

Upper Mississippi River Master Plan for Resource Management

Upper Saint Anthony Falls, Lower Saint Anthony Falls and Pools 1–10

River Miles 854.0–614.0

Minnesota, Wisconsin, and Iowa



April 2022



**US Army Corps
of Engineers**

St. Paul District

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HOW TO USE THIS MASTER PLAN

Master plans are programmatic and designed to be flexible and adaptive to changing management strategies through time. They are designed to work in conjunction with other plans, regulations, laws, agencies, and the public. Master plans are a tool used to enable responsible stewardship and sustainable management of resources in an effort to benefit present and future generations.

Generally speaking, people do not read a master plan from start to finish; rather, they read chapters that interest them most. Resource managers will want to review specific resource plans, land classifications, recreation objectives, and the environmental assessment for guidance. While this document works best as a whole product, each chapter of the Upper Mississippi River Master Plan for Resource Management (2020 Master Plan) refers to other sections, allowing the reader to understand the relationship between the different components of the plan.

This master plan has been developed for the Recreation and Natural Resource (RNR) Management programs for the U.S. Army Corps of Engineers, St. Paul District portion of the Upper Mississippi River 9-Foot Channel Navigation Project (Project). It is an update of the 1988 Upper Mississippi River Master Plan and the associated 2011 Land Use Allocation Plan.

Chapter 1: Introduction – Presents the purpose and scope of this 2020 Master Plan, along with a general description of the project area. This chapter sets the foundation for the collective vision of the St. Paul District's RNR Management Programs.

Chapter 2: Project Settings and Factors Influencing Management and Development – Introduces the physical setting that makes up the St. Paul District section of the Upper Mississippi River and sets up a baseline for the natural, cultural, and socioeconomic resources of the project.

Chapter 3: Resource Objectives – Explains the goals and objectives that guide the St. Paul District

in formulating the management alternatives and land classifications of the master plan.

Chapter 4: Land Allocation, Land Classification, Water Surface, and Project Easement Lands – Provides an in-depth description of the land classification utilized in the master plan and contains a summary of the land classifications currently being used for the project area.

Chapter 5: Resource Plan – Includes a breakdown of the revised land classifications within the project and includes any proposed changes at the different recreation sites within each pool.

Chapter 6: Special Topics, Issues, and Considerations – Addresses topics and issues that are pertinent to the Mississippi River RNR Management programs that were not addressed within other chapters of the 2020 Master Plan.

Chapter 7: Agency and Public Coordination – Provides a narrative on how interagency and public meetings, outreach, and coordination were accomplished for the 2020 Master Plan.

Chapter 8: Summary of Recommendations – Synthesizes the management and development actions that were recommended within Chapter 5. This chapter helps prioritize opportunities to enhance natural, cultural, and recreational resources within the project.

Chapter 9: Bibliography – All text and internet sources, while the **appendices** provide further details pertinent to the 2020 Master Plan. This includes environmental compliance documents and agency and public comments.

TABLE OF CONTENTS

1	Chapter 1: Introduction	1
1.1	Project Authorization*	1
1.2	Purpose and Scope of the Master Plan	1
1.2.1	Relationship to Other Plans and Programs	2
1.3	Project Purpose*	2
1.3.1	Navigation.....	2
1.3.2	Natural Resources	4
1.3.3	Recreation	4
1.4	Project Area	5
1.4.1	Public Lands.....	7
1.4.2	Navigational Servitude.....	8
1.4.3	Shoreline	8
1.5	Prior Design Memorandums & Master Planning Documents*	9
1.6	Listing of Pertinent Project Information*	9
1.7	Policy Considerations	10
1.7.1	Interagency Agreements	10
1.7.2	Executive Orders.....	11
1.7.3	Engineer Manuals, Pamphlets, and Regulations	11
1.8	Pertinent Public Laws*	13
1.8.1	Navigation.....	13
1.8.2	Recreation	14
1.8.3	Fish and Wildlife.....	15
1.8.4	Environmental Stewardship and Restoration	16
1.8.5	Cultural and Historical Considerations	17
2	Chapter 2: Project Setting and Factors Influencing Management and Development*	18
2.1	Introduction.....	18
2.2	Physical Setting	18
2.2.1	The Mississippi River Basin	18
2.2.2	Upper Mississippi River Watershed	18
2.2.3	The St. Paul District Portion of the UMR.....	21
2.2.4	River Hydrological Characteristics	22

2.2.5	Sedimentation and Shoreline Erosion	26
2.2.6	Water Quality	28
2.2.7	Topography, Geology, and Soils*	30
2.2.8	Climate and Weather	33
2.3	Natural Resource Conditions	35
2.3.1	Resource Analysis (level One inventory data)*	35
2.3.2	Cultural Resources*	50
2.3.3	Tribal Trust	59
2.4	Socioeconomic Conditions	60
2.4.1	Aesthetic Value	60
2.4.2	Demographics	61
2.4.3	Recreation Facilities, Activities, and Needs*	64
2.4.4	Regional Connecting Trails	75
2.4.5	Real Estate*	76
2.4.6	Corps Easements on Private Lands	77
2.4.7	New Non-Recreational Outgrant Proposals	78
3	Chapter 3: Resource Objectives*	79
3.1	Introduction	79
3.1.1	Master Plan Goals	79
3.1.2	Environmental Stewardship Resource Objectives	79
3.1.3	Recreation Resource Objectives	80
4	Chapter 4: Land Allocation, Land Classification, Water Surface, and Project Easement Lands* 82	
4.1	Introduction	82
4.2	Land Allocation*	82
4.2.1	Operations	82
4.2.2	Recreation	82
4.2.3	Fish and Wildlife	82
4.2.4	Mitigation	83
4.3	Land Classification*	83
4.3.1	Project Operation	83
4.3.2	High Density Recreation	83
4.3.3	Mitigation	83
4.3.4	Environmentally Sensitive Areas	83

4.3.5	Multiple Resource Management Lands	84
4.3.6	Water Surface.....	84
4.4	Project Easement Lands*.....	85
4.4.1	Operations Easement.....	85
4.4.2	Flowage Easement	85
4.4.3	Conservation Easement.....	85
5	Chapter 5: Resource Plan*	86
5.1	Introduction.....	86
5.1.1	Classification and Justification	86
5.2	Corps-Owned Recreation Areas (Managed and Outgranted)	92
5.2.1	Upper Saint Anthony Falls.....	93
5.2.2	Lower Saint Anthony Falls	94
5.2.3	Pool 1	94
5.2.4	Pool 2	95
5.2.5	Pool 3	96
5.2.6	Pool 4	97
5.2.7	Pool 5	99
5.2.8	Pool 5A	101
5.2.9	Pool 6	101
5.2.10	Pool 7	103
5.2.11	Pool 8	105
5.2.12	Pool 9	106
5.2.13	Pool 10	109
5.2.14	Pool 11	111
6	Chapter 6: Special Topics, Issues, and Considerations*	112
6.1	Partnerships and Coordination.....	112
6.1.1	Partnerships and Coordination	112
6.1.2	Roles of Cooperating Agencies for Project Land Management.....	112
6.1.3	Relationships with UMR Working Groups and Committees.....	115
6.1.4	Formalized Coordination with Other River Resource Agencies.....	115
6.1.5	Volunteers and Partnerships.....	116
6.1.6	Interpretive programing	118
6.2	Special Topics.....	119

6.2.1	Water Level Management.....	119
6.2.2	Beach Plans / Sandbar Recreation	120
6.2.3	Upper Mississippi River Forest Habitat Management Plan.....	121
6.2.4	Upper Mississippi River Restoration Program	125
6.2.5	Pollinator Habitat	126
6.2.6	Biological Opinion for the Upper Mississippi River 9-Foot Channel Navigation Project 126	
6.2.7	Hunting.....	127
6.2.8	Private Use of Federal Lands	127
7	Chapter 7: Agency and Public Coordination.....	130
7.1	Engagement Activities.....	130
7.2	Congressional Notification	130
7.3	Public Coordination	130
7.4	Agency Coordination.....	131
7.5	Tribal Coordination	132
7.6	Outgrantee Coordination	132
8	Chapter 8: Summary of Recommendations*.....	133
8.1	Land Classifications Changes.....	133
8.2	Recreation Changes	133
8.2.1	Modernize Recreation Facilities	134
8.3	Cultural and Historic Property Management Plans	134
8.4	Further Management Studies.....	135
9	Chapter 9: Bibliography*	136

*Denotes a Master Plan section requirement based on Corps guidance

LIST OF FIGURES

Figure 1-1. 2020 Master Plan scope and study area.	6
Figure 2-1. The Mississippi River Basin.	19
Figure 2-2. Commercially navigable waterways on the Upper Mississippi River and Illinois River Systems with lock and dam locations.	20
Figure 2-3. Upper Mississippi River Basin with land classification (USGS, 2003).....	21
Figure 2-4. Locks and dams along the 9-foot navigation channel on the Upper Mississippi River. ...	22

Figure 2-5. Total inundation days for all federal lands in pools 3-10 by pool and flooding class, years 1972–2011. Figure A shows the total area, while B shows the percent of area in each pool. Small acreages in pools 1, 2, and 11 are not included (De Jager et al., 2018).	25
Figure 2-6. Correlation coefficients quantifying associations between the area (hectare per RM) in different floodplain functional classes in navigation pools of the Upper Mississippi River 9-foot channel and the area (hectare per RM) in different floodplain vegetation types in navigation pools of the Upper Mississippi River 9-foot channel navigation project (De Jager et al., Indicators of ecosystem structure and function for the Upper Mississippi River System: U.S. Geological Survey Open-File Report 2018–1143, 2018).	26
Figure 2-7. CWA impairments in 2008.	28
Figure 2-8. Annual average temperatures of the Midwest (red line), which indicates a trend of increasing temperatures. The dashed line, a calculation from 1895–2012, is an increase of 1.5 F (Kunkel et al. 2013).	34
Figure 2-9. Distribution of tree basal area by diameter class and pool. Phase II Forest Inventory Data from 6,119 forest inventory plots, 2008–2018.....	47
Figure 2-10. Distribution of plot-level forest community type by pool. MAE = maple-ash-elm. Phase II Forest Inventory Data from 6,119 forest inventory plots, 2008–2018.	48
Figure 2-11. Associated periods/traditions of cultural resources on the Corps’ fee title lands.	51
Figure 2-12. Cultural resource sites identified on the Corps’ fee title lands (excluding historic structures and wrecks).....	58
Figure 2-13. National expenditures for sportspersons versus wildlife-watching persons in 2016 (USFWS, 2017).....	65
Figure 2-14. Participation by activity within the UMR Basin in 1990 (Carlson, 1995).	68
Figure 2-15. Percent of anglers and hunters by sex and age (USFWS, 2017).	70
Figure 2-16. Refuge recreation visit profile for the Winona District (a), La Crosse District (b), and McGregor District (c) of the Upper Mississippi River National Wildlife and Fish Refuge (Caudill, 2019).	73
Figure 2-17. Segment 8 trail alignment of the proposed Flyway Trail. Access to the Whitman Dam Wildlife Area and Lock and Dam 5 (Alta Planning + Design, 2016).	75
Figure 5-1. Percentage of land represented by land classification for the Corps, USFWS, and both combined.	89
Figure 5-2. The Visitor Center at Upper St. Anthony Falls.	94
Figure 5-3. A visitor to Lock and Dam 1 observes a recreational boat entering the lock chamber.	95
Figure 5-4. Visitors enjoy watching commercial traffic from the observation deck at Lock & Dam 4.	98
Figure 5-5. Aerial of Lock & Dam 6 facilities, Trempealeau Marina, and an upland dredge material placement site.....	102
Figure 5-6. The old control house at Lock and Dam 7 serves as a visitor center.	104
Figure 5-7. Blackhawk Park offers both camping and day use opportunities in Pool 9.	108

Figure 5-8. Recreational kayakers pass through Lock and Dam 10.	110
Figure 6-1. Volunteers help Corps natural resource specialists plant seedling trees.	117
Figure 6-2. St. Paul District’s 10-year Forest Management Planning framework.	125

