management Objective 2.4: Maintain and enhance WWMA infrastructure for safe, reliable use by the public as well as staff

- **Re-grade, potentially widen, and add new culverts to major access roads on the WWMA including but not limited to Siebenaler Ridge, Putnam Road, Trout Valley, Beaver Creek Road, and other deteriorating access roads on the WWMA**
- Re-establish access from Highway 30 to 564th Street by the Minnieska Cut-off Road to the Trout Valley bridge
- Upgrade tree gates to metal swing gates, keeping in mind the need to meet state and federal accessibility standards, and add signage to parking lots and major features on the WWMA
- Replace the office building well pump, windows, and doors as needed and upgrade the barracks, especially the restroom
- Continue to work with the Luxembourg Society to restore the Marnach House

Management Objective 2.5: Provide interpretation of the natural and cultural history, resources, and management of WWMA for visitors and potential visitors in a manner that is consistent with state statute

- **Establish an interdivisional steering team including Parks and Trails and Fish and Wildlife division staff to develop and potentially implement interpretive services**
- Develop an MOU with the Division of Parks and Trails and/or the County to cover interpretive and historical programs for the cemeteries
- Coordinate with the Luxembourg Society for interpretive programs and uses of the Marnach House

Implementation Process

G. Operational Overview

The management objectives and strategies laid out in this plan describe the “what” and “why” for management intended to occur on the WWMA in the next 10 years, but specific operations at WWMA are dependent on several factors, including weather conditions, funding, and changing priorities. To allow flexibility in the operational plan, the “who,” “when,” and “how” of specific work activities will be determined annually by unit staff in conjunction with division-wide annual work planning. Table 10 shows an overview of ongoing annual work activities that are performed at WWMA in a typical year.

Table 10. Overview of annual work activities performed at WWMA in a typical year

Activity/Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Develop project specs and site marking	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Required training	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes
CFA renewals	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes
Burn plans	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes
Gate/ sign repairs	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	No
Timber harvest	Yes	Yes	No	No	No	No	No	No	No	No	No	Yes
Control structure maintenance/ monitoring	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CCM project proposals	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No
Brush mowing	Yes	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Deer season/ CWD management	Yes	No	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Activity/Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ginseng permits/ data entry	Yes	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes
Timber stand exam reviews	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Trapping season/ data entry	Yes	No	No	No	No	No	No	No	Yes	Yes	No	Yes
CFA field compliance checks	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes
Inventory	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Furbearer registration	Yes	No	No	No	No	No	No	No	No	No	No	Yes
Review & update site emergency plan	Yes	No	No	No	No	No	No	No	No	No	No	No
Rx burn equipment inventory & prep	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No
Rx burning	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
Wildlife project proposals	No	No	Yes	Yes	No	No	No	No	No	No	No	No
Invasive species control	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Terrestrial invasives grant	No	No	Yes	No	No	No	Yes	No	No	No	No	No
Mow firebreaks	No	No	Yes	No	No	No	No	No	No	Yes	Yes	No
Partner coordination meetings	No	No	Yes	No	No	No	Yes	No	No	No	No	No
OHF proposals	No	No	No	Yes	Yes	No	No	No	No	No	No	No

Activity/Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Deer goal setting/ public meetings	No	No	No	Yes	No	No	No	Yes	No	No	No	No
Grouse surveys	No	No	No	Yes	No	No	No	No	No	No	No	No
Tree planting	No	No	No	Yes	No	No	No	No	No	No	No	No
Cemetery maintenance	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Road repair/ maintenance	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Dike repair	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No
Boundary posting	No	No	No	No	Yes	Yes	No	No	Yes	Yes	No	No
Prairie planting	No	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No
Mow dikes	No	No	No	No	No	Yes	No	No	Yes	No	No	No
Direct seeding	No	No	No	No	No	Yes	No	No	No	Yes	Yes	No
New prairie mowing	No	No	No	No	No	Yes	No	No	No	Yes	No	No
Goose banding	No	No	No	No	No	Yes	No	No	No	No	No	No
Mowing trails, roads, & parking lots	No	No	No	No	No	No	Yes	No	Yes	No	No	No
Accomplishment reporting	No	No	No	No	No	No	Yes	No	No	No	No	Yes
Roadside wildlife survey	No	No	No	No	No	No	No	Yes	No	No	No	No
Predator scent post survey	No	No	No	No	No	No	No	No	Yes	No	No	No
CPL & ECP grants	No	No	No	No	No	No	No	No	Yes	No	No	No
Rx burn reporting	No	No	No	No	No	No	No	No	No	No	No	Yes

Research, Monitoring, and Adaptive Management

A. Current Research and Monitoring Projects

Wildlife Monitoring

- [Southeast Minnesota Deer Movement Study](#)
- Chronic Wasting Disease (CWD)
- Goose banding
- Grouse drumming surveys
- August Roadside counts
- Predator Scent Post surveys
- Bumble bee surveys
- Butterfly surveys (Karner blue, Leonard's skippers)

Fish Monitoring

- Trout population long-term monitoring
 - Beaver Creek – Station 3.5 (1971 to 2021)
 - North Branch Whitewater River – Station 1.2 and 2.98 (1976 to 2016)
 - Middle Branch Whitewater River – Station 12.7 (1976 to 2021)
 - South Branch Whitewater River – Station 3.5 (1980 to 2021)
- Slimy Sculpin Reintroduction Program – Beaver Creek

Public Use Monitoring

- Deer season car counts
- Whitewater State Game Refuge deer hunter surveys
- Trapping permits
- Furbearer harvest
- Ginseng permits, harvest levels, and digger information

Habitat Monitoring

- [Oak wilt control trial](#) (Siebenaler Ridge, 2020-2026)
- Forest monitoring work including case studies on tree regeneration post timber harvesting
- Annual surveys of *Aureolaria pedicularia* (fernleaf false foxglove) by MBS since 2014
- Minnesota Biological Survey (MBS) established three Ecological Monitoring Network ([EMN](#)) permanent plots in the WWMA to track long-term ecological change in the state (Figure 23)
- MBS intensively resurveyed rare plant populations in two designated HCVF sites in the WWMA (North Fork Whitewater WMA and South Fork Whitewater WMA) as part of the initial HCVF

monitoring effort. The eastern portion (Olmsted and Winona Counties) of the North Fork site were resurveyed in 2019. The central and western portions have not been resurveyed yet (see Potential Research and Monitoring Projects). The South Fork site was resurveyed from 2014-2017.

- MBS resurvey work to update rare plant populations (Sand Savannas site in 2015 [Whitewater 12], Beaver Creek East in 2018, and Whitewater 24 in 2019 and 2021)
- CFA operator survey, soil testing, nutrient management, crop rotations and if/how they change through time
- Cattle grazing reed canary grass as a step in floodplain forest restoration
- [Biennial forest canopy health aerial survey](#)
- Re-survey releve locations from earlier Minnesota County Biological Survey work

