

Northern Kettle Moraine Region Wildlife, Fish and Natural Areas Master Plan and Environmental Analysis



Approved by the Natural Resources Board May 2016
Wisconsin Department of Natural Resources
DNR PUB LF-068



Cathy Stepp - Secretary

Natural Resources Board

Terry Hilgenberg, Chair
Gregory Kazmierski, Vice Chair
Julie Anderson, Secretary
William Bruins
Dr. Federick Prehn
Preston D. Cole
Gary Zimmer

Wisconsin Department of Natural Resources

101 S. Webster St. P.O. Box 7921
Madison, Wisconsin 53707-7921



DNR PUB-LF - 068

*The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and function under an Affirmative Action Plan. If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington D.C. 20240. **This publication is available in alternative format (large print, Braille, audio tape, etc.) upon request.** Please contact the Department of Natural Resources, Bureau of Facilities and Lands at (608) 266-2135 for more information.*

Photos (from upper right clockwise)

Youth deer hunting (DNR Flickr)

Brown Trout (DNR Flickr)

Cedarburg Bog woods (DNR NHC Collection)

Wood Duck (DNR Flickr)

Master Plan Team Members

Plan Acceptance Team

Sanjay Olson – Administrator, Lands Division
Thomas Hauge - Director, Bureau of Wildlife Management
Erin Crain - Director, Bureau of Natural Heritage Conservation
Doug Haag – Acting Director, Bureau of Facilities and Lands
Dan Schuler - Director, Bureau of Parks and Recreation
Paul Cunningham - Director's designee, Bureau of Fisheries
Bob Mather - Director, Bureau of Forest Management

Sponsor Team

Jeffrey Pritzl – Northeast Regional Supervisor - Wildlife Management

Core Team

Dale Katsma - Northeast Region Area Supervisor, Wildlife Management (retired)
Joe Henry – District Ecologist, Natural Heritage Conservation
Ed Jepsen – Planner, Lands and Facilities
Travis Motl – Fisheries Biologist, Fisheries Management
Tim Beyer – Forester, Forest Management
Thomas Watkins - Lands and Facilities, Recreation Planner

Technical Team

Dan Weidert - Wildlife Biologist, Wildlife Management
Tom Isaac - Wildlife Biologist, Wildlife Management
Stephen Easterly – Wildlife Technician, Wildlife Management
Sharon Fandel - District Ecologist, Natural Heritage Conservation
Randy Hoffman - Conservation Biologist, Natural Heritage Conservation
Thomas Meyer - Conservation Biologist, Natural Heritage Conservation
Brigit Brown – Parks and Recreation Specialist, Parks and Recreation
Julie Peltier – Forester, Forest Management
Tom VandenElzen – Forester, Forest Management
Joseph Jerich – Warden, Law Enforcement -
John Masterson – Water Resources Management Specialist, Water Quality
James Jackley – Real Estate Specialist, Facilities and Land
Therese Grippentrog – Landscape Architect, Facilities and Land
Joanne Kline – Wetland Ecologist, Environmental Analysis (retired)
Mark Dudzik – Archaeologist, Facilities and Lands

GIS/Map Production

Kaylin Helm – Information Systems Data Services Specialist, Facilities and Lands

Other Contributors

Charles Nettesheim and Steve Miller - Communications Specialist – Office of Communications
Sumner Matteson - Avian Ecologist
Alan Crossley - Public Lands Management Specialist - Wildlife Management (retired)
Andrew Krueger – Property Manager (Cedarburg Bog), Parks and Recreation

TABLE OF CONTENTS

TABLE OF CONTENTS	2
TABLES	4
FIGURES	4
MAPS	5
LIST OF ACRONYMS	6
EXECUTIVE SUMMARY	7
CHAPTER ONE _PROPERTIES AND PLANNING PROCESS OVERVIEW	11
<i>Master Plan Overview</i>	11
<i>Recreational Opportunities and Challenges on Public Lands</i>	15
<i>Investments in Public Lands, Recreation and Conservation</i>	17
<i>Ecological Significance</i>	19
<i>Sites of High Conservation Significance – Primary Sites</i>	19
CHAPTER TWO _SECTION ONE – GENERAL PROPERTY MANAGEMENT, DEVELOPMENT AND USE	22
VISION	22
GOALS	22
GENERAL PROPERTY MANAGEMENT	23
<i>Authority</i>	23
<i>Land Management Classifications</i>	24
<i>General Wildlife Habitat Objectives and Prescriptions</i>	26
<i>Active and Passive Landscape Management</i>	31
<i>Invasive Species Management Actions</i>	32
GENERAL HABITAT OBJECTIVES AND PRESCRIPTIONS	34
<i>Wetland Habitats (non-forested)</i>	34
<i>Upland Habitats (non-forested)</i>	37
<i>General Forest Habitats</i>	39
<i>Management Objectives and Prescriptions by Forest Type</i>	40
<i>Forested Wetlands</i>	42
GENERAL FISHERY OBJECTIVES AND PRESCRIPTIONS	46
<i>Coldwater Streams</i>	46
<i>Warmwater Streams</i>	47
GENERAL RECREATION MANAGEMENT AND USE	48
<i>Public Use and Recreation Management</i>	48
<i>Recreation and Public Use Objectives</i>	50
GENERAL PROPERTY ADMINISTRATION AND POLICIES	52
<i>Motorized Access</i>	53
<i>Real Estate Management</i>	58
<i>Plan Monitoring and Public Communications</i>	60

CHAPTER TWO SECTION TWO: INDIVIDUAL PROPERTY PLANS.....	61
<i>Project Boundary Adjustments.....</i>	<i>61</i>
<i>Land Acquisition Guidelines.....</i>	<i>62</i>
<i>Project Boundary and Acquisition goal Adjustments Program.....</i>	<i>63</i>
WILDLIFE AREAS	65
<i>Theresa Wildlife Area</i>	<i>65</i>
<i>Allenton Wildlife Area.....</i>	<i>69</i>
<i>Jackson Marsh Wildlife Area.....</i>	<i>72</i>
<i>Mullet Creek Wildlife Area</i>	<i>77</i>
<i>Nichols Creek Wildlife Area</i>	<i>81</i>
<i>Kiel Marsh Wildlife Area.....</i>	<i>85</i>
FISHERY AREAS	88
<i>Onion River Stream Bank Protection Area.....</i>	<i>88</i>
<i>LaBudde Creek Fishery Area.....</i>	<i>92</i>
NATURAL AREA	95
<i>Cedarburg Bog State Natural Area</i>	<i>95</i>
CHAPTER THREE FINDINGS AND CONCLUSIONS.....	101
<i>Property and Regional Overview.....</i>	<i>101</i>
<i>Recreational Significance, Capability and Demand.....</i>	<i>102</i>
<i>Ecological Significance and Management Opportunities.....</i>	<i>104</i>
<i>Ecological Threats and Management Challenges</i>	<i>105</i>
<i>Wildlife and Fish Management.....</i>	<i>106</i>
INFORMATION SOURCES AND REFERENCES	108

Tables

Table ES-1	NKMR Properties	7
Table 2-1	Land Management Classifications	25
Table 2-2	Wildlife Area Project Boundary Adjustments	63
Table 2-3	Fishery Area Project Boundary Adjustments	63
Table 2-4	Land Cover in the Boundary Adjustment Areas	64
Table 2-5	Theresa WA Desired Cover Types	66
Table 2-6	Allenton WA Desired Cover Types	69
Table 2-7	Jackson Marsh WA Desired Cover Types	73
Table 2-8	Mullet Creek WA Desired Cover Types	78
Table 2-9	Nichols Creek WA Desired Cover Types	82
Table 2-10	Kiel Marsh WA Desired Cover Types	85
Table 2-11	Onion River SBP Desired Cover Types	89
Table 2-12	LaBudde Creek FA Desired Cover Types	93
Table 2-13	Cedarburg Bog Desired Cover Types	96

Figures

Figure 2-1	Boardwalk Design	100
Figure 2-2	Boardwalk Route and Boat Storage Area	100
Figure 2-3	Boat Storage “T”	100

Maps

Appended Maps	Map Series
Regional Locator	Map A
NKMR Properties	Map B
Conservation Opportunity Areas	Map C
Theresa Wildlife Area	D-Series
Allenton Wildlife Area	E-Series
Jackson Marsh Wildlife Area	F- Series
Mullet Creek Wildlife Area	G-Series
Nichols Creek Wildlife Area	H-Series
Kiel Marsh Wildlife Area	I-Series
Onion River Streambank Protection Area	J-Series
LaBudde Creek Fishery Area	K-Series
Cedarburg Bog State Natural Area	L-Series

Each map series consists of the following maps respectively

- 1 = public lands
- 2 = infrastructure – existing and proposed
- 2.1 = motorized access (Theresa WA has 2.1 and 2.2)
- 3 = current cover types
- 4 = proposed cover types
- 5 = land management classifications and state natural areas
- 6 = Real Estate Action Items

LIST OF ACRONYMS

ADA	Americans with Disabilities Act
BMPs	Best Management Practices
COA	Conservation Opportunity Area
CTH	County Trunk Highway
EAB	Emerald Ash Borer
EL	Ecological Landscape
HMA	Habitat Management Area
IATA	Ice Age Trail Alliance
NAWCA	North American Wetlands Conservation Act
NCMA	Native Community Management Area
NKMR	Northern Kettle Moraine Region Wildlife, Fish and Natural Areas Planning Group
NR	Natural Resources (Wisconsin administrative code)
NRCS	Natural Resources Conservation Service
NSSF	National Shooting Sports Foundation
RPA	Regional and Property Analysis
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SGCN	Species of Greatest Conservation Need
SIATA	State Ice Age Trail Area
SNA	State Natural Area
ss.	Wisconsin State Statutes
STH	State Trunk Highway
US FWS	US Fish and Wildlife Service
WA	Wildlife Area
WDNR	Wisconsin Department of Natural Resources
WiDOT	Wisconsin Department of Transportation
WisFIRS	Wisconsin Forest Inventory and Reporting System (DNR Forestry Division)
ORAP	Outdoor Recreation Act Program (state)
LAWCON	Land and Water Conservation Fund Act (federal)
CREP	Conservation Reserve Enhancement Program (federal)

EXECUTIVE SUMMARY

The Northern Kettle Moraine Region (NKMR) Master Plan was approved by the Natural Resources Board on May 25, 2016. This plan covers nine properties totaling 15,903 acres of state owned land. The planning group includes six wildlife properties (12,698 acres), two fishery areas (1,472 acres) and one state natural area (1,733 acres) (**Map A**) (**Table ES-1**). In addition, 591 acres of easements and 309 acres of leased land provide public access for hunting, fishing and other nature based recreational activities. These properties provide 35% of the public lands available for hunting in Ozaukee, Washington and Sheboygan counties.

Table ES-1 NKMR properties State Owned Lands	
Wildlife Areas	Acres
Theresa WA	5,309
Jackson Marsh WA	2,518
Mullet Creek WA	2,217
Allenton WA	1,160
Kiel Marsh WA	843
Nichols Creek WA	651
Fishery Areas	
Onion River SBP	1,071
LaBudde Creek FA	401
Natural Area	
Cedarburg Bog	1,733

This plan builds upon the foundation laid by previous property master plans, the Statewide Comprehensive Outdoor Recreation Plan, the Wildlife Action Plan, the Wisconsin Waterfowl Strategic Plan, the Land Legacy Report, and the Streambank Protection Focus Areas. Other department plans and reports considered in this planning process include regional Eco-Summit priorities, program strategic plans, species reports and federal-state joint plans for migratory species. Consistency with regional and county comprehensive and open space plans was also considered.

This plan seeks to promote consistency with program policies, handbooks and further the habitat and public access goals conducted over the last several decades.

This plan received input from other agencies, elected officials, sporting groups UW-Milwaukee Field Station staff, friends groups, land trusts, and the public.

The recreation and habitat management objectives and prescriptions described in this master plan will be applied over the next 15-20 years. Progress toward achieving these objectives will be addressed through the annual management meetings, master plan implementation reports and results shared with stakeholders and the public.

The primary recreational and habitat management goals for these properties include the following:

- Provide quality hunting, fishing, trapping, nature based recreation and research opportunities.
- Improve habitat quality and productivity for game and non-game species by enhancing native communities with an emphasis on habitats used by waterfowl, migrating shorebirds and songbirds.
- Coordinate with public, private and non-profit partner organizations to improve recreational opportunities and increase management efficiency.

A significant majority of the current recreation and habitat management activities will continue into the future. These properties are important areas for white-tailed deer, turkey, pheasant and waterfowl hunting near the largest population centers in Wisconsin. The major changes include improved site accessibility, additional dog training areas, an increase in the number of state natural areas, and adjustments to project boundaries to improve user experiences and increase management efficiency.

Recreation – The NKMR properties are within an hour drive of one to two million people. Their appeal is expected to increase as our population grows, land ownership becomes more fragmented and access to private lands becomes more difficult. There is also an expectation that the number and diversity of users on these properties will continue to increase.

Fishing, hunting and trapping are popular in Ozaukee, Sheboygan and Washington counties with a total of nearly 56,000 fishing licenses, 67,000 hunting licenses and 900 trapping licenses sold annually.

Deer hunting in Ozaukee, Washington and Sheboygan counties has more than local appeal. About 24% of the deer harvested in these counties are taken by hunters who live outside these counties. Only 5% of the land area in these counties is publicly owned yet 12% of the harvested deer are taken on public lands.

The primary recreational activities on the fish and wildlife properties are and will continue to be hunting, fishing and trapping. The number of dog training sites will be increased from one to at least three sites. In contrast, Cedarburg Bog State Natural Area is primarily known for its research, nature enjoyment and educational activities. The UW-Milwaukee Field Station and the Friends of Cedarburg Bog are important partners at this natural area. Mud Lake on this property is also popular with local waterfowl hunters.

The Onion River is a very popular, high quality Class 1 trout stream. LaBudde Creek and Nichols Creek will also continue to offer trout fishing opportunities in Sheboygan County. This plan recommends trout habitat improvements for Allenton Creek, the only classified trout stream in Washington County.

Other recreational opportunities provided include bird and wildlife watching, canoeing/kayaking, snow shoeing, cross-country skiing, dog walking and berry picking. The Rock River Water Trail begins on the Theresa Wildlife Area. These activities are encouraged, but limited management actions are taken to promote them (e.g., groomed ski trails are not provided).

Public Access - Currently there are 55 parking lots, two improved boat landings and eight carry-in landings on the NKMR properties. This plan recommends six additional parking lots, improved hunting and coldwater fishing access for mobility impaired individuals and enhanced boat access opportunities. Additional access points may be added depending on approval of the boundary adjustments, future property acquisition and collaboration with partners.

There are 13 miles of service roads on these properties, three miles of designated Ice Age Trail at LaBudde Creek, and about one mile of primitive volunteer trails in the headwaters of Mill Creek (Onion River SBP). There are also 6.5 miles of connecting snowmobile trails on these properties.

Habitat Management - The primary habitat management objective is to increase the quality and extent of the native plant communities. To the extent practicable, the acreage of grasslands and other habitats with the greatest benefit for wildlife will be increased over the life of the plan. Properties will be managed to create larger habitat blocks consistent with landscape scale management approaches.

About 12,260 acres, 78% of the NKMR total, will be managed as Habitat Management Areas (HMAs) for the benefit of game and non-game wildlife. Important HMA cover types include emergent wetlands, cool and warm season grasslands, shrub lands and lowland forests. Key management objectives include:

- Maintaining native cover types for wildlife. These habitats will provide quality opportunities for hunting, trapping, fishing and other nature based recreation.
- Improving grassland habitat for nesting ducks and cover for pheasants.
- Improving habitat for woodcock, waterfowl, migrating song birds and shorebirds.

Agricultural practices are currently used on slightly more than 20% of the non-forested uplands land on these fish and wildlife properties. This percentage will probably decrease to accommodate larger grasslands for pheasant, woodcock and other wildlife. However, agricultural practices will continue to be a valuable tool for restoring and managing these grasslands.

The remaining 3,645 acres will be managed as Native Community Management Areas (NCMAs) to protect and expand native plant communities and the associated fauna. The NCMAs are primarily found in the current and proposed state natural areas at Cedarburg Bog SNA, Jackson Marsh WA, Mullet Creek WA and Nichols Creek WA. The natural communities of interest include Bottomland Hardwood forests, White cedar and Tamarack forests, Oak Woodlands, Sedge Meadows and Calcareous Fens.

Thinning and improvement cuts on about 690 acres of hardwood and conifer stands over the next 15 years will be the most common forest management activities. Single tree selection harvests is approved on 225 acres of oak and a variety of other hardwoods stand with coppice cutting approved to regenerate aspen stands on three (3) acres. On average about 50 acres of forestry treatments would be conducted each year through 2030.

Prescribed fire is the favored management prescription for the grassland and some oak communities. Mowing and herbicides will be used as needed to limit brush and invasive species encroachment.

A critical management activity will be improved monitoring and management of invasive species. Controlling the spread of invasive species will be a difficult task due to the presence and abundance of multiple invasive species on several of the properties. Prioritization and coordination of the management efforts between programs is needed to most effectively address this challenge.

Natural Areas Management - The three existing and four proposed state natural areas will be managed to protect native plant and animal communities. These natural areas will also be open to fishing, hunting, research, nature enjoyment and other traditional outdoor activities.

Budget - The estimated infrastructure budget is about \$160,000/year and \$80,000/year for habitat management. These costs would be covered by ongoing state appropriations and multiple sources of federal, state, local and private funds such as North American Wetlands Conservation Act (NAWCA) and game stamp funds (i.e., waterfowl, pheasant and turkey stamps). Costs to manage new parcels will depend on the need for active management, property blocking, fiscal returns (e.g., farm agreements and timber harvests), and access to tools that improve management efficiency. Future operational costs are anticipated to remain similar to or increase slightly above current operations with improved efficiency offsetting some of the costs of managing additional lands.

Stakeholder Support – The department will continue its strong collaboration on joint projects with groups such as the Ice Age Trail Alliance, UW-Milwaukee Field Station, the Friends of the Cedarburg Bog, sporting groups such as Ducks Unlimited and Trout Unlimited, and local land trusts. For example, Ducks Unlimited has protected 251 acres, created, enhanced or restored habitat on 1,260 acres and provided technical assistance or created demonstration areas on 633 acres in Washington County: (*Ducks Unlimited, 2014*). Since 1999 the NKMR properties have been awarded nearly \$500,000 in grants and volunteers have also assisted with equipment purchases. Volunteers have conservatively donated over 9,000 hours of labor to manage habitats and improve infrastructure.

Project Boundary and Acquisition Goal Adjustments

To meet the desired recreation and habitat goals the following project boundary and acquisition goal adjustments were approved by the Natural Resources Board on May 25, 2016.

- Contract the fish and wildlife project boundaries by 245 acres where conservation and public access benefits are currently limited or are expected to be compromised by future development.
- Net expansion of the wildlife project boundaries by 1,945 acres and the acquisition goals by 1,160 acres. The department owns 72 acres and Wi DOT owns 168 acres within the expansion area.
- Net expansion of the fishery project boundaries by 366 acres with no expansion of the acquisition goals. The department owns 61 acres within the expansion area.
- Expand the State Natural Areas as follows:
 - Increase the Cedarburg Bog SNA project boundary by 699 acres and the acquisition goal by 250 acres to protect Cedarburg Bog SNA and two adjacent state natural areas (Sapa Spruce Bog and Cedarburg Beech Woods). The department owns 69 acres within the expansion area.
 - Designate four new state natural areas (355 acres total) on department lands within the existing boundaries of Onion River SBP, Nichols Creek WA and Mullet Creek WA.
 - Expand two existing natural areas from 212 acres to 721 acres on department owned lands within the existing project boundary of the Jackson Marsh WA.

The land uses within the project boundary expansion areas for all these properties is 41% cropland, 31% forest/shrubs, 17% wetlands, 7% grasslands and 4% developed.

The proposed project boundary and acquisition goal adjustments seek to achieve the following:

1. Address the expected growth in recreational demand and improve the quality of the hunting, fishing and nature based outdoor recreation experiences. The changes should also reduce user confusion about property lines and minimize trespass issues.
2. Increase productivity by creating larger contiguous blocks of habitat. This will improve the efficiency of habitat management activities (e.g., prescribed burns, controlling invasive species and wetland restoration). These larger blocks can also provide higher quality habitat for nesting, foraging and/or cover for deer, turkey, pheasant and a range of migratory and resident species.
3. Expand upland habitat for grassland nesting waterfowl and cover for pheasants. A 1:1 grassland to wetland ratio is considered productive for waterfowl. However, the current ratio on these properties is about 0.6:1. The approved habitat management activities and the project boundary and acquisition goal adjustments could improve this ratio to about 0.8:1.
4. Protect current recreational activities from non-compatible land uses. Gun hunting is not allowed within 100 yards of a home unless the resident provides permission. Expanding boundaries to roads will provide greater certainty these lands can be used for all of the intended purposes.
5. Protect the quality and quantity of surface and groundwater flowing to these properties by reducing erosion, sedimentation and nutrient runoff. This is especially important to trout streams.
6. Coordinate acquisition, either by fee title or easement, and property management activities with partners to maximize habitat benefits, improve recreational opportunities, and leverage limited acquisition funds and staff resources to achieve the greatest conservation benefit.

CHAPTER ONE

PROPERTIES AND PLANNING PROCESS

OVERVIEW

The Northern Kettle Moraine Region (NKMR) Master Plan was approved by the Natural Resources Board on May 25, 2016. This plan covers nine properties totaling 15,903 acres of state owned land. The regional and county context for these properties are shown in **Maps A and B**. The six wildlife areas contain 12,698 acres, the two fishery areas contain 1,472 acres and Cedarburg Bog State Natural Area contains 1,733 acres. These properties encompass diverse habitats ranging from large open marshes to hardwood forests and highly productive trout streams. These properties are managed by staff from the following department programs: Wildlife Management (WM), Fishery Management (FM) and Natural Heritage Conservation (NHC) with assistance from Forestry (FR) and coordination with Parks and Recreation (PR) along the Ice Age Trail.

The NKMR properties in Sheboygan, Washington and Ozaukee counties provide about 35% of the public lands available for hunting, fishing, trapping and other nature based recreational activities. The appeal of these lightly developed properties is expected to increase as our population continues to grow and access to private lands becomes more difficult. These properties are within an hour drive of one to two million people. These properties complement the recreational and ecological resources of the Kettle Moraine State Forest – North Unit, the dominant public land resource in the region.

Master Plan Overview

The approved management objectives and prescriptions, and the adjustments to the project boundaries and acquisition goals are intended to provide productive, sustainable habitats and promote readily accessible recreational opportunities over the next 20 years.

General Recreation Objectives

1. Provide quality hunting, fishing, trapping and nature based recreation opportunities in lightly developed settings.
2. Improve access by adding parking areas and carry in boat access and assess opportunities for adding accessible facilities for hunting, fishing and nature enjoyment.
3. Provide additional dog training opportunities in the region.
4. Provide connecting trails for regional snowmobile networks as appropriate.

General Habitat Objectives

1. Provide quality habitat or cover for deer, turkey, pheasant, waterfowl, small game, woodcock and migrating birds.
2. Create larger blocks and improve the quality of wetlands, grasslands and forests. Increase the acreage of grasslands, oak woodlands, savanna and aspen.
3. Protect (or restore) native plant and animal communities as practicable. Monitoring and managing invasive species will be an important element of this objective.
4. Protect and/or enhance trout habitat in the coldwater (trout) fisheries at Onion River, Nichols Creek, LaBudde Creek and Allenton Creek. Enhance warmwater fishery habitat and populations to the extent resources are available.

5. Develop habitat management strategies to protect forest ecosystem health and diversity. Notable management concerns include Emerald Ash Borer (EAB) impacts on forest communities and maintaining remnant tamarack communities.
6. Identify project boundary adjustments that will improve management efficiency and provide the desired balance of habitats.
7. Protect the cultural and historical resources on these properties.

Planning and Management Background

This planning effort considered, and sought to accommodate as appropriate, the broader goals and objectives of statewide and regional wildlife management planning efforts. The planning documents and their conservation or recreation goals considered in this plan include:

- The **Statewide Comprehensive Outdoor Recreation Plan (SCORP)** is a planning process that on a 10 year cycle identifies outdoor recreation issues and evaluates the supply of and the demand for outdoor recreation resources and facilities. Depending on the recreation focus for a given cycle the SCORP document and process can provide valuable perspectives on statewide and regional trends. The nature based recreational shortages identified in SCORP (*WDNR, SCORP (2006a)*) that is best addressed by the NKMR properties is improved public access (i.e., increase the number and quality of the access sites for recreational users of all abilities).
- **Wisconsin Strategy for Wildlife Species of Greatest Conservation Need** (*WDNR August 2005*) – The plan identifies native wildlife species with low or declining populations, the habitats they are associated with, where they occur across the state, and a menu of conservation actions to help restore viable populations.
- **Upper Mississippi River and Great Lakes Region Joint Venture - Wisconsin Plan**, (*US FWS, March 1992*), **Waterfowl Habitat Conservation Strategy**, (*US FWS, December 2007*) and other shore, water and land bird conservation reports – The Joint Venture planning approach emphasizes establishing explicit regional goals by federal and state partners for waterfowl populations and habitat conservation.
- **Wisconsin Waterfowl Strategic Plan 2008–2018** (*WDNR December 2007*) - This NRB approved plan presents six primary objectives and associated strategies for the department to provide waterfowl habitat, monitor populations and improve hunting experiences.
- **Eco-Summits** – The Eco-summits were developed between 2005 and 2010 by regional department staff. These summits identified landscape scale habitat needs for wildlife in general and special concern species and native communities specifically.
- Species management reports and habitat research results (e.g., *US FWS 2008*).

Previous property master plans approved by the NRB were considered during this planning process. These properties include: Nichols Creek WA (1988), Mullet Creek WA (1986), Theresa WA (1985), Allenton WA (1984), Cedarburg Bog SNA (1982) and LaBudde Creek FA (1981). No NRB approved master plans exist for Kiel Marsh WA, Onion River SBP or Jackson Marsh WA. The previous plans are not as detailed or as rigorous as NR 44 master plans, but they do provide valuable background regarding prior habitat and recreation management goals and objectives.

County and local comprehensive land use, open space and agriculture plans for the respective counties were evaluated to assess the consistency of the recommendations in this plan with the goals and objectives of these local plans.

Prior Conservation Efforts

Native grasslands and wetlands have been substantially diminished in size and quality since European settlement. It is estimated that over 99% of Wisconsin's original grasslands have been converted to agricultural use (*WDNR Addis et al. 1995*). The availability of surrogate grasslands (e.g., pastures, grass hay, and small grains) for duck nesting has also decreased as row-crop agriculture, particularly for corn and soybean, has intensified (*Sample and Mossman 1997*). About 50% of Wisconsin's wetlands have been lost too (*WDNR 2007*).

Numerous state, federal, local, private and non-profit groups have undertaken efforts to address these losses, and to protect or maintain the remaining habitats. Some of these efforts have and will continue to directly affect the NKMR properties. Others will protect or restore habitat on private lands through programs such as the federal Conservation Reserve and Wetland Reserve programs.

The federal Conservation Reserve Program (CRP) has offset grassland losses and promoted permanent grass cover on highly erodible soils. During peak participation in the mid-1990s over 710,000 acres were enrolled in Wisconsin. However, there has been a significant reduction in CRP enrollment since that time. Enrollment dropped to less than 320,000 acres by 2013 with additional declines expected.

CRP enrollment has declined in the NKMR counties too. Enrollment dropped more than 70% by 2013 from the mid-1990's peak (i.e., a reduction from 5,100 acres to 1,400 acres) in Sheboygan, Ozaukee and Washington counties. This is a loss of 3,700 acres of grassland habitat to cropland or other uses.

The approved boundary adjustments and habitat management objectives in this master plan seek to compensate for this loss of grasslands to promote cover for pheasant and provide habitat for duck production, grassland birds and other wildlife.

Public and Inter-Governmental Support and Input

The 1992 federal-state Joint Venture plan identified a wetland restoration goal for Wisconsin of about 290,000 acres due to importance of the state as a waterfowl production area and flyway (*US-FWS, 1992*). This goal was substantially achieved by 2006. Since 75% of Wisconsin's wetlands are in private ownership, achieving this goal required collaboration between private and public partners. This success was due in part to the department's collaboration with over 75 partner organizations (*WDNR, 2007*).

Habitat acquisition, protection and management funding has come from federal sources like the Land and Water Conservation Fund Act (LAWCON), the North American Wetlands Conservation Act (NAWCA) grants, the Pittman-Robertson (i.e., firearm/ammunition) and Dingell-Johnson (i.e., fishing equipment) excise taxes, and waterfowl stamps. Over the last fifty years Wisconsin has generated conservation funding through the Outdoor Recreation Act Program, the Stewardship Fund, license sales, and game stamps. Counties have also assisted using local funds (e.g., Sheboygan County Stewardship Fund).

This master plan recognizes the valuable contributions of sporting groups, the Ice Age Trail Alliance (IATA), land trusts, UW-Milwaukee, friends groups, local governments and citizens to these properties and this planning process. Examples include Ducks Unlimited at Theresa WA; IATA at LaBudde Creek FA; Great Lakes Protection Fund, Trout Unlimited, Windway Corporation and Sheboygan County at the Onion River SBP; the UW-Milwaukee Field Station and the Friends of Cedarburg Bog at the Cedarburg Bog SNA; and local snowmobile clubs that have built and maintained trails and bridges on several properties. These entities and others have conservatively donated over 9,000 hours of labor plus significant financial donations, almost \$500,000 since 2000, to enhance the NKMR properties.

Wildlife Communities

These properties provide important habitat for both resident and migratory species. They provide good to excellent habitat for white-tailed deer, turkey, waterfowl, ring-necked pheasants, mourning doves, woodcock and other small game. Generalist species like deer and turkey are well adapted to the mix of agricultural lands, wood lots, grasslands and wetlands in the region. The proposed habitat management objectives and prescriptions will provide better food and cover for these species as well as grassland game birds such as pheasant.

Common furbearing animals on these properties include raccoon, striped skunk, coyotes, foxes, opossum, muskrat, mink and beaver. These species will benefit from the recommendations as well.