LIST OF TABLES

Table 1-1. UMR lock and dam locations.	4
Table 1-2. Upper Mississippi River Project (Pools 1–10, USAF, LSAF) planning documents.	9
Table 2-1. Monthly temperatures for St. Paul and Winona, Minnesota, and Guttenberg, Iowa, from 1981–2010 (http://www.usclimatedata.com).	33
Table 2-2. Migratory bird species protected under the Migratory Bird Treaty Act within the project, their protection status, and breeding season.	37
Table 2-3. Total number of fish species within each pool of the project based on relative abundance (Steuck et al., 2010).	38
Table 2-4. Distribution of mussel species throughout the project pools (Kelner, 2017).	39
Table 2-5. Federally listed species by state within the project.	41
Table 2-6. Threatened and endangered state listed species of each state based on group. Data is based on counties that are within the project area.	41
Table 2-7. Priority ROCs and their habitat associations for the Upper Mississippi River National Wildlife and Fish Refuge (USFWS, 2019).	43
Table 2-8. Invasive species established within the project. This table was generated via point maps and collection information gathered from the USGS’ Nonindigenous Aquatic Species generator.	44
Table 2-9. Change in tree species composition between the time of European settlement and the current time for Mississippi River forests in Wisconsin and Minnesota.	46
Table 2-10. Land cover acreage on Corps and USFWS land within each pool of the project area based on the updated land acreages for the 2020 Master Plan. Cover types are derived from USGS UMESC LTRM 2010.	49
Table 2-11. History of Corps, St. Paul District within the UMR (Merritt, 1979).	55
Table 2-12. Documented wrecks overlapping the Corps’ fee title lands (Jensen, 1992).	56
Table 2-13. Population trends within the project by county.	61
Table 2-14. Population by race and origin 2015.	62
Table 2-15. Income and education 2013–2017.	63
Table 2-16. Housing characteristics 2013–2017.	64
Table 2-17. Corps day use area visitations based on the Corps’ Visitation Estimation and Reporting System (2019).	66
Table 2-18. Upper Mississippi River National Wildlife and Fish Refuge Districts and Trempealeau NWR 2017 recreation visits (Caudill, 2019).	67

Table 2-19. Recreation trends at county park properties within Wisconsin regions (Wisconsin Department of Natural Resources, 2019).....	71
Table 2-20. Day use and overnight visitation at Blackhawk Park.	73
Table 2-21. Comment card survey 2018.	74
Table 5-1. Total acres for each land classification of the 2020 Master Plan update.....	88
Table 5-2. Total acres of land classified for the 2020 Master Plan update, segmented by pool, land classification, and agency.	88
Table 5-3. Visitation numbers at Upper Saint Anthony Falls Visitor Center.	94
Table 6-1. Volunteers’ numbers and hours in the St. Paul District UMR project area.....	117

APPENDICES

- Appendix A – Environmental Assessment & Finding of No Significant Impact
- Appendix B – Agency and Public Coordination
- Appendix C – Land Allocation and Land Classification Plates
- Appendix D – State Listed Species and Other Species Lists

List of Common Acronyms	
BMPs	Best Management Practices
CA	Cooperative Agreement
CCP	Comprehensive Conservation Plans for U.S. Fish and Wildlife Service Refuges
CMMP	Channel Maintenance Management Plan
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DMMP	Dredge Material Management Plan
DOD	Department of Defense
EA	Environmental Assessment
EM	Engineer Manual
EMP	Environmental Management Program (for the Upper Mississippi River System)
EO	Executive Order
EP	Engineer Pamphlet
EPA	Environmental Protection Agency
ER	Engineer Regulation
ES	Environmental Stewardship
ESA	Endangered Species Act / Environmentally Sensitive Area
FMP	Forestry Management Plan
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year (starts Oct. 1 and ends Sept. 30 every year for USACE)
GREAT	Great River Environmental Action Team
HMP	Habitat Management Plans
HPMP	Historic Properties Management Plan
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HREP	Habitat Rehabilitation and Enhancement Project
IADNR	Iowa Department of Natural Resources
ISOP	Interpretive Services and Outreach Program
L&D or LD	Lock and Dam
LALC	Land Allocation and Land Classification
LMVJV	Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group
LSA	Landform Sediment Assemblage
LSAF	Lower St. Anthony Falls
LTRM	Long Term Resource Monitoring
LUAP	Land Use Allocation Plan
MNDNR	Minnesota Department of Natural Resources
MNRRRA	Mississippi National River and Recreation Area
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
MRT	Mississippi River Trail (bicycle)
MVD	Mississippi Valley Division, U.S. Army Corps of Engineers
MVP	St. Paul District, U.S. Army Corps of Engineers
MVR	Rock Island District, U.S. Army Corps of Engineers
MVS	St. Louis District, U.S. Army Corps of Engineers
NECC	Navigation Environmental Coordinating Committee
NEPA	National Environmental Policy Act

NESP	Navigation and Ecosystem Sustainability Program
NGO	Non-Governmental Organization
NGVD	National Geodetic Vertical Datum (used for elevations)
NHPA	National Historic Preservation Act of 1966
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRM	Natural Resource Management
NWR	National Wildlife Refuge
O&M	Operations & Maintenance
OMP	Operational Management Plan
OMRR&R	Operation, Maintenance, Repair, Replacement, and Rehabilitation
OSIT	On-Site Inspection Team
PDT	Project Delivery Team
PM	Presidential Memorandum
PMP	Project Management Plan
RM	River Mile
RNR	Recreation and Natural Resource
ROC	Resource of Concern
RRF	River Resources Forum
RWG	Recreation Work Group
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SFSP	Systemic Forest Stewardship Plan
SHPO	State Historic Preservation Officer
SNA	State Natural Area / Scientific and Natural Area
SOP	Standard Operating Procedure
T&E	Threatened & Endangered Species
TMDL	Total Maximum Daily Load
TW	Tailwater (refers to the waters immediately downstream from a lock & dam)
UMRBA	Upper Mississippi River Basin Association
UMRBC	Upper Mississippi River Basin Commission
UMRCC	Upper Mississippi River Conservation Committee
UMESC	Upper Midwest Environmental Sciences Center
UMRR	Upper Mississippi River Restoration Program
UMR	Upper Mississippi River
USACE	U.S. Army Corps of Engineers
USAF	Upper St. Anthony Falls
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service, U.S. Department of Interior
USGS	U.S. Geological Survey, U.S. Department of Interior
VERS	Visitation Estimation and Reporting System
WIDNR	Wisconsin Department of Natural Resources
WLMTF	Water Level Management Task Force
WMA	Wildlife Management Area
WRDA	Water Resources Development Act

CHAPTER 1:

INTRODUCTION

1.1 PROJECT AUTHORIZATION*

The Rivers and Harbors Act of 1930 (Public Law 71-520) originally authorized the U.S. Army Corps of Engineers (Corps, USACE) to establish the Upper Mississippi River 9-Foot Channel Navigation Project (Project). Later authorizations modified the project by extending the navigation system to its present extent above St. Anthony Falls, Minnesota, to the mouth of the Missouri River. The Flood Control Act of 1944 (Public Law 78-534) authorized the Corps to construct, maintain, and operate public parks and recreational facilities at water resource development projects. Congress authorized the Navigation and Ecosystem Sustainability Program (NESP) in 2007 to address both critical capacity constraints on the inland navigation system and ecosystem restoration, but it has provided no appropriations to date.

1.2 PURPOSE AND SCOPE OF THE MASTER PLAN

The U.S. Army Corps of Engineers is the steward of the lands and waters at Corps water resources projects. Its Natural Resource Management Mission is to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations (Engineer Regulation [ER] 1130-2-540, Environmental Stewardship Operations and Maintenance Policies, Corps Natural Resource Management Mission Statement, Chapter 2 – Natural Resources Stewardship and ER 1130-2-550, Recreation Operations and Maintenance Policies, Chapter 2 – Recreation Management).

The primary goals of the Upper Mississippi River Master Plan for Resource Management (Master Plan) are to prescribe an overall land use management plan, resource objectives, and associated design and management concepts for implementation of a comprehensive natural resource and recreation management program on Corps-owned lands in the St. Paul District portion of the Upper Mississippi River 9-Foot Navigation Channel Project (EP 1130-2-550). It is intended to establish a clear, practical, and balanced approach to guide future environmental stewardship and public use development actions on those lands. It is also intended to classify all federally owned lands within the project area to effectively accomplish ecosystem management and outdoor recreation objectives as a component of the larger navigation project.

As a dynamic, operational document, the 2020 Master Plan is broad, flexible, and based upon changing conditions. All Corps actions and actions by those individuals who are granted management authority to Corps lands must be consistent with the master plan. Therefore, the master plan must be updated regularly to provide effective guidance to the Corps' decision-making process. The first master plan for project lands was completed in 1948. The current revision replaces the 1983 (Part I) and 1988 (Part III) updated master plan and the subsequent 2011 Land Use Allocation Plan (Part II). The current plan is reflective of changes in policy related to master plan content, format and land classification, including the newly updated Land Allocation and Land Classification (LALC)

plates in Appendix C – Land Allocation and Land Classification Plates. As a result of federal land along the river being cooperatively managed by the Corps and the U.S. Fish and Wildlife Service (USFWS), including the Upper Mississippi River National Wildlife and Fish Refuge (Refuge) via the 2001 amendment to the cooperative agreement (see section 1.7.1 Interagency Agreements), both agencies have worked together in the preparation of LALC to ensure future management decisions are jointly made in accordance with established policy. A list of additional master plan updates and associated documents are provided in section 1.6 Listing of Pertinent Project Information.

The 2020 Master Plan is based on regional and local needs, resource capabilities and suitability, and expressed public interests consistent with authorized project purposes, pertinent legislation, and regulations. It provides a district-level policy consistent with national objectives, other state and regional goals and programs. The 2020 Master Plan is intended to be conceptual and generally does not provide design or implementation details; these details are addressed in the subsequent Operational Management Plan (OMP), which implements the concepts of the master plan into operational actions.

To ensure compliance with federal laws and regulations, including the National Environmental Policy Act (NEPA), the Corps prepared an Environmental Assessment (EA) to identify and evaluate potential impacts to the affected environment. The EA can be found in Appendix A – Environmental Assessment.

1.2.1 RELATIONSHIP TO OTHER PLANS AND PROGRAMS

The 2020 Master Plan is the guiding document for resource management objectives on Corps-owned project lands. Though classification of all refuge lands, regardless of ownership, has been completed as part of this plan; the plan in no way supersedes any refuge planning documents, including the current Comprehensive Conservation Plan (CCP) and Habitat Management Plan (HMP) for the refuge. Instead, the 2020 Master Plan should be considered a companion plan that specifically guides management on Corps-owned land. Numerous other plans relate to management of navigation, dredged material, emergency management, flood risk management, or other missions related to the Corps' authorized programs in the project area. The 2020 Master Plan also does not supersede any of those plans; however, any planning in other Corps programs that has the potential to impact stewardship of natural resources and availability of public recreation on Corps-owned land should be consistent with the objectives and principles outlined in the 2020 Master Plan. Chapter 6 includes some additional information on other related plans and programs.

1.3 PROJECT PURPOSE*

The Upper Mississippi River 9-Foot Channel Navigation Project is a congressionally authorized mission to provide a 9-foot navigation channel on the Upper Mississippi River (UMR) system from the Missouri River up the Mississippi River to Minneapolis and portions of the Illinois River. The St. Paul District portion of the project, encompasses navigation, recreation, and natural resource management on lands and waters of the UMR either owned or managed by the Corps for the purposes of the navigation project.

1.3.1 NAVIGATION

River modifications to improve navigation on the UMR were first authorized by Congress in 1824, when the Corps was given responsibility to remove snags, shoals, and sandbars and to close sloughs and backwaters to allow more flow to the main channel, thus resulting in deeper depths for

navigation. Congress passed the Rivers and Harbors Appropriation Act of 1826, the first act to combine survey authorizations and projects.

In subsequent congressional authorizations, the Corps continued to improve navigation. The first comprehensive modification of the river for navigation was authorized by the Rivers and Harbors Act of 1878. This legislation authorized a 4.5-foot channel from the mouth of the Missouri River to St. Paul, Minnesota. The 4.5-foot channel was maintained by constructing dams at the headwaters of the Mississippi River to impound water for low flow supplementation, bank revetments, closing dams, and longitudinal dikes.

A 6-Foot Channel Navigation Project was authorized by the Rivers and Harbors Act of 1907. The additional depth for the 6-foot channel was obtained by increased wing dam construction and supplemented by minimal dredging. The authorization also included shoreline protection with rock revetments to prevent erosion on banks opposite wing dam fields.

The Rivers and Harbors Act of 1930 authorized the Upper Mississippi River 9-Foot Channel Navigation Project, resulting in the construction of the existing lock and dam system. The 9-foot navigation channel and associated locks and dams were constructed for the sole purpose of providing enough water depth for commercial navigation via water level regulation. Locks and dams 1 through 10 were operational in 1938, while the addition of Lower St. Anthony Falls (LSAF) and Upper St. Anthony Falls (USAF) locks and dams were not completed until 1959 and 1963, respectively. Impoundment behind dams created a series of slack water areas, known as navigation pools, with the river and floodplain upstream of a lock and dam being given a pool number associated with that lock and dam.

The 1930 legislation also gave the Corps the authority to maintain the 9-foot navigation channel depth through dredging and other channel improvements. The St. Paul District continues to dredge within the navigation pools and maintains channel training structures to ensure navigable depth and width as authorized by Congress.