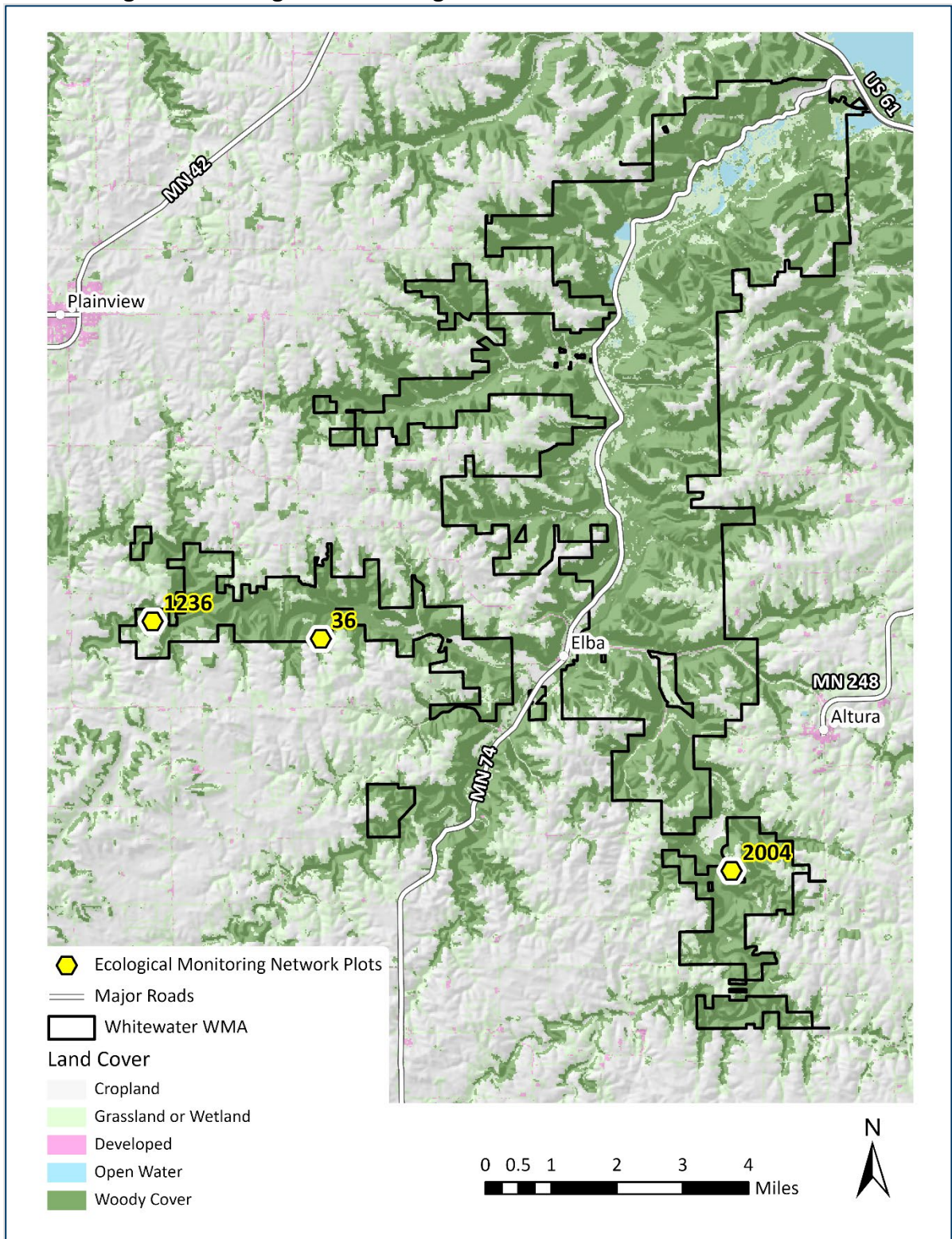
Invasive Species Monitoring

- Emerald Ash Borer monitoring
- Japanese knotweed and poison hemlock monitoring
- [Spongy moth surveys](#)
- [EDDMAPS](#)

B. Potential Research and Monitoring Projects

- Fisher and bobcat populations in southeast Minnesota with Michael Joyce, Natural Resources Research Institute, UM-Duluth
- Prescribed burn effects on various habitat types, specific plant species (natives and invasives), wildlife (game, nongame, insects, and pollinators), timing and return intervals using existing and new data
- Nongame and rare plant species surveys/monitoring
- Vegetation monitoring in habitat restorations and timber sales
- Water level management and wildlife response
- Restoration of floodplain forest to convert open reed canary grass to future closed canopy forests
- Identify volunteer(s) willing to resume Breeding Bird Survey route
- MBS survey for spring ephemeral specialist bees
- MBS re-survey of rare plant populations in the central and western portions of the North Fork Whitewater HCVF/biodiversity site
- Brook Trout Reintroduction Program
 - Unnamed Creek M-031-008.4
 - Beaver Creek M-031-006

Figure 23. Ecological Monitoring Network Plots Located within WWMA



C. Adaptive Management

Adaptive management for WWMA will include:

- Continuously reviewing research and monitoring results, and building off the results to improve habitat restoration techniques, maximize wildlife benefit, and increase user satisfaction
- Collaborating with other divisions and partners to continue, improve, and expand research and monitoring projects

The management objectives and strategies set forth in this document will be reviewed annually by regional and area staff and adjusted, as necessary. A revision of the master plan is recommended in 10 years, or 2033.

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Appendix A. Whitewater WMA Planning Team Members

Team members have changed over the course of this project. Active members at the conclusion of the project are indicated in **bold**.

Role	Name	Division	Position	Location
Executive Sponsor	Paul Telander Mike Larson Kelly Straka	FAW	Wildlife Section Manager	St. Paul
Managing Sponsor	Grant Wilson Kelly Wilder	FAW	FAW Policy & Planning Supervisor	St. Paul
Managing Sponsor	Cynthia Osmundson Jami Markle Gretchen Miller Jesse Roberts	FAW	Central Regional Wildlife Manager	St. Paul
Project Manager	Bruce Anderson Tom Keefe Laurinda Brown	FAW	WMA Planning Consultant WMA Planning Consultant Policy and Planning Coordinator	Forest Lake Whitewater Fergus Falls
Team Member	Don Nelson Jaime Edwards	FAW	Area Wildlife Manager	Whitewater
Team Member	Christine Johnson	FAW	Assistant Area Wildlife Manager	Whitewater
Team Member	Vaughn Snook	FAW	Assistant Area Fisheries Manager	Lanesboro
Team Member	Brian Schwingle	FOR	Forest Health Specialist	St. Paul
Team Member	Joe Brown	FOR	Area Forest Supervisor	Lewiston
Team Member	Michelle Martin	FOR	ECS Forester	St. Paul
Technical Advisor	Kit Elstad-Haveles	EWR	Regional Plant Ecologist	St. Paul
Technical Advisor	Erica Hoaglund	EWR	Regional Nongame Specialist	St. Paul
Technical Advisor	Lucas Youngsma	EWR	Area Hydrologist	Lake City
Technical Advisor	Brent Anderson	PAT	Park Supervisor	Whitewater
Technical Advisor	Martha Vickery	LAM	Regional Operations Coordinator	St. Paul

Appendix B. Whitewater WMA Public Comment Summary

On December 2, 2022, the draft Whitewater WMA plan was published online for public review and input. The comment period remained open until January 9, 2023. During this period, Whitewater WMA staff hosted an online plan overview and question session, an in-person open house at Whitewater State Park, and an additional online open house during which attendees were encouraged to ask questions and provide input. Comments were also collected via the Engage with DNR website, U.S. mail, email, and personal communication directly to staff. All comments were analyzed thematically and reviewed by division leadership.

The table below is a thematic summary of the comments received and how we addressed those comments. In addition to the comments summarized below, members of the public made helpful comments that corrected minor factual, syntax, or other technical errors. We made all such known corrections, with gratitude to those commenting.

The DNR appreciates and thanks all who took the time to review and comment on the plan.

Comment	Response	Detail
Executive Summary		
Executive summary could be more helpful – go beyond table of contents, make a more meaningful vision statement, and use better or clearer maps of WWMA and surroundings.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Executive summary could better stress certain aspects of biodiversity, landscape diversity, and WWMA’s place in the landscape.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Executive summary could more accurately reflect the statutory goals related to hunting, fishing, trapping, and wildlife viewing.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Mission statement should improve framing to emphasize the state’s public land base and related resources.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.