The federal-state Joint Venture plan has identified the upper Midwest as an area with substantial potential for a net increase in waterfowl habitat (US FWS, 2007). That plan indicated the NKMR properties can aid these efforts to increase mallards, blue-winged teal and wood duck populations by preserving and restoring wetlands and grassland.

The Wisconsin Natural Resources Board approved *Wisconsin Waterfowl Strategic Plan 2008–2018* (WDNR December 2007) has several objectives pertinent to this plan:

- Provide and expand habitats and management necessary to meet the year round ecological needs of Wisconsin's diverse waterfowl community and other wetland species.
- Recognize the state's role as a waterfowl production state and our waterfowl hunting heritage. Specific recommendations in the plan include:
 - Seek a 5% increase in mallards and wood ducks and a 20% increase in blue-winged teal breeding populations
 - Department land acquisition and habitat programs should focus attention on both ecologically important waterfowl habitat and lands near population centers to address hunter's desires for more hunting lands.
 - Increase grassland nesting habitat for waterfowl on public and private lands.
 - Invasive plant and animal species impact waterfowl and wetlands habitat. Continue on-going cross program efforts to manage invasive plants and animals.

Cedarburg Bog and Kiel Marsh are also noted as important bird habitat areas.

Fish Communities

The following coldwater (trout) fisheries are found on the NKMR properties: Onion River, Mill Creek, Ben Nutt Creek, Nichols Creek and LaBudde Creek in Sheboygan County and Allenton Creek in Washington County. About 11.5 miles of Class I trout waters (Nichols Creek 2 miles, LaBudde Creek 2 miles, Onion River 3.5 miles, Ben Nutt 2.6 miles and Mill Creek 1.4 miles) and 2.6 miles of Class 2 trout waters (Allenton Creek 1.6 miles; LaBudde Creek 1 mile;) flow through state owned or easement lands. These waters sustain brown and brook trout populations as well as a variety of native forage species.

Several of the wildlife areas (e.g., Theresa WA, Jackson Marsh WA and Kiel Marsh WA) provide access to a variety of warmwater sport fish communities including Northern pike, walleye, largemouth and smallmouth bass and panfish in the rivers and impoundments.

Recreational Opportunities and Challenges on Public Lands

Southeast Wisconsin has a significant population, but limited availability to state recreation lands. Population growth, increasing development and habitat fragmentation has and will increasingly place more recreational pressure on conservation lands. The aging 'baby boomer' population is also creating an active, older demographic cohort that is anticipated to result in a growth of quiet sports with a greater need for accessible infrastructure.

Increasingly diverse recreational pursuits are occurring on these properties. The users range from traditional hunters, anglers, trappers, hikers, birders and winter sport enthusiasts to walking for exercise and dog walking to more contemporary activities such as geocaching.

Nearly 20% of Wisconsin's population engages in some form of hunting or trapping. Wisconsin hunters typically hunt several different wildlife species (*Prey et al. 2005 and WDNR December 2007*). Studies have shown that access and the quality of the experience are both important to maintaining participation rates in outdoor recreational activities.

A recent Outdoor Industries Association (OIA) indicates user perception of crowding has been shown to lower the satisfaction of participants engaging in their favored outdoor activity (*OAI, 2012*). The *Wisconsin Waterfowl Strategic Plan 2008–2018 (WDNR December 2007)* noted that the quality of the waterfowl hunting experience is affected by interactions (both positive and negative) with other hunters as well as seeing and harvesting birds. The negative interactions with other hunters included crowding at hunting areas, high hunting pressure and interference from other hunters. The most important variables mentioned by duck hunters for improving their waterfowl hunting experiences included more hunting locations to reduce crowding and more opportunities to see ducks.

A number of the NKMR properties have limited uplands or difficult to access upland acreage. This has led to crowding, particularly during opening weekend for deer and waterfowl hunting, on certain properties. Long-term, regional demand for hunting and other outdoor activities, such as hiking and birding, are expected to increase the recreational pressure on the already popular NKMR properties.

Distance traveled affects user participation rates and satisfaction. The 1991-96 SCORP and the 1985 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation found that 65-70% of outdoor recreation occurs within 50 miles of home. The National Shooting Sports Foundation (*NSSF, 2010*) indicates the median distance Wisconsin hunters travel to hunt their primary game species is 25 miles.

A report published by Responsive Management and the National Shooting Sports Foundation (*NSSF, 2010*) provided the following insights on hunting access and satisfaction in Wisconsin.

- The majority of Wisconsin hunters are deer hunters (77%) followed by waterfowl (8%), upland game birds (6%), and wild turkey (6%). For the three NKMR counties the local license sales were as follows: deer (59%), waterfowl (13%), small game (12%), turkey (11%) and pheasants (5%).
- About 46% of hunters use public lands at least half the time they hunt.
- Upland game bird and waterfowl hunters have a greater propensity to hunt on public land.
- Hunters indicate they mostly hunt their primary species on the same land each year (68%).

Factors most important in hunters' decisions regarding where to hunt their primary species included:

- Land is not crowded with other sportsmen (80% say this is very important),
- Familiarity with the land (60%), and
- Easy access by foot (54%).

Potential hunting access constraints deemed major problems in the report included:

- Loss of previously open private land due to posting,
- Loss of hunting land due to new housing and other land use changes, and
- Travel cost (i.e., gasoline prices).

Local participation in hunting, fishing and trapping can be estimated based on resident license sales for Sheboygan, Washington and Ozaukee counties. In 2011, nearly 28,500 gun and 12,000 archery licenses for deer, 9,200 goose permits, 8,200 small game licenses, 7,600 turkey licenses, 3,200 pheasant stamps, 900 trapping licenses and 56,000 fishing licenses, including 6,600 inland trout stamps, were purchased. The NKMR *Regional and Property Analysis (WDNR, 2012)* document provides additional information about public use, public lands and deer harvests on the NKMR properties.

In addition to hunting, fishing and trapping, the NKMR properties are used by a broad spectrum of traditional, nature based recreational pursuits. These uses include bird watching, hiking, watching wildlife, nature photography, foraging for berries and nuts, canoeing and kayaking.

Bird watching is a popular activity in the region and eBird is a valuable web reference for assessing bird observations (*eBird, 2012*). Over 320 species of birds have been recorded in the Cedarburg Bog area. The eBird web site indicated there were 13,944 bird checklists in Ozaukee County and Cedarburg Bog is noted as a county hot spot. Sheboygan County had 5,154 checklists and 314 species of birds recorded. Washington County had 3,072 checklists and 272 species of birds recorded with Jackson Marsh WA noted as a hot spot for birders. Many of the NKMR fish and wildlife areas show up on these birding lists.

More recently, walking for exercise and dog walking has become more prevalent on the properties.

A relatively new activity is the growing popularity of geocaching (*Wisconsin Geocaching Association, 2014*). Geocaching is an outdoor pursuit where the participants use a Global Positioning System (GPS) device and other navigational techniques (e.g., compass settings) to hide and/or seek containers, called "caches". Geocaching shares many aspects with traditional orienteering, treasure-hunting and way-marking. There are over 80 recorded caches on the NKMR properties with Theresa WA and LaBudde Creek FA the most popular sites.

Shooting Ranges - Adding appropriately sited and managed target shooting ranges is a focus for the department. A previous attempt to site a public shooting range on department land in Sheboygan County was contentious and unsuccessful. Establishing a target shooting range was not recommended in this plan. Public and user group feedback during this planning process did not request or indicate a significant need for a range.

Potential Recreation Conflicts - Providing improved Class II dog training area is a goal for the department. The only Class 2 training site on a NKMR property is located at the LaBudde Creek FA. As many as 60 dog training permits were issued for this property in 2008, but the number of users has fallen by more than 50% in recent years. A section of the popular Ice Age National Scenic Trail (IAT) constructed in 2008-2009 runs through the LaBudde FA dog training area. It is not clear whether the drop in dog training at the site is due to loss of interest in the property or whether dog training participants are uncomfortable with having other users in proximity of their training activities. Upland and water dog training sites at Jackson Marsh WA and Theresa WA have been approved in this plan.

Investments in Public Lands, Recreation and Conservation

In Wisconsin, our natural resources are not just a part of our landscape; they are a part of our heritage. Wisconsin residents value their rich traditions of hunting, fishing, trapping, camping, hiking and enjoyment of nature. They also value their access to our public recreational land and wild places.

The state owns and manages about 1.6 million acres of forests, wetlands, rivers, lakes and grasslands. Of the 15,000+ acres in the NKMR planning group, nearly 11,000 acres have been purchased through the ORAP and Stewardship programs with smaller amounts acquired as gifts or mitigation lands. Hunters and anglers have also been major contributors to land purchases through license sales and the excise taxes on hunting and angling equipment. Conserving these resources is an investment that pays many economic and environmental dividends similar to our investments in other public infrastructure.

Our \$17.5 billion tourism industry (Wisconsin Department of Tourism, 2014) and \$23 billion forest industry (*WDNR 2009*) are inextricably linked to our abundant natural resources and, in part, to our public lands. Outdoor recreation accounts for 142,000 direct Wisconsin jobs, \$3.6 billion in wages and salaries and contributed \$844 million in state and local tax revenue (*OIA 2011*).

The U.S. Fish and Wildlife Service's *National Survey of Fishing, Hunting and Wildlife* report (*US-FWS 2006*) indicates a total of 2.9 million residents and non-residents, 16 years old and older, fished, hunted and/or watched wildlife in Wisconsin.

Wisconsin is second in the nation in terms of both resident hunters (763,000) and non-resident hunters (131,000) (*Southwick Associates. 2012*). These hunters participated in an estimated 12.2 million hunting days in 2011. The total economic contribution in Wisconsin is estimated at \$3.95 billion dollars generating \$228 million in state and local tax revenues.

The American Sportfishing Association (ASFA) and the Outdoor Industry Association estimated the national multiplier effect of recreation expenditures was \$1.5 to \$2 for every dollar spent on these activities. The ASFA further indicated Wisconsin is ninth in the nation in terms of angler expenditures. Their report further states that total expenditures were about 1.46 billion dollars with about 1.25 million participants (*ASFA, 2013*). Wisconsin ranked third in the nation with 337,000 non-resident anglers and it was estimated they spent an estimated \$445 million. This report estimated angling alone contributed about \$132 million toward state and local tax revenues.

An estimated \$48 million is spent annually on duck hunting alone suggesting waterfowl hunters have an important financial impact in Wisconsin (*WDNR, 2007*). According to Ducks Unlimited, Wisconsin has nearly 32,000 members and has spent nearly \$23 million on conservation activities in the state (*Ducks Unlimited, 2014*).

A number of groups collaborate with the department on conservation and education efforts. For example, Pheasants Forever has nearly 10,000 members statewide and has spent more than \$10.6 million to complete thousands of habitat projects since 1985. In addition, other chapters of national organizations and local sporting clubs also contribute financially or with in-kind services in collaboration with the department.

The following studies are not based on the NKMR properties specifically or the Wisconsin fish and wildlife properties generally, but they do provide a sense of the economic value of nature based recreation:

- A 2002 study of the Wisconsin State Park System indicated visitor expenditures and the multiplier effect of dollars flowing into the state accounted for roughly \$650 million annually (*WDNR, 2002*).
- A 2006 report for the National Parks Conservation Association showed that for every \$1 appropriated in the annual national parks budget, the national park system generates at least \$4 for state and local economies (*Hardner and McKenney, 2006*).
- A University of Minnesota study found that for every \$1 invested in conserving natural areas in Minnesota, there is a return of up to \$4 (*Minnesota Environmental Partnership, 2010*).
- The National Wildlife Refuge System generated almost \$1.7 billion in total economic activity, almost four times the federal appropriation to the refuge system in fiscal 2006 (*Greenwire, 2007*).
- In 2009, more than 1.4 million people visited the eight national wildlife refuges and the numerous waterfowl production areas in Wisconsin to hunt, fish, participate in interpretive programs, and view wildlife (*US FWS, 2012*). These FWS properties provide more than 182,000 acres for public access and recreation. By comparison, the department provides public access to more than 638,000 acres of fishery and wildlife lands statewide, many of which are heavily used and several are companion properties (e.g., Horicon Marsh) to federal lands.

There is also a growing appreciation of resources being harvested sustainably from public and private lands. Department lands are certified as being sustainably managed by two independent, third-party audit firms (i.e., Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI)). Certification means the management practices meet the social, ecological, and economic rights and needs of the present generation without compromising those of future generations. This certification allows the department to market the timber as sustainably managed and enhances the market value.

Natural lands provide valuable services by filtering pollutants and maintaining water quantity and quality for both surface and groundwater. Wetland protection and restoration can help reduce flood peaks and damage, protect human health and safety, and reduce the need for expensive projects such as levees, detention ponds and the reconstruction of flood-damaged roads.

The value of basic “ecosystem services” has been estimated for the US Fish and Wildlife Service wildlife refuges in the lower 48 states (*Ingraham and Foster, 2008*). The economic value for the wildlife habitat, carbon sequestration, disturbance prevention (e.g. flood control), freshwater management and supply, nutrient regulation and waste management of these services amounted to \$2,900/acre/year. Using the same approach, Wisconsin’s public land provides a total return of \$3.33 billion/year or \$2,400/acre/year.

Our public lands also provide cultural and historical connections. They invoke a sense of place in the landscape and are important habitats for people. The majority of Americans agree that preserving undeveloped land for outdoor recreation is important (*Outdoor Foundation, 2011*). Evidence suggests that children and adults benefit from contact with nature, therefore land conservation can be viewed as a public health strategy (*Frumkin and Louv, 2007*). They also play an important role in providing access to the outdoors for people with varied physical abilities, support environmental education, and build a public commitment to environmental conservation.

The cost of purchasing and managing public land needs to balance these costs with the full range of long-term recreation, economic, environmental, land health and connections to nature benefits. Our conservation related expenditures are best considered as investments that pay increasingly valuable dividends long into the future (*Gies, 2009*).

Ecological Significance

Sites of High Conservation Significance – Primary Sites

The *Rapid Ecological Assessment for the Northern Kettle Moraine Region Fish and Wildlife Properties (REA)* (WDNR, 2010b) identified seven Primary Sites on six properties. Primary Sites are parcels within state lands that offer opportunities to protect rare and representative natural communities, and/or harbor rare species populations. The management objectives for the Primary Sites are found in Chapter Two.

The Natural Heritage Conservation program conducted a gap analysis to inform decision making on the number of native communities and potential state natural areas needed to meet the critical ecological reference area requirements for forest certification, ecosystem/species preservation, research, and education goals of the program. The Primary Sites selected for state natural area status fill the needs identified in the gap analysis. Map C shows the relationship between the NKMR properties and the Conservation Opportunity Areas discussed in the REA.

Open Marshes and Wetland Forests

Several of these properties have large wetland complexes over 1,000 acres in size. Wetland quality and quantity varies considerably between properties as well as within properties. For example, Theresa Marsh, Mullet Creek and Kiel Marsh are found along waterways with large adjoining wetlands. However, these wetlands have been impacted by ditching, grazing and invasive species. Jackson Marsh has large tracts of Southern Swamp Hardwoods and Northern mesic white cedar-tamarack forests. Cedarburg Bog is a rare fen with high quality bog vegetation and is recognized as one of the most important Conservation Opportunity Areas in the region by the Wisconsin Wildlife Plan.

Cedarburg Bog SNA is considered a Tier 1 (high value) stopover sites for land birds (WDNR, *Grveles et al.*, 2011), an important stopover site in the Land Legacy report (WDNR, 2006) and in Important Bird Area program (Steele, 2007). Mullet Creek WA is considered a Tier 2 (moderate value) stopover site for waterfowl.

These properties provide habitat for breeding grassland birds, breeding marsh birds, rare reptiles and amphibians, and invertebrates. Opportunities also exist to enhance or protect black tern, rail and heron habitat.

While Wisconsin is fortunate to have many quality wetlands, there have been significant losses since pre-settlement periods. It is estimated that Wisconsin has lost about 50% of its original 10 million acres of wetlands. Currently, over 75% of Wisconsin's remaining wetlands are in private ownership.

Many of our river systems, especially the larger ones, have dams or water control structures that limit fish movement, impact natural water level fluctuations, and can significantly affect the shoreline habitats (Baker *et al.* 2000). Kiel Marsh WA is an example of a riverine wetland that is affected by both department management activities as well as water level management of the dam on the Sheboygan River by the City of Kiel.

Flood control and agricultural development in the early to mid-1900s significantly affected wetland habitat across the state. Draining and filling, shoreline development, control of aquatic plants, introduction of invasive species, and pollution and sedimentation were recognized as threats to our wetlands and waterfowl habitat (*Jahn and Hunt, 1964*). The 14 southeast counties alone experienced a 2% per year loss in wetlands (*Kabat, 1972*). Factors such as existing drainage ditches, on-going shoreline development, filling and altered hydrology for infrastructure, declining water quality and non-native species continue to impact the quantity and quality of waterfowl habitat in Wisconsin.

Offsetting the degradation of wetlands and the loss of grasslands has been a goal of several federal, state and private programs. Wisconsin has been a leader in obtaining funds and implementing cooperative projects for the restoration and enhancement of wetlands and waterfowl habitat. For example, during the mid-1900s the Wisconsin Conservation Department created flowages on state wildlife areas, such as at Theresa WA and Mullet Creek WA, to offset the loss of wetland habitat for ducks and Canada geese (*King 1971*). The Wisconsin state waterfowl stamp program generated on average over \$500,000 per year during the period 2000–2006 for waterfowl habitat work.

Since 1991, the department and partners have obtained \$20 million in federal grants for waterfowl habitat. This was matched by \$50 million in partner or state funds, resulting in 97,000 acres of waterfowl habitat protected and/or enhanced. Ducks Unlimited (DU) has been a valuable partner in these efforts and has invested \$11.5 million in wetland and habitat protection in Wisconsin.

These actions have immediate and long-term benefits for Wisconsin duck hunters and those who enjoy watching waterfowl. According to recent studies in Wisconsin, duck nesting success on federally funded CRP grasslands and state wildlife lands were 30% and 20% respectively, which are at or above the 15-20% success rate needed to maintain duck populations (*R. Gatti WDNR personal communication*). Depending on annual conditions, 50–70% of the total ducks harvested in Wisconsin are produced in the wetlands of our state (*Wisconsin Waterfowl Strategic Plan 2008–2018, p. 16*).

Species Richness

The NKMR planning area is noted for its diverse natural communities and species richness in the *Rapid Ecological Assessment for the Wildlife, Fishery, and State Natural Areas of the Northern Kettle Moraine Region* and the *Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need (SGCN)*. The NKMR supports 42 rare animal species and 34 rare plant species. The project area supports two rare invertebrates: the federally endangered Hine's emerald dragonfly and the state endangered swamp metalmark butterfly. High quality aquatic resources found on these properties includes seeps, springs, spring ponds, spring runs, and headwater streams.

Migratory Bird Habitats

Migratory birds from many bird groups utilize the NKMR habitats. The habitats range from large wetlands, streams, and flowages at Theresa, Allenton, Mullet Creek and Kiel Marsh wildlife areas to the forests and shrub cover found at Cedarburg SNA and Jackson Marsh, Mullet Creek and Nichols Creek wildlife areas. Over 190 migratory species have been identified at Cedarburg Bog (UW-Milwaukee Field Station) and over 10,000 land birds are estimated to utilize Cedarburg Bog during the spring and fall migrations (*WDNR, Grveles, et.al. 2011*).

Large emergent wetlands and associated open water areas provide desirable habitat for migratory waterfowl, shorebirds, songbirds, and waterbirds (i.e. cranes, herons, bitterns and egrets) during migration. Features include foraging areas of emergent aquatic plants such as smartweed (*Polygonum* spp.), arrowheads and cattails; open water areas that teem with amphibians, fish and aquatic invertebrates; and mudflats with abundant invertebrates and insect larvae.

Moist soil management in the large impoundments at Theresa and Mullet Creek provide varied habitat from mudflats to flooded areas that provide food for invertebrates and attract large concentrations of waterfowl and shorebirds. Lowland shrubs in these wetlands offer migrating songbirds protection from severe weather and predators during a critical time in their life cycle. Shrubs offer perches for capturing emerging aquatic insects in spring and feeding on fruit in the fall. Fruit is utilized by migrants to build fat reserves necessary for sustaining long migratory flight.

Invasive Species

Invasive species are a growing threat to our native plant and animal communities. Numerous invasive species are found on the NKMR properties and some are well established. These species can dominate a community to the detriment, and perhaps the exclusion, of native species. Invasive species can alter natural ecological processes by creating monotypic stands with little to no plant and animal diversity. These infestations can adversely affect the quality of the habitat for resident and migratory wildlife.

In upland habitats buckthorn, black locust, box elder, Tatarian honeysuckle, garlic mustard, Japanese knotweed, Japanese hedge parsley and other woody and herbaceous invasive species can present management challenges.

In lowlands, glossy buckthorn, phragmites, cattails and purple loosestrife can dominate wetlands while curly pondweed and Eurasian milfoil are issues in open waters or deep water marshes.

Reed canary grass is an aggressive invasive species found in many NKMR wetlands. It is one of the few invasive species that has been quantitatively assessed on a statewide basis. Satellite imagery analysis indicated almost 500,000 acres (about 10% of all Wisconsin's wetland acres) are dominated by reed canary grass making this species the most extensive wetland plant invader (*Hatch and Bernthal, 2008*).

CHAPTER TWO

SECTION ONE – GENERAL PROPERTY

MANAGEMENT, DEVELOPMENT AND USE

This chapter is divided into two sections:

Section One covers management elements applicable to all properties in this planning group.

Section Two provides a brief description of the individual properties followed by habitat and recreation management objectives and prescriptions specific to that property.

Factors considered when developing the management objectives and prescriptions included habitat distribution and quality, game species life cycle requirements, habitat needs of species of greatest conservation need, recreation usage and trends, land use patterns and trends, and public input.

Vision

The Northern Kettle Moraine Region Fish, Wildlife and Natural Areas will provide abundant outdoor recreational opportunities in lightly developed settings for current and future users. These opportunities will be provided in a mosaic of high quality and ecologically diverse habitats including open waters, wetlands, grasslands and forests. These natural communities will be managed for user enjoyment consistent with the purpose and ecological capacity of these properties. The most effective and sustainable management efforts include citizens, private landowners and resource management agencies working together.

Goals

1. Provide abundant recreational opportunities and quality infrastructure for enjoying hunting, fishing, trapping, birding, wildlife viewing, scenic vistas, nature study and other compatible outdoor activities with an emphasis on non-motorized recreation.
2. Promote high quality wetlands, grasslands, shrub lands and forests, especially oak communities, for the desired wildlife species and the rare and special concern species.
3. Provide additional habitat to promote nesting success of grassland nesting ducks (e.g., blue winged teal), migratory bird populations, and enhance woodcock populations.
4. Promote sustainable game fisheries with an emphasis on enhancing coldwater habitat to encourage natural reproduction of trout.
5. Protect native communities that are unique and provide opportunities for ecosystem research and public education.

General Property Management

Providing an opportunity for quality hunting, fishing, trapping and nature enjoyment is the primary goal for these properties. To provide these opportunities managers seek to protect and enhance the native plant and animal communities and promote certain non-native game species through stocking (e.g., pheasant and brown trout) as resources allow.

The extensive wetlands and forests that covered southeast Wisconsin prior to European settlement are mostly gone. Today, the remaining native habitats, especially grasslands and upland forests, are severely fragmented by agriculture, highways, and urban and rural development. Fragmentation presents many significant challenges including adverse impacts on wildlife migration and dispersal, insufficient habitat for species of concern, spread of invasive species and the most effective management of state properties. Despite these challenges, the NKMR properties provide valuable habitat for a variety of native game species including deer, turkey, waterfowl, doves, woodcock, small game and furbearers.

In general, wildlife benefits for a given habitat type increase as patch size increases. While the minimum area required for maintaining viable populations of many species (e.g., grassland birds) is not known, it is largely accepted that the larger a contiguous grassland is, the more benefits it provides to these species. Similarly, larger blocks of forested habitat provide higher quality habitat for interior bird species. The ease and efficiency of habitat management also increases as patch size increases. As a consequence the management objectives in this plan seek to restore large blocks of pre-settlement communities. Protecting rare natural communities is important to the extent it is practicable and sustainable.

Habitat and recreation management on these properties includes both active and passive forms of management. Active management includes direct action (e.g., stocking birds, planting trees and adding boat launches) to promote a resource or recreational activity. Passive management indicates no or very limited action is taken to direct the structure and composition of a habitat or encourage a recreational pursuit (e.g., natural succession is allowed to guide plant communities or no designated trails are added or maintained for hiking and skiing). For more information about active and passive management refer to the Northern Kettles RPA and the Forestry Passive Management report (*WDNR, 2010c*),

Protecting or rehabilitating cold water (trout) stream habitats is the highest fish management priority.

The goals in this master plan build upon the achievements of past master plans and general program management priorities. Similarly, the objectives and prescriptions in this master plan incorporate the many successful management activities, both active and passive, already used to manage habitats and provide recreation on these properties.

Authority

The use and management of a state property is governed by its official designation. This property grouping is an assemblage of designated Wildlife, Fishery, Streambank Protection, and State Natural Areas. Wildlife and fishery areas are acquired and managed under the authority of ss. 23.09 (2) (d) 3. and NR 1.51. These areas set aside habitat and provide recreation for hunting, fishing and trapping. These areas are also open for traditional outdoor uses of hiking, skiing, snow shoeing, nature study and berry picking. As directed by NR 1.51 and NR 1.61, other recreational uses are allowed by the property's Master Plan if those uses do not detract from the primary purpose of the property.

The Federal Aid in Wildlife Restoration Act (i.e., Pittman-Robertson Act) authorizes an excise tax on sporting arms and ammunition to provide funds for acquiring, developing and managing wildlife areas. This funding prohibits a state fish and wildlife agency from allowing recreational activities and related facilities that would interfere with the primary purposes (e.g., hunting, fishing and trapping) for which the land was acquired, developed or managed.

Natural Areas are defined and authorized in ss. 23.27-23.29 and NR 1.32 as "an area of land or water which has educational or scientific value or is important as a reservoir of the state's genetic or biological diversity and includes any buffer area necessary to protect the area's natural value". Section 23.27 (1) defines natural areas as "reserves for native biotic communities...habitat[s] for endangered, threatened, or critical species...or areas with highly significant geological or archaeological features". Section 23.28(1) provides authority to designate areas as State Natural Areas and Section 23.29 provides authority to legally dedicate and protect State Natural Areas in perpetuity.

The State Natural Areas program seeks to preserve the best examples of the state's diverse natural communities. They are valuable for research and educational, the preservation of genetic and biological diversity, and for providing benchmarks for determining the impact of use on managed lands. They also provide some of the last refuges for rare plants and animals. Traditional recreational uses such as hunting and hiking are allowed if those uses do not threaten the natural values designated for protection.

Land Management Classifications

Land management classifications in NR 44 describe the general management objectives for a property or a management unit within a property. These classifications are determined during the master planning process and help identify the preferred set of active and/or passive actions to achieve these objectives. Only those management activities or techniques identified or referenced in this master plan and compatible with the site's ecological capability will be pursued in these management areas. The two Land Management Classifications applicable to the NKMR properties are as follows:

Habitat Management Area (NR 44.06(5)) - A significant majority of the NKMR wildlife and fishery areas (12,851 acres) are classified as Habitat Management Areas (HMA). The primary objective for this classification is to provide integrated upland, wetland and/or aquatic habitat management that meets critical life cycle needs for a variety of plant and animal species. Typically the emphasis is to provide an appropriate balance of habitats needed to sustain productive game species populations. However, a portion of these lands may be managed for focused species production and protection (e.g., waterfowl production). Areas that initially do not have desired habitat conditions, but have a high potential to be restored may be included under this classification.

Native Community Management Area (NR 44.06(6)) – All of the state natural areas and several other management units (3,601 acres) are classified as Native Community Management Areas (NCMA). These areas are managed to perpetuate plant and animal communities typical of pre-settlement landscapes and protect the biological diversity of these native upland, wetland and aquatic ecosystems. A Native Community is a distinct and reoccurring assemblage of indigenous flora and fauna associated with similar physical settings. Areas that initially do not have the desired community conditions, but have a reasonable potential to be restored may be included in this classification.

The traditional recreational uses (e.g., hunting, fishing, trapping, hiking and cross country skiing are allowed on the NCMAs except if an area needs to be closed (e.g., during breeding season or to protect a fragile habitat).

The Land Management Classification acreage by property is shown in Table 2-1. The spatial relationship of these classifications for each property can be viewed in their respective map series D-3, E-3, etc.).

Table 2-1: Land Management Classifications for the NKMR Properties (fee title acres)		
Property Name	Native Community Management	Habitat Management*
Theresa WA	0	5,309
Allenton WA	0	1,160
Jackson Marsh WA	1,306	1,212
Mullet Creek WA	320	1,897
Nichols Creek WA	226	425
Kiel Marsh WA	0	843
Onion River SBP	60	1,011
LaBudde Creek FA	0	401
Cedarburg Bog SNA	1,733	0
Total	3,645	12,258

Note: An additional 593 acres of easement lands are managed as Habitat Management Areas.

The objectives and prescriptions used to manage a NCMA or a HMA may significantly overlap, but the desired end point may be decidedly different. For example, fallow fields under both classifications can be treated with herbicides, plowed and replanted. However, in a NCMA the objective is to re-establish native plant and animal communities while in a HMA the field may be leased for crop production, used as a wild game food plot, re-seeded to establish surrogate grasslands or perhaps restored as a prairie community. NCMA restorations typically require the use of local native seed sources to protect genetic diversity while a HMA might use non-local seed to achieve restoration objectives.

Properties purchased after the master plan is approved will be classified and managed as Habitat Management Areas unless the desired objectives and prescriptions warrant another classification. In this case a master plan amendment will be pursued.

General Wildlife Habitat Objectives and Prescriptions

The objectives and prescriptions in this master plan seek to achieve the following habitat goals:

- Protect or enhance the habitats that sustain the recreational activities.
- Protect high quality native plant and animal communities and increase the acreage of high value and under-represented habitats (e.g., grasslands).
- Optimize management efficiency by improving habitat boundaries.

The first goal is intended to benefit deer, turkey, pheasants and other game and non-game species. The habitats will be managed to maintain or create a desirable mosaic of habitats that provide the essential food, cover, water and all or a portion of the life cycle needs of resident and migratory wildlife. Actively managed habitats, such as flowages and food plots, can help meet the nutrition needs of wildlife when the quantity or quality of native foods is low. For example, they can help deer by providing supplemental nutrition during pregnancy, lactation or when bucks are growing antlers. However, food plots should not be considered a substitute for managing the native vegetation to provide quality food sources for wildlife.