The 2020 Master Plan project area encompasses 13 locks and dams along the UMR. Lock and dam locations, river miles (RM), and dimensions are listed in Table 1-1 below.

Table 1-1. UMR lock and dam locations.

Lock and Dam	Location	River Mile	Dimensions (W' x L')
USAF*	Minneapolis, Minnesota	853.9	56' x 400'
LSAF*	Minneapolis, Minnesota	853.3	56' x 400'
1	Minneapolis, Minnesota	847.9	56' x 400'
2	Hastings, Minnesota	815.2	110' x 600'
3	Welch, Minnesota	796.9	110' x 600'
4	Alma, Wisconsin	752.8	110' x 600'
5	Minnesota City, Minnesota	738.1	110' x 600'
5A	Fountain City, Wisconsin	728.5	110' x 600'
6	Trempealeau, Wisconsin	714.1	110' x 600'
7	La Crescent, Minnesota	702.5	110' x 600'
8	Genoa, Wisconsin	679.2	110' x 600'
9	Lynxville, Wisconsin	647.9	110' x 600'
10	Guttenberg, Iowa	615.0	110' x 600'

*Upper St. Anthony Falls locks have been closed to all traffic since 2015.

1.3.2 NATURAL RESOURCES

Management and conservation of natural resources, through environmental stewardship, mitigation, and enhancement activities, are the basis of the Corps' Natural Resource Management (NRM) Mission. According to the Fish and Wildlife Coordination Act (FWCA), fish and wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs. In accordance with these laws, environmental stewardship and recreation are the primary missions guiding management of project lands along the Mississippi River. The Corps integrates the management of diverse natural resource components such as fish, wildlife, forests, wetlands, grasslands, soil, air, and water with the provision of public recreation opportunities. The Corps conserves natural resources and provides public recreation opportunities that contribute to the quality of American life.

1.3.3 RECREATION

The Corps is one of the nation's leading federal providers of outdoor recreation opportunities. The mission of providing the nation with recreation areas was authorized by the Flood Control Act of 1944, as amended, which allowed for the construction of recreational development at water resource projects. The Corps maintains more than 400 lake and river projects within 43 states, providing almost 370 million visitors nationally per year with hiking, boating, fishing, camping, and a myriad of other outdoor activities. The Corps' NRM mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality outdoor public recreation experiences to serve the needs of present and future generations.

The project contains a wide variety of recreational facilities that includes campgrounds, picnic areas, boat ramps, trails, and other day use areas that can be utilized by the public. The Corps and partners provide opportunity for water-based recreational activities such as paddle sports, boating, and swimming, along with opportunities to hunt, fish, camp, hike, bird watch, etc. The Corps leases land for private marina concessions and with partners, provides numerous boat ramps. These recreation

areas and their future path forward are covered within Chapter 5 and Chapter 8 of the 2020 Master Plan.

1.4 PROJECT AREA

The 2020 Master Plan is limited to the Corps, St. Paul District boundary. The portion of the Mississippi River that the project encompasses begins in Minneapolis, Minnesota just below USAF (RM 854.0) and ends near Guttenberg, Iowa, downstream of Lock and Dam 10 (RM 614.0). Including LSAF Pool, the 240-mile section of river is made up of 13 locks and dams and associated navigation pools (Figure 1-1). It also includes 562 acres of mitigation property in Pierce County, Wisconsin, that is outside of the Mississippi River floodplain. The approved Upper Mississippi River 9-Foot Channel Navigation Project also includes 14.7 river miles of the Minnesota River, 24.5 river miles of the St. Croix River, and 1.4 river miles of the Black River. The Corps' stewardship responsibilities and authorities for the resources along these rivers are limited because no Corps fee title land lies along the shorelines of these river segments. There are no plates or land classifications for these areas. The project overlaps with three states: Minnesota, Wisconsin, and Iowa, that contain federal fee and title lands that are owned and managed by the Corps and the USFWS. Federally-owned land in the UMR floodplain south of the St. Paul District, and thus outside of the project covered in the 2020 Master Plan, is covered by individual master plans for the Corps' Rock Island (RM 614.0–300.0) and St. Louis Districts (RMs 300.0–0.0).

Channel maintenance activities, natural resource management, and regulatory functions are major management components on the Corps' fee title lands within the UMR floodplain and on mitigation lands. The Mississippi River recreation and environmental stewardship functions are headquartered in La Crescent, Minnesota. An additional staffing office is located at Blackhawk Park, in De Soto, Wisconsin, which directly manages Blackhawk Park (Figure 1-1). Project-specific administration and maintenance facilities along with interpretive displays and/or visitor centers are located at each navigation facility.

The NRM program is responsible for natural resource management, environmental stewardship, outdoor recreation, health and safety of visitors, visitor assistance, and boundary management. The Corps is responsible for locking river vessels and maintenance of lock and dam structures. Operations staff ensures needed dredging occurs to maintain proper channel depth, and they ensure channel training structures are properly maintained and utilized.

The 240 linear miles of the UMR and patchwork of federal and non-federal land make this project unique among Corps' water resource projects, which usually involve a single reservoir or lake. Lands that were acquired in connection with the development of the project predominately consist of an area of floodplain of variable width along each bank and the islands or portions of islands in the river.

There are five Corps managed recreation sites, including boat landings, within the project as well as other outgrant recreation areas (see section 2.4.5 Real Estate, and section 5.2 Corps-Owned Recreation Areas [Managed and Outgranted]). The project contains varied natural and recreation resources, often with high scenic, educational, scientific, wildlife, and cultural values. For this reason, federally owned lands are important to agencies and stakeholders involved with this project.

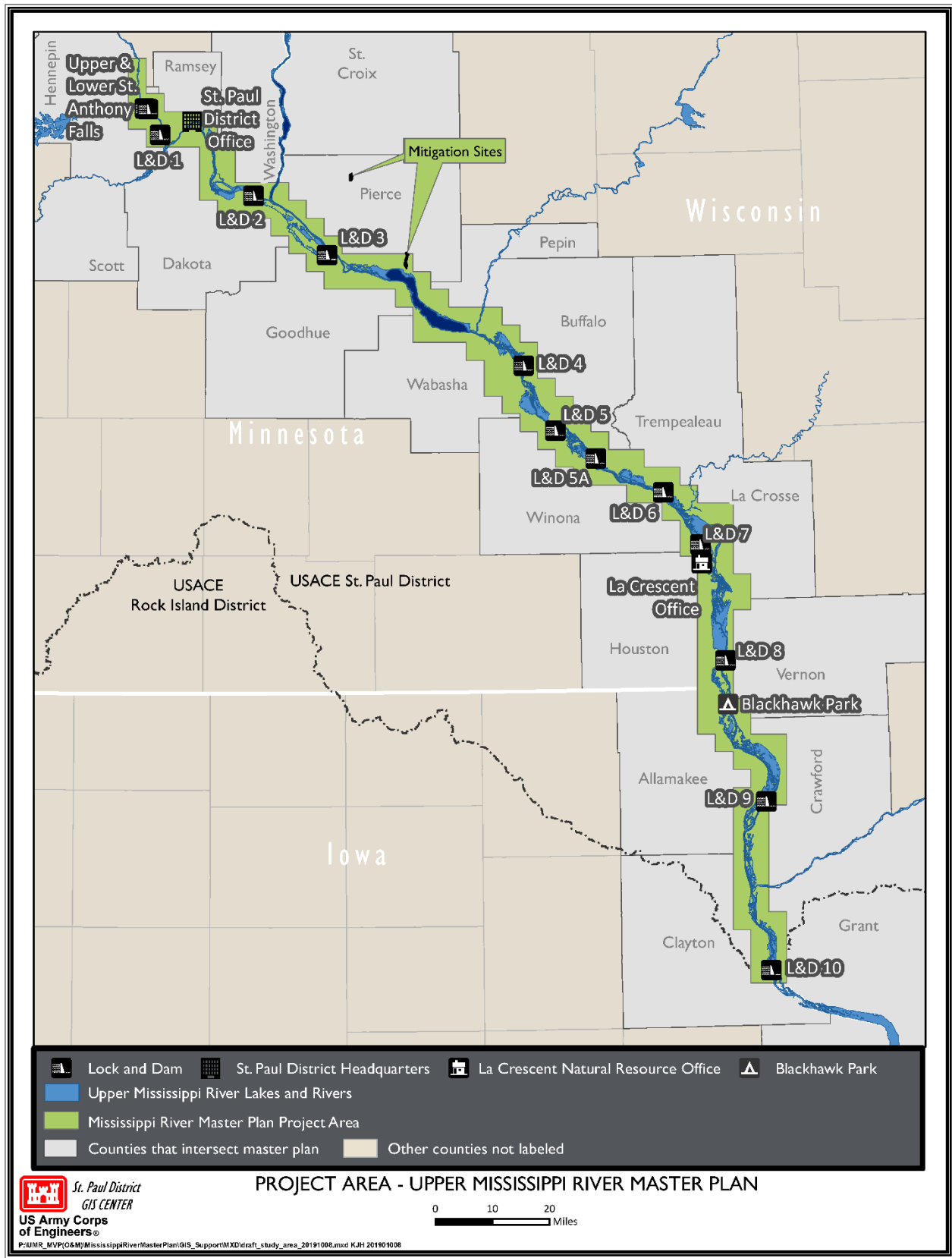


Figure 1-1. 2020 Master Plan scope and study area.

1.4.1 PUBLIC LANDS

The St. Paul District administers public lands throughout the project. The Corps acquired fee title to 51,576 acres of land in the district prior to the construction of the locks and dams system as part of the project. Of this, 24,171 acres remain above the normal pool level. These lands encompass roughly one-third of the terrestrial area within navigation pools 1 through 10 of the Mississippi River. The majority of the remaining land is owned by the USFWS and forms the Upper Mississippi River National Wildlife and Fish Refuge. A small proportion of land in the floodplain is owned and managed by the states of Wisconsin, Minnesota, and Iowa, as well as scattered municipal entities.

The distribution of land and access to the project boundaries vary. Limited Corps fee title land exists above Lock and Dam 2 in Hastings, Minnesota, with most land between pools 3 through 10. Often federal land access is blocked by railroads or sloughs, or if the property occurs on islands, with access only available by boat. A small but important piece of ownership covers shorelines adjacent to residential-type developments. These shorelines are primarily governed by the rules and regulations found in the St. Paul District's Shoreline Management Plan (SMP) and are frequently visited for inspection purposes. Additional lands are outgranted to other agencies, municipalities, and entities via various real estate instruments for the purpose of recreation and other uses.

The refuge was established in 1924 by the Upper Mississippi River National Wildlife and Fish Refuge Act (Public Law 68-268) for safety and breeding for migratory birds, fish, other wildlife, and plants. The refuge encompasses approximately 240,000 acres of the Mississippi River floodplain that stretches nearly 261 river miles from Wabasha, Minnesota, to near Rock Island, Illinois. The Refuge is divided into four districts for management, administrative, and public service effectiveness and efficiency. The Refuge districts covered in the 2020 Master Plan include all of the Winona District and La Crosse District and pools 9 and 10 of the McGregor District. The Savanna District of the refuge occurs exclusively within the Corps' Rock Island District. The Trempealeau National Wildlife Refuge also occurs in Pool 6 within the project, but as a separate refuge from the Upper Mississippi River National Wildlife and Fish Refuge, the Trempealeau National Wildlife Refuge is not included in the 2020 Master Plan.

In accordance with the Fish and Wildlife Coordination Act of 1946 (Public Law 79-732), general plans for the use of project lands for wildlife conservation and management were drawn up between the Corps, USFWS, and the respective states. The Fish and Wildlife Coordination Act of 1958 (Public Law 85-624) further requires that planning and project development on these lands are coordinated with the USFWS.

A general plan was developed for each state. In Minnesota, the Corps, USFWS, and Minnesota Department of Natural Resources agreed that the Corps would outgrant lands directly to Minnesota for wildlife management purposes, which resulted in the incorporation of 3,737 acres of Corps fee title land in Pool 3 into the Gores Pool #3 Wildlife Management Area (WMA). In pools 4 through 10, the USFWS cooperatively manages the Corps' fee title lands as part of the Refuge. The land was made available via the general plan process, resulting in a cooperative agreement (CA) between the Corps and USFWS. Though significant acreage in this area is owned in fee title by the Corps, roughly 81.5 percent of the St. Paul District, Corps-owned land in the UMR Basin has been incorporated into the refuge. See section 6.1.2 Roles of Cooperating Agencies for Project Land Management, for more details on cooperative management of ecological resources in the UMR Basin and for details of the CA.

No lands are currently outgranted to the Wisconsin or Iowa Departments of Natural Resources for wildlife management; however, the Corps does maintain real estate agreements with these states for the management of recreation and day use areas throughout the project.