Comment	Response	Detail
Introduction		
Introduction section could provide helpful links to Outdoor Recreation Act of 1975.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Introduction of plan could clarify purpose of plan.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Introduction of plan describes the public participation process; would like to see follow up on these comments and response from the department.	Change Made	We agree with the comment, appreciate the feedback, and have ensured this document follows widely used and accepted methodology for summarizing and responding to public comment. We have grouped comments thematically and summarized them in this table.
Introduction of plan lacks statewide context and/or vision for the Wildlife section or WMA system.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.
Planning process described in Introduction should have contained an “advisory group” process similar to large lake planning process.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan, but we are strongly considering this feedback as we develop plans for additional WMAs.
Long range goals in the Introduction seem very broad; recommend specific short-term goals with focus on WWMA.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The scope of a ten-year plan is intentionally, necessarily broad; we would address greater detail in annual work plans.
Introduction should clarify what triggers plan amendment.	No Change Made	We considered the comment and appreciate the thoughtful feedback. We believe we have incorporated our best interpretation of statute as it currently stands regarding plan amendments.
Guiding Documents		

Comment	Response	Detail
Guiding documents should include Pittman-Robertson Act and related rules and grant agreements. (Similar comments made for other relevant federal statutes, state statutes, and associated plans.)	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Guiding documents should include additional references/guiding document list is too long.	No Change Made	We considered the comment and appreciate the thoughtful feedback. As seen elsewhere in feedback, it can be difficult to strike a universally agreed upon balance of what to include or not in such a plan. Those included are the most directly relevant. Those not included may have specific relevance in certain contexts. It is important to provide a list of some length so that members of the public with diverse interests can see the breadth of issues and policies relevant to management of the Whitewater Wildlife Management Area.
Existing Conditions		
Existing conditions should note that ecosystems don't just occur on public lands but extend beyond boundaries.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Existing conditions includes maps, legends, and related information that need revision for sake of accuracy.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Existing conditions should include specific mention of certain habitats and/or species.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Existing conditions should include discussion of infrastructure, maintenance needs, and related funding and staffing required.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.

Comment	Response	Detail
Existing conditions should establish clearer definitions, terminology, classifications, and/or metrics used to describe habitats and their status.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.
Existing conditions need not include certain information, which might be better suited to an appendix. (Examples included specific tables and figures that the commenter felt detracted from the narrative flow.)	Change Made/Future Consideration	We considered the comment and appreciate the thoughtful feedback. We moved some of this information to the appendix, and we are strongly considering this feedback as we develop plans for additional WMAs.
Existing conditions information on species/habitat relationship could improve, e.g., to note frequency of occurrence within the WWMA, or to merge all species' information with each other so that relationships are clearer.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.
Existing conditions information should use a more specific/different classification level to set goals for certain habitats and/or species.	No Change Made	We considered the comment and appreciate the thoughtful feedback. We stand by the framework used in the plan. That said, ongoing conversations and more specific annual work plans throughout the broader planning period may take into consideration more specific taxonomy and/or related detail.
Existing conditions information should include more information on specific topics. (Examples included Forest Cover Type classification, species that could occur in the WWMA, a more thorough discussion of socio-economic context, etc.).	No Change Made	We considered the comment and appreciate the thoughtful feedback. We stand by the amount and emphasis of information relating to these important related aspects, given the need to focus a WMA plan and keep it readable.

Comment	Response	Detail
Existing conditions information on “public use” should include more specific information about timber harvesting.	No Change made	We considered the comment and appreciate the thoughtful feedback. Timber harvest is not strictly a public use, though we recognize it as a tool we can use on WMAs as part of a natural resource management strategy.
Existing conditions information should include links to various existing plans on the Internet for easier reference (e.g., DNR web pages on deer management, waterfowl management, wild ginseng, etc.).	No Change Made	We considered the comment and appreciate the thoughtful feedback. It is a judgment call as to how many links to various resources a plan should make; given the size, breadth, and duration of this plan, we are electing to refrain from too many such links. We might reconsider such an approach in future plans for selected topics.
Existing conditions information should include more specific data on certain rare species.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The plan acknowledges the need for more data and rare species inventories within WWMA boundaries and identifies strategies for collecting this information.
Strategic Considerations		
Strategic considerations discussion on climate change could benefit from more exposition (e.g., nature, pace, direction of such change), specific to the WWMA.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate changes as feasible. This feedback will also be incorporated as we develop plans for additional WMAs.
Strategic considerations discussion should include more information on any response plan for waterfowl disease outbreaks within WWMA.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Strategic considerations discussion could be improved with more information. (Examples included closer coordination of forest health and invasive species and more	Future Consideration	We considered the comment and appreciate the thoughtful feedback. This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.

Comment	Response	Detail
information on working with road authorities.)		
Strategic considerations section should include information on specific deer permit boundaries that may shift in light of Chronic Wasting Disease trends.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The commenter brings up a policy issue that this outside the scope of a WMA planning process, so we have referred the comment to appropriate agency staff for consideration in relevant policy discussions. Readers may find helpful additional context in the DNR's plan specific to Chronic Wasting Disease.
Strategic considerations section should include more information on specific species and related concerns. (Examples included Amur maple, spongy moth, etc.)	No Change Made	We considered the comment and appreciate the thoughtful feedback. We reviewed each case specifically and believe the species for which the commenters requested additional information already receive the appropriate level of attention in the plan.
Strategic considerations section should identify and describe budget, staffing, and/or other specific operational plans specific to WWMA.	No Change Made	We considered the comment and appreciate the thoughtful feedback. A ten-year plan necessarily has limitations on budget and staffing detail. While the level of detail sought by these commenters is not suitable for this plan, we will ensure that the plan is fully considered in the context of decisions on budget, staffing, and related operational details.
Strategic considerations section should link directly to operational orders and other policies referenced.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The commenter references documents that are generally internal to the agency. IT security protocols do not allow linking the public to these documents; however, any member of the public can ask for a listing or full content of any of our policies and procedures, using the data practices request procedure found on our website.
Strategic considerations section includes items that are statewide and should be addressed in a comprehensive, state-level WMA system plan.	No Change Made	We considered the comment and appreciate the thoughtful feedback. We believe it appropriate to discuss these topics in multiple contexts, including both WMA plans specific to an area, and any number of materials we might produce with a statewide perspective.

Comment	Response	Detail
Desired Conditions		
Desired conditions should treat timber harvesting as a potential tool and not leave the impression of mandatory targets.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions included some goals and objectives that were too vague or needed more emphasis. (Examples included habitat management, mitigation measures related to timber harvest, etc.)	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions should include deeper recognition of the presence and value of partnerships with non-governmental organizations, local government, et. al.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions include language regarding timber harvest that should receive revision to better reflect timber harvesting as a potential tool.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions should include more specifics on oak management, including rationale, specific strategies, and roles.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions should clarify that recreational uses should remain consistent with statute and funding intent.	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s).
Desired conditions should contain more specific short-term goals and objectives, and/or more specific strategies	No Change Made	We considered the comment and appreciate the thoughtful feedback. The scope of a ten-year plan is intentionally, necessarily broad; greater detail will be addressed in annual work plans.

Comment	Response	Detail
to achieve the goal. (Examples included habitat maintenance, wildlife biodiversity, monitoring, survey process, interagency coordination, land management, infrastructure, budget, staffing, etc.)		Many details will depend upon annual staffing and budget calculations that a ten-year plan cannot address.
Implementation Process		
Implementation process should include more detail on budget, staffing, timeline, and related information.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The scope of a ten-year plan is intentionally, necessarily broad; we will address greater detail in annual work plans. Many details will depend upon annual staffing and budget calculations that a ten-year plan cannot address.
Research and Monitoring		
Research and monitoring could include additional specific activities. (Commenters listed several different possibilities.)	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s). Several of these recommendations are either already planned or under active consideration. In some other cases, the activity requested would not be possible or appropriate.
Appendices		
Much of the information included in the body of the plan would be more appropriate in the Appendices. (This was a common point of feedback relating to many different tables, figures, etc.)	Change Made	We agree with the comment, appreciate the feedback, and have made appropriate change(s). In a few cases, the change was not possible for the Whitewater WMA plan but will be considered in future WMA plans with similar tables/figures.
General Comments (not attributable to a specific section)		
The Whitewater WMA is a critical resource that needs good, thoughtful management by the DNR.	No Change Made	We agree with the comment and appreciate the feedback. We took these types of general comments as statements of support for the concept management plans and for WWMA