Wetlands comprise about 70% of the overall land cover on the NKMR properties. The wetlands are a mix of non-forested (e.g., submergent, marsh, sedge meadow, fen and lowland brush) and forested habitats (bottomland hardwoods and swamp conifers). Non-forested wetlands and open water are most common and make up about two thirds of the wetland cover. On the forested wetlands, hardwoods are the most common cover type with swamp conifer being a minor, but important component.

The second goal seeks to create or maintain more diverse and sustainable native communities, especially for grassland cover types. Grass and shrub lands make up about 75% of the upland cover on these properties with the remaining acres in hardwood forests. In the future, some of the upland shrub communities and cropped parcels will be converted to grasslands.

The management of the state natural areas is and will continue to be focused on protecting and restoring native plant and animal communities. These natural areas are open to fishing, hunting, trapping and other traditional nature based activities.

Agricultural practices are and will continue to be an integral part of managing wildlife lands in southern Wisconsin. Currently these practices are used on slightly more than 20% of the non-forested uplands. These practices are used on food plots and are routinely used to help establish, maintain and rejuvenate grasslands on these wildlife properties.

The third goal seeks to improve efficiency by improving boundaries so habitat blocks can more easily be burned, harvested or managed. Properties bounded by significant amounts of private land require more time to post boundaries, address trespass concerns, resolve encroachment issues and monitor invasives.

Finally, the following general wildlife objectives and prescriptions apply to all the properties. These objectives and prescriptions are described in more detail in the property manager and program management handbooks (*WDNR, web based data*). These references also include best management practices (BMPs) for achieving the desired outcome while minimizing potential adverse impacts.

Property or management unit-specific objectives and prescriptions are described in Section 2 of this chapter. These objectives and prescriptions will be applied contingent upon the availability of staff and material resources, or modified as needed to respond to unpredictable or catastrophic events (e.g., storm damage or severe insect/disease infestations).

General Wildlife Management Objectives

A major objective for these properties is improving habitat quality for game and non-game species. Providing grassland habitat for grassland birds, waterfowl nesting and brood rearing, and pheasant cover is of particular value. These properties also provide valuable stopover and resting habitat for migratory species. Efficiently managing the state owned properties and collaborating with public and private partners to promote sound management on adjacent lands will multiply their value for wildlife.

- Promote sustainable wildlife populations on these properties by maintaining permanent native and managed cover types for common and rare wildlife species.
- Manage Habitat Management Areas to maintain or create larger blocks to enhance their wildlife habitat value. As part of this management maintain, or create as appropriate, a mosaic of lowland to upland habitats. This mosaic can provide travel corridors for species movement between habitat blocks.
 - High quality grassland and oak communities are upland habitat priorities.
 - Improve the habitat value of surrogate grasslands, sedge meadows, shrub-carr and forest habitats for area sensitive bird species.
 - Maintain existing shrub-carr on parcels that do not have high potential as sedge meadow.
- Protect, and enhance as practicable, the quality and extent of the wetland communities classified as Native Community Management Areas. Communities of particular interest include wet and wet-mesic prairie, sedge meadow, fens, emergent marsh and southern tamarack swamp.
- Protect and enhance habitats and populations of threatened and endangered species and species of greatest conservation need (SGCN).
- Reduce the threat of invasives species to protect the biodiversity of these properties.
- Provide opportunities for habitat and species research and public education consistent with the approved management habitat and species objectives.

General Wildlife Habitat Prescriptions and Actions

The following management prescriptions and actions are authorized on all properties, unless there is a property specific restriction. Additional authorized prescriptions are described in the General Management Objectives and Prescriptions by Habitat and Forest Type sections.

- Actively manage old fields to create larger habitat blocks of grasslands by removing fence lines, conifer plantations and encroaching brush or trees.
- Create additional native or cool season grasslands on cropped lands except where farming agreements and/or food plots are being used to aid habitat restoration efforts or are being used to enhance wildlife populations and hunting opportunities, especially for doves and pheasants.
- Manage forests to provide cover, denning, nesting and food for wildlife and permanent cover to protect the watersheds.
- Manipulate water levels at flowages and impoundments to manage wetland vegetation and improve wildlife habitat, especially for waterfowl and shorebirds.
- Restore wetlands by filling or blocking ditches, breaking tile lines and shaping soils as needed .
- Use nest boxes, platforms or similar devices to enhance reproduction of desired wildlife.
- Control beaver and muskrat populations to mitigate damage to dikes, water control structures, and flooding of neighboring private lands.
- Passively manage large and small game populations except for the stocking of farm raised pheasants and providing food plots for doves to enhance hunting opportunities.

Vegetation Management Prescriptions

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

Prescribed burns mimic natural fire disturbance and help control many woody plants and invasive weeds, improve the quality of wildlife habitat, reduce fuels to lessen fire hazard, and liberate nutrients tied up in dead plant material. Upland nesting cover used by pheasants, waterfowl and songbirds is more productive if periodically burned. Even wetlands, such as sedge meadows, benefit from fire. Burning is also the most cost-effective treatment compared to the other management prescriptions.

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

Prescribed fires may be used in other plant communities as deemed appropriate by the property manager in consultation with the Natural Heritage Conservation ecologist and Forestry staff.

Other management actions that can be used to implement these prescriptions include:

- Mechanically cut, hand cut, pull, bulldoze and/or smother vegetation.
- Chemical control of vegetation or pests using approved products and application techniques.
- Bio-control measures may be used as deemed appropriate, safe and effective.
- Grazing.
- Biomass harvests that follow approved Wisconsin Biomass Harvesting Guidelines.
- Seeding or planting native woody and herbaceous species.
- Agricultural activities may be used to provide crop rotations for food patches, hunting or nesting cover, brush and invasive species control, and site preparation for native community restoration.
- Forestry practices as described in department manuals and guidance. This may include salvage of trees after a major natural disturbance if the volume of downed trees inhibits fire or other approved management prescriptions. The Natural Heritage Conservation ecologist shall be consulted before harvests are planned in state natural areas or primary sites.

Waterfowl and Shorebird Habitat Management

Protecting and enhancing waterfowl habitat is a wildlife management priority both statewide and on the NKMR properties. Wetlands constitute nearly 70% of the land cover on these properties so management of the wetlands and impoundments is important for maintaining the productive waterfowl populations desired by both hunters and wildlife viewers.

A number of the NKMR properties have high quality wetlands that provide valuable breeding and staging area benefits for waterfowl. However, a number of the properties have limited nesting value due to the lack of permanent upland grass cover for grassland nesting ducks like mallards and blue-winged teal. The most desirable ratio of grassland to wetland is 3:1, but a ratio of 1:1 can be productive as well. Some properties have grassland to wetland ratios as low as 0.25:1 (e.g., Theresa WA) and the average is slightly under 0.6:1 for the property grouping as a whole indicating a substantial shortage of upland grass.

A landscape mosaic that contains large blocks of wetlands and hemi-marsh conditions adjacent to large blocks of permanent upland grass cover provides quality breeding, brooding and nesting habitat. These conditions can improve nesting success by reducing predation and eliminating losses due to mowing and other human disturbances.

Waterfowl research conducted in Wisconsin (*R. Gatti WDNR – personal communication*) indicates mallards and blue-winged teal strongly prefer to nest in blocks of permanent grasslands. They prefer to nest in grasslands twice as much as in wet meadows and 5-6 times more than in alfalfa fields. Their nesting success was 28% in larger blocks of permanent upland grass compared to 6% in wet meadows, 4% in linear grasslands and 3% in cropped alfalfa fields. Nesting success on some state owned upland grassland has equaled or exceeded the values indicated above.

Flowage and Impoundment Management

Periodic and timely fluctuation of water levels can provide optimal seasonal habitat requirements for many species. The following are general management guidelines for impoundments:

- Make full use of the existing water control capabilities to maximize the abundance and diversity of desirable wetland vegetation types.
- Strive to provide “hemi-marsh” conditions (i.e., a 50:50 ratio of open water to emergent vegetation) to promote waterfowl production and enhance migration habitats.
- Conduct seasonal and longer term (1-2 years) drawdowns on flowages and impoundments to provide a variety of habitat conditions, including shorebird habitat (i.e., mudflats), wetland furbearer habitat (i.e., cattail marsh), and waterfowl migration habitat (i.e., moist-soil areas and hemi-marsh areas).
- Provide adequate spring and fall water levels for migratory waterfowl and other wetland species, and fall waterfowl hunting.
- Ensure adequate flow at dams and water control structures to allow for fish spawning migrations.

Moist Soil Management

Some properties have shallow-water impoundments that can be managed for “moist soil” plants, providing food and cover for migrating waterfowl. Theresa Marsh WA has twelve sub impoundments or runoff basins varying in size from 7 to 80 acres. Short-term and long-term rotational systems are followed to optimize conditions in these habitats.

Short-term rotation schedules involve moist-soil management over a 2-3 year period. Typically, water is drawn or pumped down (mid-July to mid-August) to dry the soils and allow machinery access. Reed canary grass is mowed under as part of a farming agreement or by department staff. Mowing alternating rows creates strips of mowed grass (food/roosting areas) and forbs including smartweed (*Polygonum* spp.) and sticktight (*Bidens* spp.) that provide duck food and cover.

Soils on the mowed areas may be disturbed mechanically using an offset disc, rotavator, or deep tiller to enhance conditions to re-establish moist soil plants. Soil disturbance and exposure promotes smartweed and sticktight growth the year following disturbance. These plants usually persist for two years before reverting to reed canary grass. Ideally, re-flooding of disturbed or mowed sub-impoundments is completed by mid-September for migratory bird use and hunter access.

Long-term rotations of sub-impoundment may consist of idling one or more sub-impoundment (i.e., removing them from the 3-5 year cycle of summer drawdown and fall re-flood each year) to allow a cattail/bulrush wetland with scattered water openings to develop. When the cattails start to dominate the impoundment, the 3-5 year soil disturbance rotation pattern can be re-started to reset the vegetation mix in the impoundment. In this way, a portion of the moist-soil management units can be in a hemi-marsh state at any given time while the remaining areas will be under active soil disturbance regimes.

Prescribed burns can also be used, often in conjunction with herbicide treatments or water level manipulation, to reduce cattails or convert reed canary grass to a more desirable habitat types.

Shorebird Management

Water levels at flowages and impoundments can provide habitat for both shorebirds and waterfowl. In southern Wisconsin water levels can be maintained to accommodate the peak waterfowl migration occurring between ice-out and the third week of April and then drawn down to provide shorebird habitat during their spring (late April to early June) and fall (mid-July to late September) migrations.

The following is a list of important shorebird habitat requirements:

- Migrating shorebirds require shallowly flooded areas that have at least 75% open water surface.
- Water depth and shorebird body size correlate, i.e., larger shorebirds forage in deeper water. Depth for shorebird foraging habitat ranges from dry to approximately five inches of water.
- Shorebirds habitats need to support an abundance of invertebrates – a minimum of 100 individuals per square meter – consisting mostly of midges and bloodworms.

Whether managing for spring or fall shorebird habitat, it is recommended that moist soil units be disked. The impoundments should provide an interspersed mudflat, shallow water and deeper water with at least 20% of the basin less than 8 inches deep. Slow drawdowns (e.g., 1-2 inches/week) are a good practice. If more than one impoundment is involved, drawing them down asynchronously provides more consistent shorebird habitat. Flooding lands adjacent to the wetland vegetation in early spring can help decompose the vegetation to promote midge populations.

Summer drawdown management on moist soil units for shorebirds typically includes:

- Early July drawdowns to leave wetland moist and encourage production of moist soil plants.
- Return water to basin in late August after a build-up of plant biomass.
- Flood basins in late winter, particularly in areas that experienced late summer drought or hard winter freezes, to prevent the die-off of shorebird prey (midge larvae).

Winter drawdown management on moist soil units for shorebirds typically consists of the following:

- Begin drawdowns in July, but leave wetlands moist to encourage production of moist soil plants.
- Let wetlands dry throughout the winter to promote vegetation decomposition.
- Fill the basins in late April to promote growth of overwintering larvae in nutrient-rich detritus.
- Keep water shallow (one to two inches) to encourage algal growth and nutrients for midges.
- From mid-July to late September or early October, start a gradual drawdown, always maintaining one to two inches of water in the wetland basin.

In addition to these recommended practices, managers are encouraged to establish a long-term monitoring program in shorebird habitat units. Record weather data, shorebird species, numbers of individuals, and the management regime for each basin. This information enables managers to determine the management practices that most successfully attract shorebirds.

Woodcock Management Units

Management prescriptions for woodcock management units (WMU) follow the guidelines found in the Best Management Practices for Woodcock and Associated Bird Species (*Upper Great Lakes Woodcock and Young Forest Initiative*). These prescriptions also benefit shrub land species including some Species of Greatest Conservation Need.

Ideally these units should be 500 – 1,000 acres with suitable habitat on surrounding private lands considered as well. More than 80% of the WMU should be managed for dense sapling growth on moist soil types. The upland areas adjacent to the core wooded wetlands should be managed in early successional tree species, like aspen, or upland shrubs. Wetland shrubs, alder, forested wetlands and early successional forest types, including aspen, can provide the core habitat.

To achieve the desired young forest cover open areas may be planted to desired species as needed. The aspen should be managed to maintain a diversity of age classes through even aged management.

Within the WMU not more than 20% should be managed as roosting fields and singing ground habitats (i.e., open grasslands). In each WMU maintain one roosting field at least 5 acres in size per 100 acres. In addition, maintain 8 smaller openings of at least 0.5 acres as singing grounds per 100 acres. The open areas can be maintained through burning, mowing, timber harvest or farming agreements.

Active and Passive Landscape Management

Active management includes the direct manipulation of the plant and animal communities. Examples include seeding a parcel to re-establish grasslands, conducting prescribed burns, harvesting timber, stocking fish or pheasants, or adding structures in trout streams. Active management activities span a significant range of time scales. Fish may be stocked every year, prescribed burns may occur every three to five years while timber harvests may occur on 15-50 year cycles or even longer.

Passive management indicates no or very limited direct action is taken to manage a habitat. Passive management is often used in habitats with the following characteristics:

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

Passive management is often applied to Reference Areas on state natural areas. In Reference Areas natural forces are allowed to direct the structure, composition and function of the plant and animal communities. These areas provide an opportunity to study changes in natural systems.

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

Biotic and Cultural Surveys and Research

Surveys and monitoring to be conducted including their frequency, location and objectives, as well as the parties responsible for conducting the surveys are described in the individual property plans as needed. Basic and applied research occurring at the UW-Milwaukee Field Station at Cedarburg Bog is a significant activity. Reports produced from department research and monitoring efforts shall include habitat and/or species management recommendations (as practicable) for consideration and implementation by the respective program(s) and added to the property master plan as necessary. Surveys and research not covered by this master plan, but intended to improve habitat or species management, enhance educational activities or increase our understanding of the ecological and cultural resources on the properties shall be reviewed and must be approved by the property manager in consultation with the district ecologist and relevant program and science experts.

Invasive Species Management Actions

The threat of exotic and/or invasive species, including plants, animals, insects and diseases represent a significant and growing threat to our native plant and animal communities. To address this concern, invasive species inventory, monitoring and control actions are included in the annual property planning for each property. The inventory, monitoring and control efforts follow the guidance provided in the department's *Property Managers Handbook*. Key activities include:

- Inventory properties annually to detect new infestations. Property-wide inspections are ideal, but not always practicable. At a minimum, inspections should be conducted at entry points such as trails, roads, waterways, rights-of-way, and areas where soil has been disturbed.
- Control new or existing invasive species populations as practicable.
- Clean mowing equipment to avoid dispersal of invasive plant seeds.
- Monitor control activities to assess effectiveness and determine if follow-up is needed.

Infestations of buckthorn, honeysuckle, garlic mustard, spotted knapweed, wild parsnip, sweet clover, burdock, dewberry, black locust, autumn olive, crown vetch, Japanese hedge parsley, Japanese knotweed and other invasive species have been noted on these properties. Reed canary grass is a very common invasive on disturbed wetlands. Other wetland invasives include cattails, purple loosestrife, common reed and phragmites. Native species with invasive habits, such as red cedar, sumac, prickly ash and box elder, are also a management challenge on several properties.

Emerald Ash Borer

Emerald Ash Borer (EAB) is an invasive species that places ash at considerable risk of mortality. Woodlands with ash as a major component are at highest risk. Rapid mortality can affect the diversity, health and overall value of these forests. Anticipated adverse impacts over the next 10-20 years include loss of mature canopy trees, degraded habitat for game and non-game species, and increased potential for infestation by other invasive plants. Many of the at-risk forests are located on wet soils making control of or slowing the spread of this pest difficult and expensive. Actions to minimize EAB impacts include:

- Conduct sanitation cuts of infected trees or trees at significant risk of infection;
- Under plant with desired species to promote regeneration and minimize catastrophic canopy loss;
- Conduct salvage harvests and replant to other desirable tree species;
- Harvest the ash component while promoting other desirable canopy species;
- Utilize approved chemical or bio-control methods as applicable; and
- Use other standard practices identified in the Forestry handbooks.

Wildlife Outreach Activities

As time and resources allow, wildlife staff may inform, educate and share information with volunteers, users and private landowners, especially on parcels adjacent to department properties. Issues of particular concern include collaborative habitat management to protect and enhance critical habitat for key game species and species considered endangered, threatened or Species of Greatest Conservation Need, and monitoring and controlling invasive species.

General Habitat Objectives and Prescriptions

An overall objective is to increase the extent and quality of the desired plant communities. These communities will in turn provide better habitat for deer, turkeys, waterfowl, songbirds, fish and other wildlife in the increasingly developed landscape of southeastern Wisconsin. These communities will be managed to create larger blocks of the desired habitat as practicable. Protecting watersheds and water quality by reducing sedimentation, nutrient inputs and excessive runoff is important too. Maintaining groundwater recharge is critical for sustaining the cold water springs and seeps feeding trout streams.

Both natural processes (e.g., passive management) and active manipulations (e.g. plantings, seeding, controlled burns, brushing, farm agreements and herbicide applications) will be used to manage the structure and composition of these habitats. Historically, fire played a key role in maintaining many of the plant communities in southern Wisconsin so prescribed fire is a primary management tool used to mimic natural disturbance patterns and promote native communities.

This section describes the general management objectives and prescriptions to be used on the NKMR properties for specific cover types. However, the individual property descriptions later in this chapter may specify certain management techniques to maintain or regenerate the desired habitat due to unique conditions on the different properties. More detailed descriptions of these habitat and management options are contained in the wildlife management, inland fisheries management, native communities and forest management in the department web references (*WDNR program web references*).

Wetland Habitats (non-forested)

Sedge Meadows

Southern Sedge Meadow habitats support many rare species such as bobolink, willow flycatcher and rare herptiles. Today, these open wetlands, or wet meadows, are much less abundant than they once were. They have been lost or severely degraded due to lower water levels (e.g., tiling and drainage ditches), flooding, grazing, lack of fire and/or invasive species. Degraded Sedge Meadows are often dominated by reed canary grass or are invaded by woody vegetation due to the lack of disturbance (e.g. fire on the site). Reed canary grass is less desirable because it replaces native plant species and creates a monotype with low habitat value. Restoring Sedge Meadows infested with reed canary grass is a difficult task given the tools currently available. Development of cost-effective, environmentally safe methods for removing reed canary grass would significantly benefit the protection or restoration of sedge meadows.

Management Objectives:

- Increase the extent and/or quality of the Sedge Meadows on all sites as practicable.
- Restore the original hydrology of disturbed wetlands if compatible with other primary objectives and practicable given adjacent ownership, land uses and agency resources.

Management Prescriptions:

- Use prescribed fire, mowing and herbicides, where practicable, to remove or reduce competition from invading woody and herbaceous species.
- Farming agreements are used as a cost-effective way to manage sedge meadows, control reed canary grass and willow shrubs, and provide habitat for migratory waterfowl and shorebirds.

Calcareous Fen

Fens have much in common with sedge meadow, wet prairie, and wet-mesic prairie communities. However, fens have attributes such as unique plant species that are supported by the special hydrological conditions that set them apart. Only 87 fens have been identified in Wisconsin and they cover less than 1,000 acres statewide. The statewide gap analysis conducted by the State Natural Areas Program indicates there is a need to protect and manage fens for future generations and scientific inquiry.

The primary threats to calcareous fens are disruption of hydrology and invasion by woody species and reed canary grass. Ditching, damming, dredging, tiling, pumping, and quarrying can all affect the quantity and quality of groundwater needed by fens. Invasive species can be serious threats to calcareous fens, with glossy buckthorn, narrow-leaved cattail, giant reed grass, and purple loosestrife among the potential offenders. Grazing, vehicular traffic, and overuse by hikers or other recreationists can physically damage the surface and destroy sensitive vegetation. The lack of fire in the present landscape has contributed to the encroachment of woody species on open fen habitat, with the consequent suppression or loss of the more light-demanding herbs.

Habitat Management Objective:

- Maintain and restore the fen community type on all sites where it occurs as practicable.

Habitat Management Prescriptions:

- Manage the surrounding lands and groundwater resources to preserve the hydrologic function.
- Use fire management (and brushing and herbicides as needed) to control encroaching woody species and invasive species, especially reed canary grass. Woody vegetation should be kept short in stature, scattered and toward the periphery of the fen. Prescribed burns should be used to mimic natural disturbance patterns and achieve desired compositional and structural characteristics.
- Routine management should only occur on frozen ground to protect fen soils.
- Other management activities, such as ground layer augmentation, should only occur after consultation with NHC staff and other science experts.
- Where possible, manage fens as an element in wetland complexes that include marsh, wet meadow, low prairie, shrub-carr, and southern tamarack swamp.

Marshes and Submergent Aquatics

Marsh and Submergent Aquatic communities are found in areas with permanent water. These communities are associated with both natural water bodies (e.g., Mud Lake) and impoundments where water levels are controlled by dikes, berms and water control structures (e.g., Theresa and Mullet WAs).

Submergent Aquatics occur in deeper water and may include coon's-tail, common bladderwort, pondweeds, water-shield, water lilies, native water-milfoil, and water-marigold. Submergent aquatic communities are typically passively managed.

Marshes, also called Emergent Vegetation, are typically dominated by species such as common bur-reed, common reed grass, bulrush, pickerel-weed, and wild rice. The invasive narrow-leaved cattail can be a management challenge in these marshes (i.e., Theresa WA). Marshes can benefit from both active and passive management. For example, periodic water level reductions provide mudflats for shorebirds and increase the amount of submergent and emergent vegetation once water levels are restored.

Marshes and Submergent Aquatics are critical habitats for wildlife species such as ducks, muskrat and numerous songbirds, shorebirds and marsh birds. The value of these habitats can be increased substantially, especially for ducks, if they adjoin grass uplands that provide nesting habitat.

A 50:50 mix of open water to emergent vegetation, called hemi-marsh, is a desired management objective and provides optimal habitat for breeding migratory birds, including most waterfowl, black and Forster's terns, American coots, and certain blackbirds (*US FWS, Waterfowl Management Handbook*).

Cattails are prolific and can quickly dominate a hemi-marsh. Monotypic stands of cattails have reduced overall habitat value, but will provide some benefits for wintering white-tailed deer and ring-necked pheasants and breeding habitat for marsh wrens, least bitterns, and various species of blackbirds.

Habitat Management Objectives:

- Maintain the extent and protect or restore the quality and diversity of the marsh and submergent aquatic plant communities.
- Manipulate water levels to enhance waterfowl use, improve shorebird habitat, benefit native wetland floral and faunal communities, and facilitate vegetative management practices

Habitat Management Prescriptions:

- Maintain or restore the original hydrology of the wetlands to the extent practicable.
- Conduct periodic partial and/or complete drawdowns every few years, or as needed, on impoundments and flowages to promote the resurgence of desirable wetland species like smartweeds, arrowheads and bidens as a food source for wildlife where water control infrastructure provides the needed capacity.
- Coordinate water level management with cutting, crushing, shearing and discing in late spring; prescribed fires in winter; grazing in spring; timely herbicide applications; and grading on sites dominated by invasive species (e.g., cattails) where practicable and desirable,
- Passively manage the native aquatic communities and allow natural processes to determine the ecological characteristics (i.e., composition and structure of the communities) unless the existing native plant community and/or seed bank in restoration areas does not provide the desired diversity and density of native species.
- Monitor and control invasive species to the extent practicable. Invasive species of concern include cattails, purple loosestrife, Eurasian milfoil and some pondweeds.

Shrub Wetlands (Shrub-carr)

Shrub-carr wetlands provide important wildlife habitat, especially as winter cover for ring-necked pheasants and white-tailed deer. Shrub-carr wetlands often encroach on sedge meadows and wet prairie due to a lack of fire or disturbed hydrology (e.g., lower water levels due to ditching and tiling). This habitat type requires periodic management to maintain the health and vigor of the shrub community and prevent encroachment on other wetland types.

Management Objective:

- Maintain existing shrub-carr wetland in areas that do not have high potential for management as Sedge Meadow, Wet Prairie, or Wet mesic Prairie.

Management Prescription:

- Use prescribed burns, cutting, herbicide treatments and mowing to maintain shrub-carr habitat.

Upland Habitats (non-forested)

Grasslands, Prairies and Oak Savanna

Most of the NKMR grasslands were croplands, old fields or pastures that have been replanted to warm and/or cool season grasses and forbs. These grasslands provide important habitat or cover for certain waterfowl, grassland birds and pheasants. Fields dominated by introduced species are often referred to as “*cool season grasslands*” and those dominated by native species are referred to as “*warm season grasslands*”. The term Surrogate Grasslands is occasionally used to refer to land under agricultural management (e.g., corn fields, hayland and pasture) that provide grassland-like qualities.

Native Grasslands, Oak Savanna and Oak Openings are rare communities and native remnant Mesic Prairies are virtually non-existent on the NKMR properties. There were limited amounts of these habitats prior to European settlement. Opportunities to manage for these cover types are found on several properties including Theresa and Jackson Marsh. While prairie restorations typically have limited biodiversity compared to native prairies, they do provide important habitat for many wildlife species. Prairie types found on these properties include Dry mesic Prairie and Dry Prairie.

Management Objectives:

- Maintain and restore prairies and enhance grassland communities wherever practicable with an emphasis on promoting native species and controlling invasive and woody species.
- Wherever practicable restore or enhance Oak Savanna including Oak Openings.

Management Prescriptions:

Management approaches used on individual parcels will vary based on the management potential and opportunities at the site including factors such as topography, hydrology, soils, cover type, parcel size and surrounding land uses. The following management practices are to be applied on grassland and oak restoration sites:

- Remove hedgerows, fence lines, small conifer plantations and small low quality forest and brush patches to increase the size of grassland/prairie blocks. Remove trees in grasslands that serve as perch trees for raptors. Retain or plant oaks for savanna restorations and oak opening sites.
- Use prescribed fire to invigorate native grasses and forbs, suppress the encroachment of woody species, control non-native invasive plants and simulate natural disturbances.
- Use grazing, cutting, mowing, brushing and herbicides (when necessary) to remove trees, shrubs and invasive species. Both commercial and non-commercial timber cutting may be used to achieve the desired structural and compositional characteristics.
- Selective biomass harvests may be used if consistent with the site management objectives.
- Plant a diversity of native prairie and savanna species at the grassland, prairie and savanna restoration sites using local seed sources to maintain genetic diversity, especially on state natural areas and in management units classified as Native Community Management Areas.
- Where preservation of local genetic diversity is not a management priority, a variety of cool season grasses, legumes or forbs may be planted on sites targeted as cool-season grass habitat.
- NHC staff shall be consulted during the planning phase for any habitat management activities in Native Community Management Areas.
- Follow department Grassland/Savanna Protocol to minimize impact on sensitive plants and animals.

Upland Shrub

Upland Shrub communities are a minor cover type on the NKMR properties. They are typically found along old fence lines or scattered across the properties on former pastures or in unmanaged woodlands. Deer, pheasant and other wildlife will use Upland Shrub for cover and browse. These shrub communities may contain desirable native tree and shrub species, but they may be heavily infested with invasive species as well. Restoring heavily infested sites is difficult and maybe impracticable with current tools.

Management Objectives:

- Maintain native shrub communities where desired to provide a range of habitats for game species, especially cover for game birds such as pheasants.
- Convert Upland Shrub communities dominated by invasive species to grassland, savanna or forest as practicable.

Management Prescriptions:

- Use prescribed burns, mowing and other approved techniques to maintain the vigor and diversity of the desirable native shrub communities. Passively manage species composition and allow natural processes to determine the ecological composition and structure of these communities.
- Convert parcels infested with invasive species to adjacent native communities using prescribed burns, cutting, herbicides or other approved technique as practicable. Actively manage species composition to develop the desired composition and structure of these communities.

Cropland, Farming Practices and Food Plots

Parcels may be temporarily, or permanently, managed using agricultural practices compatible with the management purposes of the property. About 600-800 acres are cropped every year on the NKMR properties. Many of these acres are under farm agreements that are typically 3-5 years in length. Most of these lands are farmed for several years and then converted to permanent cover (e.g., upland grassland cover) or used on an extended rotation as food plots for game species. Farming practices, such as row crops, mowing grasslands for hay, or grazing to remove exotic species, may be conducted if consistent with the habitat objectives. Practices such as food plots, haying and an occasional 3-5 year rotation of grasslands into row crops can be used to provide food and aid habitat restoration efforts (e.g., control of invasive species). It can provide easier walking access for users as well.

Management Objectives:

- Provide a food source for game and non-game wildlife species, especially pheasant and doves.
- Provide brush/weed control prior to conversion to grasslands, prairies, savannas or woodlands.

Management Prescriptions:

- Plant food plots or leave agricultural crops (e.g., on farming agreement lands) standing to provide winter food for game species.
- Annually plant 100 to 150 acres of wildlife food plots in five to twenty acres plots on the NKMR properties. Agricultural crops can be manipulated to attract doves and other game birds (e.g., mow portions of sunflower fields when they are mature to disperse the seeds and create open areas where doves prefer to forage).
- Utilize farming practices to control weeds and prepare the site for habitat restoration.
- Use farming agreements on 150 – 200 acres of managed impoundments as a cost-effective way to maintain cover types (surrogate sedge meadows) for migratory waterfowl and shorebirds.