An additional 562 acres in mitigation lands in Pierce County, Wisconsin, were acquired in the mid-2000s, for which the Corps is currently the sole land manager and maintains natural resource and recreation management responsibilities. Between the Mississippi River floodplain and these mitigation lands, the project accounts for 24,733 acres of emergent fee title land above pool elevation and 170,662 acres of water surface created via the locks and dams.

Unlike other master plans, which are specific only to the Corps' fee title lands, the land allocation and classification in the 2020 Master Plan includes USFWS fee title lands (see Chapter 4). The plan reflects the close working relationship established through the FWCA legislation and CA described above and as evidenced in previous Land Use Allocation Plans and the 2020 Master Plan.

In the early 1980s, the Corps and USFWS developed a new master plan for the federally-owned lands within the UMR and within the project. Through several coordination meetings it was decided that if the two agencies carried out their planning jointly, the policies established would be more compatible and the general public would be able to review and comment on all federal policy at one time. The decision was made to produce a joint document called the Land Use Allocation Plan (LUAP). As a result, the first LUAP was approved by the two agencies in September 1983, and was subsequently updated in 2011. The current update, now referred to as a Land Allocation/Land Classification (LALC) plan, has been carefully reviewed by both agencies to ensure that federal mandates are balanced and maintained. The current plan will continue to be a document jointly used by both the Corps and USFWS, though USFWS management actions on lands allocated and classified in this plan are contingent upon the approved alternatives defined in the Upper Mississippi River National Wildlife and Fish Refuge Comprehensive Conservation Plan (CCP) (USFWS, 2006a) and Habitat Management Plan (2019).

1.4.2 NAVIGATIONAL SERVITUDE

Navigational servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution to use, control and regulate the navigable waters of the United States. It includes submerged lands and water flowing over them, and it pertains to all lands below the ordinary high-water mark of a navigable river. Servitude is a concept of authority, not of property, and it expresses the notion that the right of the public to use a waterway supersedes any claim of private ownership.

1.4.3 SHORELINE

Shoreline areas and islands under federal-fee ownership provide numerous recreational opportunities within the navigation pools. This includes providing recreation areas managed by the Corps, USFWS, and other entities. Because it was constructed before December 13, 1974, the project also includes allowance for privately-owned recreational structures on project lands in specified areas such as cottage lease sites and shoreline management areas. On project lands in pools 3 through 10, there are approximately 500 shoreline-use permits for docks, lifts, and floating boathouses and over 200 licenses for stairways, sheds, and other land-based facilities. The Recreation and Natural Resource Branch administers this program, which includes inspections of facilities, maintaining records, initiating renewals, facilitating transfers and collecting fees. General information on shoreline management is included in Chapter 6. The Shoreline Management Plan is a separate document, although it is related and complementary to the 2020 Master Plan.

1.5 PRIOR DESIGN MEMORANDUMS & MASTER PLANNING DOCUMENTS*

The original master plan was approved in 1948, with revisions made in 1965, 1968, 1972, 1983, 1988, and 2011. The LUAP was last updated in 2011. Two step-down plans, the Shoreline Management Plan (SMP) and the Operational Management Plan (OMP), provide detailed guidance on the implementation of objectives in the master plan. The current SMP, approved in January 1988, is the project's guiding document for managing private, exclusive use on Corps property. The OMP, approved in January 1993, provides a framework for natural resource management and recreation development and outlines an annual work plan to implement objectives. The 2020 Master Plan supersedes all previous project master plans. Following completion of the 2020 Master Plan, the St. Paul District SMP and OMP will be updated pending availability of funding. Table 1-2 lists previous planning documents and details which are or have been superseded by more current master planning.

Table 1-2. Upper Mississippi River Project (Pools 1–10, USAF, LSAF) planning documents.

Document	Date
Mississippi River Project Master Plan (Original)	February 1948, Revised 1956
Master Recreation Plan Part I	August 1965
Master Plan for Resource Management Part II	September 1972
Master Plan for Public Use Development and Resource Management Part I and Part II – Land Use Allocation Plan	September 1983, Revised 2011
Master Plan for Public Use Development and Resource Management – Part III, September 1988	September 1988
Shoreline Management Plan	January 1988
Operational Management Plan	January 1993
Channel Maintenance Management Plan	April 2001
Environmental Pool Plans (River Resources Forum)	January 2004
Upper Mississippi River Systemic Forest Stewardship Plan	August 2012

1.6 LISTING OF PERTINENT PROJECT INFORMATION*

The working relationship between the Corps and USFWS is well documented in the Upper Mississippi River National Wildlife and Fish Refuge CCP, which was approved in July 2006. The Corps participated fully in the CCP planning process and formally concurred with the CCP. All policy discussed in the 2020 Master Plan is intended to endorse and complement those policies set forth in the CCP.

The following excerpt is taken from the CCP:

“In an effort to help clarify agency roles and responsibilities, cooperative agreements were negotiated and signed in 1945, 1954, 1963, and 2001 (amended the 1963 agreement), each time bringing more clarity to who managed what within the refuge. An excellent and thorough history of the cooperative agreements is found in the CCP for Mark Twain National Wildlife Refuge Complex, Chapter 3, available at <http://midwest.fws.gov/planning/marktwain/index.html>.

In summary, the cooperative agreement, with some reservations, grants to the service [USFWS] the rights to manage fish, wildlife and its habitat on those lands acquired by the

Corps of Engineers. These lands are managed by the service as a part of the refuge and the National Wildlife Refuge System. The Corps of Engineers retained the rights to manage as needed for the navigation project, forestry, and Corps of Engineers managed recreation areas, and all other rights not specifically granted to the service. A copy of the cooperative agreement can be found [online](http://www.fws.gov/midwest/planning/uppermiss) (<http://www.fws.gov/midwest/planning/uppermiss>).

As part of the planning process, the refuge-initiated efforts with the Corps to amend the current agreement to clarify language on the responsibility and authority of each agency, especially regarding recreational uses. These discussions will continue. Other conflicts over the years between navigation, fish and wildlife conservation, and recreation influenced the refuge and the Corps' cooperative working arrangements. In 1974, the Corps and the service began work on a long-range management strategy for the UMR.

A broad-based task force representing five states and several federal agencies was formed under the auspices of the Upper Mississippi River Basin Commission and became the Great River Environmental Action Team (GREAT). The Great River Study (H.R. 15225) was authorized by Congress in 1976 and called upon the Corps, in concert with other agencies and the states, to develop a management plans throughout the UMR that looked at the needs of navigation, barge traffic, fish and wildlife, recreation, watershed management, and water quality. As a result, GREAT I (Minneapolis, Minnesota – Guttenberg, Iowa), GREAT II (Guttenberg, Iowa – Saverton, Missouri) and GREAT III (Saverton, Missouri – Cairo, Illinois) were completed by the appropriate Corps district, which gave a comprehensive look at all aspects of the UMR and provided the institutional framework for the service, the Corps, states and other agencies to work together to meet often regarding divergent needs and mandates. In 1978, Congress mandated that the UMRBC complete a comprehensive master plan for the UMR, which includes the refuge. The plan was completed in 1982 and encompassed many of the recommendations developed in the GREAT studies for dredge material disposal, fish and wildlife conservation, and recreation management.

In 1983, the service and the Corps (St. Paul District), in cooperation with Minnesota, Wisconsin, and Iowa, completed the first Land Use Allocation Plan for refuge and the Corps acquired lands in Pools 1-10 (Pools 4-10 affect the refuge). The plan, through policy statements and detailed maps, provided a clear, practical, and balanced plan to guide future federal land use actions. In effect, the plan was a zoning plan for federal lands, allocating lands in the floodplain for wildlife management, navigation project operations, low-density recreation, intensive recreation, and natural areas.”

1.7 POLICY CONSIDERATIONS

The 2020 Master Plan and EA were prepared in accordance with the following guidance:

1.7.1 INTERAGENCY AGREEMENTS

General Plans, March 9 – November 2, 1953, revised March 8, 1961 – General plans for the use of project lands for wildlife conservation and management were drawn up in accordance with the Fish and Wildlife Coordination Act of 1946 (Public Law 79-732). Through this agreement, the Secretary of the Army made certain project lands available to the Secretary of the Interior for Wildlife Conservation and Management. The Secretary of the Interior may, in turn, make these lands available to the respective state conservation agencies for administration.

Memorandum of Agreement, April 18, 1973 – A Memorandum of Agreement (MOA) between the Corps and the U.S. Coast Guard clarifies areas of jurisdiction and responsibilities under federal statutes to regulate certain activities in navigable waters of the United States. The agreement covers alteration of bridges; construction, operation, and maintenance of bridges and causeways; closure of waterways and restriction of passage under bridges; and design of flood flows. The agreement also requires mutual coordination and consultation on projects and activities in or affecting navigable waters.

Cooperative Agreement, 2001 – Through cooperative agreements (CAs) between the Department of the Army (DA) and the Department of the Interior (DOI), Bureau of Sport Fisheries and Wildlife (now the USFWS), certain Corps lands and waters in the project area were made available to the DOI for conservation and wildlife management. Previous CAs were negotiated in 1945, 1954, and 1963. The 2001, the CA amended the previous agreements. However, the DA retains the right to develop public use facilities, conduct forest management, and issue leases and easements for public use and special licenses for non-exclusive private uses. Under this agreement, every proposal to develop a public use area must be coordinated with the USFWS, and the Corps must consider any adverse effect that a proposed development may have on the wildlife management program. The agreement stipulates the USFWS must submit an annual management plan to the Corps' Division and District Engineers.

1.7.2 EXECUTIVE ORDERS

Executive Order 11593, May 13, 1971 – The executive order requires the federal government to provide leadership in preserving, restoring and maintaining the historic and cultural environment of the nation. Federal agencies shall: (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans, and programs in such a way that federally-owned sites, structures, and objects of historical, architectural, or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation, institute procedures to assure that federal plans and programs contribute to the preservation and enhancement of non-federally-owned sites, structures, and objects of historical, architectural, or archaeological significance.

Executive Order 11988, May 24, 1977 – The executive order, which superseded Executive Order 11296, places new emphasis on environmental aspects of floodplain management. It requires federal agencies to recognize the significant values of floodplains and to consider the public benefits that would be realized from restoring and preserving floodplains. The executive order requires the Corps to provide leadership and to take action to avoid development in the base floodplain unless it is the only practical alternative, to reduce the hazards and risks associated with floods, to minimize the impact of floods on human safety and welfare, and to restore and preserve the natural and beneficial values of the base floodplain.

Executive Order 13112, February 3, 1999, as amended – The executive order states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law shall: (1) identify such actions, (2) use relevant programs and authorities to prevent, control, monitor, and research such species, and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.

1.7.3 ENGINEER MANUALS, PAMPHLETS, AND REGULATIONS

The following Corps Engineer Manuals (EMs), Engineer Regulations (ERs), and Engineer Pamphlets (EPs) govern activities on the Corps' project lands:

Engineer Manual

EM 1110-1-400, Recreation Facility and Customer Services Standards, 01 November 2004 – This regulation provides guidance compiled from experience and research for use in the planning and design of recreation areas, sites, and facilities.

Engineer Pamphlets

EP 1130-2-550, Recreation Operations and Maintenance Policies, 15 November 1996, Revised 30 January 2013 – This pamphlet establishes guidance for the management of recreation programs and activities and for operation & maintenance (O&M) of Corps recreation facilities and related structures, at civil works water resource projects. It supplements ER 1130-2-510, Hydroelectric Power Operations and Maintenance Policies.

EP 1165-2-1, Digest of Water Resources Policies and Authorities, 30 July 1999 – This pamphlet establishes guidance for the management of Flood Risk Management (formerly known as Flood Damage Reduction).

EP 1165-2-316, Rules and Regulations Governing Public Use of Corps of Engineers Water Resource Development Projects, 05 May 2000 – This regulation governs the public use of water resources development projects administered by the Chief of Engineers.

Engineer Regulations

ER 200-1-5, Policy for Implementation and Integrated Application of the USACE Environmental Operating Principles and Doctrine, 30 October 2003 – This regulation provides specific policy and guidance for implementation and the integrated application of USACE's Environmental Operating Principles (EOP) and associated doctrine across the full spectrum of USACE's program management initiatives and business processes.

ER 200-2-2, Procedures for Implementing the National Environmental Policy Act, 04 March 1988 – This regulation provides guidance for implementation of the procedural provisions of (NEPA) for the Civil Works Program of the Corps. It supplements Council on Environmental Quality (CEQ) regulations 40 CFR 1500-1508, 29 November 1978, in accordance with 40 CFR 1507.3, and is intended to be used only in conjunction with the CEQ regulations.

ER 200-2-3, Environmental Compliance Policies, 30 October 1996, revised 29 October 2010 – This regulation established the policy for the management of environmental compliance related O&M activities at Corps Civil Works and military projects and facilities.