Comment	Response	Detail
		itself, and not as specific suggestions for plan revisions.
This plan may be in conflict with federal or state statute; commenter indicated the potential for legal action.	No Change Made	We considered the comment and appreciate the thoughtful feedback. We are confident in the legality of our plans and actions, and we remain in communication with the agency's legal staff to ensure continued understanding and compliance with all relevant federal and state statutes.
The plan should provide more detail to goals and objectives, and/or staffing plans and budget.	No Change Made	We considered the comment and appreciate the thoughtful feedback. The scope of a ten-year plan is intentionally, necessarily broad; we will address greater detail in annual work plans.
The plan should do more to recognize and discuss the contributions of non-governmental organization and volunteer efforts within WWMA.	Future Consideration	We considered the comment and appreciate the thoughtful feedback. We agree that partners and volunteers are absolutely essential to the long-term health of WMAs (and natural resource management more broadly). This change is not possible for the Whitewater plan due to time constraints, but we are strongly considering this feedback as we develop plans for additional WMAs.
The DNR should undertake a specific change in law or rules. (Examples included adjusting hunting numbers/restrictions, phasing out lead, etc.)	No Change Made	We considered the comment and appreciate the thoughtful feedback. Where a comment references a policy or rule that is not within the scope of an individual WMA planning process, we refer the commenter to the appropriate policy-making (e.g., legislative) or rule-making (e.g. season setting) venue. As we implement this plan, we will fully consider and incorporate as appropriate any future statutory or rule changes.
The DNR should increase/decrease food plots for wildlife, and/or increase/decrease the amount of farming supported within WWMA.	No Change Made	We considered the comment and appreciate the thoughtful feedback. There is a range of opinions about the value of food plots and whether they are appropriate on a WMA. As stated in the plan, DNR is continually evaluating the use of food plots and agricultural practices on WMAs.
The plan does not do enough to address concerns	No Change Made	We considered the comment and appreciate the thoughtful feedback. We believe the plan is

Comment	Response	Detail
about/support for timber harvest.		consistent with DNR’s commitment to manage WMAs to achieve fish and wildlife habitat objectives, and in some cases, to use active management techniques like timber harvest to accomplish those objectives.
The plan should address specific species management issues that the commenter has seen/observed (e.g., “there is X happening at Y location right now”).	No Change Made	We considered the comment and appreciate the thoughtful feedback. Where a commenter noted anything like this, we have referred the specific issue to appropriate staff for consideration and potential future action.
This plan is overdue.	No Change Made	We considered the comment and appreciate the thoughtful feedback. We acknowledge the long gap between plans and agree that it is important going forward to establish and maintain current plans for the Whitewater WMA.

Appendix C. Acronyms and Initialisms Used in the WWMA Master Plan

Acronym	Explanation	Page First Occurs
ATV	All-Terrain Vehicle	72
Bat HCP	Lake States Forest Management Bat Habitat Conservation Plan	69
BMP	Best Management Practices	78
BWSR	Board of Water and Soil Resources	12
CFA	Cooperative Farming Agreement	40
CWD	Chronic Wasting Disease	63
DNR	Minnesota Department of Natural Resources	3
DPA	Deer Permit Area	55
ECS	Ecological Classification System	76
EDDMapS	Early Detection and Distribution Mapping System	65
END	Endangered	34
EWR	Division of Ecological and Water Resources	70
FAW	Division of Fish and Wildlife	12
FIM	Forest Inventory Module	81
FOR	Division of Forestry	99
FRC	Minnesota Forest Resource Council	12
IBA	Important Bird Area	18
LAM	Division of Lands and Minerals	99
LCCMR	Legislative-Citizen Commission on Minnesota Resources	17
LSOHC	Lessard-Sams Outdoor Heritage Council	17

Acronym	Explanation	Page First Occurs
MNWAP	Minnesota Wildlife Action Plan	18
NPC	Native Plant Community	26
PAT	Division of Parks and Trails	99
SGCN	Species of Greatest Conservation Need	18
SPC	Species of Special Concern	34
THR	Threatened	34
TLCB	Two-Lined Chestnut Borer	72
USFWS	U.S. Fish and Wildlife Service	10
WMA	Wildlife Management Area	3
WWMA	Whitewater Wildlife Management Area	3

Appendix D. 30-year average temperature and precipitation and associated changes from 1921-1980 (Southeast Minnesota, Climate Division 9)

	30-year Average Temperature, 1987-2016 (°F)	Change from 1921-1980 Averages (°F)	30-year Average Precipitation, 1987-2016 (inches)	Change from 1921-1980 Averages (inches)
January	15.2	+3.4	0.9	0.0
February	19.4	+2.3	0.9	0.0
March	32.1	+3.1	2.0	+0.1
April	45.7	+1.1	3.6	+1.0
May	57.4	+0.5	4.2	+0.5
June	67.3	+0.8	5.2	+0.7
July	71.1	-0.3	4.4	+0.7
August	68.8	-0.1	4.6	+0.9
September	61.0	+1.0	3.4	-0.2
October	48.0	-0.6	2.3	+0.3
November	34.0	+2.1	1.8	+0.3
December	20.4	+2.3	1.3	+0.3
Annual	45.0	+1.3	34.6	+4.6

Source: NOAA National Centers for Environmental Information, Climate at a Glance

Appendix E. 30-year snowfall average and associated changes from 1940-1986 for Rochester, MN

	30-year Average Snowfall, 1987-2016 (Inches)	Change from 1940-1986 Averages (Inches)
October	1.2	+0.5
November	4.7	-0.8
December	12.8	+2.6
January	11.6	+2.8
February	9.4	+1.8
March	9.3	-0.8
April	3.4	-1.0
May	0.7	+0.6
Winter Total	51.2	+5.8

Appendix F. Conservation status ranks

Rank Code	Rank Label	Rank Description
S1	Critically Imperiled	At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
S2	Imperiled	At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
S3	Vulnerable	At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
S4	Apparently Secure	Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	Secure	Common; widespread and abundant.

Appendix G. Complete Bird Checklist for Whitewater WMA and Surrounding Area

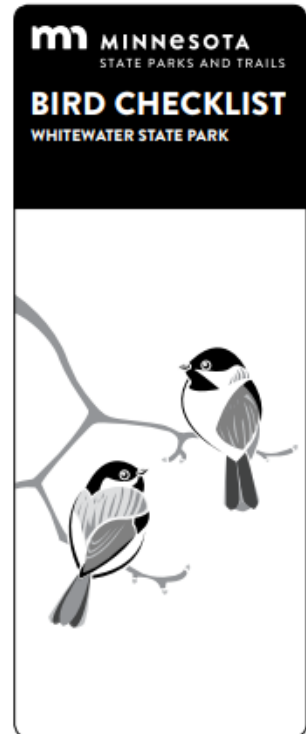
STATE PARK BIRDS	Sp	S	F	W	DATE
GRATCATCHERS					
<input type="checkbox"/> Blue-gray Gnatcatcher	C	C	C		
KINGLETS					
<input type="checkbox"/> Golden-crowned Kinglet	C	C	C	U	
<input type="checkbox"/> Ruby-crowned Kinglet	C	C	C		
THRUSHES					
<input type="checkbox"/> Eastern Bluebird	C	C	C	O	
<input type="checkbox"/> Townsend's Solitaire			R		
<input type="checkbox"/> Veery	U	U	O		
<input type="checkbox"/> Gray-cheeked Thrush	U	U	O		
<input type="checkbox"/> Swainson's Thrush	U	U			
<input type="checkbox"/> Hermit Thrush	U	U			
<input type="checkbox"/> Wood Thrush	U	U	U		
<input type="checkbox"/> American Robin	C	C	C	U	
THRASHERS, MOCKINGBIRDS					
<input type="checkbox"/> Gray Catbird	U	C	C		
<input type="checkbox"/> Brown Thrasher	U	U	U	R	
STARLINGS					
<input type="checkbox"/> European Starling	C	C	C	C	
WAXWINGS					
<input type="checkbox"/> Cedar Waxwing	C	C	C	U	
OLD WORLD SPARROWS					
<input type="checkbox"/> House Sparrow	C	C	C	C	
FINCHES					
<input type="checkbox"/> House Finch	C	C	C	C	
<input type="checkbox"/> Purple Finch	C	C	C	C	
<input type="checkbox"/> Common Redpoll	O	O	O		
<input type="checkbox"/> Pine Siskin	U	U	U		
<input type="checkbox"/> American Goldfinch	C	C	C	C	
LONGSPURS, SNOW BUNTINGS					
<input type="checkbox"/> Snow Bunting	U	O	U		
TOWHEES, SPARROWS					
<input type="checkbox"/> Eastern Towhee	U	U	U		
<input type="checkbox"/> American Tree Sparrow	C	C	C	C	
<input type="checkbox"/> Chipping Sparrow	C	C	C	C	
<input type="checkbox"/> Clay-colored Sparrow	U	U	U		
<input type="checkbox"/> Field Sparrow	C	C	U		
<input type="checkbox"/> Vesper Sparrow	C	C	C		