General Forest Habitats

All forest management activities shall follow the guidance in the department Silviculture Handbook (2431.5), the Public Forest Lands Handbook (2460.5), the Timber Sale Handbook (2461), and the Old Growth and Old Forest Handbook (2480.5), except for southern tamarack swamp. The prescriptions listed below are for the primary forest types found on these properties. The prescriptions include an overview of the general management methods and guidance from the Silviculture Handbook as well as considerations applicable to the NKMR. Consult the Silviculture Handbook for more details and management considerations. Where management prescriptions alter or eliminate harvest rotations, the Wisconsin Forest Inventory and Reporting System (WisFIRS) will be adjusted accordingly.

Management Objectives for all Forest Types:

- Manage oaks as a large-scale mosaic of patches along a successional gradient that includes Oak Forest, Oak Woodland, Oak Opening and Oak Savannas. Enhance and expand mature oak forest patches as an element of the oak continuum.
- Expand or retain aspen consistent with objectives to benefit wildlife, especially woodcock.
- Maintain the extent and enhance the quality of Northern and Central Hardwoods, Bottomland Hardwoods, Swamp Hardwoods, and southern tamarack swamps with an emphasis on providing wildlife habitat and protecting aesthetic values unless there is a property specific objective.
- Convert all Red and Scotch pine and Norway spruce plantations to native grasslands or desired forest types to increase wildlife values and increase ecosystem diversity.
- Retain patches of white pine to provide cover and food for wildlife and site aesthetic.
- Harvest timber using appropriate silvicultural systems including even aged and uneven-aged management. Selective harvests, shelterwood cuts, improvement and thinning prescriptions, and salvage harvests are used to achieve the desired composition and structure of the forests.

Management Prescriptions for all Forest Types

- Use harvest and thinning prescriptions to regenerate the desired woody and herbaceous species in a manner that reduces the spread of harmful insects, diseases and invasive species.
- Where appropriate, extend the rotation age for some stands of oak and central/northern hardwoods to increase the abundance of older-age trees and closed canopy forests.
- Leave long-lived reserve trees as individuals or in groups to meet wildlife needs and aesthetic values when their retention does not conflict other forest management objectives.
- Use intermediate forest treatments, such as release or crown thinning, as appropriate to develop young stands, improve the species composition of the forest and increase timber quality.
- Phase out conifer (e.g., red pine and Norway spruce) plantations using thinning and sanitation cuts. Convert to cover types that increase wildlife and/or native community habitat values.
- Retain white pine for wildlife mast, cover and aesthetics while promoting natural regeneration.
- Retain snags and coarse woody habitat if it does not conflict with other management objectives.
- Trees damaged by wind, ice, fire, insects and disease may be salvaged if it meets the property or unit management objectives and the amount of woody debris would inhibit prescribed fires.
- Under plant forested wetlands with desired woody species as appropriate where the threat of Emerald Ash borer could lead to invasion by undesirable species, such as reed canary.

Management Objectives and Prescriptions by Forest Type

Central and Northern Hardwoods

Central Hardwoods, such as black cherry, American elm, black walnut, bitternut hickory and shagbark hickory, tend to grow in partial shade to full sun, whereas Northern Hardwood tree species, such as sugar maple and basswood, tolerate shady conditions. Due to this variation in shade tolerance either even-aged or uneven-aged regeneration systems may be used depending upon the tree species being favored. Even-aged silvicultural methods, such as overstory removal or shelterwood, tend to keep all the trees about the same age by harvesting the entire stand at 80-150 year intervals. Uneven-aged methods, such as single-tree or group selection, tend to create stands with three or more distinct age classes. In this master plan these forest types are often labeled as Upland Hardwoods on the maps.

Management Objective:

- Maintain the health, vigor and diversity of central and northern hardwood stands to provide wildlife habitat and aesthetic value, and secondarily to produce forest products.

Management Prescriptions:

- Consider the forest conditions on the surrounding parcels when planning stand level management prescriptions, as a variety of age classes and stand sizes across the landscape is beneficial for wildlife and aesthetics.
- Assess the degree of succession to central or northern hardwoods prior to prescribing regeneration activities for a stand.
- Natural regeneration of central hardwoods can utilize both even and uneven-aged methods, including overstory removal, shelterwood, group selection, single-tree selection, coppice, and clearcut. Follow the department Silviculture and Forest Aesthetics Handbook guidance on selecting the appropriate regeneration system based on stand composition, advanced regeneration, site characteristics and other factors.
- Use intermediate treatments, such as release or crown thinning, to develop young stands and improve composition and timber quality.
- Artificial regeneration by seeding or planting seedlings of desirable species may be used where seed source and/or advanced regeneration is lacking.
- Other management techniques that can be used to help regenerate stands include soil scarification, herbicide treatments, and prescribed fire where feasible and safe.

Oak

Oak woodlands historically developed or regenerated following significant disturbance, such as fires that were common prior to European settlement. Oak provides valuable habitat for many game and non-game wildlife species because of the mast production, cover and denning/nesting sites. Generally, site disturbance is required to regenerate or maintain oak in mixed stands.

Oak management typically involves even-aged harvest practices depending on the species present. For example, harvest intervals for northern red oak are in the 100-150 year range while white oak may have harvest cycles over 200 years. The type of harvest and the size of the cut will depend on stand composition, potential for oak regeneration site quality and other management variables.

Management Objective:

- Enhance the quality and extent of oak stands as practicable.

Management Prescriptions:

- Maintain oak stands through management techniques appropriate for the stand and site conditions. Natural regeneration systems of oak include even-age management techniques, clearcutting, and shelterwood harvesting techniques.
- Oak regeneration by seeding or planting seedlings may be used prior to or after timber harvests when natural regeneration is not adequate. Other management techniques that can be used to help regenerate oak include soil scarification, herbicide treatments, and prescribed fire where feasible and safe. Intermediate treatments, such as release or crown thinning, may be used to enhance young oak stands, improve their composition and timber quality.
- Assess the degree of succession to central hardwood species and advanced regeneration density prior to prescribing oak regeneration harvests. Natural conversion to these species may be prescribed if oak regeneration seems unlikely. If successful regeneration of an existing oak stand is questionable, allow the stand to convert, but retain the oak as long as possible. It may be more feasible and desirable to establish an oak stand on a new site through planting.
- Where the objective is to develop or maintain a stand of mixed tree species, retain individual longer-lived species, such as oak. These trees can improve stand structure, wildlife habitat, aesthetic beauty, and increase the diversity of the stand.
- On non-forested sites naturally succeeding into oak, passively manage the site (use fire where appropriate) and allow it to convert to oak woodland or oak savanna. If a more rapid conversion is desired oak may be planted. Oak acreage may also be expanded by planting suitable sites (e.g., agricultural fields) adjacent to forested uplands.
- Research prescriptions are allowed though they may vary from standard silvicultural practices.
- Manage all oak woodlands in a manner that limits the spread of oak wilt and other pests.
- Encourage regeneration of other cohort trees, such as hickory and black cherry, and other desirable woodland understory species to provide food and habitat.

Aspen

Aspen is a small component of the forests on these properties. Aspen provides cover for early successional wildlife species, including woodcock and ruffed grouse, which have declined in numbers as woodlands have matured. This early successional forest type requires disturbance and abundant sunlight to regenerate. It is typically managed using complete even-aged harvests at intervals of 45-60 years.

Management Objective:

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

Management Prescriptions:

- Regenerate aspen primarily through coppice (i.e., root sprouts) cutting with a management emphasis on its habitat value for ruffed grouse and woodcock populations.
- Natural conversion to other forest types, such as central hardwoods, may be prescribed if aspen regeneration is unlikely or other hardwood goals take precedence. Harvest aspen and other short-lived species, leaving the long-lived species to develop.

Upland Conifers

A number of coniferous species are found on the NKMR properties. White pine is native to the area, but has also been planted widely to provide wildlife food and cover, and contribute to cover type diversity. Limited natural stands of white pine are found on several of the properties, but this species has been planted in plantations or mixed with hardwoods on several properties.

Small plantations or shelter belts of red pine, Norway spruce and Scotch pine are found on a number of the properties. These are often monotypic stands with noticeable populations of invasive species in the understory. These small stands offer very little benefit to wildlife species, are a hindrance to managing larger blocks of more desirable cover types and often have poor productivity due to insects and diseases.

Management Objectives:

- Convert conifer plantations and fencerows to another forest or other habitat type.
- Maintain white pine to biological maturity and retain as a component of future mixed hardwood and conifer stands.

Management Prescriptions:

- Use even-aged management practices (e.g., thinning and improvement cuts) to maximize the stands health, vigor and quality until the plantations are harvested.
- Fencerows should be removed during timber harvests or when doing other habitat improvements such as burning, herbicide application or other approved techniques.
- White pine should be actively managed by thinning and improvement cuts to attain biological maturity and then harvested. White pine may be retained through natural recruitment.

Forested Wetlands

Forested wetlands on the NKMR properties primarily consist of bottomland hardwood and swamp hardwood forests with smaller acreages of conifer wetlands (tamarack and white cedar forests) except at Cedarburg Bog. These forests are associated with wet soils in flood plains, depressions and stream/river bottoms.

Forested wetlands are intricate and variable ecosystems due to species richness, flooding, ice movement and internal drainage patterns. The pattern of deposition and development of soils in these stands is complex. Given the variability of these site conditions, as well as the species mix and silvicultural characteristics, multiple regeneration prescriptions may be pursued on these stands.

Due to the threat of EAB on the ash component of these forests the General Management Objectives and Prescriptions for EAB will be followed on forested wetlands.

Invasive exotic species, wet soil conditions and high water tables can make forest management in these cover types a challenge. Deer browsing can also hinder stand regeneration in areas where deer populations are high.

Wildlife that utilizes these habitats includes common species such as raccoon, white-tailed deer and turkey and Species of Greatest Conservation Need such as cerulean warbler, red-shouldered hawk and yellow-billed cuckoo.

Bottomland Hardwoods

Management Objectives

- Protect and enhance the extent and quality of the bottomland hardwood stands.
- Encourage the major species (e.g., cottonwood, river birch, swamp white oak and silver maple).
- Silvicultural management requires consultation between the wildlife/fishery manager and the forester with input from the Natural Heritage Conservation biologist if needed.

Management Prescriptions:

- Plant bottomland hardwood species and/or passively allow these tree species to invade adjacent open habitats to increase the width of these habitat corridors.
- Retain snags, cavity trees and coarse woody debris as denning and nesting habitat.
- Retain trees on the bank, especially on outer bends, to add coarse woody debris as fish habitat.
- Riparian zone management will incorporate relevant BMP's and shall implement measures appropriate to protect the scenic and aesthetic qualities of woodlands bordering waterways.
- Silvicultural and other management activities must avoid as practicable the introduction and/or spread of invasives (especially reed canary grass) in the understory of these communities.

Southern Swamp Hardwoods

Management Objectives

- Promote the stability and diversity of these forested wetlands by favoring other desirable hardwood species and increase the cedar and tamarack component where practicable.
- In stands lacking desirable hardwoods and/or conifers, succession to lowland brush or sedge meadow may be pursued with the demise of ash.
- Silvicultural management requires consultation between the wildlife/fishery manager and the forester on all Habitat Management Areas and the Natural Heritage Conservation biologist as needed. The wildlife/fishery manager and the Natural Heritage Conservation biologist shall be consulted on silvicultural management for all Native Community Management Areas.

Management Prescriptions

- Retain and regenerate swamp white oak whenever possible;
- Retain snags, living and dead cavity trees and coarse woody debris as denning habitat and encourage the recruitment of natural woody debris into the water channels to provide fish habitat.
- Riparian zone management will incorporate relevant BMP's and shall implement measures appropriate to protect the scenic and aesthetic qualities of the woodlands.
- Silvicultural and other management activities must avoid the introduction and/or spread of invasives (especially reed canary grass) in these communities.

White Cedar dominated Conifer Swamps

White cedar swamps are relics of the glacial period and are at the southern end of their range in southeast Wisconsin. This forest type covers about 500 acres on the NKMR properties and high quality stands are protected in the Cedarburg Bog and Jackson Marsh state natural areas. These swamps are one of the most ecologically diverse cover types and they provide habitat for many rare plants and animals. Cedar swamps often have black ash and/or red maple present in the stands. Deer browsing can significantly reduce regeneration and can affect the long-term health of white cedar stands. Emerald ash borer may result in focused efforts to remove the ash to promote cedar and red maple.

Management Objectives:

- Protect the health and encourage natural regeneration of white cedar.
- Reduce the ash component of these stands as warranted.

Management Prescriptions:

- Follow approved silvicultural techniques to regenerate white cedar as practicable.
- Remove ash and favor conversion to white cedar or secondarily to red maple or shrubs if appropriate.
- Manage invasive species as practicable with an emphasis on minimizing catastrophic loss of ash canopy to EAB.

Southern Tamarack Swamp (Rich)

Tamarack is found on moist organic soils, peats and mucks of swamps and muskegs, especially at the limits of its range in southern Wisconsin. This is a rare habitat and is valuable for many species such as American woodcock and black billed cuckoo and provides escape cover for white-tail deer. Like the southwest Wisconsin pine relics, these are remnant northern forests from the post glacial age that have persisted in the fire-prone southern Wisconsin landscape due to the wetness of the swamps. Following the recession of the glaciers, fires transformed the boreal forests on dryer sites to prairies/savannas. It is likely that fire did occasionally reach these areas during drought years and set these generally fire intolerant plant communities back for decades, or perhaps longer. It is also likely that pests and wind-throw occasionally decimated these single-species dominated stands.

There are significant challenges in managing southern tamarack swamps. This species does not reproduce under its own shade so some naturally occurring events had to set them back periodically – thus, providing an opportunity for tamarack to regenerate. Importantly, these stands are at the southern fringe of their range so they may be more susceptible to changes in critical climate variables.

Hydrologic changes can quickly convert this community to a shrub swamp. Altered hydrology caused by ditching and/or soil compaction and the deposition of sediments and nutrients from adjacent uplands can affect this community. Invasive plants also pose a serious threat to the southern tamaracks swamp communities. The diverse factors affecting the health and vigor of this community make it difficult to identify the reason(s) for the decline of a tamarack swamp.

Management Objectives:

- Actively maintain the larger and more sustainable tamarack stands to the extent practicable.
- Marginal tamarack stands may be managed to allow a change to other plant communities if the stands are small, low quality and/or on marginal sites where maintaining the stand conflicts with the objectives of a larger, associated wetland community.

Management Prescriptions:

- Where feasible, manage this forest type in conjunction with other complementary forest and wetlands communities. Isolated sites should be buffered from land uses that degrade them.
- Assess the status of the stand to determine its condition and management issues. The assessment should include evaluation of the hydrology of the area (including the impact of ditches, dikes, and runoff from adjacent uplands), impacts from activities on adjacent uplands, invasive species encroachment, development/high capacity wells, and agricultural activities. Develop and implement management recommendations based on this assessment.

- Use management actions such as ditch filling or dike removal as appropriate.
- Use management practices that limit soil damage, erosion, sedimentation, and hydrologic changes on these sites and adjacent lands. Convert adjacent upland crop land to grassland cover whenever possible.
- Management activities following a catastrophic natural event or significant insect/disease infestation shall be determined after consultation between the staff of the Wildlife, Forestry and Natural Heritage Conservation programs.
- Use prescribed burning for regeneration purposes, if deemed appropriate by the Wildlife, Forestry and Natural Heritage Conservation staff.
- Periodically monitor for and eradicate/control invasive species using mowing, brushing, hand cutting, or herbicides. Exotic species of known concern include glossy buckthorn, purple loosestrife, narrow-leaved cattail, giant reed-grass, and reed-canary grass. Red maple, a native species, is a potential concern and has been reported to invade tamarack swamps substantially reducing regeneration potential.
- Bio-control methods may be used for purple loosestrife, or other species as deemed appropriate, safe, and effective.

Additional information about all of these cover types can be found at the department web site using the following key words – forestry handbooks, forest habitat type classification system, endangered resources, ecological landscapes, natural communities.

General Fishery Objectives and Prescriptions

Coldwater Streams

Wisconsin's trout habitat management program has been a national leader for many decades. The program has evolved over time and is currently focusing on less intensive methods of improving in-stream habitat for various trout species and critical life stages (*WDNR, 2011-13 BIENNIAL REPORT*). The objectives and prescriptions referred to in this master plan incorporate these methods.

Coldwater streams are dominated by groundwater inputs and can sustain fish communities adapted to cold, oxygen rich, flowing water conditions. Important coldwater species include brook trout, brown trout, rainbow trout and native species such as white sucker, mottled sculpin and various minnow species. Coldwater streams will often support diverse communities of invertebrates as well as environmentally sensitive flies, stoneflies and caddis flies.

The physical habitat of a trout stream can be quite variable and is generally determined by watershed and landscape characteristics, specifically soils and geologic parent material as well as watershed size and gradient. Larger, lower gradient streams are often sinuous and have bottom material composed of fine grained sands and silts. Smaller higher gradient streams tend to be defined by riffles and runs with gravel and rock substrate. Habitat enhancements in both stream types can increase the carrying capacity, growth and natural recruitment of desirable fish species, specifically trout.

Coldwater streams often rely on external sources of energy (e.g., leaves) for the aquatic food web. Small streams are often shaded by trees and grasses so the invertebrates are adapted to eating leaves and detritus from terrestrial sources. Management of the streamside vegetation can increase the productivity by allowing sunlight to penetrate directly into the stream to increase the production of algae and phytoplankton. This results in increases in invertebrate and fish populations, while balancing the need to remain sufficiently cold to sustain trout populations.

Protection of these coldwater streams and the trout fishery resource also requires working with partners to reduce thermal and non-point pollution, protecting or restoring spawning habitat and stocking with hardy trout strains.

Management Objectives:

- Fishery Management staff will have priority in managing vegetation in the 132 foot riparian corridor (66 feet on either side of the center line) along classified trout streams to maintain and enhance in-stream habitat quality and the productivity of coldwater communities.
- Maintain, and increase as practicable, the extent and quality of Class 1 and Class 2 trout streams to promote self-sustaining brown and brook trout populations.
- Protect rare/endangered species and species of greatest conservation need in the streams and on fishery areas.

Management Prescriptions:

- Manage near stream vegetation to enhance the trout fishery, protect water quality and quantity, and enhance the aesthetics of the stream corridor.
- Install and maintain department approved streambank protection measures including livestock fencing, bank stabilization using rock rip rap and vegetation to restore eroded areas.

- Install and maintain in-stream enhancements to improve habitat quality and diversity. Enhancements include lunker and boom cover installations, revetments and current deflectors, brush bundles and other approved measures.
- Remove beaver dams to maintain the free flowing environment coldwater streams required to maintain robust trout populations.
- Consult with Natural Heritage Conservation during the planning of in-stream and riparian habitat enhancement projects.
- Follow the Bureau of Fisheries Management guidance on stocking rates.
- Activities to protect in-stream and near stream habitats include the planting of desired native species, removal of vegetation such as tag alder, aspen, box elder, black willow and invasive species to minimize bank erosion, excessive stream shading or degraded habitat quality. Vegetation management outside this riparian 132 foot riparian corridor will follow the Wildlife Management prescriptions.
- Maintain and encourage mature hardwoods in the riparian corridors, specifically swamp white oak, hackberry, hickory, elm and red maple.
- Inform and educate landowners, agricultural interests and communities in the respective watersheds about protecting water quality and quantity of groundwater and surfacewater inputs

Warmwater Streams

The ponds, lakes, flowages and larger rivers and streams on or adjacent to the NKMR properties provide opportunities to manage warmwater game fisheries and habitats for diverse semi-aquatic and aquatic plant and animal communities. Currently, limited funding for warmwater fishery management, especially in free flowing streams and rivers, means passive management is generally pursued on these ecosystems. While limited fish stocking may occur, habitat manipulations in the riparian and near shore areas are rarely, if ever, conducted on the warmwater resources.

Management Objectives:

- Promote riparian zone plant communities that protect water quality and quantity.
- Enhance littoral and riparian zone habitats for game and non-game species.
- Promote native fish species.

Management Prescriptions

- Allow natural processes to direct the composition and structure of the native warmwater fisheries. Stocking game fish is allowable under DNR stocking protocols.
- Conduct accepted in-stream and riparian zone habitat management activities (e.g., fish cribs, shoreline protection, invasive species control, etc.) as resources allow.
- In-stream habitat improvements may be implemented under Chapter 30 guidelines and under a general permit, individual permit and/or manual code approval.
- Control aquatic invasive and nuisance species (e.g., carp control) that degrade habitat for native plant and animal communities as resources allow.
- Inform and educate landowners, agricultural interests and communities in the respective watersheds about protecting water quality and quantity of groundwater and surfacewater inputs.

General Recreation Management and Use

The NKMR properties are popular destinations for deer, turkey, waterfowl, pheasant and other small game hunting. Several are also popular for trout and warmwater sport fishing, and trapping furbearers. Several sites have qualities that make them attractive to non-hunting pursuits such as bird watching, ecosystem research and environmental education. The NKMR properties, like wildlife, fishery and natural areas statewide, are approved for a wide range of outdoor recreational uses as noted below.

The recreational management objective is to provide access for a variety of quality recreational experiences in rustic or lightly developed settings. This corresponds to a NR 44 Type 2 recreational setting:

- A somewhat remote setting with little development and a predominantly natural-appearing environment offering opportunities for solitude and primitive, non-motorized recreation.
- The area is managed to maintain or create a moderate perception of remoteness. The objective is to provide conditions where users feel they are in a secluded setting. The context of topography, vegetation and adjacent or nearby adjacent land uses will be considered when managing these opportunities for solitude.
- Recreational facilities are simple, dispersed and provide a modest level of user conveniences while meeting environmental protection needs.

These properties have some (or a number of) limitations that constrain efforts to improve recreational experiences for a broad range of activities. Wetlands and open water are the most common cover types (about 70% of the total) in the NKMR. These wet areas are generally surrounded by small, non-contiguous uplands. This pattern of ownership limits the acreage available for upland deer and turkey hunting as well as other recreational pursuits (e.g., hiking). In addition, some of the upland areas are land locked or have limited access. Importantly, the popularity of these properties can result in overcrowding, especially on opening day of the various hunting seasons. This presents both a management challenge as well as detracting from user enjoyment.

Both active and passive recreation management activities will be pursued on these properties. **Active management** includes installing and maintaining parking lots, boat launches and other infrastructure needed to pursue a recreational activity. **Passive management** indicates an activity can be pursued, but no specific infrastructure will be added or actions taken to promote the activity. For example, users may hike; berry pick and bird watch, but designated trails, berry patches and bird watching blinds will not be developed or maintained.

Public Use and Recreation Management

These properties are open to a wide variety of traditional outdoor recreational uses as required by the federal and state funding sources (e.g., federal - Land and Water Conservation Fund Act (LAWCON), and state - Outdoor Recreation Act Program (ORAP) and Stewardship) used to purchase these lands. With a few exceptions (e.g., a waterfowl refuge) the properties are open to a variety of nature based recreational pursuits such as hunting, fishing, trapping, hiking and nature enjoyment. Parcels closed to the public or closed to specific use are posted. Certain types of hunting opportunities (e.g., dove and pheasant) may occur on all properties, but habitat management to increase hunting opportunities may be focused on selected properties as described in the individual property section of this chapter.

Wildlife and bird watching, hiking, cross country skiing, snowshoeing, canoeing, dog walking and nature study are becoming increasingly popular on these properties. Edible fruits and nuts, wild mushrooms, wild asparagus, and watercress may be removed by hand without a permit for the purpose of personal consumption by the collector (Note: collection of seeds, roots, or other plant parts is prohibited). These activities are allowed, but except as noted in the specific property descriptions, no designated infrastructure will be established nor are these activities considered recreational management priorities.

The majority of state natural areas are open to the public though access may vary due to use restrictions for public safety, protection of endangered or threatened species, or unique natural features. Lands may be temporarily closed when specific management activities (e.g., prescribed burns) are occurring.

Foot travel is allowed on all service roads, dikes and berms unless restricted in posted wildlife refuges or during habitat management activities or safety concerns (e.g., flood periods).

Motorized access is restricted on all properties to the designated public access roads and parking lots (see Motorized Access Plan page 53). Motorized recreational craft (i.e., boats) may be used on flowages and impoundments unless posted.

Snowmobiles are allowed on designated snowmobile trails. These trails are allowed at the discretion of the property manager if it is part of a regional trail system. Snowmobile trails are not allowed on natural areas unless the trail was in place prior to parcel acquisition. Requests to route a new connector snowmobile trail shall be directed to the property manager for consideration.

There are allowances for motorized use by individuals with mobility impairments under the American Disability Act - Power Driven Mobility Device regulations. Please refer to the specific language under "Disabled Accessibility" in the General Property Administration, Management Policy and Provisions section.

Prohibited activities on state fish, wildlife and natural areas as described in NR 45 include:

- Horseback riding (see following note)
- Rock climbing
- Mountain biking, ATVs, aircraft and model aircraft and rocketry.
- Collection of plants including seeds, roots or other parts of herbaceous plants.
- Camping and campfires.
- Wheeled dog sleds.

Note: horseback riding is allowed on trails and roadways designated for their use or if allowed under a permit (i.e., horses may be used at dog trailing events).

Collection of animals, fungi, rocks, minerals, fossils, archaeological artifacts, soil, downed wood or any other natural material, alive or dead may be allowed, but a permit or approval may be needed. Check with the property manager prior to collecting materials. Collecting for scientific research requires a permit issued by the department. Information on rules governing public use of department-owned lands is found in NR 45.

Recreation Trends

Three important trends will affect future usage, recreational pursuits and infrastructure needs on these properties. These trends include:

1. Aging of the general population. The quality and character of access to our sites will change as our user base changes. For example, there will be an increased need to provide some accommodation to individuals with mobility impairments.
2. There has been a slow decline in the number of hunters and trappers statewide. This decline could negatively impact game population management and program revenues. However, bird watching has increased and there has been a new cohort of non-traditional, non-revenue generating recreational activities (e.g., walking, pet walking and geocaching). Many of these new uses will probably be compatible with the primary purposes of these properties, but may contribute to crowding or conflicts during hunting season or at peak use periods.
3. The growth and diversity of outdoor activities will probably result in increasing year round usage of the properties and present additional management opportunities and challenges.

In addition, population growth and non-compatible land uses immediately adjacent to wildlife and fishing areas (e.g., the addition of housing on the boundaries of state properties) can adversely affect the management, use and enjoyment of these public lands. For example, gun hunting is not allowed within 100 yards of a home unless the resident agrees.

Recreation and Public Use Objectives

The primary recreation objectives include providing quality hunting, trapping and fishing opportunities consistent with the capacity and character of the natural resources on these properties. Deer, turkey, waterfowl, pheasant and small game hunting, trout fishing, and trapping furbearers are the primary recreational activities. Secondary, but increasingly important, recreational uses for most of these properties include wildlife observation, birding, hiking, non-groomed cross country skiing, snow shoeing, nature study, foraging, canoeing, outdoor education and other nature based recreational activities. To accommodate these uses the following objectives will be pursued:

- Promote compatible recreational opportunities that emphasize non-motorized activities in lightly developed to primitive settings. Secondary recreational activities will be passively managed.
- Improve accessibility and recreational opportunities for mobility impaired individuals.
- Provide opportunities for research and educational activities consistent with the primary management purposes and user safety.

Recreation and Public Use Management Prescriptions

- Install, maintain and monitor parking lots, access roads, boat launches and signage consistent with department policies and rules.
- Access shall be provided appropriate to the management objectives of the property with a focus on providing dispersed access to lower congestion and enhance the experience of users.
- Stock pheasants on sites with suitable cover to supplement natural pheasant production and provide improved opportunities for hunting success.
- Maintain a network of service roads and stocking lanes to provide department vehicular access for pheasant stocking, habitat and facilities management, and foot access for users.
- Provide improved trout fishing, boating access and wildlife observation opportunities and infrastructure for mobility impaired individuals as determined practicable.

- Manage the riparian vegetation along classified trout streams to protect in-stream habitat while also providing improved fishing opportunities for anglers.
- Service roads, non-designated trails and dikes may be walked by hunters, anglers and hikers to access the property unless within a closed area, a refuge or an area closed for maintenance or other habitat management activities.

Ice Age Trail Routes

The Ice Age Trail (IAT) is a Wisconsin State Trail and one of eleven National Scenic Trails in the United States. The IAT is a long-distance hiking and backpacking trail. A 2.5 mile segment of the trail passes through the LaBudde Creek FA.

The following criteria will be used to assess the suitability of a NKMR property to host new segments or relocating an existing IAT segment:

- soil suitability
- habitat management priorities
- natural heritage inventory information
- compatibility with other recreational uses
- development and maintenance considerations

Additional criteria may be applicable during the IAT planning process.

General Property Administration and Policies

The following policies and provisions apply to all state managed lands, including the NKMR properties.

Implementation and Funding Considerations

Implementation of the master plan actions is dependent upon staffing and funding allocations set by processes outside of the master plan. Funding for land acquisition can come from a variety of federal (e.g., Pittman-Robertson and others), state (e.g., Stewardship), local and private (e.g., land trusts) sources as well as land donations. Capital and operational funding for department programs are established biannually by the state legislature. Funds are also provided by federal programs and occasionally from private sources. Therefore, these legislative and administrative processes outside of the master plan will determine how and when the actions in this master plan are implemented.

Facility Management

All infrastructure used for habitat management and public access shall be inspected and maintained as required in program guidance and manual codes. This infrastructure includes, but is not limited to, dikes, spillways, water control devices, roads, gates, parking lots, bridges, boat launches and buildings.

Dikes and water control structures are essential for controlling water levels in flowages and enhancing emergent marsh habitats. The following routine activities apply to the maintenance of dikes and water control structures:

- Conduct dike maintenance and approved water manipulation activities;
- Maintain dikes to secondarily provide pedestrian access for hunters and trappers;
- Control beaver and muskrat populations to mitigate burrowing and damming; and
- Plan and implement major maintenance of dikes on approximately 20-year rotations.

Water control structures at dikes or impoundments that cannot provide the range of water fluctuations needed to optimize habitat for wildlife and enhance the native wetland plant communities should be replaced or improved.

NR 17.10(1) authorizes the designation of department lands for hunting dog field trials, year-round, except hunting shall have priority.