ER 405-1-12, Real Estate Handbook, 30 September 1994 – This is a restricted file; contact your publication point of contact for a copy.

ER 1105-2-100, Planning Guidance Notebook, 22 April 2000, Updated 20 November 2007 – This regulation describes the types of Army Civil Works planning programs and studies, the various purposes served by water resource projects, principle guidelines and procedures for formulating and evaluating water resource plans, and the Washington-level review process.

ER 1110-2-400, Engineering and Design, Design of Recreation Sites, Areas, and Facilities, 31 May 1988 – This regulation establishes policy and guidance for the design of recreation sites, areas and facilities.

ER 1130-2-406, Shoreline Management at Civil Works Projects, 31 October 1990 / 28 May 1999 – The purpose of this regulation is to provide policy and guidance on management of shorelines of Civil Works projects where 36 CFR Part 327 is applicable. Defines the Corps’ policy on managing recreational use and identifies specific management procedures to deal with private use on Corps administered lands and waters at all Civil Works projects. The regulation also states that each district engineer has the responsibility to evaluate the compatibility of existing private recreation use with project purposes.

ER 1130-2-500, Partners and Support (Work Management Policies), 27 December 1996, Change 01 June 2006 – This regulation establishes the policy for the management of O&M activities of Corps personnel performing Civil Works functions related to navigation, dredging, environmental stewardship, and recreation services at water resource projects. Programs described include cooperating associations, volunteer, contributions, and challenge cost share among others.

ER 1130-2-520, Navigation and Dredging Operations and Maintenance Policies, 29 November 1996 – This regulation establishes the policy for district commanders to operate and maintain jetties, groins, and breakwaters for their functions as navigation aids and shoreline protection structures in a manner that does not enhance or encourage recreational or other public use unless a non-federal entity has sponsored recreation.

ER 1130-2-530, Flood Control Operations and Maintenance Policies, 30 October 1996 – This regulation, in addition to ER 1130-2-500, established the policy for O&M of Corps flood control and related structures at Civil Works water resource projects and of Corps-built flood protection projects operated and maintained by non-federal sponsors.

ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies, 15 November 1996, Updated 11 August 2008 – This regulation establishes the policy for the management of O&M activities of the Corps personnel performing Civil Works functions related to flood control, navigation, dredging, hydroelectric power generation, environmental stewardship, and recreation services at water resource, waterway, and other Corps projects.

ER 1165-2-27, Establishment of Wetlands Areas in Connection with Dredging, 18 August 1989 – This regulation provides guidance for the establishment of wetlands areas in connection with dredging required as part of water resource development projects.

ER 1165-2-400, Recreation Planning, Development, and Management Policies, 09 August 1985 – This regulation defines objectives and policies governing planning, development, and management of outdoor recreational resources, plus enhancement of fish and wildlife at Corps water resource projects.

1.8 PERTINENT PUBLIC LAWS*

This section discusses the federal statutes, other applicable laws, executive orders, interagency agreements, and regulations that affect development and management of the project.

1.8.1 NAVIGATION

Public Law 71-520, July 3, 1930 – The River and Harbor Act of 1930 (46 Stat. 918) authorized the Upper Mississippi River 9-Foot Navigation Channel Project, to be achieved by constructing a system of locks and dams, supplemented by dredging. This act also authorized the Secretary of the Army to acquire land for the project.

Public Law 86-645, July 14, 1960 – Section 107 of the River and Harbor Act of 1960 (74 Stat. 480), as amended, provides authority for the Corps to develop and construct small navigation projects, including small-boat harbors for recreational boaters. Although Section 107 authorizes the Corps to plan and construct such projects, only general navigational facilities can be provided as a federal project. Terminal facilities and interior dredging are local responsibilities.

Public Law 95-217, December 27, 1977 – The Federal Water Pollution Control Act of 1977, also called the Clean Water Act of 1977 (91 Stat. 1566), amends earlier acts to establish a more effective program of water pollution control by extending federal authority and increasing construction grant authority. Section 404(b) of the act requires an evaluation of dredged material disposal activities to ensure compliance with guidelines developed by the administrator of the U.S. Environmental Protection Agency (EPA) and the Secretary of the Army. Section 404(t) authorizes any state to regulate, in accordance with its laws, the discharge of dredged material, in any portion of the navigable waters within the jurisdiction of the state that results from maintenance dredging involving Corps navigation projects.

Public Law 95-502, October 21, 1978 – The Inland Waterways Revenue Act of 1978 (92 Stat. 1693) provides a schedule for taxing fuel used in commercial transportation on inland waterways. Sections 203 and 204 of this act established an Inland Waterways Trust Fund (in which fuel tax receipts are to be deposited) and specify its use. Money in this fund is reserved for future construction and rehabilitation to facilitate navigation. Section 101 stipulated that the Upper Mississippi River Basin Commission (UMRBC), now the Upper Mississippi River Basin Association (UMRBA, circa 1981), prepare a comprehensive master plan for the Upper Mississippi River system. No replacement, construction, or rehabilitation that expanded the navigational capacity of locks and dams or channels was to be undertaken by the Secretary of the Army until Congress approved the UMRBC master plan, except for the construction of a single 1,200 foot-long lock at Lock and Dam 26 and for necessary operation and maintenance.

1.8.2 RECREATION

Public Law 78-534, December 22, 1944 – Section 4 of the Flood Control Act of 1944 (58 Stat. 887), as amended, authorizes the Chief of Engineers to construct, operate, and maintain public park and recreational facilities at water resource projects. It also allows for the water areas of all such projects to be open to the public use for boating, fishing, and other recreation provided that such use is not unsafe or detrimental to the primary purposes of the project.

Public Law 83-780, September 3, 1954 – Section 209 of the Flood Control Act of 1954 (68 Stat. 1256) amends the Flood Control Act of 1944 and authorizes the Secretary of the Army to grant licenses for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreation purposes.

Public Law 87-714, September 28, 1962 – The Refuge Recreation Act (76 Stat. 653), as amended, authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the primary purposes of these areas. This act authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental facilities and wildlife-orientated recreational development or for protection of natural resources. It also authorizes charging fees for public use.

Public Law 88-578, September 3, 1964 – The Land and Water Conservation (LAWCON) Fund Act of 1965 (78 Stat. 897), as amended, established a fund to help public agencies meet outdoor recreation demands and needs. The act authorized acquisition of lands for federally-administered

recreating areas plus matching grants for state recreation planning and for state and local land acquisition and development. Various state, county, and city parks along the UMR have been developed with LAWCON money, and it is the chief funding mechanism for continuing land acquisition within the generally recognized boundary of the Upper Mississippi River National Wildlife and Fish Refuge.

Public Law 89-72, July 9, 1965 – The Federal Water Project Recreation Act of 1965 (79 Stat. 213), as amended, established recreation at federal water resources projects as a full project purpose. This act requires consideration of recreation opportunities and of fish and wildlife enhancement in planning water resources projects. Section 2(a) specifies that benefits for recreation must be included in the economic analyses of proposed projects when a non-federal public agency agrees to administer the facility at its expense and to pay half of the separable first cost. Section 3(b) authorizes land acquisition to preserve the recreation potential of a project for a 10-year period, when no local sponsor can be found.

1.8.3 FISH AND WILDLIFE

Public Law 95-616, - The Migratory Bird Treaty Act of 1918, as amended, prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. This Act was originally between the U.S. and Canada. Today, the act also includes treaties between the U.S. and Mexico (1936), Japan (1972) and Russia (1976). The species protected by this law are primarily based on bird families and species. The treaty is intended to ensure the sustainability of populations of all protected migratory bird species.

Public Law 68-268, June 7, 1924 – The Upper Mississippi River National Wildlife and Fish Refuge Act (43 Stat. 650) authorized a refuge between Rock Island, Illinois and Wabasha, Minnesota. (Originally administered by the U.S. Department of Agriculture, this refuge is now under the jurisdiction of the U.S. Department of the Interior, USFWS.) The Upper Mississippi River National Wildlife and Fish Refuge is designated as a refuge and breeding place for migratory birds. As prescribed by the Secretary of the Interior through regulations, this area also serves as a refuge and as a breeding and conservation area for other wild birds, game animals, furbearing animals, wildflowers, aquatic plants, fish, and other aquatic animal life.

Public Law 86-80, June 8, 1940 – The Bald Eagle Protection Act of 1940, as amended, provides protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

Public Law 79-732, August 14, 1946 – Section 3 of the Fish and Wildlife Coordination Act of 1946 (60 Stat. 1080) provides for use of water resource projects for the conservation, maintenance, and management of wildlife resources and wildlife habitat, to be administered by state agencies or the Secretary of the Interior. In accordance with this act, general plans for the use of Lands and Waters of the Navigation Channel Project for Wildlife Conservation and Management were formulated and approved by the Secretary of the Army, the Secretary of the Interior, and the heads of pertinent state agencies.

Public Law 80-697, June 19, 1948 – Section 5(a) of the Anti-Drawdown Law of 1948 (62 Stat. 497) directs the Corps to give full consideration and recognition to the needs of fish and wildlife and their habitat dependent upon the waters of the Upper Mississippi River by operating and maintaining pool levels as though navigation were carried on throughout the year, to the maximum extent possible.

Public Law 85-624, August 12, 1958 – The Fish and Wildlife Coordination Act of 1958 (72 Stat. 563) requires that fish and wildlife conservation receive equal consideration with other project

purposes and that they be coordinated with other features of water resource development programs. All planning and project development must be coordinated with the USFWS.

Public Law 89-669, October 15, 1966 – The National Wildlife Refuge System Administration Act of 1966 (80 Stat. 927), as amended, defines the National Wildlife Refuge System as including wildlife refuges, areas for the protection and conservation of fish and wildlife species that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. A 1997 amendment, known as the National Wildlife Refuge Improvement Act of 1997, established a mission for the refuge system and provided clear policy direction and management standards. The Secretary of the Interior is authorized to permit any use of an area, provided that such use is compatible with the major purposes for which such area was established. Any payments for right-of-way through such areas go into the Migratory Bird Conservation Fund for the acquisition of the additional lands. By regulation, up to 40 percent of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary of the Interior finds that hunting any species of migratory game bird in more than 40 percent of such an area would be beneficial to the species. This requires an act of Congress for the divestiture of lands in the system, except (1) that lands acquired through the Migratory Bird Conservation Fund may be divested upon approval of the Migratory Bird Conservation Commission, and (2) that any lands can be removed from the system by lands exchange, or if bought into the system by a CA, then these lands can be removed according to the terms of the agreement.

Public Law 93-205, December 28, 1973 – The Endangered Species Act of 1973 (87 Stat. 884), as amended, states the policy of Congress that all federal departments and agencies must seek to conserve endangered and threatened species. Section 7 requires each federal agency to consult with the Secretary of the Interior to ensure that authorized actions neither jeopardize the continued existence of any endangered or threatened species nor result in adverse modification of critical habitat. Unless previously completed and included in the project environmental impact statement, a biological assessment must identify any endangered species that, in the opinion of USFWS, may be affected by the project. This requirement applies to all civil works studies, projects, or programs and includes the O&M of completed projects.

1.8.4 ENVIRONMENTAL STEWARDSHIP AND RESTORATION

Public Law 86-717, September 6, 1960 – This law (74 Stat. 817) requires that projects be developed and maintained to encourage adequate forest resources. Forest management programs must be administered to increase the value of project lands for recreation and wildlife and to promote natural ecological conditions by following accepted conservation practices.

Public Law 94-587, October 22, 1976 – The Water Resources Development Act of 1976, Section 117, authorized funds to initiate the interagency Great River Environmental Action Team (GREAT) study.

Public Law 99-662, November 17, 1986 – The Water Resources Development Act of 1986 authorized the Upper Mississippi River Restoration Environmental Management Program (UMRR-EMP). EMP is intended to ensure the coordinated development and enhancement of the UMR with primary emphasis on habitat restoration and protection projects as well as long-term resource monitoring. Original authorization provided for a 10-year program starting in 1987; Section 405 of the Water Resources Development Act of 1990 (Public Law 101-640) extended the Program an additional 5 years; Section 509 of the Water Resources Act of 1999 (Public Law 106-53) extended the program.

Public Law 110-114, November 9, 2007 – Water Resources Development Act of 2007 authorized the Navigation and Ecosystem Sustainability Program (NESP). This act authorized \$2.2 billion in navigation improvements and \$1.7 billion in ecosystem restoration activities on the UMR and Illinois Waterway.

1.8.5 CULTURAL AND HISTORICAL CONSIDERATIONS

Public Law 59-209, June 8, 1906 – Public Law 59-209, the Antiquities Act of 1906 (34 Stat. 225), 8 June 1906, provides for the privation and protection of antiquities on public lands. This includes archeological remains and historic sites. The act makes it a federal offense to appropriate, excavate, injure, or destroy any historic ruin or monument located on lands owned or controlled by the federal government, without permission from the Secretary of the Department having jurisdiction over those lands.