STATE PARK BIRDS	Sp	S	F	W	DATE
<input type="checkbox"/> Savannah Sparrow	C	C	C		
<input type="checkbox"/> Grasshopper Sparrow	U	R	U	U	
<input type="checkbox"/> Henslow's Sparrow	R	R			
<input type="checkbox"/> Fox Sparrow	C	C	C	R	
<input type="checkbox"/> Song Sparrow	C	C	C	O	
<input type="checkbox"/> Lincoln's Sparrow	U	U	U	O	
<input type="checkbox"/> Swamp Sparrow	C	C	C	C	
<input type="checkbox"/> White-throated Sparrow	C	C	C	O	
<input type="checkbox"/> Harris's Sparrow	U	U	U		
<input type="checkbox"/> White-crowned Sparrow	U	U	R		
<input type="checkbox"/> Dark-eyed Junco	C	C	C	C	
BLACKBIRDS, ORIOLES					
<input type="checkbox"/> Bobolink	C	C	C	C	
<input type="checkbox"/> Eastern Meadowlark	C	C	C	O	
<input type="checkbox"/> Orchard Oriole	U	U	O		
<input type="checkbox"/> Baltimore Oriole	C	C	C	C	
<input type="checkbox"/> Red-winged Blackbird	C	C	C	O	
<input type="checkbox"/> Brown-headed Cowbird	C	C	U		
<input type="checkbox"/> Rusty Blackbird	C	C	O		
<input type="checkbox"/> Common Grackle	C	C	C	O	
WARBLERS					
<input type="checkbox"/> Ovenbird	C	C	C		
<input type="checkbox"/> Louisiana Waterthrush	U	U	U		
<input type="checkbox"/> Northern Waterthrush	C	U			
<input type="checkbox"/> Golden-winged Warbler	U	U	O		
<input type="checkbox"/> Blue-winged Warbler	U	U	O		
<input type="checkbox"/> Black-and-white Warbler	C	C	C		
<input type="checkbox"/> Prothonotary Warbler	U	U	O		
<input type="checkbox"/> Tennessee Warbler	C	C	C		
<input type="checkbox"/> Orange-crowned Warbler	C	C	C		
<input type="checkbox"/> Nashville Warbler	C	C	C		
<input type="checkbox"/> Connecticut Warbler	U	U	O		
<input type="checkbox"/> Mourning Warbler	U	U	U		
<input type="checkbox"/> Common Yellowthroat	C	C	C	C	
<input type="checkbox"/> American Redstart	C	C	C	C	
<input type="checkbox"/> Cape May Warbler	U	U	U		
<input type="checkbox"/> Cerulean Warbler	U	O	O		
<input type="checkbox"/> Northern Parula	U	U	U		

STATE PARK BIRDS	Sp	S	F	W	DATE
<input type="checkbox"/> Magnolia Warbler	U	U	U		
<input type="checkbox"/> Bay-breasted Warbler	U	U	U		
<input type="checkbox"/> Blackburnian Warbler	U	U	U		
<input type="checkbox"/> Yellow Warbler	C	C	C	C	
<input type="checkbox"/> Chestnut-sided Warbler	C	C	C	C	
<input type="checkbox"/> Blackpoll Warbler	U	U	U		
<input type="checkbox"/> Palm Warbler	C	C	C	C	
<input type="checkbox"/> Pine Warbler	U	U	U		
<input type="checkbox"/> Yellow-rumped Warbler	C	C	C	R	
<input type="checkbox"/> Yellow-throated Warbler	O	O			
<input type="checkbox"/> Black-throated Green Warbler	U	U	U		
<input type="checkbox"/> Canada Warbler	U	U	U		
<input type="checkbox"/> Wilson's Warbler	U	U	U		
TANAGERS, CARDINALS, GROSBEAKS					
<input type="checkbox"/> Scarlet Tanager	U	U	U		
<input type="checkbox"/> Northern Cardinal	C	C	C	C	
<input type="checkbox"/> Rose-breasted Grosbeak	C	C	C	C	
<input type="checkbox"/> Indigo Bunting	C	C	C	C	

Checklist created by Robert B. Janssen, Jerry Borkoski and MNDNR. Data was gathered from MNDNR staff observations, public observations and Minnesota Ornithologist's Union records. Nomenclature and organization of checklist based off of the Checklist of North American Birds (7th edition) as currently supplemented.

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Birding at Whitewater State Park

The park's diverse habitat includes towering bluffs, woodlands, marshes, riparian and other wetlands that make it a popular birding destination. The Whitewater Wildlife Management Area surrounds the park and provides further habitat for birds.

Watch for migrating warblers and vireos in the spring. Hike bluff trails to view raptors such as hawks and eagles. The woodlands along the Whitewater River and the bottomlands of the nearby Mississippi River also provide excellent birding opportunities.

Key

Occurrence
 Sp - Spring (Mar—May)
 S - Summer (Jun—Jul)
 F - Fall (Aug—Nov)
 W - Winter (Dec—Feb)

Abundance
 C - Common (Present, relatively easy to find)
 U - Uncommon (Present, not certain to be seen)
 O - Occasional (Infrequent, may not return each year)
 R - Rare (Observed at least once, may not return)

Date: Enter the date you saw the bird.

Bird Identification Tips

When you observe a bird, make note of at least three characteristics.

Location: Where did you see the bird? (water, forest, feeder, lower branch, tree trunk, etc.)

Body size and shape: Compare to a known bird. (smaller than a... bigger than a... plump like a... slender like a...) Look at tail, legs and bill. (long, short, thick, thin, curved, straight)

Color and markings: Look on wings, tail, back, belly, rump and head. (stripe above eye, white spot on tail, etc.)

Sounds and movements: How do they act and sound? (travel alone or in groups, in-flight wing position - soaring, flapping, flap and glide, etc.)

STATE PARK BIRDS	Sp	S	F	W	DATE
GEESE, SWANS, DUCKS					
<input type="checkbox"/> Canada Goose	C	C	C	C	
<input type="checkbox"/> Tundra Swan	U	U	U		
<input type="checkbox"/> Wood Duck	C	C	O		
<input type="checkbox"/> Blue-winged Teal	C	C	C		
<input type="checkbox"/> Mallard	C	C	C	C	
<input type="checkbox"/> Hooded Merganser	U	U	U	U	
PARTRIDGE, PHEASANTS, GROUSE, TURKEYS					
<input type="checkbox"/> Ring-necked Pheasant	C	C	C	C	
<input type="checkbox"/> Ruffed Grouse	C	C	C	C	
<input type="checkbox"/> Wild Turkey	C	C	C	C	
GREBES					
<input type="checkbox"/> Pied-billed Grebe	O	O			
PIGEONS, DOVES					
<input type="checkbox"/> Rock Pigeon	C	C	C	C	
<input type="checkbox"/> Mourning Dove	C	C	C	U	
CUCKOOS					
<input type="checkbox"/> Yellow-billed Cuckoo	U	U	U		
<input type="checkbox"/> Black-billed Cuckoo	U	U	U		
NIGHTJARS					
<input type="checkbox"/> Common Nighthawk	C	C	C		
<input type="checkbox"/> Eastern Whip-poor-will	U	U			
SWIFTS					
<input type="checkbox"/> Chimney Swift	C	C	C		
HUMMINGBIRDS					
<input type="checkbox"/> Ruby-throated Hummingbird	C	U	U		
CRANES					
<input type="checkbox"/> Sandhill Crane	U	R	U		
PLOVERS					
<input type="checkbox"/> Killdeer	C	C	C	O	
SANDPIPERS AND ALLIES					
<input type="checkbox"/> American Woodcock	U	U	U		
<input type="checkbox"/> Wilson's Snipe	U	U	U		
<input type="checkbox"/> Spotted Sandpiper	C	C	C		
BITTERNS, HERONS, EGRETS, NIGHT-HERONS					
<input type="checkbox"/> Great Blue Heron	C	C	C		
<input type="checkbox"/> Great Egret	U	U	U		
<input type="checkbox"/> Green Heron	C	C	C		