Public Health and Safety and Emergency Action Plan

All facilities will comply with federal, state, and local health and sanitation codes. The property manager has the authority to close trails and other facilities on a property when necessary due to health, safety, or environmental damage concerns. Trees and other natural elements deemed public hazards will be removed within designated public use areas (e.g., parking lots and designated trails). Safety inspections of designated public use areas are done at least twice per year.

Refuse Management

Visitors are required to carry out any refuse they produce. Refuse and recycling receptacles are not provided. Burying of refuse is not allowed on the properties.

Motorized Access

Under ss 23.16 the department is required to inventory the network of public access, service and habitat management roads on department properties. Public access roads, service roads, permanent burn breaks, stocking lanes, dikes tops and other temporary roads (e.g., logging roads) are part of the transportation network for each property. The public access roads connect the state lands to the broader public road networks. The service roads, lanes and dike tops provide department staff access for habitat and species management activities. Some of this infrastructure may also provide seasonal access for recreational activities, such as snowmobiling. The various types of roads, routes and trails across and within these properties are shown in the map series for each property (e.g., MAP C-2.1, MAP D-2.1).

The general road management goals include meeting the recreation and accessibility needs consistent with the purpose of the property, maintaining the roads to the designated road standards and in a sustainable condition, and meeting the land and aquatic management needs while minimizing environmental impacts.

Federal highways, state highways and county/town roads bordering or passing through the NKMR properties are the management responsibility of the respective jurisdictions.

Public Road Access - All roads are open to public access with street licensed vehicles unless the road is closed through signage or other physical obstruction. The Property Manager may temporarily close a road to public use to conduct habitat management practices (e.g., prescribed burns and timber harvests), for safety or law enforcement reasons.

Closed roads may be opened seasonally to allow access for firewood collection or other uses at the discretion of the Property Manager. The Wildlife, Fishery and Natural Heritage programs will not maintain roads for the expressed benefit of private individuals or residents, but at the discretion of the Property Manager a land use agreement may be considered for isolated, land locked parcels.

Road Classifications - Public roads are defined in ss 340.01 (22) and the department road classifications in NR 44.07(3) reflect a range of development and maintenance standards:

- **Primitive roads** are temporary or permanent seasonal roads with a maximum sustained cleared width normally not exceeding 12 feet, have little or no roadbed grading, minimal cut and fill, and a surface of primitive or native material.
- **Lightly developed roads** are temporary roads, permanent seasonal roads or permanent all-season roads that are primarily a single lane with a maximum sustained cleared width normally not exceeding 16 feet, are lightly to well-graded with minimal cut and fill, are surfaced with native or aggregate materials except in limited special use situations where asphalt may be used, and have a maximum design speed of 15 miles/hour (mph).
- **Moderately developed roads** are permanent seasonal roads or a permanent all-season roads that typically have 2-lanes, but may be one-lane, have a maximum sustained cleared width normally not exceeding 45 feet for 2-lane and 30 feet for one-lane, have a well-graded roadbed and may have moderate cuts and fills and shallow ditching, have a surface of aggregate, asphalt or native material, and a maximum design speed of 25 mph.
- **Fully developed roads** are permanent all-season roads with a cleared width normally of 50 feet or more, a roadbed with cuts and fills as needed, an aggregate, asphalt or other paved surface and are designed for speeds exceeding 25 mph.

Road Inventory - There are about 4.0 miles of fully developed to primitive access roads that are accessible to a standard motor vehicle and another 13.4 miles of service roads, burn breaks and stocking lanes (lightly developed to primitive) that are permanently closed to motorized access. Temporary roads and lanes used for seasonal management purposes are also closed. However, all of the “closed” roads are accessible to hunter, angler, trapper and hiker foot traffic.

Road Classifications and Motorized Access on the NKMR Properties

Accessibility	Current miles	Proposed miles	NR44 Road Designation
Open	0.2	0.2	Fully Developed
Open	3.6	3.6	Moderately-Lightly Developed
Open	0.2	0.2	Primitive
Closed	6.0	6.0	Moderately-Lightly Developed
Closed	7.4	7.4	Primitive
Seasonally Opened	0.0	0.0	

State properties typically have primitive or lightly to moderately developed service roads for management purposes. All department service roads not open to public vehicles will be maintained as primitive or lightly developed roads (NR 44.07(3)). Closed roads are gated or signed. Primitive roads, such as old farm roads used for management purposes, may not be routinely maintained. All service roads are closed to ATVs unless designated for such use.

The property manager may relocate or temporarily close road and trail segments or other public use facilities as deemed necessary after appropriate authorization by normal department approval processes. The location and design of new roads or trails must be consistent with the land classification requirements (NR 44) and the management objectives for the area in which they are to be located.

Public access roads managed by the department shall be constructed and maintained as either lightly developed or moderately developed roads. The property manager may determine which of these road standards to apply on a case by case basis.

The following motorized access objectives and prescriptions apply to the NKMR properties.

Management Objective:

- Provide access to all public parking lots and boat launches.

Management Prescriptions:

- The roads, trails and routes will be maintained to meet the Best Management Practices identified in department handbooks.
- Maintain road surfaces periodically to maintain proper surface drainage and inspect permanent roads throughout the year and develop a maintenance schedule.
- Maintain permanent service roads and public access roads within the wildlife areas in a sustainable condition by following department road standards and considerations for Wisconsin’s Forestry Best Management Practices for Water Quality.
- Regularly inspect active roads, especially after heavy storm events. Clear debris as needed from road surfaces, culverts and ditches to decrease unsafe conditions and prevent damage.
- Maintain stable road surfaces to facilitate proper drainage and reduce degradation from traffic during wet or soft conditions.

- Minimize the manipulation/removal of vegetation and soil disturbance to the extent practicable to prevent erosion.
- Design, route and construct roads to minimize habitat fragmentation and impacts to endangered, threatened and species of special concern.
- Restore roads used in timber harvests to non-erosive conditions, in accordance with Wisconsin's Forestry Best Management Practices for Water Quality.
- The department will collaborate with municipal, town and county roadside maintenance crews to protect and enhance the quality of roadside easement areas, especially to control the spread of invasive species.

Walking Access on Service Roads, Fire Breaks, Dikes and Paths

The public may hike on service roads, game stocking lanes, fire breaks and dikes to gain access for all of the approved recreational activities. This infrastructure is not designed, designated or maintained as designated hiking trails, but users can utilize them unless posted closed to the public. Non-designated primitive paths formed by years of use by hunters or anglers are found on all the properties. Non-hunters may use these paths as well. Designated hiking trails, such as the Ice Age Trail, may be used by hunters and trappers to gain access to those properties open to hunting.

Snowmobile Trails

A snowmobile trail is allowed to cross wildlife/fishery areas if it provides the most feasible route to maintain a regional snowmobile trail system, does not degrade habitat, is not routed through important winter habitat areas, and is signed and maintained according to applicable state statutes and administrative codes.

Disabled Accessibility

The department is committed to providing quality outdoor recreation opportunities for people with mobility impairment. All new construction and renovation of infrastructure will follow guidelines set forth within the Americans with Disabilities Act and be done in a manner consistent with the NR 44 land use classification for the development site.

The property manager has the authority to provide access accommodations for people with disabilities. Users with mobility impairment may be allowed to use power-driven mobility devices (PDMD) with a permit issued by the department. Approval will depend on factors including (i) the physical characteristics of the device, (ii) the volume of pedestrian traffic at the location, (iii) the design and operational characteristics of the site, (iv) safety considerations, and (v) whether the proposed use creates substantial risk of serious harm to environmental, natural or cultural resources.

Endangered, Threatened and Species of Special Concern Protection

Implementation of all management prescriptions in the master plan will be carried out with consideration of the needs of endangered, threatened, and species of special concern and the potential impacts to the species and their habitat. Management actions will be checked against a database of known occurrences of listed species to assure that no department actions results in the direct taking of any known endangered or threatened resource during the plan implementation phase.

Protection of Archaeological Features

Property managers will prevent physical disturbance of the archeological features (e.g., mounds) on properties. This includes controlling woody species invading the mound. Managers will follow department guidelines outlined in "Burials, Earthworks and Mounds Preservation Policy and Plan". The following federal cultural resource regulations should be referenced as applicable:

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470-470t) - This act establishes as policy that the Federal Government is to provide leadership in the preservation of the Nation's prehistoric and historic resources. Historic preservation is defined in the Act as the protection, rehabilitation, restoration, and reconstruction of sites, buildings, structures, and objects significant in American history, architecture, engineering, and archaeology. Sections 106 and 110 of the Act define the primary requirements federal agencies will follow to identify, evaluate and protect significant cultural resources.

Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469-469c) - This Act directs the preservation of historic and archaeological data in Federal construction projects. The Act authorizes Federal agencies to seek future appropriations, to obligate available funding, or to reprogram existing appropriations to provide for the identification and preservation of data.

Archaeological Resources Protection Act of 1979, as amended - This Act protects materials of archaeological interest from unauthorized removal or destruction, and requires Federal managers to develop plans and schedules to locate archaeological resources.

Best Management Practices for Water Quality

All forest management and construction activities shall comply with the most recent guidelines for Best Management Practices for Water Quality (BMPs). Natural shorelines will be maintained in vegetative cover to hold the soil from erosive forces. On banks more difficult to vegetate, other forms of protection should be used ranging from bioengineered banks to hard armoring (e.g., riprap).

Forest Certification

Wisconsin State Forests gained Forest Certification from the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) in 2004. The State Forests were re-certified under FSC and SFI and the balance of department-owned land were added to the certification in 2009. Third-party certification means management of department-owned land meets standards for ecological, social, and economic sustainability. Forest certification improves competitiveness in global markets that increasingly demand certified raw materials. Management of multi-use lands involves balancing the goals of conserving forestland, supporting economic activities, protecting wildlife habitat, and providing recreational opportunities. Forests on fish and wildlife properties are managed to meet the forest certification principles.

Fire Suppression

Wisconsin ss. 26.11, states, "The department is vested with power, authority and jurisdiction in all matters relating to the prevention, detection and suppression of forest fires outside the limits of incorporated villages and cities in the state except as provided in sub (2), and to do all things necessary in the exercise of such power, authority and jurisdiction." Wildland fire suppression actions will consider the property management goals and the threats of the fire to life and property. Appropriate techniques will be used in each event to provide effective fire suppression while minimizing resource damage.

Forest Pest Control

Wisconsin ss. 26.30 states, “It is the public policy of the state to control forest pests on or threatening forests of the state...” Any significant forest pest events will be evaluated with consideration given to the property management goals and the potential threat of the pest to other landowners. Infestations will be managed according to the respective management plan, if they exist. Responses to significant infestations from pests (e.g., emerald ash borer) include timber salvage or pesticide treatments. Any response to a significant pest outbreak or threat of a significant pest outbreak will be evaluated by an interdisciplinary team of scientists and communicated through press releases and notices to interested parties. If necessary, an immediate emergency response to prevent a major outbreak may be authorized by the State Forester.

Authorized Response to Catastrophic Events

Catastrophic events are rare, but allowances must be made to provide management flexibility when such events occur (NR 45.075). These events include severe flooding, ice and wind storms, insect and disease infestations, wildfires or other catastrophic occurrences. The immediate management responses to these events will follow existing department protocols. If the management objectives and prescriptions need to be revised a variance to the master plan must be approved by the Natural Resources Board.

Wildfires, tree diseases and insect infestations shall be controlled to the degree appropriate to protect the values of each management area. Emergency actions may be taken to protect public health and safety, or as directed by the State Forester to prevent a catastrophic incident from spreading to adjacent forests.

The response to catastrophic events is determined on a case-by-case basis. Salvage of trees damaged by wind, fire, ice, disease, or insects may occur if consistent with the objectives and prescriptions. Salvage may also occur as part of an emergency response authorized by the State Forester.

Control of Invasive Species

Invasive species can significantly harm the habitat and recreational potential of a conservation area so property managers should follow the guidance regarding control of invasive species in the department’s *Property Managers Handbook*. Proper management will require the inventory, control and monitoring of invasive species on the properties. Invasive species can be managed using the following methods: bio-control, herbicides, grazing, cutting, smothering, hand removal or fire, unless restricted to protect sensitive resources. Farming practices may be used for invasives control and restoration of heavily infested parcels. Best Management Practices (BMPs) for Invasive Species and the guidance in the *Property Managers Handbook* shall be used to direct management practices on these properties.

Administrative rules and voluntary actions taken by informed users will help slow the spread of aquatic and terrestrial invasive species. Examples include cleaning and disinfecting boats and equipment; not transporting live fish or spawn away from their indigenous waters; not transporting bait species between waterbodies, and hunters/hikers cleaning boots and clothing to reduce the spread of seed.

Chemical Use

Herbicides and pesticides may be used to manage invasive plants and insects or limit plant competition in restoration areas except as restricted in the property specific management prescriptions in this plan. All applications shall follow department procedures and herbicide and pesticides label requirements.

Non-Metallic Mining Policy

The department may use gravel, sand, fill dirt or other fill material from department-owned lands for department use. Under certain circumstances other government bodies or agencies may also have access to these materials. Wisconsin Statutes 23.20 states, “the department may permit any town, county, or state agency to obtain gravel, sand, fill dirt or other fill material needed for road purposes from any department-owned gravel pit or similar facility if this material is unavailable from private vendors within a reasonable distance of the worksite. The department shall charge a fee for this material commensurate with the fee charged by private vendors.”

Nonmetallic mining is regulated under the requirements of NR 135 Nonmetallic Mining Reclamation, except for sites that do not exceed one acre in total for the life of the mining operation. Site reclamation under NR 135 is administered by the county. NR 135 requires mining sites to be located appropriately, operated in a sound environmental manner, and that all disturbed areas be reclaimed according to a reclamation plan. New sites will not be considered if they will impact significant geological or ecological feature or sites within any designated State Natural Area.

Wi DOT projects are exempt because they have project reclamation requirements.

Real Estate Management

Acquisition Policies

The Natural Resources Board and the department acquire lands from willing sellers only. As required by state and federal laws, the department pays just compensation (e.g., estimated fair market value based on an appraisal) for property. Staff will periodically contact landowners within a project boundary to explain the department’s land acquisition program and determine if they have an interest in selling their property. Acquisition priorities for the properties vary from year to year and are based on a number of factors, such as resource management or recreation needs and the availability of funds.

Rather than purchasing land in fee title, the department may acquire an easement from a willing land owner. A number of easement options are available to address the circumstances. For example, fishery easements provide access for anglers, protection of riparian habitat and allow habitat development projects. This option is suited to protecting critical or unique habitat when fee acquisition is not feasible due to costs, local concerns, or an owner’s desire to retain fee title to the land.

Aides in Lieu of Taxes

State law requires the department to make payments in lieu of property taxes (PILT). The department uses an automated process for collecting information and calculating PILT payments. The process is determined by statute with little room for interpretation or calculation by the department. There are two separate statutes and several formulas under each statute that dictate the amount of each individual payment.

Wisconsin Statutes ss. 70.113 applies to lands acquired by the department prior to January 1, 1992. Payments under this statute are made directly to the taxation district in which the land is located. Schools, VTAE and counties do not receive any payment under this law.

Wisconsin Statutes ss. 70.114 governs the payment in lieu of property taxes for all lands purchased by the department after January 1st, 1992. The specific formula used to determine each specific payment varies depending on when and how the property was acquired. Payments are made to each taxing district in January, similar to the way a private citizen would pay their property taxes and each taxing district then makes payments to all taxing jurisdictions in the taxing district. For detailed information on how the department pays property taxes, visit dnr.wi.gov and search "PILT".

Project Boundary and Acquisition Goal Adjustment Process

The Natural Resources Board (NRB) must approve the Project Boundary and an Acquisition Goal for designated projects. The "project boundary" is the area within which the department is authorized to purchase or acquire land or easements from willing sellers or donors. The "acquisition goal" is the amount of land the NRB has authorized the department to acquire within the project boundary. The acquisition goal for a property is typically smaller than the project boundary. Changes to the project boundary and the acquisition goal must be approved by the department.

Parcels may be removed from a project boundary if it is developed or not needed to meet project goals. Lands may be added to acquire high quality resource lands or to meet expanding recreational needs. Boundary changes of 40 acres or more require approval by the NRB. NR 44 provides an amendment process that may be used to make adjustments in the project boundary after the master plan is approved. Where land purchase or easements are being considered the department can acquire land under the various authorities in ss. 23.09.

Conveyed Easements and Other Land Use Agreements

There are about 767 acres of conveyed easements on the properties in this planning group. Conveyed easements or access permits provide access across state property for utilities, public roads and infrastructure that provide a public benefit or enable a landholder surrounded by state property to access their property.

Easements, access permits, land use agreements and leases across department land require consultation and joint action by the affected program and the Bureau of Facilities and Lands Real Estate staff. These actions are subject to NR 1.48 and NR 1.485. Before any rights are conveyed, the Bureau of Facilities and Lands - Real Estate must determine if federal funds were used to acquire the land and, if so, obtain the appropriate approvals. Conveyed easements may serve a broader public purpose (e.g., a utility corridor), but they can adversely affect a property by limiting the public's full use and enjoyment; restricting department habitat and recreation management options; interfering with natural succession of cover types; introducing exotic and invasive species; introducing additional herbicides and other contaminants; and lastly, creating liability concerns.

Plan Monitoring and Public Communications

Public comments in the form of written, verbal and email comments were received at the following points in the master planning process: 1.) 30 day comment period for the Phase 1 Regional and Property Analysis including two open houses, 2.) 30 day comment period for the Phase 2 draft Master Plan including two open houses, and 3.) A stakeholder group developed and the department accepted recommendations for the Mud Lake boardwalk and boat storage issues at the Cedarburg Bog State Natural Area. A 21 day public comment period was also provided for point 3.

Staff met or communicated with elected officials, Friends groups, federal, state and local agencies, sporting groups and interested individuals during both phases of the planning process. In addition, the West Bend open house for the draft master plan was offered to the public via a live stream (Mediasite).

Fourteen people attended the Plymouth Service Office open house and 30 individuals attended the open house at the Washington County Annex in West Bend for the draft master plan in fall 2014. A total of forty two comments were submitted via email, though paper forms at the open houses or the on-line comment option. Sixty seven requests to watch live or review the Mediasite material were received.

Twenty five comments were submitted during the Mud lake boardwalk and boat storage comment period in March/April 2016.

Progress on implementing the habitat and recreation management objectives will be reported annually. These annual report will be available to the public on the department Internet Web site and linked to the respective property descriptions. The report will provide information on how the public can become involved in master plan implementation and when significant property management issues arise.

The annual report will summarize the following:

- Management and development activities completed and significant issues addressed,
- Planned management and development activities for the upcoming year, and
- Potential changes to management actions or approaches.

The annual report may also include information on topics related to property management and uses. Examples include: the status of forest insect or disease problems, storm damage, updates on endangered or threatened species, recreation management issues, and recreational use trends.

If the department considers a substantive change to the master plan (i.e., a plan variance or amendment) the public will be informed of the proposal and the review and comment process. As appropriate, news releases will be used to announce master plan amendment/variance proposals and review procedures. The department will also maintain a contact list of persons, groups, and governments who have requested to be notified of potential plan changes.

The following department staff may be contacted regarding questions about the Northern Kettle Moraine Region properties. At the time of this publication, the property contacts include:

Dan Weidert (920) 893-8540 dan.weidert@wisconsin.gov Wildlife Biologist, Sheboygan/Fond du Lac counties.
Tom Isaac (262) 670-3409 thomas.isaac@wisconsin.gov Wildlife Biologist Washington/Ozaukee counties.
Travis Motl (920) 893-8549 travis.motl@wisconsin.gov Fishery Manager.
Sharon Fandel (608) 275-3207 sharon.fandel@wisconsin.gov Conservation Biologist Cedarburg Bog.

CHAPTER TWO

SECTION TWO: INDIVIDUAL PROPERTY PLANS

Project Boundary Adjustments

The department currently owns 15,903 acres and has easements on an additional 593 acres at the nine NKMR properties. Over the last decade, the department has purchased about 70 acres/year of fee title land from willing sellers at fair market value. These expansions have allowed the department to protect critical habitat and provide quality recreational experiences on these properties.

The following project boundary and acquisition goal adjustments have been approved for these properties:

- Contract project boundaries by 245 acres where existing or future public access and conservation benefits are considered minimal. Factors considered in these recommendations included parcels being located in sewer service areas, existing development, and/or poor to no access.
- Expand the wildlife area project boundaries by a net of 1,945 acres and increase the acquisition goals by 1,160 acres. Within this expansion area 72 acres are already in department ownership and 168 acres are in Wi DOT ownership.
- Expand the fishery project boundaries a net 366 acres with no expansion of the acquisition goal.
- Expand State Natural Areas as follows:
 - Increase the Cedarburg Bog State Natural Area project boundary by 699 acres and the acquisition goal by 250 acres to protect the watersheds of Cedarburg Bog SNA and two adjacent natural areas (Sapa Spruce Bog and Cedarburg Beech Woods). The department owns 69 acres and the Ozaukee Washington Land Trust has acquired development rights on 38 acres within the approved boundary expansion area.
 - Designate four new state natural areas (355 acres total) on existing department lands within the existing boundaries of Onion River SBP, Nichols Creek WA and Mullet Creek WA;
 - Expand two existing natural areas from 212 acres to 721 acres on department owned lands within the existing project boundary of the Jackson Marsh WA.

The reasons for adjusting the project boundaries and acquisition goals at these properties include:

1. Improve public access and recreational opportunities. Several adjustments are intended to reduce user confusion about property lines and minimize trespass issues. Others are intended to link non-contiguous uplands to improve upland access and recreational opportunities around the water bodies and wetlands. The adjustments also seek to maintain or improve the quality of the users experience by reducing crowding and improving the aesthetic value of the properties.
2. Provide larger contiguous blocks of wetland, grassland and forest ownership to improve the efficiency of habitat management activities, especially for prescribed burn management.
3. Increase the acreage of upland grasslands for grassland nesting waterfowl, pheasants and grassland birds. The desired grassland to wetland ratio for grassland nesting waterfowl ranges between 1:1 and 3:1. The current grassland: wetland ratio for Mullet, Theresa, Allenton and Jackson Marsh wildlife areas is about 0.6:1 indicating a significant deficiency in grasslands. The approved project boundary adjustments could potentially improve this ratio to about 0.8:1.

4. Conserve high quality plant and animal communities. For example, management of invasive species is more consistent and effective if project boundaries follow roads or natural features.
5. Buffer current properties and uses from encroachment by non-compatible land uses. Hunting regulations state that gun hunting is not allowed within a 100 yard radius of homes unless the resident provides permission. Expanding boundaries as approved provides greater certainty that existing department lands can be fully used for all of the intended purposes.
6. Protect our existing investment in wildlife and fishery lands by sustaining critical water resources while reducing the risk of habitat degradation from sedimentation and nutrient enrichment.
7. Coordinate acquisition and property management activities with partners. Optimize the use of limited management and acquisition funds to maximize habitat and public recreation benefits.
8. These recommendations are consistent with NR 1.40 regarding the acquisition of recreational land readily accessible to the heavily populated areas of the state. These recommendations help consolidate and complete existing projects and help meet the following needs:
 - Protect rare natural resources and conserve genetic and biological diversity
 - Protect, manage or restore critical fish and wildlife habitat.
 - Protect land and water resources important to the quality and quantity of surface and ground water on the state properties and the associated recreational activities.
 - Accommodate outdoor recreation and state recreational trails.
 - Provides recreational land within 40 miles of Wisconsin's 12 largest cities, including Milwaukee, West Allis, Waukesha, Oshkosh and Appleton.

Land Acquisition Guidelines

The following criteria are used to assess the merits of property being offered for sale by willing sellers.

1. Lands greater than 40 acres with no or low-value improvements.
2. Lands with high quality wildlife habitats or contain critical habitat for Species of Greatest Conservation Need and/or contain Natural Communities identified as rare within the Southeast Glacial Plains Ecological Landscapes.
3. Lands that could provide quality opportunities for hunting, trapping, and fishing experiences as well as compatible nature-based outdoor activities.
4. Lands adjacent to current state lands or other protected lands that can provide a buffer from existing or future incompatible land uses.
5. Lands that currently affect the hydrology of important conservation lands (e.g., trout streams).
6. Lands affected by wetland restoration projects (i.e., private lands affected by raising water levels).

Portions of properties not needed for conservation purposes may be sold/leased back for agricultural or other compatible uses though the state may retain development and public access rights. Improvements may occasionally be brought into a project boundary. If buildings are purchased as part of a land holding, the buildings are typically sold off consistent with local zoning ordinances. However, access across developed parcels may be sought to provide public access to an isolated state parcel.

Project boundary adjustments often follow roads or natural features (e.g., rivers) to create public access opportunities off the public roads and the boundaries are easier to portray on maps. A project boundary encompasses more land than the respective acquisition goal to provide the department and partners with flexibility when negotiating the purchase, easement, sale or trade of land.

Project Boundary and Acquisition Goal Adjustments by Program

Wildlife Areas

This plan recommends the following adjustments for wildlife properties (Table 2-2).

Table 2-2 Wildlife Properties - Project Boundary and Acquisition goal Adjustments (acres)				
Wildlife Areas	State Parcels Outside Existing Boundaries	Expansions	Contractions	Acquisition Goal
Theresa	7	461	15	500
Jackson Marsh	15	73	83	0
Mullet Creek	44	357	0	0
Allenton	0	210	105	0
Nichols Creek	0	205	0	160
Kiel Marsh	6	776	3	500
Total	72	2,082	206	1,160

Fishery Areas

The plan recommends the following adjustments for the fishery properties (Table 2-3).

Table 2-3 Fishery Properties - Project Boundary Adjustments (acres)				
Fishery Areas	State Parcels Outside Existing Boundaries	Expansions	Contractions	Acquisition Goal
LaBudde Creek	0	60	0	0
Onion River	61	306	39	0
Totals	61	366	39	0

Natural Areas

This plan recommends four new natural areas (355 acres) be established on three properties (i.e., Onion River SBP, Mullet Creek WA and Nichols Creek WA) and two existing natural areas at Jackson Marsh be expanded (from 212 acres to 721 acres). All of these new or expanded natural areas will be overlays within existing wildlife and fishery property boundaries on state owned land. These expansions will fill ecological reference areas gaps in the state natural areas system. Refer to the individual property plans in the following section for specific descriptions of the new or expanded state natural areas.

This plan recommends the project boundary and acquisition goal of Cedarburg Bog State Natural Area be expanded by a total of 699 acres and 250 acres, respectively. This expansion brings 69 acres currently owned by the department into the project boundary as well as a 38 acre parcel where the development rights easement has been acquired by the Ozaukee-Washington Land Trust. This adjustment seeks to protect the watershed that contains three current state natural areas (Cedarburg Bog, Sapa Spruce Bog and the Cedarburg Beech Woods). It also offers the potential to improve land management efficiency, increase public access for nature education and enjoyment and protect working farmlands.

Land Cover in the Project Boundary Expansion Areas

A variety of sources were used to estimate the cover types and land uses on non-department lands in the approved project boundary expansion areas. They include existing department intranet aerial photography, Forestry WisFIRS (forest inventory data base), Water Division Wetland acreages and county based internet web mapping and planning documents. These data sources use different criteria for assessing cover types and land uses so different estimates may be developed depending on the source(s) used. Small inclusions of different land covers may be embedded within a more dominant land cover in the following acreage estimates and property maps.

Table 2-4 Land Cover in the Approved Project Boundary Expansion Areas						
Property	Forests/Brush	Grasslands	Wetlands	Cropland	Developed	Total
Kiel Marsh WA	391	23	128	227	4	773
Nichols Creek WA	109	9	10	68	9	205
Mullet Creek WA	33	8	5	296	15	357
Jackson Marsh WA	37	0	17	15	4	73
Allenton WA	85	7	35	83	2	212
Theresa WA	62	6	110	258	25	461
LaBudde Creek FA	17	20	10	0	3	60
Onion River SBP	68	86	49	63	18	284
Cedarburg Bog SNA	135	53	160	240	42	630
Grand Total	937	212	524	1,250	122	3,055
Wildlife Total	717	53	305	947	59	2,081
Fishery Total	85	106	59	63	21	344
Natural Areas Total	135	53	160	240	42	630

Note: This table includes land use on private lands and Wi DOT parcels. It does not include parcels owned and managed by department, but outside the current project boundary.

Wildlife Areas

Theresa Wildlife Area

Theresa Wildlife Area (WA) is the largest wildlife area in the planning group and is located in northwestern Washington and northeastern Dodge counties. This property has a project boundary of 8,770 acres and an acquisition goal of 5,990 acres. The department currently owns 5,309 acres, has easements on 534 acres and a Voluntary Public Hunting (VPA) lease on 17 acres. The Theresa WA maps are located in Map Series D.

Over 75% of this wildlife area is emergent wetland, forested wetland or open water. This property has been extensively modified by dams, drainage ditches, stream straightening and agricultural activities. A dam on the Rock River creates a 1,500 acre flowage and a number of small impoundments totaling about 600 acres have also been constructed. Two waterfowl refuges on this property provide resting area for waterfowl during the fall migration.

Theresa WA provides excellent habitat for a variety of wildlife including waterfowl, shorebirds, songbirds, herons, egrets and the endangered black tern. The wildlife area is an important breeding area for dabbling ducks, especially blue-winged teal (BWT). This marsh provides valuable resting and feeding habitat during migration periods for large numbers of geese, ducks and other wetland birds. A study by the department to determine the cause of a regional blue wing teal (BWT) population decline found the highest densities of breeding BWT and higher-than-average nest success (47%) at the Theresa WA (*Gatti 2009*). The marsh is also an important spawning area for northern pike.

The main recreational activities on this property include waterfowl, deer, turkey and pheasant hunting. It is heavily used during these hunting seasons and overcrowding can be an issue. Mourning dove hunting is enhanced through the establishment of food plots. Fishing is also popular, especially below the dam, and trapping of furbearing animals also occurs on the property.

The property has over 12 river miles of public access along the East Branch of the Rock River. The large pool above the dam provides opportunities for waterfowl hunting as well as canoeing and kayaking. The Rock River Water Trail starts at the dam and extends to the state line of Illinois. Wildlife watching and photography are popular with excellent viewing along State Highway 28, Mohawk Road and at high points along the marsh. Other recreational opportunities include hiking, cross-country skiing, snow shoeing, and berry picking. Two snowmobile trails also cross through this property.