Public Law 86-523, June 27, 1960 – The Reservoir Salvage Act of 1960 (74 Stat. 220), as amended by Public Law 93-291 (88 Stat. 174), specifically provides for preservation of historical and archaeological data that might otherwise be irreparably lost or destroyed as a direct result of any federal construction project or any federally-licensed project, activity, or program. For federal construction projects, up to 1 percent of the authorized appropriation for the project may be expended for survey and mitigation work. For emergency programs, no recovery or mitigation work is required if such work would impede the emergency action.

Public Law 89-665, October 15, 1966 – The National Historic Preservation Act of 1966 (80 Stat. 915), as amended by Public Law 96-515 (94 Stat. 2987) – Established national policy for historic preservation, authorized the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and created the Advisory Council on Historic Preservation. Section 101 of Public Law 89-665 authorized the Secretary of the Interior to grant funds to individual states for comprehensive statewide historic surveys. These surveys were to inventory historic, archeological resources within states. Many of the counties along the Mississippi River in Iowa, Minnesota, and Wisconsin have been surveyed by the State Historic Preservation Offices in the last decade. Section 106 specifies that federal agencies, before approval of any expenditure or before issuance of any license, must consider the effect of the action on any property included in or eligible for the NRHP and must afford the advisory council on historic preservation a reasonable opportunity to comment on this action. Section 110 requires each federal agency to establish a program to locate, inventory, and nominate all properties under the agency's ownership or control that appear to qualify for inclusion on the national register.

Public Law 96-95, October 31, 1979 – The Archaeological Resources Protection Act of 1979 (93 Stat. 721) provides excavation and removal of archaeological resources on public or Indian lands, by qualified individuals with a permit from the federal land manager. The act establishes criminal and civil penalties for persons engaged in illegal excavation, removal, or damage to archaeological resources or in the sale, purchase, exchange, or transportation of illegally-removed resources. This act authorizes rewards for information that leads to conviction. It authorizes the forfeiture of archaeological resources, equipment, and vehicles involved in a violation. It authorizes the federal land manager to withhold disclosure of the location and nature of archaeological resources. The act also provides for cooperation with private individuals having collections obtained before passage of this act.

CHAPTER 2:

PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT*

2.1 INTRODUCTION

This chapter builds the framework for the master plan as it will set up the environmental and ecological characteristics, facilities, and the factors that influence management decisions. The master plan is quite different from other Corps master plans in that it encompasses multiple states and pools throughout the Upper Mississippi River (UMR) Basin. To establish the project setting, each pool within the project will be described briefly and include any unique characteristics that may influence management decisions.

2.2 PHYSICAL SETTING

2.2.1 THE MISSISSIPPI RIVER BASIN

The Mississippi River is the largest riverine ecosystem in North America and third largest in the world. The Mississippi River is also one of the world's major river systems in size, habitat diversity, and biological productivity, flowing 2,340 miles from its source at Lake Itasca in the Minnesota north woods, through the mid-continental United States and the Gulf of Mexico Coastal Plain, to its subtropical Louisiana Delta (Kammerer, 1990). The reach of the basin extends from the Allegheny Mountains in the eastern United States to the Rocky Mountains, including all or parts of 31 states (Figure 2-1) and two Canadian provinces. It measures 1,857,840 square miles, covering about 40 percent of the United States and about one-eighth of North America.

2.2.2 UPPER MISSISSIPPI RIVER WATERSHED

The northern portion of the larger Mississippi River, the UMR, includes all the commercially navigable waterways on the Mississippi River and tributaries above Cairo, Illinois (Figure 2-2), with the exception of the Missouri River and its tributaries. The St. Paul District is responsible for the upper portion of the Mississippi River between Minneapolis, Minnesota to Guttenberg, Iowa (240 river miles).

The combined floodplains of the upper section of the Mississippi and its major tributaries, the Illinois, Kaskaskia, Minnesota, Black, and St. Croix rivers, cover approximately 2.6 million acres and constitutes the largest continuous wetland system in North America (USACE, 2012). The UMR floodplain ecosystem consists of a mosaic of bottomland forests, grasslands, islands, backwaters, side channels and wetlands – all of which support more than 300 species of birds, 57 species of mammals, 45 species of amphibians and reptiles, 150 species of fish, and nearly 50 species of mussels. It is a migratory flyway for more than 40 percent of North America's migratory waterfowl and shorebirds

and a globally important flyway for 60 percent of all bird species in North America (USACE, 2012; National Park Service, 2016).

This floodplain ecosystem, especially in the context of its size and connectivity, is unique to the Midwest, the United States, and the world. Lands in the UMR floodplain constitute part of one of the “largest blocks of floodplain habitat in the lower 48 states,” habitats considered by non-governmental conservation organizations to be a critical area of habitat and was designated in 2010 by the United States government as a Wetland of International Importance through the Ramsar Convention on Wetlands of International Importance (USFWS, 2006a).

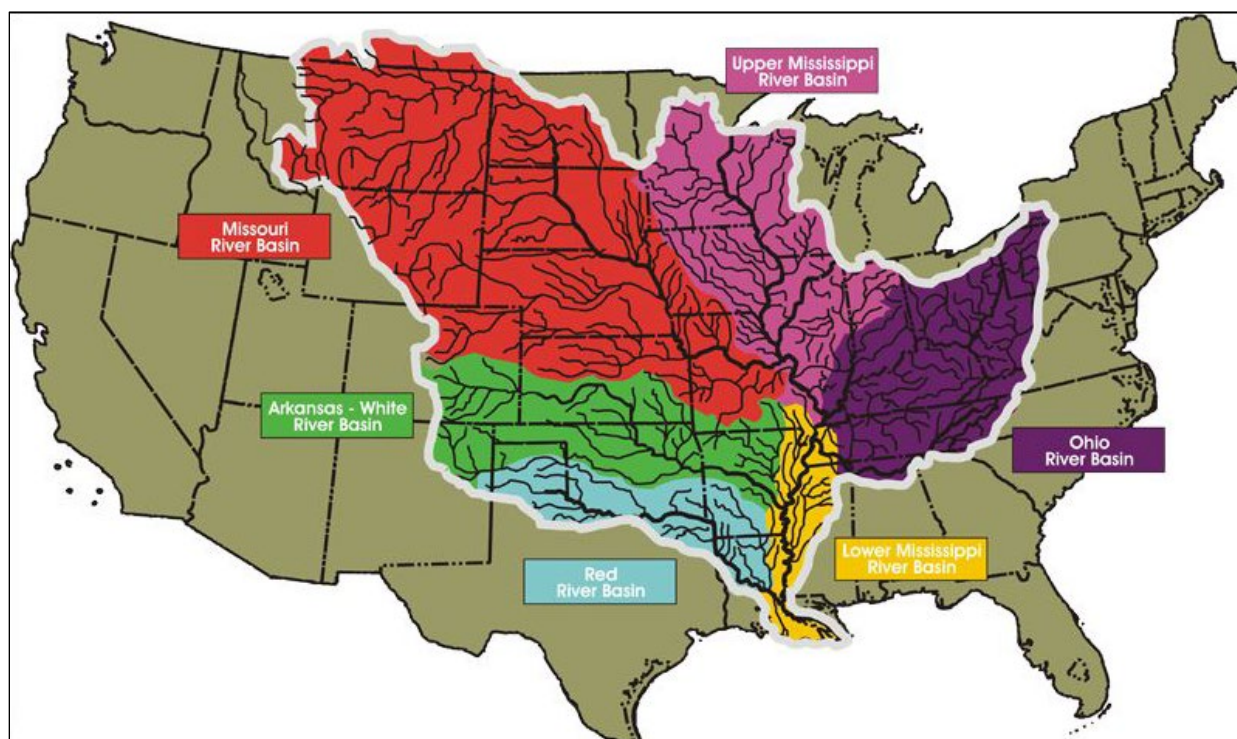


Figure 2-1. The Mississippi River Basin.

The Upper Mississippi River has a record of human history spanning over 13,000 years and is increasingly seen as one of the most archeologically and historically significant regions in the country. The name “Mississippi” comes from an Anishinabe (Ojibwa) word meaning “great river” or “father of waters.” The Dakota people called the river “Hahawakpa,” meaning “River of the Falls” in reference to what we now call St. Anthony Falls, located in Minneapolis, Minnesota.

Most of the river and its floodplain, defined as the adjacent, generally flat surface that is periodically inundated by floodwaters overflowing the river’s natural banks, have been altered by human development. Much of the watershed is intensively cultivated (Figure 2-3), and many tributaries deliver substantial amounts of sediment, nutrients, and pesticides into the river. Pollutants also enter the river from metropolitan and industrial areas.



Figure 2-2. Commercially navigable waterways on the Upper Mississippi River and Illinois River Systems with lock and dam locations.

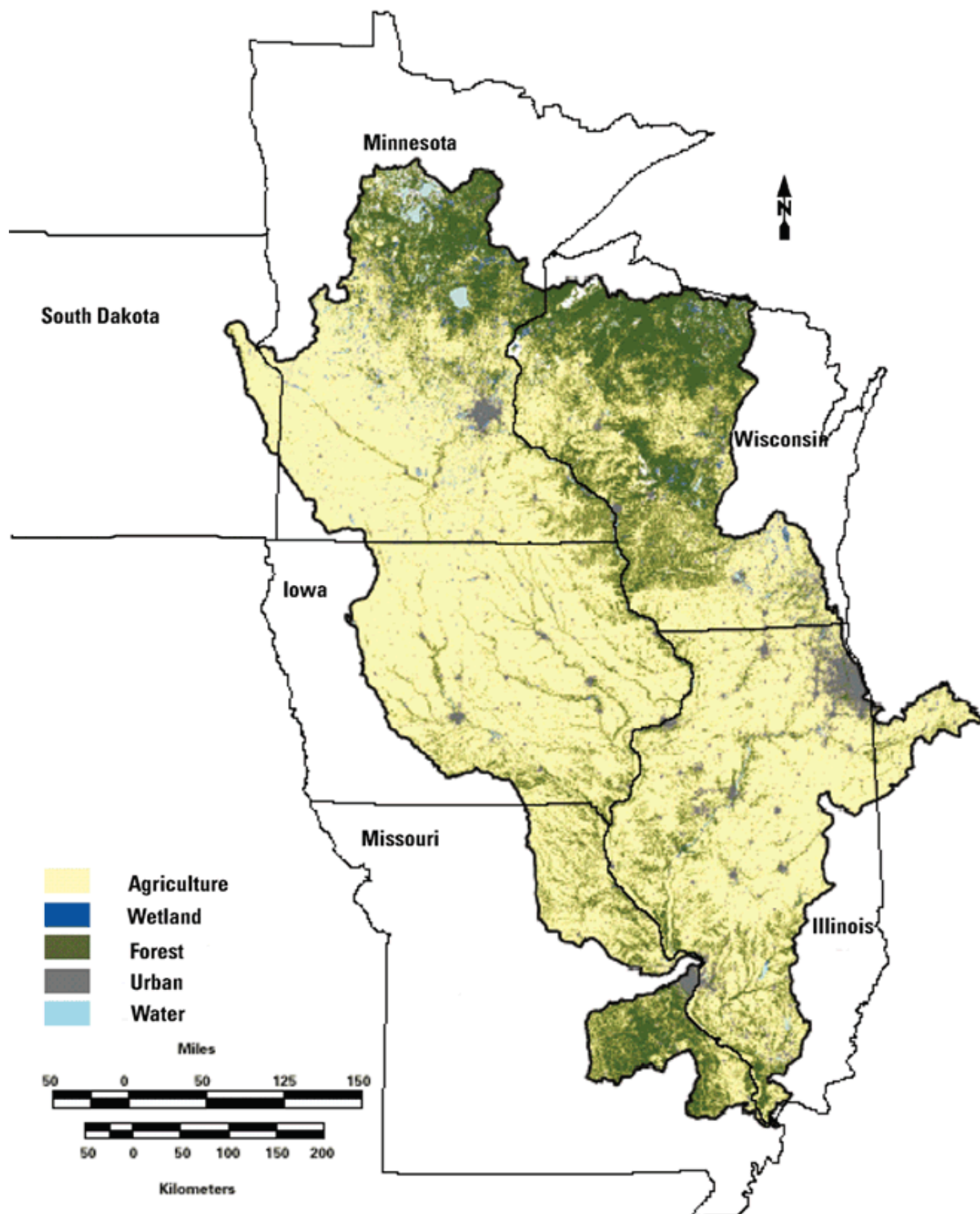


Figure 2-3. Upper Mississippi River Basin with land classification (USGS, 2003).