STATE PARK BIRDS	Sp	S	F	W	DATE
NEW WORLD VULTURES					
<input type="checkbox"/> Turkey Vulture	C	C	C		
OSPREY					
<input type="checkbox"/> Osprey	U	U	U		
KITES, HAWKS, EAGLES					
<input type="checkbox"/> Golden Eagle	O	O	O	O	
<input type="checkbox"/> Northern Harrier	U	U	U	O	
<input type="checkbox"/> Sharp-shinned Hawk	U	U	O		
<input type="checkbox"/> Cooper's Hawk	U	U	O		
<input type="checkbox"/> Bald Eagle	C	U	U		
<input type="checkbox"/> Red-shouldered Hawk	U	U	U		
<input type="checkbox"/> Broad-winged Hawk	C	U	C		
<input type="checkbox"/> Swainson's Hawk	O	O	O		
<input type="checkbox"/> Red-tailed Hawk	C	C	C	C	
<input type="checkbox"/> Rough-legged Hawk	U	U	U		
TYPICAL OWLS					
<input type="checkbox"/> Eastern Screech Owl	U	U	U	U	
<input type="checkbox"/> Great Horned Owl	U	U	U	U	
<input type="checkbox"/> Barred Owl	U	U	U	U	
<input type="checkbox"/> Northern Saw-whet Owl	O	O	O		
KINGFISHERS					
<input type="checkbox"/> Belted Kingfisher	C	C	C	U	
WOODPECKERS					
<input type="checkbox"/> Red-headed Woodpecker	U	U	U	O	
<input type="checkbox"/> Red-bellied Woodpecker	C	C	C	C	
<input type="checkbox"/> Yellow-bellied Sapsucker	C	U	C		
<input type="checkbox"/> Downy Woodpecker	C	C	C	C	
<input type="checkbox"/> Hairy Woodpecker	C	C	C	C	
<input type="checkbox"/> Northern Flicker	C	C	C	O	
<input type="checkbox"/> Pileated Woodpecker	U	U	U	U	
FALCONS					
<input type="checkbox"/> American Kestrel	C	C	C	U	
<input type="checkbox"/> Peregrine Falcon	U	U	U		
FLYCATCHERS					
<input type="checkbox"/> Great Crested Flycatcher	C	C	C		
<input type="checkbox"/> Eastern Kingbird	C	C	C	C	
<input type="checkbox"/> Olive-sided Flycatcher	U	U	U		
<input type="checkbox"/> Eastern Wood-pewee	C	C	C		

STATE PARK BIRDS	Sp	S	F	W	DATE
<input type="checkbox"/> Yellow-bellied Flycatcher	U	U	U		
<input type="checkbox"/> Acadian Flycatcher	U	U	O		
<input type="checkbox"/> Willow Flycatcher	U	U	U		
<input type="checkbox"/> Least Flycatcher	C	C	C		
<input type="checkbox"/> Eastern Phoebe	C	C	C		
SHRIKES					
<input type="checkbox"/> Northern Shrike	U	U	U		
VIREOS					
<input type="checkbox"/> Bell's Vireo	O	O			
<input type="checkbox"/> Yellow-throated Vireo	C	U	U		
<input type="checkbox"/> Blue-headed Vireo	U	U	U		
<input type="checkbox"/> Philadelphia Vireo	U	U	U		
<input type="checkbox"/> Warbling Vireo	C	C	C		
<input type="checkbox"/> Red-eyed Vireo	C	C	C		
JAYS, MAGPIES, CROWS, RAVENS					
<input type="checkbox"/> Blue Jay	C	C	C	C	
<input type="checkbox"/> American Crow	C	C	C	C	
LARKS					
<input type="checkbox"/> Horned Lark	U	U	O		
MARTINS, SWALLOWS					
<input type="checkbox"/> Purple Martin	O	O			
<input type="checkbox"/> Tree Swallow	C	C	C		
<input type="checkbox"/> Northern Rough-winged Swallow	C	C	C		
<input type="checkbox"/> Bank Swallow	C	C	C		
<input type="checkbox"/> Cliff Swallow	C	C	C		
<input type="checkbox"/> Barn Swallow	C	C	C		
CHICKADEES, TITMICE					
<input type="checkbox"/> Black-capped Chickadee	C	C	C	C	
<input type="checkbox"/> Tufted Titmouse	O	O	O	O	
NUTHATCHES					
<input type="checkbox"/> Red-breasted Nuthatch	U	U	O		
<input type="checkbox"/> White-breasted Nuthatch	C	C	C	C	
CREEPERS					
<input type="checkbox"/> Brown Creeper	U	U	U		
WRENS					
<input type="checkbox"/> House Wren	C	C	C		
<input type="checkbox"/> Winter Wren	U	O	U	R	

Appendix H. Mammal species known or suspected to occur at WWMA

Common Name	Scientific Name	Habitat	State Status	Federal Status
Virginia Opossum	<i>Didelphis virginiana</i>		None	None
Eastern Cottontail	<i>Sylvilagus floridanus</i>	F,B	None	None
Masked shrew	<i>Sorex cinereus</i>	F,B,W,P	None	None
Short-tailed Shrew	<i>Blarina brevicauda</i>	B,W,P,A	None	None
Eastern Mole	<i>Scalopus aquaticus</i>		None	None
Big Brown Bat	<i>Eptesicus fuscus</i>	F,B,W,P,A	SPC	None
Eastern Red Bat	<i>Lasiurus borealis</i>		SGCN	None
Hoary Bat	<i>Lasiurus cinereus</i>		SGCN	None
Little Brown Myotis	<i>Myotis lucifugus</i>	F,B,W	SPC	None
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	F,B,W	SPC	END
Tri-colored Bat	<i>Perimyotis subflavus</i>	F,B,W	SPC	None
Coyote	<i>Canis latrans</i>	F,B,P,A	None	None
Gray Fox	<i>Urocyon cinereoargenteus</i>	F,B,P	None	None

Common Name	Scientific Name	Habitat	State Status	Federal Status
Red Fox	<i>Vulpes vulpes</i>	F,B,P	None	None
Bobcat	<i>Lynx rufus</i>	F,B	None	None
Striped Skunk	<i>Mephitis mephitis</i>	F,B,P,A	None	None
Northern River Otter	<i>Lontra canadensis</i>	W	None	None
Long-tailed Weasel	<i>Mustela frenata</i>	F,B,P	None	None
Ermine (Short-tailed Weasel) (possible occurrence)	<i>Mustela erminea</i>	F,B,P	None	None
American Mink	<i>Neovison vison</i>	W	None	None
American Badger	<i>Taxidea taxus</i>	P,A	SGCN	None
Fisher	<i>Pekania pennanti</i>	F	None	None
Northern Raccoon	<i>Procyon lotor</i>	F,B,P,A	None	None
American Black Bear (occasional occurrence)	<i>Ursus americana</i>	F,B	None	None
White-tailed Deer	<i>Odocoileus virginianus</i>	F,B,P,A	None	None
American Beaver	<i>Castor canadensis</i>	W	None	None