Habitat management challenges include invasive garlic mustard, buckthorn, crown vetch, autumn olive and wild parsnip in the uplands and reed canary grass, hybrid cattails and phragmites in the wetlands.

Property Plan Highlights

- **Increase the acreage of grassland habitat for nesting ducks, pheasant cover and area sensitive songbirds.**
- **Expand the project boundary by 461 acres and the acquisition goal by 500 acres to improve public access and management efficiency,**
- **Maintain current water management regime and infrastructure to provide seasonal habitat for migrating waterfowl, shorebirds and wildlife.**
- **Add a Class 2 dog training area by 2017.**
- **Reduce the closed areas by 877 acres to provide additional recreation opportunities.**

Habitat and Infrastructure Management

The habitats (Table 2-5) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Agriculture	380	7	300	6
Grassland	550	10	637	12
Aspen	190	4	190	4
Oak	30	<1	30	<1
Central Hardwood	50	1	50	1
Conifer Plantation	10	<1	3	<1
Upland Shrub	120	2	120	2
Shrub Wetland	220	4	220	4
Marsh/Emergent Wetland	1,959	37	1,959	37
Non-forested Wetlands	545	10	545	10
Swamp Hardwoods	80	2	0	0
Bottomland Hardwoods	1,050	20	1,130	21
Water	120	2	120	2
Developed	5	<1	5	<1
Total	5,309	100	5,309	100

Wetlands, Grasslands, Shrub and Forests - Habitat Management Area (5,309 acres)

Management Objectives:

- Provide habitat for waterfowl and shorebird feeding, nesting and brooding
- Expand the extent and improve the quality of the Grassland habitats for grassland nesting duck, especially for blue-winged teal, and provide cover for pheasants.
- Improve the quality and maintain the extent of the forest and shrub habitats.
- Expand food plots for doves and other game species.

Management Prescriptions:

- Enhance quality of wetlands with the following actions:
 - Improve hemi-marsh conditions on the 1,500 acres main flowage as practicable.
 - Control carp populations.
 - Work with the WI DOT, Ducks Unlimited and other partners to enhance the waterfowl and wildlife habitat of “Peterburs Flowage” (~80 acres) north of STH 28 (2022).
 - Evaluate the quality and develop management actions as warranted to protect and improve the Fen-like unit at Watercress Road (2017).
- Enhance grassland habitat value:
 - Convert cropland to permanent upland grasslands if not needed as food plots, dove fields, cool season grass rotation or other habitat management purposes,
 - Improve Surrogate Grassland value for grassland nesting ducks and pheasants by seeding with a combination of native grasses and forbs and introduced grasses.

- Provide an average of 10-30 acres/year of wildlife food plots for doves and other wildlife.
- Improve the value of forest habitat with the following actions:
 - Use thinning, improvement cuts and other approved techniques to maintain health and vigor of the lowland and upland forests.
 - Reduce ash component of the forest canopy and under plant with desired species as appropriate.
 - Plant native conifer buffer along Hwy 41 for visual and noise barrier (2017) (6 acres)
- Maintain Oak Savanna habitats.
- Monitor and control invasive species as practicable.
- Follow the existing Water Management Plan (WMP) for the main pool and sub-impoundments. Update the WMP every five years, or as warranted, to incorporate state of the art management techniques.
- Update the Dam Management Plan and Dam Emergency Action Plan annually.

Warmwater Fishery Habitats - Habitat Management Areas

Management Objective:

- Maintain a warmwater fishery in the Rock River, its tributaries and ponds.
- Pursue habitat improvements as resources allow.

Management Prescription:

- Follow General Warmwater Fishery in-stream and shoreline habitat prescriptions.
- Stock with game fish as resources allow.
- Control carp populations to protect wetlands.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing service roads, gates, dikes and water control structures.

Management Prescriptions:

- Maintain the existing 5 miles of primitive and lightly developed service roads and 19 dikes (9.25 miles) and fourteen water control structures.
- Maintain existing 12 gates to protect habitat and public safety. Annually assess whether additional gates are needed or gates can be removed.

Public Use Management

The following supplements the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Increase hunting and recreation opportunities by reducing the size of the closed area.
- Provide opportunities for nature enjoyment, bird/waterfowl observation and other nature based recreational uses.
- Provide warmwater fishing opportunities.
- Maintain the existing and provide additional public access infrastructure.
- Add a dog training area by 2017.

Management Prescriptions:

- Decrease the size of the closed areas by 877 acres (reduce the closed area from 2,497 acres to 1,620 acres) to provide more land for hunting (except for waterfowl) and other recreational uses. Closed area boundaries will be posted as closed to waterfowl hunting at all times, and closed to all entry September 1–November 15.
- Maintain the existing 3.5 miles of access roads, 13 parking lots, two viewing sites and four unimproved carry in boat access sites. Conduct the following improvements:
 - Construct a parking lot/carry in canoe/kayak access site north of Mohawk Road access point (2019).
 - Upgrade the existing carry-in canoe/kayak landing site at CTH D to provide trailered small boat access (2020).
- Continue the pheasant stocking program.
- Assess alternatives to current railroad crossing options to improve hunter safety. Prepare a report with recommendations (2018). Take action as needed (property manager lead).
- Develop a Class 2 dog training area on a 30 acre parcel off CTH D by 2016.
- Seek public comment on two alternatives dog training sites (see MAP D-2B). Forward a recommendation on need by December 2017 (Property Manager lead).
- Add a 5-10 car parking lot along the Soo Road rail line at the north end of the property (2017).
- Add a 5-10 car parking lot on CTH D (2017).
- Add a 5-10 car parking lot off STH 28 on old building site (2018).
- Provide watchable wildlife information at parking lot overlooking marsh (2018).

Allenton Wildlife Area

Allenton WA is located about 1.5 miles south of STH 33 and the Village of Allenton. This wildlife area has a project boundary of 1,720 acres, an acquisition goal of 1,591 acres and the department currently owns 1,160 acres. There are an additional 99 acres of Voluntary Public Access leases adjacent to the state lands. Maps for Allenton WA can be found in Map Series E.

This property is nearly 80% wetland habitat with the uplands hosting scattered forests (oak woodlands and aspen) and grasslands (both warm and cool season grasses/forbs). This wildlife area provides stopover habitat for birds during migration periods. The approved management activities will improve the cover for pheasants and habitat for deer, waterfowl and other game species.

This wildlife area is most frequently used for deer, waterfowl, turkey and small game hunting with some opportunities for trapping also present. Allenton Creek, a Class 2 trout stream, flows through the property and is the only designated trout stream in Washington County. Ponds on the property also provide pan fishing opportunities. Limestone Creek also flows through this wildlife area and it is listed as an impaired waterbody due to degraded habitat and sediment loading from non-point sources.

Management challenges include existing and proposed developments on the boundary of this property and US 41 along the eastern boundary. These developments present the potential for conflict with the primary hunting uses of this property.

Property Plan Highlights

- **Create larger blocks of forests.**
- **Adjust project boundaries with a net expansion of 105 acres.**
- **Maintain the Class 2 trout status of Allenton Creek and enhance in-stream habitat and angler access along the stream.**

Habitat and Infrastructure Management

The habitats (Table 2-6) and infrastructure will be managed according to the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Grassland	227	20	194	16
Central Hardwoods	10	1	20	2
Conifer Plantings	2	<1	2	<1
Upland Shrub	30	3	20	2
Shrub Wetland	470	41	492	42
Marsh /Emergent Wetland	80	7	80	7
Swamp Conifer	10	1	30	3
Swamp Hardwood	40	3	20	2
Bottomland Hardwood	270	23	280	24
Water	20	1	20	1
Developed	1	<1	2	<1
Total	1,160	100	1,160	100

Wetlands, Grasslands, Shrub and Forests - Habitat Management Area

(1,124 acres)

Management Objectives:

- Expand Lowland and Upland Deciduous Forests to create larger forest blocks.
- Maintain white cedar/tamarack communities.
- Maintain Shrub and Grassland habitat except as noted below.
- Improve the quality of the Grassland habitat for duck nesting habitat and pheasant hunting.
- Maintain existing emergent wetland communities to provide habitat for resident and migrating waterfowl and shorebirds.

Management Prescriptions:

- Allow natural succession of brush to lowland and upland forest.
- Plant six acre grassland along highway 41 to upland hardwoods with buffer rows of native conifers to provide visual/sound barrier and create a larger forest block (2020).
- Allow natural succession of grasslands south and west of the Wildlife Road "Safari Club" ponds to lowland brush.

Allenton Creek and Riparian Zone - Habitat Management Area (36 acres)

Management Objectives:

- Maintain Class 2 trout stream designation of Allenton Creek.
- Seek an easement to protect the watershed east of US 41.

Management Prescriptions:

- Manage riparian zone (132 feet total width) vegetation to sustain trout and maintain the cold water resource. Fish Management shall consult with WM and Forestry staff on vegetation management within the riparian zone.
- Work with partners and adjacent land owners to acquire a buffer easement along the stream east of US 41.
- Reduce ash as a component of the forest canopy and under plant with desired species.
- Maintain existing in-stream habitat infrastructure and enhance a minimum of 1,000 feet of additional in-stream and riparian zone habitat downstream of Wildlife Road to promote coldwater communities and improve angler access by 2020.

Warmwater Fishery Habitats - Habitat Management Areas

Management Objective:

- Provide a warmwater fishery in the Rock River, its tributaries and ponds as practicable.

Management Prescriptions:

- Follow General Warmwater Fishery habitat and stocking prescriptions.
- Provide carp control when needed to maintain hemi marsh conditions and water quality.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing service roads, gate, dams, dikes and water control structures.
- Maintain the water management regime.

Management Prescriptions:

- Maintain the existing 5,000 feet of primitive to lightly developed service roads and one gate.
- Maintain the four dikes (collectively about 0.73 miles long) and four water control structures.

Public Use Management

The following supplements the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Provide quality opportunities for deer, turkey and pheasant hunting. Also provide opportunities for trapping and small game hunting as a secondary priority.
- Provide quality trout and warmwater fishing opportunities.
- Provide opportunities for nature enjoyment, primarily bird watching and walking.
- Maintain the existing public access infrastructure.

Management Prescriptions:

- Brush a minimum 1,000 feet along Allenton Creek to improve fishing access by 2020.
- Mow dike tops for fishing access to the largest pond west off Wildlife Road.
- Maintain pheasant stocking program.
- Maintain current infrastructure - one mile of service road and four parking lots.
- Maintain existing gate at CTH W unless it is determined the gate is no longer necessary for management purposes.
- Develop a report with recommendations on potential locations and impacts associated with siting a Class 2 dog training area with both water and upland training capacity. Take action as recommended. Property Manager lead. (2017)

Jackson Marsh Wildlife Area

Jackson Marsh Wildlife Area is located in southeastern Washington County, two miles northeast of Jackson and 10 miles northwest of Milwaukee County. Jackson Marsh has a project boundary of 3,340 acres and an acquisition goal of 3,173 acres. The department currently owns 2,518 acres and has 120 acres of Voluntary Public Access leases within the existing project boundary. Maps for Jackson Marsh WA are located in Map Series F.

The Jackson Marsh Wildlife Area was established in 1952. It provides valuable hunting and outdoor recreation opportunities close to the Milwaukee metropolitan area. This wildlife area is the second largest property in this planning group and contains a diverse mix of cover types including large forested wetlands surrounded by grasslands, croplands and small upland forests. Cedar Creek and several small tributaries with riparian zone wetlands and scattered ponds are also found on this property. This property provides excellent hunting opportunities for white-tailed deer, turkey, pheasant and small game. Pheasants are stocked to improve the hunting opportunities.

Jackson Marsh has three forested blocks that are designated state natural areas. These existing natural areas and the larger surrounding Primary Sites contain a mixture of good quality Northern Wet-mesic Forest and good to moderate quality Southern Swamp Hardwood forests. The hardwood canopies contain large silver maple with red maple, green ash, and elms. Other trees typically found further north in Wisconsin, including black ash and yellow birch, are also present.

Cedar Creek flows eastward from Big Cedar Lake to Jackson Marsh. Wetlands are located along several unnamed tributaries and springheads adjoining Cedar Creek. Evergreen Creek, a tributary, is listed as an impaired waterbody due to sediment and total suspended solids that degrade the aquatic habitat.

Cedar Creek is a popular bank fishing destination during the spring, summer and fall months. It has a self-sustaining warmwater sport fishery. Common species include northern pike, white sucker, bullheads, rock bass, and largemouth bass. A few small ponds scattered around the property provide additional fishing opportunities for bass and pan fish.

Canoeists and kayakers also use Cedar Creek.

Portions of the Cedar Creek Streambank Protection Area lie immediately adjacent to this wildlife area. A 66 acre block of state owned wetlands and grassland north of STH 60 and west of CTH G is managed by the Wildlife Management program.

Management of this property is challenged by the amount of surrounding development, in-holdings and the utilities and gas lines that cross the property.

Property Plan Highlights

- **Create larger blocks of hardwood forests.**
- **Improve the quality of the Grasslands for nesting ducks and pheasant cover.**
- **Increase the state natural areas from 212 acres to 578 acres on existing state owned lands.**
- **Reduce the project boundary by a net 10 acres.**
- **Develop a 39 acre Class 2 dog training site off Maple Road.**

Habitat and Infrastructure Management

The habitats (Table 2-7) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Agriculture	45	2	40	2
Grassland	536	21	440	18
Oak and Oak Savanna	30	1	40	1
Central Hardwoods	30	1	51	2
Conifer Plantations	60	2	60	2
Shrub (Upland)	50	2	40	2
Non-forested Wetlands	370	15	360	14
Marsh/Emergent Vegetation	10	<1	10	<1
Swamp Conifer	240	10	240	10
Swamp Hardwoods	55	2	55	2
Bottomland Hardwoods	1,075	42	1,165	46
Water	15	<1	15	<1
Developed	2	<1	2	<1
Total	2,518	100	2,518	100

Wetlands, Shrublands, Grasslands, Forests and Agricultural Lands - Habitat Management (1,197 acres)

Management Objectives:

- Expand the acreage and improve the quality of the woodland habitats.
- Improve grassland quality for migratory and nesting waterfowl and pheasants.
- Improve wetland habitat quality for nesting and migratory waterfowl and shorebirds.

Management Prescriptions:

- Plant 4 acres of fallow crop field to swamp white oak/lowland forest species (west end of Klug Parcel by 2017).
- Plant 31 acres oak/northern hardwood in the grassland bordered by CTH G and Pleasant Valley Road by 2019.
- Restore 4 acres oak savanna off County G by 2015.
- Provide an average of 5-10 acres/year of food plots for doves and other wildlife species.
- Allow natural succession of isolated pockets of lowland grass/brush to lowland forest.
- Follow the Young Forest and Woodcock management prescriptions to create the desired mosaic of shrub, young forests and grasslands to provide nesting habitat for woodcock. This will also provide habitat for deer and other species.
- Enhance the quality of four large upland Grassland blocks to improve waterfowl nesting habitat and pheasant hunting cover.

- Maintain existing wetlands and ponds. Use scrapes, tile breaks and ditch plugs west of CTH G and south of Cedar Creek; along Church Road; and other sites on the property to restore wetlands as practicable over the life of the plan.
- Wildlife Management staff will assess the feasibility of meandering the straightened segment of Cedar Creek. Provide a report with recommended actions by 2020. Take action as recommended. Coordinate with Fishery and consult drainage district before taking action.

White Cedar Swamp Natural Area - Native Community Management

Management Objectives:

- Expand the white cedar/tamarack natural area (west of County G) from 84 acres to 294 acres.
- Manage as an ecological reference area.

Management Prescriptions:

- Allow natural processes to shape forest composition and structure of the white cedar/tamarack forest except for control of ground layer invasives.
- Allow the ash component of the canopy to evolve based on mortality caused by EAB.

Southern Swamp Hardwood (west unit) - Native Community Management

Management Objectives:

- Manage for closed canopy Southern Swamp Hardwood forest. This unit surrounds the White Cedar Swamp Natural Area west of County G (502 acres).

Management Prescriptions:

- Allow passive expansion of native white cedar/tamarack community into the Southern Swamp Hardwoods.
- Actively manage as frozen ground and soil wetness allow. Reduce the ash component of the canopy to minimize the potential adverse effects of catastrophic EAB mortality (e.g., reed canary grass infestation). Harvests should promote a diversity of species and diameter classes with primary emphasis on growing large diameter trees.
- Monitor and control invasive species as practicable.

Southern Swamp Hardwood Natural Area (central unit) - Native Community Management

Management Objectives:

- Expand the existing Southern Swamp Hardwoods unit from 54 acres to 210 acres (Jackson Marsh Primary Site east of County G).
- Manage as an ecological reference area.

Management Prescriptions:

- Manage for closed canopy Southern Swamp Hardwood forest.
- Allow passive expansion of Swamp Hardwoods into isolated openings in the forest.

Southern Swamp Hardwood Natural Area (east unit) - Native Community Management

Management Objectives:

- Maintain the existing Southern Swamp Hardwoods natural area west of County M (74 acres)
- Manage as an ecological reference area.

Management Prescriptions:

- Allow natural processes to direct the character and structure of the native community.
- Monitor and control ground layer invasive species as practicable.

Southern Swamp Hardwood (east unit) - Native Community Management

Management Objective

- Maintain closed canopy Southern Swamp Hardwood forest (226 acres).

Management Prescriptions

- Reduce the ash canopy to minimize the adverse effects of catastrophic mortality caused by EAB as frozen ground and soil wetness allow. Harvests should promote a diversity of species with primary emphasis on growing large diameter (20-24 inch + dbh) trees.
- Monitor and control invasive species as practicable.

Warmwater Fishery Habitat - Habitat Management Area

Management Objective:

- Passively manage the warmwater fishery in Cedar Creek.

Management Prescription:

- Follow the General Warmwater Fishery management techniques.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the majority of the existing service roads, gates, bridge, dikes and water control structures.

Management Prescriptions:

- Maintain the current 2.5 miles of primitive/ lightly developed service roads, six dikes (collectively 2.4 miles long), seven water control structures and one bridge. Maintain the remaining gate unless it is determined it is no longer necessary for management or public safety purposes.

Public Use Management

The following supplements the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Promote quality hunting opportunities for deer, pheasant, turkey, small game and waterfowl.
- Provide opportunities for wildlife viewing and other nature based recreational pursuits.
- Provide warmwater fishing opportunities in Cedar Creek.
- Provide access for canoeing and kayaking along Cedar Creek

Management Prescriptions:

- Maintain the existing ten parking lots and two primitive, carry-in canoe launch sites.
- Install one new 5-10 car parking lot at the approved Maple Road dog training area.
- Continue pheasant stocking as game farm production allows.
- Develop a Class 2 dog training area off Maple Road by 2017. An alternative site on Church Road is shown on MAP F-2.

Mullet Creek Wildlife Area

Mullet Creek Wildlife Area (WA) is located south of State Highway 23 in east central Fond du Lac County between the cities of Fond du Lac and Plymouth. Mullet Creek WA has a project boundary of 2,490 acres, an acquisition goal of 2,744 acres and the department currently owns 2,217 acres. Maps for Mullet Creek WA are found in Map Series G.

Mullet Creek provides excellent hunting opportunities for waterfowl, white-tailed deer, turkey, pheasant and small game. Pheasants are stocked to provide hunting opportunities. This property is heavily used and crowding can be an issue during the opening weekends of the waterfowl, pheasant and the nine day deer gun hunting seasons. This wildlife area provides important habitat for migratory stopover and duck production. This site is popular with birders during the spring migration.

Department staff have had a long collaboration with local conservation groups at this property. The Doty Hunting and Fishing Club has been a partner in stocking pheasant on the wildlife area.

Other uses on the property include trapping of beaver, muskrat and other furbearers. Some fishing for northern pike, perch and various pan fish may occur, but these recreation opportunities are limited due to impediments in fish movement (i.e., the dams), the shallow water depths and winter kill in the flowages (WDNR, 2010d).

Mullet Creek WA has a diverse mix of habitats ranging from open water, marshes, shrub and forested wetlands all surrounded by scattered oak and central hardwood woodlands and grassy fields. Two waterfowl flowages are located along the main stem of Mullet Creek. Water levels in these flowages are controlled by dikes and water control structures and cover about 750 acres. Several smaller dikes were added to the wildlife area creating an additional 36 acres of flowages. These flowages are quite shallow and are often filled with cattails and other emergent vegetation.

The wildlife area contains a good quality white cedar tamarack forest that provides valuable and relatively unique habitat in this region of the state. Efforts to maintain or expand this cover type are anticipated to be challenging due to the high deer population in this area.

The approved 495 acre Mullet Lake State Natural Area project area is located about ½ mile south of the wildlife area. The 200 acre hard-water seepage lake is surrounded by a wetland complex of tamarack, shrub-carr, sedge meadow, and swamp forest. The lake and swamp complex is the headwaters of the Mullet River that flows through the wildlife area.

Property Plan Highlights

- **Establish the Mullet Creek White Cedar Wetland State Natural Area (160 acres).**
- **Expand the extent and improve the quality of the grassland and shrub habitats for dabbling ducks and grassland birds.**
- **Manage a 380 acre unit of moist soils with an emphasis on woodcock.**
- **Expand the Project Boundary by 357 acres to improve public access, management efficiency and increase Grassland habitat.**
- **Assess the feasibility of adding a Class 2 dog training site.**

Habitat and Infrastructure Management

The habitats (Table 2-8) and infrastructure will be managed using the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Agriculture	40	2	15	<1
Grassland	375	17	430	19
Aspen	15	1	10	<1
Oak	45	2	50	2
Northern Hardwoods	75	3	85	4
Conifer Plantation	5	<1	0	0
Upland Shrub	195	9	110	5
Shrub Wetland	180	8	140	6
Marsh/Emergent Wetlands	540	24	540	24
Swamp Conifer	80	4	170	8
Swamp Hardwood	480	22	480	22
Bottomland Hardwood	140	6	140	6
Water	45	2	45	2
Developed	2	<1	2	<1
Total	2,217	100	2,217	100

Wetlands, Grasslands, Forests, Shrub and Agricultural Lands - Habitat Management (1,897 acres)

Management Objectives:

- Manage for larger blocks of native plant communities to enhance habitat value for game and native non-game species.
- Expand the acreage and quality of the Grassland habitat for nesting and migrating waterfowl and cover for pheasants.
- Manage wetlands for nesting waterfowl, and migratory waterfowl and shorebirds.
- Retain Oak and other desired mast species on dry mesic sites.
- Allow the expansion of northern hardwoods on mesic sites through natural succession over the life of this plan.
- Protect the cedar stands and lowland shrub/grass communities except as noted on Map G-4.
- Manage for and favor Bottomland Hardwoods over Swamp Hardwoods (see MAP G-4).
- Provide resting and feeding habitat for woodcock in moist soil areas of marsh, shrub and aspen (see MAP G-5).

Management Prescriptions:

- Follow an all-aged forest management strategy on mesic sites. Retain the Oak as practicable allowing for a conversion to more shade tolerant Northern Hardwoods over time.
- Maintain planted Oak stands on dry mesic sites. Retain other desired mast species.
- Manage Bottomland Hardwoods on an all-aged basis. The stands will be managed to favor red and silver maple due to the threat of EAB.
- Maintain existing water management regime to provide nesting, brooding and feeding habitat for waterfowl.
- Maintain the health of the white cedar through thinning as practicable.
- Manage for hemi-marsh conditions on 50-100 acres of the eastern flowage between Hillview Road and County Highway G.
- Provide 15 acres of food plots for doves and game birds.
- Follow the Young Forest and Woodcock management prescriptions to create the desired mosaic of shrub, young forests (focus on aspen stands) and grasslands on 380 acres to provide singing and nesting habitat and migratory stopover habitat for woodcock.
- Monitor and control invasive species as practicable.

White Cedar Swamp Natural Area - Native Community Management (160 acres)**Management Objective:**

- Designate the white cedar/tamarack forest portion of the Primary Site a state natural area.
- Manage as an ecological reference area.

Management Prescriptions:

- The white cedar and tamarack stand will be passively managed allowing natural succession to shape the forest structure and composition.
- Control ground layer invasives.
- Allow ash canopy to evolve based on natural ecological processes and EAB mortality.

Southern Swamp Hardwood – Native Community Management (160 acres)**Management Objective:**

- Manage the Southern Swamp Hardwoods portion of the Primary Site to maintain a closed forest canopy.

Management Prescriptions:

- Actively manage the Southern Swamp Hardwoods as frozen ground and soil wetness allow. Reduce the ash component to minimize the potential adverse effects of catastrophic EAB mortality. If EAB infestation is imminent stands may be harvested to salvage merchantable timber.
- Allow passive expansion of native white cedar/tamarack community into the Southern Swamp Hardwoods.

Warmwater Fishery Habitat - Habitat Management Area**Management Objective:**

- Passively manage the warmwater fishery in the flowages and Mullet Creek.

Management Prescription:

- Follow the General Warmwater Fishery management techniques as resources allow.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing service roads, gates, dams, dikes and water control structures.

Management Prescription:

- Maintain the current 3.5 miles of primitive and lightly developed service roads, three gates, six dikes (collectively about 0.78 miles long) and four water control structures.

Public Use Management

The following supplements the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Provide hunting opportunities for waterfowl, deer, turkey, pheasant, woodcock and small game.
- Assess the feasibility and desirability of adding a Class 2 dog training area.
- Provide opportunities for nature enjoyment/bird watching and canoeing/kayaking.
- Retain the current complement of public access roads, parking lots and boat launches.
- Improve management and public access to wildlife parcels off Banner Road.
- Improve recreational opportunities for mobility impaired individuals.

Management Prescriptions:

- Maintain a navigable channel along Mullet Creek between Hillview Road and CTH G.
- Maintain existing 400 feet of access roads, 10 parking lots, and 2 carry in (non-motorized) canoe/kayak launches.
- Enhance the wildlife viewing and access at the north County G entry site.
 - Enlarge parking lot to 8 cars.
 - Provide a lightly developed viewing area.
 - Maintain the existing primitive path to the carry in launch site.
- Evaluate the feasibility of adding an accessible hunting/observation infrastructure. Report on the feasibility of an accessible site by December, 2017. Take action as appropriate.
- Provide a Class 2 dog training area at the small runoff pond in the southeast part of the property.
- Prepare a short report with recommendations on whether to provide an additional Class 2 dog training area. Wildlife Management is the lead on this report due December 2017.

Nichols Creek Wildlife Area

Nichols Creek Wildlife Area is located in the southwest portion of Sheboygan County about 4-miles southwest of Plymouth and just northwest of the Village of Cascade. This wildlife area has a project boundary of 1,050 acres, an acquisition goal of 1,012 acres and the department currently owns 651 acres. Maps for Nichols Creek Wildlife Area are located in Map Series H.

The Sheboygan County Conservation Association acquired the first parcels of this property to ensure public access to Nichols Creek. This land was then purchased by the Wisconsin Conservation Commission after the project was approved as a State Wildlife Area in 1946. Department staff will continue this collaboration with local conservation groups to protect and manage this property.

The property is used extensively for deer, turkey and small game hunting with the heaviest use during the nine day deer gun season. This property is stocked with game farm raised pheasants to improve hunting opportunities. Mourning dove hunting is becoming popular and food plots are planted to increase dove population and hunting success. Other popular activities include hiking and nature observation, small game hunting, trout fishing and bird watching.

Coldwater springs and seeps on this property form the headwaters of Nichols Creek and the North Branch of the Milwaukee River. Nichols Creek is a Class 1 trout stream that supports self-sustaining populations of brook and brown trout.

The Wisconsin Wetlands Association has designated the complex of coniferous swamps, sedge meadows, seeps, spring runs and the waters of Nichols Creek and the North Branch of the Milwaukee River as a "Wetland Gem". Nichols Creek is also recognized as an "Outstanding Resource Water". Surface waters designated as such provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities.

This property contains several high quality white cedar and southern mesic hardwood forests worthy of state natural area consideration.

Property Plan Highlights

- **Create larger blocks of oak forest and shrub habitat.**
- **Expand the project boundary by 205 acre and the acquisition goal by 160 acres to provide additional upland habitat and recreational lands. It would also protect woodlands, springs and high quality wetlands feeding Nichols Creek, a Class 1 trout stream.**
- **Create two state natural areas – one for a white cedar swamp forest and the other for a mixed white cedar and southern hardwood forests. Both have spring seeps and runs valuable to Nichols Creek.**

Habitat and Infrastructure Management

The habitats (Table 2-9) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Agriculture	30	5	15	2
Grassland	125	19	125	19
Oak	30	5	50	8
Central Hardwoods	180	28	180	28
Conifer Plantation	10	2	0	0
Upland Shrub	60	9	65	10
Shrub Wetland	20	3	20	3
Marsh/Emergent Wetland	21	3	21	3
Swamp Conifer	30	5	30	5
Swamp Hardwoods	140	22	140	22
Water	4	<1	4	<1
Developed	1	<1	1	<1
Total	651	100	651	100

White Cedar Swamp Natural Area - Native Community Management (73 acres)

Management Objectives:

- Recommend the portion of the Nichols Creek Primary Site (primarily north of County N) be recognized as a state natural area.
- Manage this unit as an ecological reference area.

Management Prescriptions:

- Allow natural processes to determine the species composition of the springs, forests and wet mesic White Cedar communities.
- Passively manage except for control of ground layer invasives.
- Allow ash canopy to evolve based on natural ecological processes and EAB mortality.

Southern dry Mesic Forest and wet Mesic White Cedar Forest Natural Area - Native Community Management (137 acres)

Management Objectives:

- Recommend a portion of the Nichols Creek Primary Site (south of County N) be recognized as a state natural area.
- Manage this unit as an ecological reference area.

Management Prescriptions:

- Actively manage to protect and promote the springs, Southern dry Mesic Forests and wet mesic White Cedar communities.
- Monitor and control ground layer invasives as practicable.

Nichols Creek and Riparian Zone - Habitat Management Area (50 acres)

Management Objective:

- Maintain Class 1 trout stream designation for Nichols Creek.

Management Prescriptions:

- Maintain the existing in-stream trout habitat.
- Manage riparian zone (132 feet total width) vegetation to maintain this cold water resource. Reduce ash as a component of the forest canopy.
- Consult with Wildlife, Forestry and Natural Heritage staff on vegetation management prescriptions.