2.2.3 THE ST. PAUL DISTRICT PORTION OF THE UMR

The St. Paul District portion of the UMR runs from St. Paul, Minnesota, to Guttenberg, Iowa. The Corps maintains navigation through a series of 13 locks and dams, channel regulating structures, and

dredged material management plans (Figure 2-4). The river has played a significant role in the development of the modern Midwestern economy and culture, and it continues to provide many benefits to the states and local communities along the river corridor. Each pool within the project provides opportunities for a broad spectrum of outdoor recreation that can be utilized by the nation's public. Each pool possesses varied natural and recreation resources, often with high scenic, educational, scientific, environmental, and cultural values. The protection and stewardship of these resources are important to the Corps and its partners.

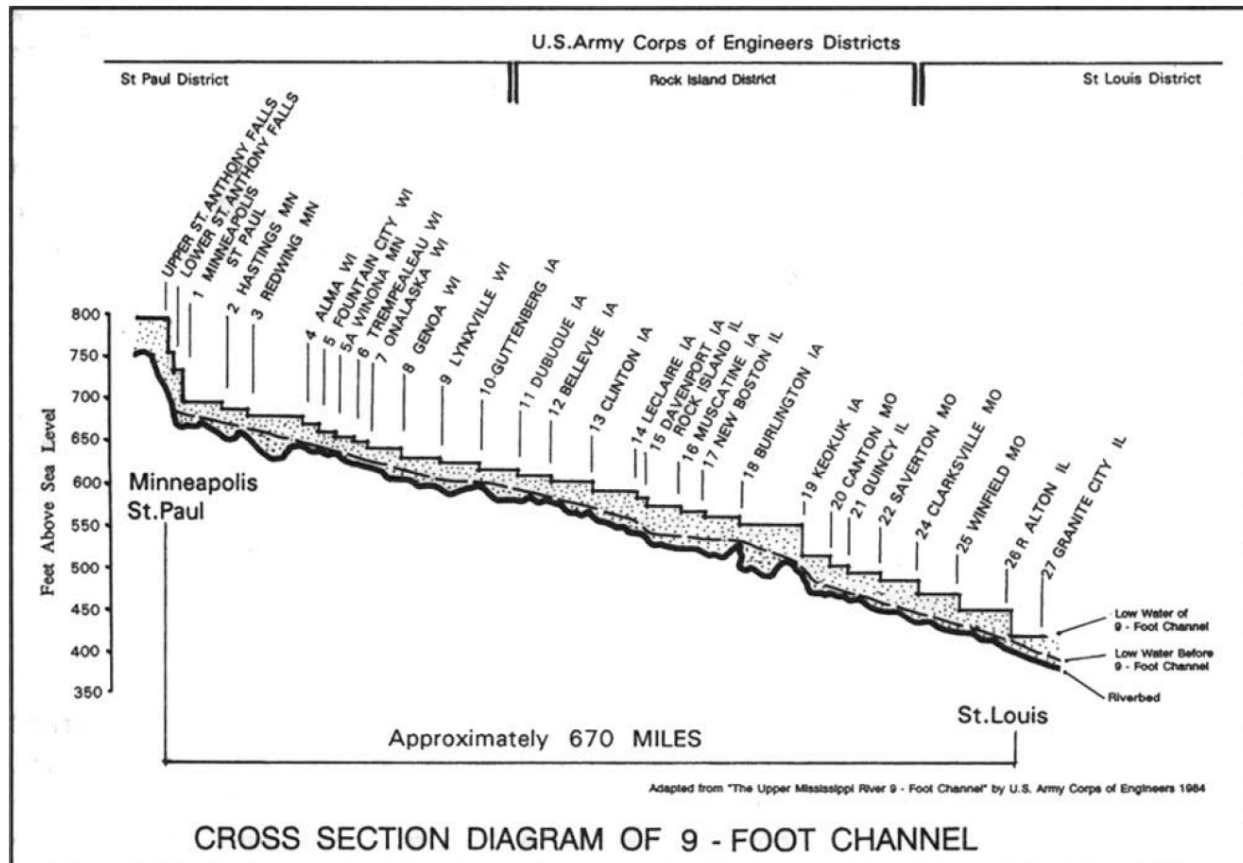


Figure 2-4. Locks and dams along the 9-foot navigation channel on the Upper Mississippi River.

The UMR floodplain in the project is the main artery that flows through the center of the 24,000 square mile Driftless Area of Minnesota, Wisconsin, Iowa, and Illinois, which eventually gives way to a broader, flatter landscape. The Driftless Area is a region of rugged topography that escaped glaciation in the most recent glacial period and, as a result, contains a unique range of habitats and species. The steep bluffs that rise from the UMR are a part of this landscape, and the ecotone between river and upland provide a range of habitat conditions found nowhere else in the United States.

2.2.4 RIVER HYDROLOGICAL CHARACTERISTICS

The project area and its tributaries drain an area of approximately 80,000 square miles. Of these lands, 45,000 square miles are in Minnesota, 32,000 are in Wisconsin, and the remainder are in South Dakota and Iowa. In St. Paul, the UMR drops 60 percent of its total fall (Figure 2-4). Some of the main tributaries for the UMR include the Minnesota River, which joins at Fort Snelling in Pool 2; the

St. Croix River at Prescott, Wisconsin in Pool 3; the Chippewa River at the lower end of Pool 4; the Zumbro River below Lock and Dam 4; the Black River at Lake Onalaska in Pool 7; the Upper Iowa River in upper Pool 9; and the Wisconsin River in Pool 10.

Land use practices and the management of the river to improve navigation have altered many of the river's habitats and natural water flows throughout the floodplain. The locks and dams and channel training structures (e.g., wing dams and closing dams) have greatly altered the way river waters interact with the floodplain. The locks and dams were designed to impound, or hold back water, to raise water elevations during periods of low flow such as during a drought and provide a 9-foot navigation channel for commercial navigation by raising and stabilizing water levels along the UMR (River Resources Forum, 2004).

With Upper Saint Anthony Falls locks and dams closed to navigation, there are 12 locks and dams in operation in the St. Paul District. The majority of lock chambers for the project are of the same dimension, 110 feet wide and 600 feet long and have provisions for future construction of an additional lock if required. Only the lower locks at St. Anthony Falls, which are 56 feet by 400 feet and Lock and Dam 1, which has twin locks each 56 feet by 400 feet, have different dimensions and no provision for an additional lock. The height a vessel is lifted or lowered on average in the lock ranges from 5.5 feet at Lock and Dam 5A to 49.2 feet at Upper St. Anthony Falls. The locks fill and empty by gravity, so power is only required for controlling the valves and gates.

As a result of the low river banks on the Mississippi River, the relatively wide and extensively cultivated floodplain, and close encroachment of railroads and towns on the river channel, a series of low dams were designed (Gjerde, 1983). Plans were to construct a series of low dams with moveable gates that could be lifted above the water during flood periods as well as be adjusted to control pool levels in times of normal and low flows or during periods of low temperatures to allow ice passage (Gjerde, 1983). In addition to the lock and gated sections, most structures also have earthen dikes of varying lengths. In some cases, the dikes also include an overflow section and low flow culverts.

There are three different sections, or parts, within each pool. The upper one-third of each pool looks very much like it did before the locks and dams were built. From the air, this area of a pool reveals an intricate mosaic of flowing and dead-end channels, shallow water marshes, wetlands, and wooded islands, which make up the backwaters of the UMR. When the earthen dikes of the locks and dams were built, some of the backwaters in the upstream end of this portion of the pool were cut off from flowing water.

The middle one-third of each pool reflects a transition area where backwater habitat is giving way to riverine lakes. This diverse area has fewer islands and many more wetlands. Because of the increase in water elevations, soils on many islands in this area are too saturated to support trees, and therefore the islands are dominated by wet meadows and marshy habitats. Deposition of sediment from tributaries also tends to be high in mid-pool areas, leading to a high rate of filling of backwater lakes.

The water levels in the lower section of the pools were increased the most by dams, flooding the river's valley and converting riverine habitat to a lake-like habitat. This process created numerous backwater lakes and islands. Islands in the lower third of a pool protect aquatic vegetation by deflecting the river's current and breaking up waves as they roll across large expanses of water immediately above the locks and dams. The lower sections of the pools are also the areas that have been most affected by the stabilization of water levels, which is one factor contributing to a reduction in the diversity and abundance of aquatic vegetation in this section of the pool.

Flooding is one of the primary drivers of the distribution of habitat types and vegetative succession within the UMR Basin. A wide range of metrics are available to assess flooding, with the most straightforward and widely used of these being annual growing season flood inundation. Annual growing season flood inundation describes the number of days per growing season (April 1 – Sept. 30) that a terrestrial site is classified as being underwater. This metric is calculated by integrating daily river gage data readings with comprehensive elevation datasets to assign each point on a map a value associated with the point's elevation relative to water surface. If the elevation for a given day is greater than the water surface elevation for that location, it is classified as non-flooded. To simplify interpretation, annual days of inundation are grouped into 10-day flood classes (Figure 2-5).

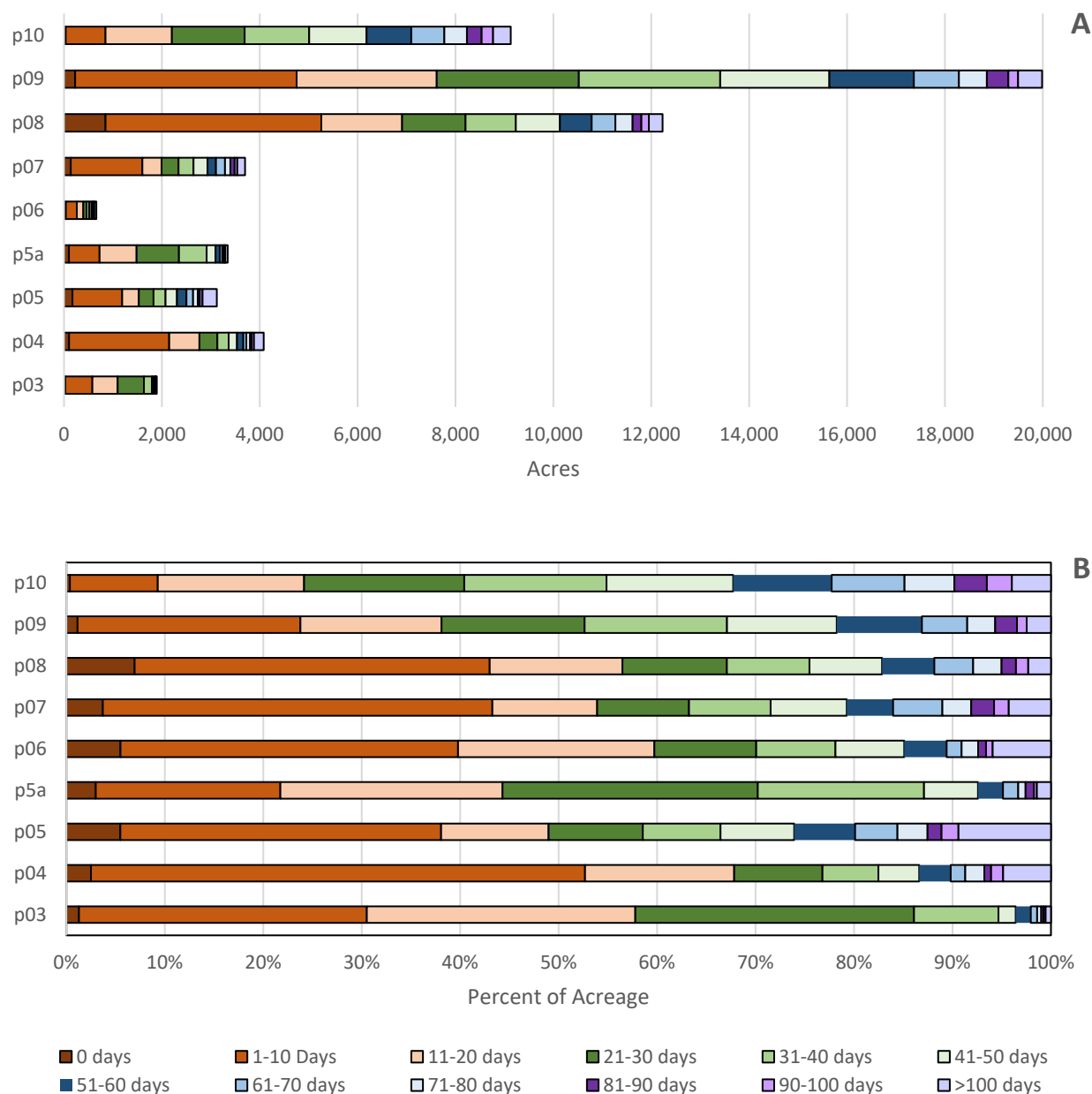


Figure 2-5. Total inundation days for all federal lands in pools 3-10 by pool and flooding class, years 1972–2011. Figure A shows the total area, while B shows the percent of area in each pool. Small acreages in pools 1, 2, and 11 are not included (De Jager et al., 2018).