Common Name	Scientific Name	Habitat	State Status	Federal Status
House Mouse	<i>Mus musculus</i>	F,B,P,A	None	None
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	F	None	None
White-footed Mouse	<i>Peromyscus leucopus</i>	F,B,A	None	None
Deer Mouse	<i>Peromyscus maniculatus</i>	F,B,P,A	None	None
Western Harvest Mouse (possible occurrence)	<i>Reithrodontomys megalotis</i>	P	SPC	None
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	B,W,P	None	None
Meadow Vole	<i>Microtus pennsylvanicus</i>	B,P	None	None
Woodland Vole	<i>Microtus pinetorum</i>	F	SPC	None
Common Muskrat	<i>Ondatra zebethicus</i>	W	None	None
Plains Pocket Gopher	<i>Geomys bursarius</i>	P,A	None	None
Southern Flying Squirrel	<i>Glaucomys volans</i>	F	None	None

Common Name	Scientific Name	Habitat	State Status	Federal Status
Thirteen-lined Ground Squirrel	<i>Ictidomys tridecemlineatus</i>	P	None	None
Woodchuck	<i>Marmota monax</i>	B,P,A	None	None
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	F	None	None
Eastern Fox Squirrel	<i>Sciurus niger</i>	F	None	None
Eastern Chipmunk	<i>Tamias striatus</i>	F	None	None
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	F	None	None

**Habitat Key: F=Forest, B=Brushlands, W=Wetlands, P=Prairies and Grasslands, A=Agricultural Lands
END=endangered, THR=threatened, SPC=special concern, SGCN=Species of Greatest Conservation Need (all of Minnesota's endangered, threatened, and special concern species are SGCN, those listed as SGCN in the table are species not on the Minnesota's endangered, threatened, and special concern list)**

Appendix I. Fish species sampled in the Main Whitewater River and North Fork Whitewater River, Whitewater River Watershed

Common Name	Scientific Name	Main Whitewater River	North Fork Whitewater River
American Brook Lamprey	<i>Lampetra appendix</i>	Yes	Yes
Mooneye	<i>Hiodon tergisus</i>	Yes	No
Gizzard Shad	<i>Dorosoma cepedianum</i>	Yes	No
Common Carp	<i>Cypinuis carpio</i>	Yes	Yes
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Yes	Yes
Common Shiner	<i>Luxilus cornutus</i>	Yes	No
Golden Shiner	<i>Notemigonis crysoleucas</i>	Yes	No
Emerald Shiner	<i>Notropis atherinoides</i>	Yes	Yes
Bigmouth Shiner	<i>Notropis dorsalis</i>	Yes	Yes
Spotfin Shiner	<i>Cyprinella spiloptera</i>	Yes	No
Sand Shiner	<i>Notropis stramineus</i>	Yes	No
Fathead Minnow	<i>Pimephales promelas</i>	Yes	Yes
Blacknose Dace	<i>Rhinichthys obtusus</i>	Yes	Yes
Longnose Dace	<i>Rhinichthys cataractae</i>	Yes	Yes
Central Stoneroller	<i>Campostoma anomalum</i>	Yes	Yes
Creek Chub	<i>Semotilus atromaculatus</i>	Yes	Yes
Quillback	<i>Carpoides cyprinus</i>	Yes	No
White Sucker	<i>Catostomus commersoni</i>	Yes	Yes
Northern Hog Sucker	<i>Hypentelium nigricans</i>	Yes	No
Greater Redhorse	<i>Moxostoma valenciennesi</i>	Yes	No

Common Name	Scientific Name	Main Whitewater River	North Fork Whitewater River
Silver Redhorse	<i>Moxostoma anisurum</i>	Yes	Yes
Golden Redhorse	<i>Moxostoma erythrurum</i>	Yes	No
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	Yes	Yes
Black Bullhead	<i>Ameiurus melas</i>	Yes	Yes
Channel Catfish	<i>Ictalurus punctatus</i>	Yes	No
Tadpole Madtom	<i>Noturus gyrinus</i>	No	Yes
Northern Pike	<i>Esox lucius</i>	Yes	No
Central Mudminnow	<i>Umbra limi</i>	Yes	Yes
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Yes	Yes
Brown Trout	<i>Salmo trutta</i>	Yes	Yes
Brook Trout	<i>Salvelinus fontinalis</i>	Yes	No
Burbot	<i>Lota lota</i>	Yes	No
Brook Stickleback	<i>Culaea inconstans</i>	Yes	Yes
Slimy Sculpin	<i>Cottus cognatus</i>	Yes	Yes
White Bass	<i>Morone chrysops</i>	Yes	Yes
Rock Bass	<i>Ambloplites rupestris</i>	Yes	No
Pumpkinseed	<i>Lepomis gibbosus</i>	No	Yes
Bluegill	<i>Lepomis macrochirus</i>	Yes	No
Green Sunfish	<i>Lepomis cyanellus</i>	Yes	Yes
Black Crappie	<i>Pomoxis nigromaculatus</i>	No	Yes
Largemouth Bass	<i>Micropterus salmoides</i>	Yes	No
Iowa Darter	<i>Etheostoma exile</i>	Yes	No
Johnny Darter	<i>Etheostoma nigrum</i>	Yes	Yes
Fantail Darter	<i>Etheostoma flabellare</i>	Yes	Yes
Blackside Darter	<i>Percina maculata</i>	Yes	No
Mud Darter	<i>Etheostoma asprigene</i>	Yes	No

Common Name	Scientific Name	Main Whitewater River	North Fork Whitewater River
Logperch	<i>Percina caprodes</i>	Yes	Yes
Sauger	<i>Sander canadense</i>	Yes	No
Walleye	<i>Sander vitreus</i>	Yes	No
Freshwater Drum	<i>Aplodinotus grunniens</i>	Yes	No

Appendix J. Fish species sampled in Middle Fork Whitewater River and South Fork Whitewater River, Whitewater River Watershed

Common Name	Scientific Name	Middle Fork Whitewater River	South Fork Whitewater River
American Brook Lamprey	<i>Lampetra appendix</i>	Yes	Yes
Common Carp	<i>Cypinus carpio</i>	No	Yes
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Yes	No
Common Shiner	<i>Luxilus cornutus</i>	Yes	Yes
Hornyhead Chub (SGCN)	<i>Nocomis biguttatus</i>	Yes	No
Emerald Shiner	<i>Notropis atherinoides</i>	No	Yes
Bigmouth Shiner	<i>Notropis dorsalis</i>	Yes	Yes
Sand Shiner	<i>Notropis stramineus</i>	Yes	No
Northern Redbelly Dace	<i>Phoxinus eos</i>	Yes	No
Bluntnose Minnow	<i>Pimephales notatus</i>	Yes	No
Fathead Minnow	<i>Pimephales promelas</i>	Yes	Yes
Blacknose Dace	<i>Rhinichthys obtusus</i>	Yes	Yes
Longnose Dace	<i>Rhinichthys cataractae</i>	Yes	Yes
Central Stoneroller	<i>Campostoma anomalum</i>	Yes	Yes
Creek Chub	<i>Semotilus atromaculatus</i>	Yes	Yes
White Sucker	<i>Catostomus commersoni</i>	Yes	Yes
Silver Redhorse	<i>Moxostoma anisurum</i>	No	Yes
Golden Redhorse	<i>Moxostoma erythrurum</i>	No	Yes
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	No	Yes
Black Bullhead	<i>Ameiurus melas</i>	Yes	Yes

Common Name	Scientific Name	Middle Fork Whitewater River	South Fork Whitewater River
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Yes	Yes
Brown Trout	<i>Salmo trutta</i>	Yes	Yes
Brook Trout	<i>Salvelinus fontinalis</i>	Yes	Yes
Burbot	<i>Lota lota</i>	No	Yes
Brook Stickleback	<i>Culaea inconstans</i>	Yes	Yes
Mottled Sculpin	<i>Cottus bairdi</i>	Yes	No
Slimy Sculpin	<i>Cottus cognatus</i>	Yes	Yes
White Bass	<i>Morone chrysops</i>	No	Yes
Pumpkinseed	<i>Lepomis gibbosus</i>	No	Yes
Green Sunfish	<i>Lepomis cyanellus</i>	No	Yes
Johnny Darter	<i>Etheostoma nigrum</i>	Yes	Yes
Fantail Darter	<i>Etheostoma flabellare</i>	Yes	Yes

SGCN=Species of Greatest Conservation Need

Appendix K. Fish species sampled in Beaver Creek and Trout Valley Creek, Whitewater River Watershed