Wetlands, Grasslands and Forests - Habitat Management Area (375 acres)

Management Objectives:

- Create larger blocks of grassland, shrub and forest cover types and improve habitat quality by promoting native plant communities.
- Enhance habitat for woodcock.
- Retain management infrastructure as described below.
- Provide food plots for doves and bird species.

Management Prescriptions:

- Convert cropland to grassland along Glacier Road for pheasants and grassland nesting waterfowl by 2018.
- Convert conifer plantations and isolated shrub/grasslands south of County N into hardwoods/shrub by 2017.
- Convert low quality grassland (~20 acres) south of Kettleview Road by planting northern half to oak and southern half to aspen by 2017.
- Provide resting and feeding habitat for migrating woodcock. General management activities for shrub/young forest/grassland mosaic will provide incidental habitat for nesting woodcock.
- Maintain existing three gates and 4,500 feet of native surface service road. Remove barn on County N by 2017.

Northern Hardwoods – Native Community Management (16 acres)

Management Objective:

- Enhance the quality and character of the northern hardwoods on this unit similar to the northern hardwoods in the approved natural area north of County N.

Management Prescriptions:

- Promote northern hardwood forest species.
- Monitor and control ground layer invasives as practicable.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objectives:

- Retain the existing service roads, culvert and gates.
- Remove the barn.

Management Prescriptions:

- Maintain the existing 4,500 feet of service roads and three gates.
- Remove the barn when practicable or as safety assessment requires.

Public Use Management

The following supplements the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Provide trout fishing and hunting opportunities for deer, turkey, waterfowl, pheasant, dove and other small game.
- Provide opportunities for bird watching and other non-consumptive recreational uses.
- Retain existing parking lots, foot bridge, and add one lot to improve public access.

Management Prescriptions:

- Maintain the existing four (4) gravel surfaced parking lots and the walking bridge over Nichols Creek south of CTH N.
- Add the following infrastructure to improve public access:
 - Add a two car parking lot off Cedar Lane for trout stream access (FM lead) (2017).
 - Add a 3-4 car parking lot (west end of property (WM lead) (2018).
- Brush at least 1,000 feet of stream upstream of Cedar Lane every five (5) years to provide trout angling access.

Kiel Marsh Wildlife Area

The Kiel Marsh WA is one of the smallest NKMR properties and is located due south of the City of Kiel. Portions of this wildlife area lie within the city limits. The property primarily lies within Sheboygan County, but portions straddle the border of Calumet and Manitowoc counties. This property has a project boundary of 1,180 acres, an acquisition goal of 1,072 acres and the department currently owns 843 acres. Maps for the Kiel Marsh WA are located in Map Series I.

Due to the extensive wetland holdings the recreational activities are almost exclusively connected with water based activities. Kiel Marsh is popular with trappers, water-fowl hunters, anglers, canoeists, kayakers and birders. The heavy use creates occasional crowding during trapping and waterfowl hunting seasons.

This wildlife area is almost entirely composed of wetlands and is an important shorebird stopover site during migration periods. This property is recognized for its marsh habitat along the Sheboygan River and adjacent forested wetlands. This property is located within the “Mid to North Kettle Moraine” Conservation Opportunity Area (COA) of the Wisconsin’s Wildlife Action Plan. This site offers conservation opportunities of both statewide and Upper Midwest significance.

This site has abundant furbearers, waterfowl (e.g., dabbling ducks) and migratory shorebirds. Protecting the quality of the diverse wetland communities including Southern Sedge Meadow, Fen, Southern Tamarack Swamp (rich), Shrub-carr, Emergent Marsh and springs is an important objective of the plan.

Property Plan Highlights

- **Protect the high quality marsh and riparian zone habitats.**
- **Increase public access to upland habitat and improve habitat management efficiency by expanding the project boundary by 776 acres and the acquisition goal by 500 acres.**
- **Transfer three (3) acres of department land along 8th Street to the Village of Kiel.**

Habitat and Infrastructure Management

The habitats (Table 2-10) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Shrub Wetland	417	49	417	49
Marsh/Emergent Wetlands	235	27	235	27
Swamp Conifer	75	9	75	9
Swamp Hardwoods	10	1	10	1
Bottomland Hardwoods	15	2	15	2
Water	90	11	90	11
Developed	1	<1	1	<1
Total	843	100	843	100

Wetlands and Uplands - Habitat Management (708 acres)

Management Objectives:

- Maintain large blocks of wetland, forest and shrub habitats for migratory and resident waterfowl, shorebirds and furbearers.
- Maintain white cedar/tamarack cover type.
- Coordinate water level management activities with the City of Kiel to protect marsh habitat.
- Resolve ownership and maintenance of 8th Street with the City of Kiel.

Management Prescriptions:

- Control invasive species (e.g., cattails and phragmites) to promote hemi-marsh conditions.
- Reduce the ash canopy to minimize adverse effects of catastrophic EAB mortality.
- Develop a water level management regime for the Sheboygan River to coordinate dam releases with the City of Kiel and Sheboygan County at Sheboygan Marsh.
- Develop a report with recommendations regarding ownership and maintenance of 8th Street by 2018. Take action as appropriate. Property Manager lead.

Sheboygan River and Sloughs - Habitat Management (135 acres)

Management Objectives:

- Maintain a warmwater fishery.
- Coordinate water level management activities with the City of Kiel.

Management Prescriptions:

- Conduct general warmwater fishery management activities as opportunities arise.
- Collaborate with City of Kiel on water level management at the Kiel Dam.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing two culverts.

Management Prescription:

- Maintain the existing culverts.

Public Use Management

The following supplement the general public use objectives and prescriptions described in Chapter Two, Section One - General Recreation Management and Use.

Management Objectives:

- Provide opportunities for high quality waterfowl hunting and trapping.
- Provide high quality experiences for non-consumptive users with an emphasis on bird observations and non-motorized boating.
- Assess the feasibility of adding an accessible wildlife/fishing and boat access infrastructure.
- Collaborate on recreational reuse of the rail ROW passing through this property.

Management Prescriptions:

- Maintain the public access provided by two (2) parking lots, one improved and one unimproved boat landings and one pier. Retain the existing 2,100 feet of moderately developed road along 8th Street and 750 feet of native surface road off Highview Road.
- The department Parks and Recreation program will have the lead in coordinating with the National Park Service Ice Age Trail program, Ice Age Trail Alliance and local governments on assessing trail route options on the rail ROW south of the City of Kiel.
- Assess the feasibility of developing an accessible boat launch and wildlife observation/fishing pier at the parking lot on 8th Street. Develop a report with recommendations on potential collaboration with City of Kiel by 2018. Take action as appropriate.
- Improve the parking lot and carry in boat access at Highview Road.
- Collaborate with local jurisdictions to improve awareness of this property as a bird watching and canoeing/kayaking opportunity.

Fishery Areas

Onion River Stream Bank Protection Area

The Onion River Stream Bank Protection (SBP) Area is the premier trout fishing property in this region. This property is located about 3 miles west and south of the City of Plymouth. The department currently holds 1,071 acres in fee title and 50 acres in easements within the 2,390 acre project boundary. Maps for the Onion River SBP are found in Map Series J.

The Wisconsin Land Legacy Report (*WDNR 2006*) indicated the upper Onion River, Ben Nutt Creek and Mill Creek were important to protect to meet the state's conservation and recreation needs for the next 50 years. The goals of the streambank protection program are consistent with meeting this need. This program acquires land in fee title or through easements on exceptional waterways, especially in focus areas, to protect water quality, improve fish habitat and provide public access.

The restoration of the Onion River to Class 1 trout stream status dates to the early 1990's and was a successful collaboration that involved the Lakeshore Chapter of Trout Unlimited, Windway Corporation, the River Alliance of Wisconsin, the Sheboygan County Conservation Association, the Sheboygan River Basin Partnerships, Michels Corporation, private citizens and the department. Habitat restoration included thousands of feet of bank protection, bank covers, brush removal and other activities to improve habitat quality and protect water quality. This effort highlights what can be accomplished with thoughtful and motivated partnerships.

The Onion River is formed by the confluence of two spring-fed, headwater streams (Ben Nutt Creek and Mill Creek). Ben Nutt Creek, Mill Creek and a 5.2 mile segment of the upper Onion River from the confluence to County Highway N are classified as Class 1 trout streams (i.e., trout populations are sustained by natural reproduction). Public access is provided on about 9.5 miles of the 13.6 miles of stream frontage within the project boundary.

Other recreational uses enjoyed on this property include deer, turkey and small game hunting as well as birding, hiking, winter sports and snowmobiling.

The Kamrath Creek Forest and Fen State Natural Area (60 acre) was given approved by the Natural Resources Board in May, 2016. This natural area features high-quality natural communities of regional importance including a red oak and shagbark hickory forest (Southern Dry-mesic forest), a small Calcareous Fen dominated by sedges and calciphile plant species, and a rich Southern Mesic Forest and Forested Seeps at the base of the slope.

Property Plan Highlights

- **Maintain the Class 1 trout classification of these streams.**
- **Protect springs and feeder streams in this system.**
- **Improve public and management access.**
- **Improve wildlife habitat value with an emphasis on woodcock.**
- **Expand the project boundary with a net project boundary adjustment of 306 acres, including a 39 acre contraction and the inclusion of 61 acres of DNR land currently outside the boundary.**
- **Establish the Kamrath Creek State Natural Area.**

Habitat and Infrastructure Management

The habitats (Table 2-11) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Agriculture	140	13	20	2
Grassland	195	18	195	18
Aspen	10	1	55	5
Oak/Hickory	10	1	65	6
Upland Hardwood	42	4	67	6
Conifer Plantation	30	3	0	0
Upland Shrub	20	2	45	4
Shrub Wetlands	60	6	60	6
Marsh/Emergent Wetlands	15	2	15	2
Non-Forested Wetlands	65	6	65	6
Swamp Hardwood	398	36	398	37
Bottomland Hardwood	79	7	79	7
Water	5	<1	5	<1
Developed	2	<1	2	<1
Total	1,071	100	1,071	100

Onion River and Riparian Zones - Habitat Management Area (190 acres)

Management Objective:

- Maintain the Class 1 trout stream status on the Onion River, Ben Nutt Creek and Mill Creek.

Management Prescriptions:

- Manage vegetation in the riparian zone (132 feet total width) to sustain the coldwater fishery.
- Maintain existing in-stream habitat infrastructure upstream of County U.
- Improve in-stream habitat and remove brush along at least 1,000 feet of streambank downstream of County U. Fishery Manager will consult with Wildlife, Forestry and Natural Heritage when developing trout stream habitat improvements.

Wetland, Grassland, Shrub and Forests - Habitat Management (821 acres)

Management Objectives:

- Promote native plant communities and expand permanent cover to improve wildlife habitat.
- Provide nesting, cover and feeding habitat for both resident and migrating woodcock.
- Address encroachment of private landowners on state land.

Management Prescriptions:

- Use prescribed burning and other approved techniques to limit brush encroachment and improve habitat quality.
- Manage the oak to regenerate oak, hickory and desired woody and understory species.
- Harvest red pine and Norway spruce plantations and convert to surrogate grasslands, shrub or hardwood forest types. Retain some residual white pine and allow for natural regeneration to provide forest diversity, cover and mast for wildlife, and aesthetic purposes.
- Convert croplands (especially those within 150 feet of streams) into cool season grasses, aspen and scattered oak through 2020 (as farming agreements expire). Follow BMP guidelines for woodcock management, including providing up to 20% grass cover for roosting and singing ground habitat.
- Convert grasslands east of Silver Spring Lane to oak by 2025 (18 acres).
- Convert lowland shrub areas east of County Highway S to aspen/hardwood. Utilize supplemental planting of existing stand as needed (41 acres).
- Convert fallow lands south of CTH U to oak by 2025 (7 acres).
- No or limited harvesting or disturbance to the Bottomland Hardwoods south of CTH U. Harvesting plan will consult FM, NHC and Forestry.
- Convert cropland west of County E to aspen by 2025 (7 acres).
- Reduce ash component of forest canopy, especially within the riparian zone, to minimize potential adverse effects of catastrophic EAB mortality.
- Monitor and inform landowners north of CTH U about encroachment. Provide report (Wildlife lead) on progress by December 2017. Continue to take action until issue is resolved.

Kamrath Creek Forest and Fen Natural Area – Native Community**Management (60 acres)****Management Objectives:**

- Manage as an ecological reference area.
- Provide habitat for Swamp Metalmark.

Management Prescriptions:

- Allow natural ecological processes, including EAB related ash mortality, to shape the Fen, Forest Seeps and Southern Wet and Dry Mesic forests.
- Actively manage the open shrub and grassland communities near Kamrath Creek to enhance habitat for Swamp Metalmark to provide nectar plants.

Habitat Management Infrastructure

The following supplement the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing service roads, gates, culverts and bridges except as noted below.

Management Prescription:

- Maintain the existing four gates, culvert crossing of Mill Creek and 230 feet of primitive service roads.

Public Use Management

The following Objectives and Prescriptions supplement the General Recreation and Infrastructure objectives and prescriptions described in Chapter Two, Section One.

Management Objectives:

- Promote quality trout fishing, hunting, hiking and nature based recreational experiences.
- Maintain existing public use infrastructure except as noted below.

Management Prescriptions:

- Maintain the existing eight (8) gravel and native surface parking lots.
- Collaborate with volunteers to maintain the one (1) mile of lightly developed to primitive hiking trail, bridges and interpretive signs at Silver Springs.
- Develop an agreement with neighbors and trail users on the location, scale and maintenance of the non-designated trails in the Silver Springs unit by 2017. This volunteer trail system complements the designated trail discussed in the previous bullet.
- Brush a minimum of 1,000 feet of stream edge every five years to provide angler access.
- Add a five (5) car parking lot off of County E Road if the land acquisition occurs.
- Allow continued use of the existing regional snowmobile trail segments on the property. Four bridges (two over Kamrath Creek and two over Ben Nutt Creek) are used and maintained by snowmobile clubs. Bridges will be maintained to state standards. If any of the bridges are abandoned Wildlife Management will determine if there are sufficient property or recreation management reasons to assume management responsibilities. If not the bridges will be removed.
- Retain the old field access bridge over Ben Nutt Creek (south of Sumac Road) until maintenance and/or safety inspections warrant removal.
- Remove two dilapidated bridges (Kamrath Creek unit) as resources allow.
- Assess the feasibility of providing one or two accessible hunting blinds for deer and turkey hunting (Wildlife Management lead) and an accessible trout fishing site (Fishery Management lead). Kamrath Creek and the Silver Spring areas are included as potential sites because the former roads could provide accessible paths to the blinds. Provide recommendations in a joint report by December 2018. Take action to implement the preferred alternative by 2020.

LaBudde Creek Fishery Area

LaBudde Creek Fishery Area (FA) lies about one mile east/southeast of the Village of Elkhart Lake. This cool water stream supports both brook and brown trout. This property has a project boundary of 490 acres and an acquisition goal of 504 acres. To date, 401 acres are currently held in fee title by the department. Maps for the LaBudde Creek Fishery Area are located in Map Series K.

LaBudde Creek is about 7 miles in length and flows into the Mullet River, another Class 2 trout stream. About 3 miles of LaBudde Creek lie within the project boundary of which about 2.8 miles are on state lands. The stream currently is classified as having 3.9 miles of Class 1 trout waters (from the headwaters to Badger Road) and 3 miles of Class 2 trout (Badger Road to its confluence with the Mullet River). LaBudde Creek serves a cool water refuge for trout and some natural brown and brook trout reproduction is still occurring in the stream.

LaBudde Creek has been adversely affected by residential developments in the watershed and an estimated 33% of the headwaters are not buffered (*WDNR, 2010d*) to protect the stream. Fish communities in the stream are rated as fair to poor.

The stream provides a challenging fishing experience due to the thick vegetation and wet soils along many portions of this narrow, shallow stream. This property provides deer, turkey and small game hunting opportunities, but only limited trapping potential. This fishery area hosts a popular segment of the Ice Age Trail and provides opportunities for four season nature enjoyment including cross country skiing, berry picking and wildlife viewing.

A 20 acre Class 2 dog training area is located in the southwest corner of the property. Permits for this training area have been declining over the last three years. This decrease may be due in part to the route of the Ice Age Trail through the training area about five years ago. Other NKMR wildlife properties have been identified as better sites for hosting a dog training area with both upland and water training opportunities.

Property Plan Highlights

- **Classify the entire LaBudde Creek as Class 2 trout waters.**
- **Reduce the acreage of Grassland and conifer plantations and expand the acreage of Oak, Aspen and Shrub land.**
- **Promote habitat suitable for woodcock.**
- **Expand the Project Boundary by 60 acres to include a tributary stream and springs feeding LaBudde Creek and create a corridor to permanently locate the Ice Age Trail on the property.**

Habitat and Infrastructure Management

These habitats (Table 2-12) and infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current		Planned 50 year Objective	
	Acres	% Cover	Acres	% Cover
Grassland	60	15	20	5
Aspen	5	1	30	7
Oak/Hickory	25	6	60	15
Upland Hardwood	30	7	30	8
Conifer Plantation	50	12	0	0
Upland Shrub	43	11	73	18
Shrub Wetlands	10	2	10	2
Non-forested Wetland	4	1	4	1
Swamp Conifer	1	<1	1	<1
Bottomland Hardwood	171	43	171	43
Water	1	<1	1	<1
Developed	1	<1	1	<1
Total	401	100	401	100

LaBudde Creek and Riparian Zone - Habitat Management Area (45 acres)

Management Objectives:

- Recommend a Class 2 trout stream designation for entire length of LaBudde Creek.
- Protect this stream as a coldwater resource for the Mullet River and as a brook trout refuge.

Management Prescriptions:

- Passively manage the existing in-stream trout habitat.
- Manage riparian zone vegetation (132 feet wide total width) to maintain this coldwater resource. Remove brush along at least 1000 feet of stream corridor downstream of CTH A and upstream of STH 67 to improve angler access improve woodcock habitat.
- Reduce ash as a component of the forest canopy.

Wetlands, Grasslands, Shrub lands and Forests - Habitat Management (356 acres)

Management Objectives:

- Create larger blocks of upland hardwood forests.
- Provide resting and feeding habitat for migrating woodcock.

Management Prescriptions:

- Convert isolated grasslands, cropland and conifer plantations to oak and central hardwoods, aspen and upland shrub by 2025.
- Reduce ash and favor other native canopy species to provide mast, cover and denning sites.
- Follow woodcock management guidelines to provide shrub/young forest/grassland mosaic to provide habitat for migrating woodcock and incidental habitat for nesting woodcock.
- Conduct thinning or improvement cuts to enhance the wildlife and aesthetic value of Swamp and Bottomland Hardwoods.

Habitat Management Infrastructure

The following supplements the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing gate.

Management Prescription:

- Maintain the existing gate.

Public Use and Infrastructure Management

The following supplements the General Recreation and Infrastructure objectives and prescriptions described in Chapter Two, Section One.

Management Objectives:

- Maintain current public access infrastructure.
- Provide deer, turkey, small game and woodcock hunting opportunities.
- Provide trout fishing opportunities.
- Provide opportunities for hiking on the Ice Age Trail and nature enjoyment.

Management Prescriptions:

- Maintain the existing three gravel surface parking lots.
- Riparian zone fishing access will be challenging except in areas where woodcock habitat management is occurring.
- Collaborate with Ice Age Trail Alliance (IAT) to maintain the trail segment on this property and permanently locate the connector route of the IAT to a more desirable woodland habitat setting.
- Assess the viability of the Class 2 dog training area. Prepare a short report indicating trend in usage at this site, availability of other sites and other with recommendations by December 2017 (Property Manager lead). Take action as appropriate.

Natural Area

Cedarburg Bog State Natural Area

Cedarburg Bog State Natural Area (SNA) is located in west central Ozaukee County about 2.5 miles west of the Village of Saukville. This natural area has a project boundary of 2,600 acres, an acquisition goal of 2,250 acres and the department currently owns 1,733 acres. The maps for this property are located in Map Series L.

Cedarburg Bog State Natural Area was dedicated in 1953 and was the second natural area to be established in the state. The primary reason for the purchase of Cedarburg Bog was to preserve the unique biological resources and promote scientific research and appreciation of the unique natural communities at the site. Hunting, fishing and trapping are compatible uses on this property.

This property contains a unique and diverse array of wetlands including the southernmost patterned string bog in North America. This property has been designated a National Natural Landmark by the US Department of Interior. It also has been designated a *Wetland Gem* by the Wisconsin Wetlands Association and an *Important Bird Area* by the Wisconsin Bird Conservation Initiative.

Cedarburg Bog State Natural Area lies within a relatively small watershed that contains six lakes, including Mud Lake the largest inland lake in Ozaukee County. This watershed also contains the Sapa Spruce Bog and the Cedarburg Beech Woods state natural areas.

Ozaukee County and the Southeast Wisconsin Regional Planning Commission have identified a number of high quality and interconnected wetland and upland habitats worthy of state protection in the watershed. The UW-Milwaukee Field Station (230 acres) and other local public and Ozaukee-Washington Land Trust properties offer opportunities for collaborative efforts to protect and manage valuable conservation lands while also providing educational and recreational opportunities. These natural areas and adjacent parcels present a unique opportunity for landscape scale conservation less than 25 miles from downtown Milwaukee.

Many unique bird and plant species are found at Cedarburg Bog. Over 300 species of birds have been documented in and around the bog, including 19 species near the southern extent of their range in Wisconsin. The bog provides excellent habitat for a wide variety of breeding and migrating birds. More than 35 plant species found in the bog are at or near the southern extent of their range in Wisconsin, including orchids and insectivorous plants like round-leaved sundew and purple pitcher plant.

Bottomland forests found on the periphery of the bog primarily consist of silver maple, cottonwood and green ash. The small islands in the bog have a predominantly maple-basswood overstory that also includes black cherry, oak, paper birch, trembling aspen, Canada yew, ironwood and dogwood.

The department is actively working with the UW-Milwaukee Field Station and the Friends of the Cedarburg Bog to manage invasive species, especially glossy buckthorn. Emerald Ash Borer has significant potential to cause rapid die off of the ash canopy and is a major management concern. Department staff have collaborated with the Wisconsin Geological and Natural History Survey to define the surface water and groundwater sheds contributing to this wetland complex (*Hart and Kline, 2013 and Hart and Kline in process*).

This property is notable for the significant research and education programs conducted by the UW-Milwaukee and the Friends of the Cedarburg Bog at the Field Station and in the bog. About 11,000 hours of environmental study occur on these properties each year.

The primary uses of the property are research, environmental education and nature enjoyment. Other uses include waterfowl and deer hunting, hiking, cross country skiing and berry picking.

Property Plan Highlights

- **Preserve the native plant communities with an emphasis on the core wetlands. Actively manage invasive species and seek to minimize impacts of Emerald Ash Borer mortality on the native plant communities.**
- **Collaborate with the UW-Milwaukee Field Station, the Friends of the Cedarburg Bog, Ozaukee County Parks and Planning Department, the Ozaukee Washington Land Trust and other partners to protect the unique habitats in and around the Cedarburg Bog, Sapa Spruce Bog and Cedarburg Beech Woods state natural areas.**
- **Construct a primitive outrigger style boardwalk to provide access to Mud Lake. Establish a designated boat storage area near the terminus of the boardwalk consistent with NR 45.11 (2) to protect the wetlands and regulate the storage of small hunting and water craft.**
- **Protect the ground and surface watersheds for the three natural areas and adjacent high quality wetlands and upland communities by expanding the project boundary by 699 acres and the acquisition goal by 250 acres.**

Habitat and Infrastructure Management

These habitats and related infrastructure will be managed in accordance with the General Management Objectives and Prescriptions described in Section One of this Chapter or as supplemented below.

Cover Type	Current			Desired 50 year	
	Acres	% Cover		Acres	% Cover
Grassland	55	3		40	2
Hardwood (Islands)	25	1		25	1
Upland Shrub	60	3		60	3
Shrub Wetland	145	8		145	8
Sedge Meadow	20	1		20	1
Marsh/Emergent Vegetation	80	5		80	5
Non-Forested Wetlands	7	<1		7	<1
String Bog	210	12		210	12
Swamp Conifer	722	42		722	42
Bottomland Hardwood	233	14		248	15
Water	175	10		175	10
Developed	1	<1		1	<1
Total	1,733	100		1,733	100

Wetland Communities - Native Community Management Areas (1,612 acres)

Management Objectives:

- Protect the core wetlands and native communities within the existing State Natural Area.
- Manage as an ecological reference area.

Management Prescriptions:

- Allow natural processes to shape the structure and composition of the wetlands, especially the string bog, hardwood islands and white cedar communities.
- Manage as an ecological reference area except to control invasive plant species.
- Develop a report to assess strategies for maintaining/regenerating tamarack/white cedar (December 2017).

Forests, Shrubs and Grasslands - Habitat Management Areas (121 acres)

Management Objectives:

- Create larger blocks of native forest and shrub communities.
- Develop ash canopy management recommendations to address the EAB threat to forest health and the buffering capacity of the peripheral upland/lowland forest habitats. Develop a draft report by December, 2017. Implement approved actions.
- Continue collaboration with UW-M and Friends of Cedarburg Bog on ecosystem research and management.

Management Prescriptions:

- Plant Bottomland Hardwood species in 14 acres of former cropland by 2018. (71 acre parcel east of CTH Y and north Cedar Sauk Road).
- Allow natural processes to shape the structure and composition of the grassland and shrub communities (50 acre isolated parcel north of Cedar Sauk Road).
- Develop a report with recommendations regarding desired forest and pest management prescriptions to minimize the potential for catastrophic ash mortality from EAB infestation.
- Discuss canopy management options including pre-emptive reduction of the ash component, sanitation cuts and efficacy of bio-control options. NHC is lead program with input from Forestry, Wildlife, property manager and others as appropriate.
- Develop an updated MOU with the UW-Milwaukee Field Station on cover type management and research in the bog by December 2017 (NHC lead).
- Develop an updated management MOU with the Friends of the Cedarburg Bog by December 2017 (Property Manager lead).
- Collaborate on invasive species monitoring and control efforts as practicable. Update invasives species control plan every 5 years (NHC lead).

Warmwater Fisheries - Habitat Management Areas

Management Objective:

- Passively manage the warmwater fishery in all lakes and streams.

Management Prescription:

- Collaborate with UW-M Field Station staff and NHC property manager on fish surveys in Mud and Watts Lakes to assess fish populations.

Habitat Management Infrastructure

The following supplement the general habitat infrastructure objectives and prescriptions described in Chapter Two, Section One and the General Property Administration and Policies.

Management Objective:

- Retain the existing access points.

Management Prescriptions:

- Maintain the existing access points at Watts Lake off STH 33, Mud Lake off Cedar Sauk Road and Knollwood Road.

Public Use and Recreation/Research/Education

Follow the General Recreation Management prescriptions and program guidance for these activities and infrastructure over the life of the master plan except as supplemented below.

Management Objectives:

- Promote opportunities for research of the natural communities and ecosystem processes.
- Provide opportunities for nature enjoyment, education and hiking in a non-motorized setting.
- Provide opportunities for waterfowl, deer, turkey and small game hunting.

Management Prescriptions:

- Develop an updated MOU with UW-Milwaukee and Friends of Cedarburg Bog to promote research and public education programs.
- The Meadow Trail (at the north end of the property) will remain a primitive volunteer trail.
- Maintain current public access infrastructure:
 - Watts Lake – a parking lot, accessible trail and observation pier and primitive canoe/kayak carry-in access at the lake.
- Evaluate the management and public access options for the Hillcrest Road access point. Develop recommendations by December 2017 (NHC lead).
- Evaluate the need for improved public access off Knollwood Road. Develop recommendations by December, 2017 (NHC lead).

Mud Lake Boardwalk and Boat Storage

Management Objectives:

- Provide a boardwalk to improve and direct user access to Mud Lake.
- Designate a boat storage area near Mud Lake to meet seasonal storage needs.

Management Prescriptions:

- Location and design of the boardwalk: Construct a wooden, two plank “outrigger” style boardwalk (Figure 2-1) along the route mapped with the red line (Figure 2-2). The walking surface of the boardwalk would be 8-12 inches above the vegetative mat and about 22 inches wide. The boardwalk will have six step outs placed at 100 foot intervals to allow users moving in opposite directions to pass one another along the boardwalk. A portion of the boardwalk will be re-routed to the east approximately 50 feet and will allow the boardwalk to reside on more stable bog mat. Where the vegetative mat changes from one that is firm to where the vegetative mat is no longer grounded, the boardwalk design would transition to a 4-ft wide walk supported on floats to keep the boardwalk above water. There will be a “T” section of boardwalk at its terminus near the edge of Mud Lake (see Figure 2-3).

- Location and size of the boat storage area: Install a “T”, about 70 feet in total length, near the end of the boardwalk (see Figure 2-3). The “T” will extend about 30-40 feet on either side of the main boardwalk. The “T” will have the same outrigger design and width as the main boardwalk. Boats will be stored on the south side of both arms of the “T” as further defined in the following section.
- Boat storage infrastructure: Boats will be stored on top of a loosely formed “platform” of tamarack and cedar snag logs collected from the property. This rustic design allows the boats to rest on the logs above the bog mat and will allow vegetation to grow under and around the logs. Eye rings will be fastened to the “T” or to the logs so the boats can be locked and secured in place.
- Boat storage: The boat storage area to be designated under NR 45.11 (2) will be delineated by the 70 foot “T” and will be of sufficient size to accommodate the anticipated boat storage needs at the site of up to 15 boats at any one time.
- Boat storage season: The posted season for overnight storage will be seven (7) days prior to the waterfowl hunting season through seven (7) days after the waterfowl season closes.
- Boat reservation system: If the demand for boat storage exceeds the capacity of the storage area, the department will consider the need for developing a reservation system. The decision making process will be open and transparent, and will include a full review of the issue and an opportunity for public comment.
- Boat identification: Each watercraft stored overnight must be identified with either the department customer ID or the boat owner/user name and address in legible writing.
- Funding, installation, maintenance and enforcement of the boat storage site: The Friends of the Cedarburg Bog have agreed to fund the entire cost of the initial boardwalk materials. Stakeholder volunteers and department staff will construct and install the boardwalk, boat storage “T” and boat storage area facilities, which will be inspected and maintained to department standards. Additionally, stakeholder groups have committed to providing volunteer assistance with removal of the miscellaneous boards, pallets and other materials that had been previously used to improve footing along the volunteer trails. Maintenance of the boardwalk and boat storage area will be the joint responsibility of the stakeholders and the department. Enforcement would be the responsibility of the department.
- Signage: Signs at the boat storage site shall indicate, “Any materials placed in the bog will be considered litter and cited as such”. A sign will be placed in front of the former west access point, and any other unauthorized access points, indicating, “Unauthorized access, no entry permitted”. To obscure the west path, the foot path will be allowed to re-vegetate and/or brush, stones or other natural materials may be placed to discourage use.