Common Name	Scientific Name	Beaver Creek	Trout Valley Creek
Silver Lamprey	<i>Ichthyomyzon unicuspis</i>	Yes	No
American Brook Lamprey	<i>Lampetra appendix</i>	Yes	Yes
Common Carp	<i>Cypinus carpio</i>	Yes	Yes
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Yes	Yes
Common Shiner	<i>Luxilus cornutus</i>	Yes	No
Golden Shiner	<i>Notemigonis crysoleucas</i>	Yes	No
River Shiner	<i>Notropis blennioides</i>	Yes	Yes
Bigmouth Shiner	<i>Notropis dorsalis</i>	Yes	Yes
Pugnose Shiner	<i>Notropis anoogenus</i>	No	Yes
Northern Redbelly Dace	<i>Phoxinus eos</i>	Yes	No
Fathead Minnow	<i>Pimephales promelas</i>	Yes	Yes
Blacknose Dace	<i>Rhinichthys obtusus</i>	Yes	Yes
Longnose Dace	<i>Rhinichthys cataractae</i>	Yes	Yes
Central Stoneroller	<i>Campostoma anomalum</i>	Yes	Yes
Creek Chub	<i>Semotilus atromaculatus</i>	Yes	Yes
White Sucker	<i>Catostomus commersoni</i>	Yes	Yes
Black Bullhead	<i>Ameiurus melas</i>	Yes	No
Northern Pike	<i>Esox lucius</i>	Yes	Yes
Central Mudminnow	<i>Umbra limi</i>	Yes	Yes
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Yes	No
Brown Trout	<i>Salmo trutta</i>	Yes	Yes
Brook Trout	<i>Salvelinus fontinalis</i>	Yes	Yes
Brook Stickleback	<i>Culaea inconstans</i>	Yes	Yes
Slimy Sculpin	<i>Cottus cognatus</i>	Yes	No
Pumpkinseed	<i>Lepomis gibbosus</i>	Yes	No

Common Name	Scientific Name	Beaver Creek	Trout Valley Creek
Green Sunfish	<i>Lepomis cyanellus</i>	Yes	Yes
Largemouth Bass	<i>Micropterus salmoides</i>	Yes	No
Johnny Darter	<i>Etheostoma nigrum</i>	Yes	No
Fantail Darter	<i>Etheostoma flabellare</i>	Yes	No

Appendix L. Fish species sampled in Logan Creek, Whitewater River Watershed

Common Name	Scientific Name	Logan Creek
Fathead Minnow	<i>Pimephales promelas</i>	Yes
Blacknose Dace	<i>Rhinichthys obtusus</i>	Yes
Longnose Dace	<i>Rhinichthys cataractae</i>	Yes
Central Stoneroller	<i>Campostoma anomalum</i>	Yes
Creek Chub	<i>Semotilus atromaculatus</i>	Yes
White Sucker	<i>Catostomus commersoni</i>	Yes
Black Bullhead	<i>Ameiurus melas</i>	Yes
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Yes
Brown Trout	<i>Salmo trutta</i>	Yes
Brook Stickleback	<i>Culaea inconstans</i>	Yes
Johnny Darter	<i>Etheostoma nigrum</i>	Yes
Fantail Darter	<i>Etheostoma flabellare</i>	Yes

Appendix M. Reptiles and amphibians known to occur in the WWMA

Taxa	Common Name	Scientific Name	State Status	Federal Status
Amphibian	Eastern Tiger Salamander	<i>Ambystoma tigrinum</i>	None	None
Amphibian	American Toad	<i>Anaxyrus americanus</i>	None	None
Amphibian	Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	None	None
Amphibian	Gray Treefrog	<i>Hyla versicolor</i>	None	None
Amphibian	Green Frog	<i>Lithobates clamitans</i>	None	None
Amphibian	Pickereel Frog	<i>Lithobates palustris</i>	SGCN	None
Amphibian	Spring Peeper	<i>Pseudacris crucifer</i>	None	None
Amphibian	Boreal Chorus Frog	<i>Pseudacris maculata</i>	None	None
Amphibian	Northern Leopard Frog	<i>Lithobates pipiens</i>	None	None
Amphibian	Wood Frog	<i>Lithobates sylvaticus</i>	None	None
Reptile	Snapping Turtle	<i>Chelydra serpentina</i>	None	None
Reptile	Painted Turtle	<i>Chrysemys picta</i>	None	None
Reptile	Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	None
Reptile	Prairie Skink	<i>Plestiodon septentrionalis</i>	None	None
Reptile	Six-lined racerunner	<i>Aspidoscelis sexlineata</i>	SGCN	None
Reptile	North American Racer	<i>Coluber constrictor</i>	SPC	None
Reptile	Timber Rattlesnake	<i>Crotalus horridus</i>	THR	None

Taxa	Common Name	Scientific Name	State Status	Federal Status
Reptile	Ring-necked Snake	<i>Diadaphis punctatus</i>	SGCN	None
Reptile	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	SGCN	None
Reptile	Milksnake	<i>Lampropeltis triangulum</i>	None	None
Reptile	Common Watersnake	<i>Nerodia sipedon</i>	None	None
Reptile	Western Foxsnake	<i>Pantherophis ramspotti</i>	None	None
Reptile	Gophersnake	<i>Pituophis catenifer</i>	SPC	None
Reptile	Dekay's Brownsnake	<i>Storeria dekayi</i>	None	None
Reptile	Red-bellied Snake	<i>Storeria occipitomaculata</i>	None	None
Reptile	Plains Gartersnake	<i>Thamnophis radix</i>	None	None
Reptile	Common Gartersnake	<i>Thamnophis sirtalis</i>	None	None

END = endangered, THR = threatened, SPC = special concern, SGCN = Species of Greatest Conservation Need (all of Minnesota's endangered, threatened, and special concern species are SGCN, those listed as SGCN in the table are species not on the Minnesota's endangered, threatened, and special concern list)

Appendix N. Invasive plant species known to occur on WWMA and their associated plant communities

Invasive Plant Species	Lowland deciduous	Upland deciduous	Upland conifers	Lowland shrubs	Upland shrubs	Prairie/grassland	Wetland/non-forested	Roadsides/disturbed areas
European buckthorn	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Glossy buckthorn	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Honeysuckle spp.	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Black locust	Yes	Yes	No	No	Yes	Yes	No	Yes
Japanese knotweed	Yes	No	No	No	No	No	No	Yes
Japanese barberry	No	Yes	Yes	No	Yes	Yes	No	Yes
Multiflora rose	Yes	No	No	No	No	Yes	No	Yes
Oriental bittersweet	No	Yes	Yes	No	No	No	No	No
Siberian peashrub	No	Yes	Yes	No	No	No	No	Yes
Amur maple	No	Yes	Yes	No	No	No	No	No
Canada thistle	No	No	No	No	No	Yes	No	Yes
Garlic mustard	Yes	Yes	Yes	No	No	Yes	No	Yes

Invasive Plant Species	Lowland deciduous	Upland deciduous	Upland conifers	Lowland shrubs	Upland shrubs	Prairie/ grassland	Wetland/ non-forested	Roadsides/ disturbed areas
Wild parsnip	No	No	No	No	No	Yes	No	Yes
Spotted knapweed	No	No	No	No	No	Yes	No	Yes
Poison hemlock	No	No	No	No	No	Yes	No	Yes
Queen Anne's lace	No	No	No	No	No	Yes	No	Yes
Perennial sow thistle	No	No	No	No	No	Yes	No	Yes
Smooth brome grass	No	No	No	No	No	Yes	No	Yes
Amur silver grass	No	No	No	No	No	No	No	Yes
Sercia lespedeza	No	No	No	No	No	Yes	No	Yes
Curly-leaf pondweed	No	No	No	No	No	No	Yes	No
Purple loosestrife	No	No	No	Yes	No	No	Yes	No
Hybrid cattail	No	No	No	Yes	No	No	Yes	No
Reed canary grass	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Species list and plant community associations compiled from Midwest Invasive Plant Network and WMA staff knowledge of the unit