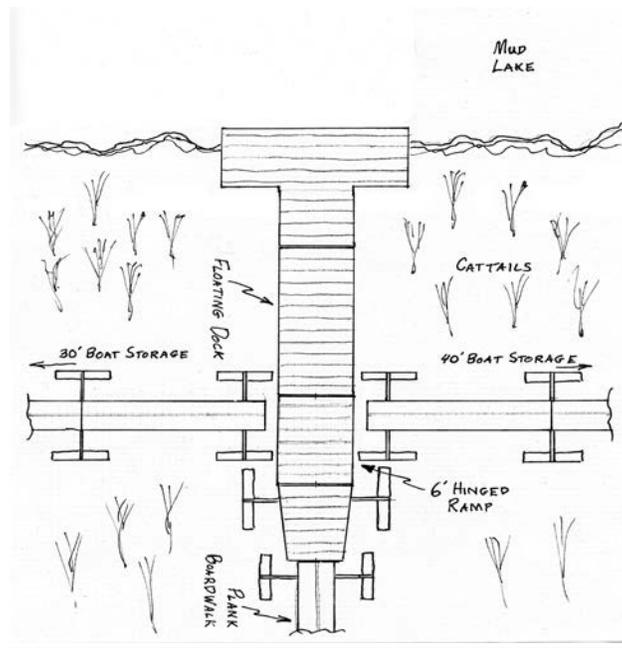
Figure 2-1 Boardwalk Design



Figure 2-2 Boardwalk Route



Figure 2-3 Boat Storage "T"



CHAPTER THREE

FINDINGS AND CONCLUSIONS

Individuals interested in learning more about the NKMR properties and the underlying ecological and socio-economic context are encouraged to read the supporting material in the *Rapid Ecological Assessment for the Northern Kettle Moraine Region Fish and Wildlife Properties (WDNR ER-810, June 2010)* and the *Regional & Property Analysis for the Northern Kettle Moraine Region Wildlife, Fish and Natural Areas (WDNR Pub #059)*. These documents can be viewed on the web at dnr.wi.gov key words “master planning”.

The following Findings and Conclusions from the Regional and Property Analysis has been updated to include information and analysis developed after the RPA was published.

This chapter contains the FINDINGS AND CONCLUSIONS section from the Northern Kettle Moraine Region (NKMR) Regional and Property Analysis. This section identifies and summarizes the most important recreational uses, the ecological significant habitats and the management opportunities and concerns for these properties within the regional setting. These FINDINGS AND CONCLUSIONS helped guide the development of the management objectives and prescriptions, and the alternatives considered during the master planning process.

Property and Regional Overview

The NKMR project area is located in seven southeastern and east central Wisconsin counties: Washington, Dodge, Fond du Lac, Calumet, Manitowoc, Sheboygan and Ozaukee. The project's nine properties comprise 15,903 acres of state owned land on wildlife areas (12,698 acres), two fishery areas (1,472 acres) and one state natural area (1,733 acres).

In addition, 591 acres of easements and 309 acres of leased land provide public access for hunting, fishing, trapping and other nature based recreational activities. The NKMR properties provide 35% of the public lands available for hunting in Ozaukee, Washington and Sheboygan counties.

Wetlands comprise over 70% of the land cover on the NKMR properties. These extensive wetlands are a mix of non-forested (e.g., marsh, sedge meadow, fen, and lowland brush) and forested (hardwoods and conifer) habitats. Open, non-forested wetlands and open water make up about two thirds of the wetland cover. On the forested lowlands, hardwoods are the most common with swamp conifer being a minor, but important component.

The remaining lands are 14% grasslands, 6% hardwood forests, 4% shrub lands and 4% agricultural lands. About 20% of the non-forested uplands on the NKMR properties are in agricultural management or are harvested for hay.

These properties provide important habitat for a variety of common and rare wildlife, both resident and migratory species. Several properties are noted as providing important bird and waterfowl habitat, including Cedarburg Bog SNA, Theresa WA and Kiel Marsh WA.

Recreational Significance, Capability and Demand

The Kettle Moraine State Forest is the dominant public land feature in the region. The NKMR properties provide important complementary opportunities for outdoor recreation, particularly for activities related to waterfowl hunting and bird watching. Other important recreational opportunities include deer and upland game bird hunting, and trout fishing. Hiking and cross-country skiing are popular, but the extensive wetlands on many of the properties significantly limit these and other "trail" type activities.

From a regional perspective, the limited amount of public lands, growing population and increasing development create a large and increasing demand for outdoor recreation opportunities. These properties also provide recreational opportunities for counties to the south with even less public lands.

The limited availability of resources, when exacerbated by population growth and increasing urbanization will place greater pressures on these natural resources. The potential for increased competition among users for limited access is expected to increase, especially given the growing diversity of outdoor interests. Looking long-term, regional demand for wildlife-related activities such as hunting, fishing and bird-watching will likely increase recreational usage on already popular NKMR properties. The aging 'baby boomer' population is shifting the population toward an increasingly older demographic, resulting in quiet and accessible sports such as wildlife viewing and hiking becoming more popular.

Recreational Capabilities and Limitations

- The NKMR wildlife and fishery areas are heavily used for hunting. Overcrowding can be an issue during deer, turkey and pheasant seasons on several of the properties. Trapping is most popular on Kiel Marsh. A Class II dog training ground is provided on the LaBudde Creek Fishery Area. Conflicts between hunters and non-hunters currently are infrequent as most non-hunters are aware when hunting seasons are occurring. However, conflicts may increase in the coming years if the level of use and the diversity of uses increase.
- Birding, wildlife viewing and nature study are all popular activities in the region. The NKMR properties provide diverse wetland habitats and several properties like Cedarburg Bog are important migratory stopover sites. These properties are close to the to the important Lake Michigan bird migration corridor. Over 100 migratory species have been documented over 30 years of autumn banding at Cedarburg Bog. Seasonal estimates of 10,000 migratory birds are believed conservative. Cedarburg Bog has a long history of public participation in environmental education field courses, administered and led by its Friends group and the UW-Milwaukee Field Station.
- The NKMR offers both warmwater and coldwater sportfishing opportunities. Onion River and Nichols Creek provide the highest quality trout fishing opportunities with LaBudde Creek and Allenton Creek offering secondary opportunities. These latter streams are challenged by land use impacts (highways, subdivisions and cropland) from the upstream watershed. Trout populations are maintained by natural reproduction in Onion River and Nichols Creek while LaBudde Creek and Allenton Creek require supplemental stocking.

The practice of using wild-source stocked fish has improved the fitness of trout populations and resulted in improved natural reproduction in some streams. Restoring degraded streams on these properties could potentially improve sport fishing opportunities. However, adverse impacts to water levels, stream temperatures and water quality from land uses outside the properties pose long-term challenges.

- Limited opportunities for boating (primarily non-motorized boating) are available on Kiel Marsh, Theresa Marsh, Jackson Marsh and Mullet Creek. There are limited opportunities to expand boating on these properties.
- Regionally, walking for pleasure, hiking and sightseeing are among the activities in highest demand by recreational users. Hiking, cross country skiing (ungroomed), and snowshoeing, occur on most properties and demand is likely to increase in the future. However, the extensive wet soils and limited contiguous uplands pose significant barriers to the expansion of these activities on most of the properties.
- The Ice Age National Scenic Trail (IAT) is the premier hiking venue in the region. A section of the IAT is located in LaBudde Creek Fishery Area. Currently, an active habitat management partnership has been developed between the department and volunteers associated with the Ice Age Trail Association and friends groups. Though a portion of the trail passes through the designated dog training area only a few conflicts between dog trainers and hikers have been reported.
- Segments of regional snowmobile trails traverse almost all of these properties. The trails are maintained by local snowmobile clubs. ATV use is currently prohibited on the properties due to the combination of very wet soils and sensitive ecological communities. ATV and off-road vehicle uses are generally not compatible with the purpose of wildlife and fishery areas
- Horseback riding and mountain biking are not authorized uses on the NKMR properties. Physical limitations of the properties such as the predominance of wet soils and limited contiguous uplands would not be conducive to trail development. Opportunities for horse and bike uses on these properties are further limited by the requirement (NR 1.51) that non-primary uses not significantly detract from the primary purposes of the property. Abundant equestrian and mountain bike trails are provided on the Kettle Moraine State Forest.
- Camping is not provided on these properties. Camping opportunities are provided in the area on the Kettle Moraine State Forest, county parks and at private campgrounds.

In southeastern Wisconsin public conservation lands are limited and are in high demand for a variety of nature based recreational pursuits. Four of the properties are located within the Greater Milwaukee Metropolitan Area. About 40% of Wisconsin's population (~2.2 million) resides in the eleven southeastern Wisconsin counties. Regional population has more than doubled from 1950 to 2006, twice the rate of the state's overall population growth.

Department coordination with regional and local parks, planning and transportation agencies on proposed acquisition and infrastructure projects is needed to protect the existing properties and provide buffers to maintain or create sustainable fish and wildlife populations. For example, identifying road-stream crossings that impair the passage of aquatic organisms, and protecting ground and surface inputs and flows are opportunities for collaboration.

Ecological Significance and Management Opportunities

The “Kettle Moraine” stretches from Manitowoc County southward to Walworth County. This southeast Wisconsin area contains some of the state’s most impressive glacial features. Ecotypes at the southern extent of their range, such as northern wetland and hardwood swamp forests typify this property grouping. Native communities such as Calcareous Fens, Peatlands, and Tamarack Swamps, pose rare opportunities in southern Wisconsin for enjoyment and conservation.

Several of the properties in the NKMR planning group are recognized as being part of ecologically significant landscapes from a continental and regional perspective. Cedarburg Bog has been designated as a Natural National Landmark due to its size, rare features and high quality. Allenton and Theresa wildlife areas have state level significance due to their high quality, productive deep water marshes and other wetlands.

The NKMR properties are an important contributor to the Lake Michigan Flyway. As noted earlier, many bird species congregate in large numbers during migration because of proximity to the Lake Michigan bird migration corridor. The diversity of wetland habitats ranging from large wetlands, streams, and flowages at Theresa, Allenton, Mullet Creek and Kiel Marsh Wildlife Areas and the undeveloped forests and shrub cover found at Cedarburg Bog SNA, Jackson Marsh, Mullet Creek, and Nichols Creek Wildlife Areas, offer important resources for game species and numerous bird groups.

These properties support a significant array of rare natural communities and species. Sixteen "major" and "important" natural communities of regional importance are represented. In total, 42 rare animals (six endangered, seven threatened and 29 special concern) have been documented on the properties. Also, 34 rare plants have been recorded (three endangered, seven threatened, and 24 special concern).

Seven "primary sites," have been identified on or adjacent to these properties. They offer important opportunities for protecting “major and important” natural communities and managing for biodiversity conservation. Primary sites generally encompass the best examples of representative natural communities and/or significant, documented rare species populations. The seven primary sites are:

Cedarburg Bog SNA: Cedarburg Bog is the largest, least disturbed peatland complex in southeast Wisconsin. It contains extensive conifer swamp forest and patterned peatland (characterized by noticeable ridges and swales running perpendicular to water flow). This southernmost patterned peatland in North America is one of only four known in Wisconsin. Several rare plants, including insectivorous species and rare orchids, are found at this site.

Jackson Marsh Cedar Swamp: The primary feature is a core of good quality Northern Wet-mesic Forest (swamp conifer) surrounded by a good to moderate quality Southern Hardwood Swamp.

Jackson Marsh Southern Hardwood Swamp: The canopy is dominated by large silver maple, with red maple, green ash and elms. This site is located on the Jackson Marsh WA.

Mullet Creek Forested Wetland: Good quality Northern Wet-mesic Forest (swamp conifer) surrounded by a Southern Hardwood Swamp. This site is notable in that it is free of invasive species. The site is primarily in department ownership, but portions are privately owned.

Kiel Marsh Breeding and Migratory Bird Area: This site is a cattail-dominated marsh along the Sheboygan River with scattered areas of willow-dominated shrub-carr.

Nichols Creek Cedar Swamp and Springs: This site is composed of two units connected by the North Branch Milwaukee River. It features a complex of good quality Northern Wet-mesic Forest, Springs and Spring Runs, Spring Ponds, small Calcareous Fens in the lowlands, and variable quality Southern Mesic and Southern Dry-mesic Forest in the uplands. Good quality Northern Wet-mesic Forest dominated by northern white-cedar is also present.

Kamrath Creek Forest and Fen: Located in the Onion River Stream Bank Protection Area, this 60 acre site features several high-quality natural communities of regional importance. The highest ground is a Southern Dry-mesic Forest with an overstory of oak and shagbark hickory. Other features include water seeps and spring runs that feed a Calcareous Fen and an area of Forested Seeps. Significantly, this site is generally free of invasive species. Of special note, the swamp metalmark butterfly has been found on the site and is one of only three known sites in the state. This butterfly is currently being assessed as a potential candidate for Federal listing.

Ecological Threats and Management Challenges

Future success in maintaining and enhancing the native communities, habitats, and biodiversity on the NKMR properties will greatly hinge on limiting ecological simplification and habitat fragmentation, restoring previously altered ecological processes and reducing future impacts (e.g., invasive species).

Many wetlands on the NKMR properties contain high-quality native community wetlands and minimal impacts from draining. However, others have been heavily impacted by previous disturbances such as ditching and grazing. Opportunities exist to improve these sites through restoration and limiting further disturbances. Some specific management challenges include limits on use of fire and tamarack die-off.

Fire is an important tool for maintaining certain types of natural communities. The ability of managers to use fire as a management tool is and will increasingly be challenged by the proximity of residential developments and major highways to these properties. Other tools exist, but they often are less effective and more costly. Over recent years southern Wisconsin tamarack has been experiencing a die-off and regeneration of stands has been poor. This poses a long-term challenge for managers, and maintaining this rare southern Wisconsin nature community may be difficult.

Invasive species are a significant and growing threat to native communities and wildlife habitats. If not controlled, there is potential for significant harm to the value and the general fitness of these habitats. They may prove to be the greatest threat and management challenge on these properties. The primary invasive species include: buckthorn, garlic mustard, honeysuckle, spotted knapweed, cattails, Japanese knotweed, and reed canary grass. The emerald ash borer, a major potential threat to the ash component of lowland hardwood communities, poses a significant long-term management challenge.

As is true in nearly all areas of the state, deer herbivory has and continues to significantly impact many tree and shrub species. As long as deer numbers remain high, their impacts will continue to be a management challenge for property managers.

Wildlife and Fish Management

The NKMR properties provide abundant, quality habitat for game and non-game wildlife species in an area dominated by agriculture and development. The primary wildlife game species on these include white-tailed deer, eastern wild turkey, ring-necked pheasants, waterfowl and fur-bearers. A number of these properties are also known for their excellent bird watching opportunities.

The demand for wildlife-based recreation is anticipated to steadily increase over time. Opportunities exist on these properties to improve habitat for both game and other wildlife species for both hunting and non-hunting purposes.

The Onion River, Nichols Creek, LaBudde Creek and Allenton Creek provide cold – cool water habitats and fishing opportunities for native brook trout and naturalized brown trout. These streams sustain viable populations because of significant groundwater inputs that maintain the coldwater temperature regimes needed by trout. Supplemental trout stocking occurs where in-stream habitat limits natural reproduction. The aquatic habitats in LaBudde Creek and Allenton Creek have been adversely affected by upstream land uses and non-point source runoff. Significant opportunities for enhancing and rehabilitating disturbed stream habitat to improve trout population fitness exist on these properties. However, long-term threats to these fisheries include nutrient loading and groundwater pumping that may reduce cold groundwater inputs to the streams.

The sport fishery in the warmwater streams have also been adversely affected by habitat destruction, sedimentation, nutrient loading and invasive species such as carp and Eurasian milfoil. Protecting and restoring wetlands, spawning habitat and minimizing impacts from invasive species, are needed to maintain the desired game and native species abundance and diversity. However, funding and resources for promoting warmwater sport fisheries are very limited so passive management of these resources is anticipated for the foreseeable future.

Summary

The NKMR properties (six wildlife areas, two fishery areas, and one state natural area) are located close to the largest population centers in Wisconsin. Public lands for hunting, fishing and trapping are relatively limited. Hunting for deer, turkey, waterfowl and pheasant remain popular activities while a variety of other uses such as hiking, cross country skiing, snow shoeing, wildlife viewing, nature study and geocaching are growing in popularity. The demand for more accessible, "user friendly" trails or wildlife viewing areas is expected to increase due to the aging of the population. Several of the properties offer opportunities to accommodate lightly developed, non-motorized recreational uses, but these wetland-dominated properties have extensive wet soils and lack connected uplands thus limiting trail options.

In a region where high quality native habitats are limited, these properties provide a valuable functional link in the Lake Michigan flyway. They are important stopover points for large numbers of migrating birds, particularly waterfowl and marsh birds. During the spring and fall migrations, birders from around the region and beyond are drawn here to observe waterfowl, marsh birds, grassland birds and forest birds.

The NKMR properties offer a number of significant opportunities to manage for regionally significant native communities and rare species. Collectively, these properties contain a variety of communities including northern wet mesic forest communities (rare for southern WI), diverse cold and warm water fisheries, open wetlands, upland and lowland forests, springs, sedge meadows, tamarack swamps and populations of rare species.

Cedarburg Bog State Natural Area is a particularly valuable property with significant ecological features and unique opportunities for environmental education and research. Major threats to the biodiversity are interrelated and include ecological simplification, habitat fragmentation, altered ecological processes, deer herbivory, and infestation by aggressive invasive species.

Thoughtful planning and management will be needed to maintain quality wildlife and fisheries habitats and protect sensitive resource while also providing satisfying recreational experiences for an increasing number of users and uses.

INFORMATION SOURCES AND REFERENCES

Acres estimates in this master plan were generated from several web based intranet data systems. All acres for existing department properties were derived from the department's Bureau of Facilities and Lands Land Records system.

Boundary adjustments and cover type acres were derived from several department data bases including the Lands Division Land Records system, Forestry Division WisFIRS, Water Division surface water and fisheries data, and Natural Heritage Conservation state natural areas. Soils information was taken from the NRCS Web Soil Survey. The respective county comprehensive planning and interactive web mapping tools were consulted to assess natural resources designation, and agricultural soils and preservation recommendations.

This master plan analyzed many attributes including land use patterns and trends, habitat distribution and quality, life history requirements of species of greatest conservation need, recreation needs and trends, and factors that provide for high quality outdoor experiences, and public input.

eBird: An online database of bird distribution and abundance [<http://www.ebird.org>]. Cornell Lab of Ornithology, Ithaca, New York. (2012).

Ducks Unlimited. Personal Communication (email) with Brian Glenzinski. (March 2014).

Ducks Unlimited. Wisconsin Fact Sheet.

<http://www.ducks.org/media/global/documents/stateFactSheets/wisconsin.pdf>

Frumkin, H. and R. Louv. *The powerful link between conserving land and preserving health*. Land Trust Alliance Special Anniversary Report. (2007).

Gies, E. *Conservation: an investment that pays – the economic benefits of parks and open space*. The Trust for Public Lands. (2009).

Greenwire. *National refuges bring positive economic return*. Washington D.C. E&E Publishing, (November 28, 2007)

Hart, D., and Kline, J., 2013, Identification of contributing areas for groundwater supply to Cedarburg Bog to protect critical habitat: Final report to the Wisconsin Coastal Management Program, 82 pages.

Hart, D., and Kline, J., forthcoming, Identification of contributing areas for groundwater supply to Cedarburg Bog to protect critical habitat: Wisconsin Geological and Natural History Survey Technical Report.

Hatch, Brynda K. and Thomas W. Bernthal. *Mapping Wisconsin Wetlands Dominated by Reed Canary Grass, Phalaris arundinacea L.: A landscape level assessment*. Final Report to the U.S. Environmental Protection Agency, Region V Wetland Grant # 96544501-0. (October 2008)

Hardner, J. and B. McKenney. *The U.S. National Park system: an economic asset at risk*. National Parks Conservation Association. (2006).

Herkert, J.R. An Analysis of Midwestern Breeding Bird Population Trends: 1966-1993. *American Midland Naturalist* 134:41-50. (1995).

Ingraham M.W. and S. G. Foster. *The value of ecosystem services provided by the U.S. National Wildlife Refuge System in the contiguous U.S.* *Ecological Economics*. 67: 608-618. (2008).

Jahn and Hunt. 1964. (referenced in Wisconsin Waterfowl Strategic Plan 2008–2018 p.16)

Kabat. 1972. (referenced in Wisconsin Waterfowl Strategic Plan 2008–2018 p.16)

Minnesota Environmental Partnership. *Why invest in conserving natural areas?* (2010).

Mossman, M.J., Y. Steele, and S. Swenson. *A Strategic Vision for Bird Conservation on the Leopold-Pine Island Important Bird Area*. Unpublished report. Aldo Leopold Foundation, Baraboo, WI. (2009)

Outdoor Foundation. *Outdoor recreation participation report 2011*. (2011).

Outdoor Industry Association. (OIA) *The Outdoor Recreation Economy*. (2013)
http://www.outdoorindustry.org/images/ore_reports/WI-wisconsin-outdoorrecreationeconomy-oia.pdf

Ozaukee County Planning and Parks Department. <http://www.co.ozaukee.wi.us/551/Planning-Division>
Links to the Comprehensive Plan, Parks and Open Space Plan, and Farmland Preservation Plan.

Sheboygan County Planning and Zoning Department. Key word search on Sheboygan County Planning for links to the Comprehensive Plan, Parks and Open Space Plan and Farmland Preservation Plan.

Sportfishing in America: (SFA). *An Economic Force for Conservation*. 2013. American Sportfishing Association. http://asafishing.org/uploads/2011_ASASportfishing_in_America_Report_January_2013.pdf

Southwick Associates. *Hunting in America: An Economic Force for Conservation*. Produced for the National Shooting Sports Foundation in partnership with the Association of Fish and Wildlife Agencies. 2012. http://www.nssf.org/PDF/research/HuntingInAmerica_EconomicForceForConservation.pdf

Responsive Management and the National Shooting Sports Foundation. *Issues Related to Hunting Access in the United States: Wisconsin Results*. Funded by U.S. Fish and Wildlife Service grant administered by the Association of Fish and Wildlife Agencies. Multi-State Conservation Grant CT M-8-R. 2009. http://www.responsivemanagement.com/download/reports/Hunting_Access_WI_Report.pdf

Robbins, S.D., D.W. Sample, P.W. Rasmussen, and M.J. Mossman. *The Breeding Bird Survey in Wisconsin: 1966-1991*. *Passenger Pigeon* 59:81-179. (1996).

Tourism Federation of Wisconsin. 2011. <http://www.witourismfederation.org/>

US Fish and Wildlife Service. *Stepping Down the Habitat Goals of the American Woodcock Conservation Plan for the Upper Great Lakes Woodcock and Young Forest Initiative - (BCR 12 and 23 in Michigan, Minnesota, and Wisconsin)*. Tom Cooper (FWS) in cooperation with the Wildlife Management Institute. December 2008.
http://www.timberdoodle.org/sites/default/files/UGLWI_Stepdown_Plan_December_2008.pdf

US Fish and Wildlife Service. Upper Mississippi River and Great Lakes Region Joint Venture. Waterfowl Habitat Conservation Strategy. (December 2007).

http://www.uppermissgreatlakesjv.org/docs/UMRGLR_JV_WaterfowlHCS.pdf

US Fish and Wildlife Service. National survey of fishing, hunting, and wildlife-associated recreation – Wisconsin. (2006).

US Fish and Wildlife Service. Waterfowl Management Handbook Fish and Wildlife Leaflet 13. Richard S. Sojda US-FWS and Kent L. Solberg Mn DNR. US Department of the Interior. Washington, D.C. (1993).

http://www.nwrc.usgs.gov/wdb/pub/wmh/13_4_13.pdf

US Fish and Wildlife Service. Upper Mississippi River and Great Lakes Region - Joint Venture Wisconsin Plan. (March 1992).

University of Milwaukee – Cedarburg Bog Field Station. Excel spreadsheet count of bird species.

<http://www4.uwm.edu/fieldstation/datasets/species.cfm>

Washington County Planning and Parks Department. Links to the Comprehensive Plan, Parks and Open Space Plan, and Farmland Preservation Plan.

<http://www.co.washington.wi.us/departments.imi?mdl=departments.mdl&ID=PLN>

Wildlife Management Institute. Implementing the American Woodcock Conservation Plan - Progress to Date. July 2010

http://www.timberdoodle.org/sites/default/files/Woodcock_Conservation_Progress_Report-070610.pdf

Wisconsin Department of Natural Resources. DRAFT Ecological Landscapes of Wisconsin Handbook. 1805.1. (In Prep. a.)

Wisconsin Department of Natural Resources. *Protecting bird migration stopover habitat in the western Great Lakes: A conservation plan for Wisconsin*. Grveles, K., S.W. Matteson, and S. Eichhorst. 2011.

Wisconsin Department of Natural Resources. Holzwart, James. DNR Wildlife Management. Email communication July 16, 2012. (2014).

Wisconsin Department of Natural Resources. *Department of Natural Resources 2011-13 BIENNIAL REPORT*. (October 2013).

Wisconsin Department of Natural Resources. Gatti, Ronald. DNR Science Services. Email communication January 26, 2012. (2012).

Wisconsin Department of Natural Resources. *Important Bird Areas of Wisconsin, Critical Sites for the Conservation and Management of Wisconsin Birds*. Steele, Y. (2011).

Wisconsin Department of Natural Resources. *Regional & Property Analysis: Northern Kettle Moraine Region Fish and Wildlife Properties*. Land Management Section, Bureau of Facilities and Land. FL 059. (July 2011).

Wisconsin Department of Natural Resources. *Wisconsin's Statewide Forest Assessment*. (2010a)

Wisconsin Department of Natural Resources. *Rapid Ecological Assessment for the Northern Kettle Moraine Region Fish and Wildlife Properties*. Natural Heritage Inventory Program, Bureau of Endangered Resources. June 2010 Second Version. ER-819 2010. (2010b)

Wisconsin Department of Natural Resources. *Wisconsin Watersheds, Mullet River Watershed – 2010 Water Quality Management Plan Update*. Water Division. March 2010. (2010c).

Wisconsin Department of Natural Resources. *State Lands – Passive Management Report*. Division of Forestry. August 2010. (2010d).

Wisconsin Department of Natural Resources. *A look at Wisconsin's forests*. PUB-FR-122-09. (2009)

Wisconsin Department of Natural Resources. *Natural Heritage Inventory Working List*. Wisconsin Natural Heritage Inventory Program, Bureau of Endangered Resources. (2009).

Wisconsin Department of Natural Resources. *Birding and Nature Trail – Southern Savanna Region*. Bureau of Endangered Resources. Great Wisconsin Publication ER-662-2008. (2008)

Wisconsin Department of Natural Resources. *Wisconsin Waterfowl Strategic Plan 2008–2018*, Van Horn, Kent and Kim Benton, WM-479-2007. (2007). Approved by the Natural Resources Board Dec. 2007 <http://dnr.wi.gov/topic/WildlifeHabitat/documents/plan2.pdf>

Wisconsin Department of Natural Resources. *2005-2010: Wisconsin Statewide Comprehensive Outdoor Recreation Plan (SCORP)*. PR-026-2006. (2006a).

Wisconsin Department of Natural Resources. *Wisconsin Wildlife Action Plan*. (2006a) and (2006b).

Wisconsin Department of Natural Resources. *Wisconsin Land Legacy Report: An Inventory of Places to Meet Wisconsin's Future Conservation and Recreation Needs*. Pohlman, John D., Gerald A. Bartlet, Andrew C. Hanson III, Paul H. Scott, and Craig D. Thompson (Editors). (2006).

Wisconsin Department of Natural Resources. *Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need, Appendix C - State Natural Areas and other Ecological Reference Sites by Ecological Landscape*. Pub-ER-641. (2005).

Wisconsin Department of Natural Resources. *State Parks and their Gateway Communities: Development and Recreation Planning Issues in Wisconsin (G3773)*. PR-466-2002. (2002).

Wisconsin Department of Natural Resources. Sample, David W., and Michael J. Mossman. *Managing habitat for grassland birds - a guide for Wisconsin*. PUBL-SS-925-97. (1997).

Wisconsin Department of Natural Resources. *Wisconsin's Biodiversity as a Management Issue, chapter 2 "Biodiversity: Issues and Implications," A report to Department of Natural Resources Managers*. Addis, James, et.al. (1995).

Wisconsin Department of Natural Resources. Web based data and program files. Go to www.dnr.org and enter a specific search term (e.g., woodcock, savanna, trout) or enter the following: Wildlife Areas - www.dnr.org key words *wildlife* and *wildlife areas*; Fishery Areas – www.dnr.org key words *fisheries management* and *fishery areas*

State Natural Areas - www.dnr.org key words *natural areas*

Forestry - www.dnr.org key words *forestry*, (*WisFIRS*; *Wisconsin Forestry Inventory & Reporting System*), *best management practices* and *biomass*

Handicapped accessible recreation www.dnr.org key words *Open The Outdoors*

For detailed information on how the DNR pays property taxes search “PILT”.

Bureau of Facilities and Lands property files - previous master plans for Nichols Creek WA (1988), Mullet Creek WA (1986), Theresa WA (1985), Allenton WA (1984), Cedarburg Bog SNA (1982), and LaBudde Creek FA (1981).

Wisconsin Department of Natural Resources. *Managed Lands Needs Assessment*. (June 21, 2010).

Wisconsin Department of Tourism. 2013. <http://industry.travelwisconsin.com/press-release/wisconsin-tourism-industry-continues-steady-growth-in-2013>

Wisconsin Geocaching Association. (2014). <http://www.wi-geocaching.com/index.php>

Wisconsin Wetlands Association. *Wetland Gems Cedarburg Bog*. (2009). http://www.wisconsinwetlands.org/Gems/SE2_Cedarburg_Bog.pdf