There are a handful of inundation thresholds that appear to be important in determining the potential vegetation communities for a site. Upland forest is only found in areas with less than 10 days of flooding per year (De Jager et al., 2015). Lowland forest is most associated with areas with 20 or less days of flooding. Floodplain forest has a neutral association with areas that are flooded for less than 10 days per year but is most strongly associated with zones between 10 and 90 days of annual flooding. For non-forested, terrestrial communities, wet meadows are most associated with flood durations of 0.1–30 days; shrubby communities are uncommon overall but occur across all flooding zones. Marsh communities become more important beyond 90 days of annual inundation (Figure 2-6).

Floodplain functional class	Upland forest	Conifers	Lowland forest	Grassland	Shrub/scrub	Sedge meadow	Populus community	Floodplain forest	Wet meadow shrub	Wet meadow	Salix community	Shallow marsh	Sand/mud
0	0.41	0.25	0.48	0.40	0.38	0.34	-0.27	-0.36	0.07	0.09	0.02	0.13	-0.04
10	0.00	0.02	0.07	0.39	0.20	0.47	0.09	0.33	0.12	0.32	0.12	0.48	0.04
20	-0.11	0.01	-0.05	-0.11	-0.13	-0.11	0.37	0.75	0.18	0.14	0.13	0.34	0.15
30	-0.18	-0.01	-0.02	-0.21	-0.22	-0.11	0.56	0.78	0.35	0.23	0.14	0.47	0.21
40	-0.21	-0.05	-0.06	-0.25	-0.26	-0.12	0.60	0.79	0.45	0.33	0.27	0.55	0.36
50	-0.14	-0.03	-0.20	-0.19	-0.16	-0.09	0.51	0.64	0.44	0.43	0.59	0.55	0.58
60	-0.12	-0.04	-0.27	-0.10	-0.08	-0.04	0.40	0.48	0.31	0.32	0.64	0.45	0.59
70	-0.02	-0.01	-0.38	-0.08	-0.06	-0.02	-0.07	0.25	0.02	0.20	0.73	0.27	0.57
80	0.05	0.01	-0.42	-0.07	-0.08	0.01	-0.12	0.22	-0.03	0.21	0.62	0.27	0.45
90	0.12	0.01	-0.38	-0.04	-0.03	-0.04	-0.12	0.28	-0.04	0.15	0.29	0.21	0.40
100	0.20	0.01	0.01	0.01	0.03	0.01	0.01	0.35	0.05	0.25	0.08	0.29	-0.08
>100	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.34	0.01	0.24	-0.02	0.22	-0.18

Figure 2-6. Correlation coefficients quantifying associations between the area (hectare per RM) in different floodplain functional classes in navigation pools of the Upper Mississippi River 9-foot channel and the area (hectare per RM) in different floodplain vegetation types in navigation pools of the Upper Mississippi River 9-foot channel navigation project (De Jager et al., Indicators of ecosystem structure and function for the Upper Mississippi River System: U.S. Geological Survey Open-File Report 2018–1143, 2018).

Flood duration thresholds are also evident for different tree species, and these thresholds are reflective of the community thresholds. Sites subjected to less than 20 days of flood inundation support a much more diverse suite of overstory and understory species, with silver maple becoming much more dominant beyond 40 days of flooding per year.

Though project lands occur in a relatively uniform climatic context, there is variation among the pools in the area occupied by different flooding classes. For example, in Pool 4, almost 70 percent of federally-owned land occurs in areas with annual inundation of 20 days or less. Pools 3, 6, 7, and 8 also have more than 50 percent of their acreage above the 20-day flood inundation zones. In contrast, in Pool 10, almost 75 percent of federally-owned land is flooded for more than 20 days a year, and Pools 5, 5a, and 9 all have more than 50 percent of their federally-owned land in zones subject to more than 20 days a year of flooding (Figure 2-5). Thus, opportunities for management of diverse forest types are likely to be more limited in the pools with the longest flood durations.

2.2.5 SEDIMENTATION AND SHORELINE EROSION

Erosion by waves, ice, and river currents has reduced the number and acreage of islands in the lower section of many pools. When an island is lost due to erosion, the impact is more than just losing land within the river's floodplain; a chain of events begins to occur. River currents begin to enter the once protected area, uprooting some of the vegetation beds. More vegetation beds are uprooted and lost because of unchecked wave energy rolling across miles of open water. The waves continue to build in size and eventually begin stirring up bottom sediments. Once the sediment is suspended in the water, it blocks out light that the underwater plants need to grow.

Islands in the midsection of a pool are also being eroded and causing a different chain of events. Island dissection is a term used to describe areas where channels have formed, or eroded, through an island. This allows for current to enter areas of the backwaters that were formerly free of current. These new channels carry sediment into the backwater lakes, reducing their quality due to sedimentation.

Sedimentation, the filling or accumulation of sediments on the bottom of aquatic areas, is a constant physical process occurring within the project. Impoundment of the river has slowed water velocities and thus intensified the process in many backwater areas. Excessive sedimentation of side channels and backwaters restricts flows and eliminates deep-water habitat for riverine fish.

Sedimentation also affects backwater lakes. Large amounts of fine clay and silt sediments, originating from runoff within the project, are deposited in areas where river current velocities have slowed. These lake-like conditions allow sediments to be deposited in deeper areas of the backwater, thus flattening the bottom and reducing depth (bathymetric) diversity.

Sedimentation was historically accelerated in backwaters areas as a result of the pools created by the construction of the locks and dams and disposal of dredged material inside channels leading to these open backwater areas. To decelerate this sedimentation in backwaters, dredge material is now placed in preselected placement sites on land. To identify these sites, the Corps develops dredged material management plans (DMMPs). A portion of these locations are shown on the associated plates (Appendix C – Land Allocation and Land Classification Plates).

Bank lines on both sides of the river are exposed to erosion. Erosion and sedimentation are natural processes; however, human interferences (e.g., land use changes, river engineering) can alter them. The bank line along the fast moving side of the river is exposed to the current, scouring and eroding the bank. The riverbank running along the slow side of the river can also be exposed to a more gradual form of erosion. Wind, rain, the impact of humans, and the river itself all contribute to the loss of shoreline stability.

Upland erosion and the sedimentation in downstream areas are major causes of reduced water quality and habitat destruction in most Midwestern rivers and streams. Sedimentation in the backwaters of the UMR is a significant environmental problem. The depth diversity in the impounded areas has been reduced since construction of the dams especially in non-channel backwater areas (Johnson & Hagerty, 2008).

According to the United States Geological Survey (USGS): “In all reaches, sedimentation has filled-in many backwaters, channels, and deep holes. In the lower reaches, sediments have completely filled the area between many wing dikes producing a narrower channel and new terrestrial habitat. Erosion has eliminated many islands, especially in impounded zones. Although annual rates of sedimentation and erosion were highly variable, the net effect over 50 years was a substantial loss of habitat diversity. We expect sediment inputs to the system to remain high and expect both filling and erosion to continue, but at slower rates” (Johnson & Hagerty, 2008).

This sedimentation has not only affected the ecological resources of the project, but has also affected recreation. Some recreation areas, including both Corps managed and Corps outgrants, have reduced boating access due to sedimentation.

2.2.6 WATER QUALITY

The water quality of the UMR is of paramount importance for sustaining the many uses of the river including drinking water, recreational and commercial activities and support for the river's ecosystems and the environmental goods and services they provide. The UMR's vast scale, complexity, and diversity, as well as basin-wide influences and system modifications, present numerous challenges in water quality management. The Upper Mississippi River in Minnesota, Wisconsin, Iowa, and Illinois, was listed by American Rivers as America's number one most endangered on American's Most Endangered Rivers list of 2020. This is an annual list of ten rivers under threat that all Americans should take action to protect (American Rivers, 2020).

Each state implements the Clean Water Act (CWA) independently on the UMR. All three states in the St. Paul District have the Mississippi River listed on the 303d list of Impaired Water Bodies as of 2018. While there are many commonalities among the states in their CWA implementation on the UMR, there are also significant differences in designated uses, water quality criteria, monitoring, assessment methodologies and impairment listings (UMRBA, 2011). Figure 2-7 compares the states' CWA 303d impairment listings from 2008, showing the complexity of water quality analysis on the UMR. General impairment pollutants common among all states include fecal coliform, polychlorinated biphenyls, mercury, and total phosphorous. These pollutants enter the system through various means such as non-point source pollution, point source pollution, and to a lesser extent, environmental spills.

The UMR is a complex, natural system that provides a source of drinking water for millions and supports a variety of commercial and recreational activities. There are a large variety of factors that affect the overall health and vitality of the water quality within the UMR. Implementation of the CWA has greatly reduced pollution throughout the UMR, resulting in overall better water quality. As pollution has been cleaned up and habitat restored, wildlife has rebounded. The river is once again home to healthy bald eagle, mussel, and fish populations. These are some of the symbols of our shared ability to rejuvenate the UMR and are an inspiration for future success.

While the CWA has improved water quality and reduced pollution throughout the UMR, there are a number of water quality problems that persist. The UMR continues to be impaired by excess

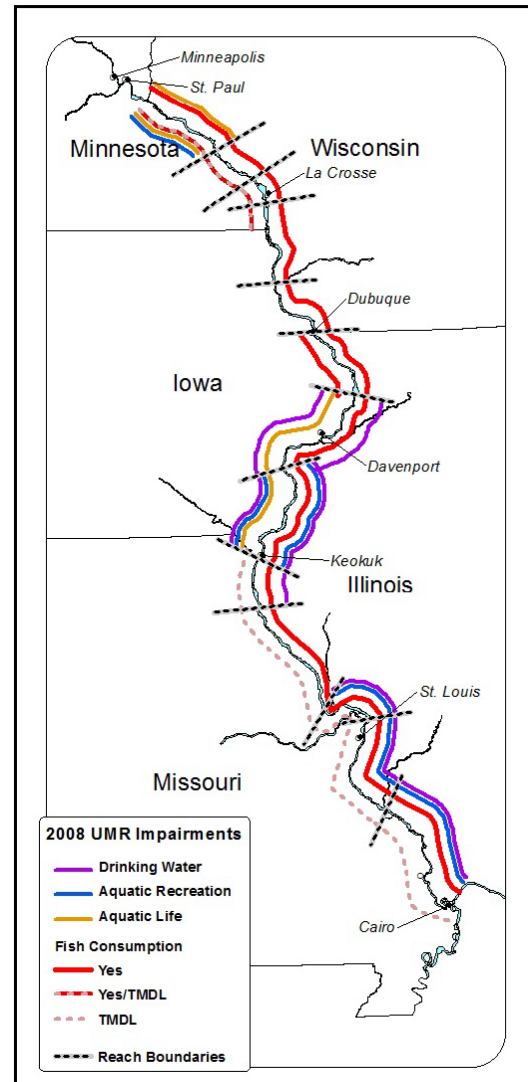


Figure 2-7. CWA impairments in 2008.

TMDL is Total Maximum Daily Load

sediment, bacteria, and phosphorus, degrading aquatic habitat and recreation. Fish consumption guidelines are in place throughout the river due to elevated levels of contaminants like perfluorooctanesulfonic acid and mercury. River flows have increased, resulting in a destabilized river system with large amounts of non-point source pollution and an increase of nitrate concentrations. Microplastic fibers, pharmaceuticals, and triclosan-derived dioxins in the metropolitan portion of the river pose uncertain risks to aquatic life and health. Additional research and collective action are required to mitigate their potential long-term impacts.

While the challenges we face are complex and daunting, the river today is healthier thanks to the actions of previous generations. The return of abundant wildlife is evidence that restoring the UMR is possible through shared commitment and decisive public action.

Point-Source Pollution

The CWA, passed by Congress in 1972, is the cornerstone of surface water quality protection in the United States, employing regulatory and non-regulatory measures designed to reduce direct pollutant discharges into waterways. The CWA has reduced pollution in the UMR from "point sources" such as industries and water treatment plants, but problems stemming from urban runoff, agriculture, and other "non-point sources" have proven more difficult to address (National Research Council, 2008). Planning or regulating point-source pollution is outside of the scope of this 2020 Master Plan. Each respective state that overlaps the UMR, in addition to the EPA, is involved in regulating point-source pollution. The UMRBA and other organizations such as the McKnight Foundation, have also taken steps to address point-source pollution affecting the river (UMRBA, 2011; National Research Council, 2008).

Point-source pollution discharges are not as prevalent as they were forty years ago. The development of the National Pollutant Discharge Elimination System (NPDES), in 1972, was a major advancement. The CWA created the NPDES permit system, which regulated industrial and municipal discharges. This did not completely eliminate point-source problems but did greatly reduce the impact to the water quality and sediment within the UMR.

Non-Point Source Pollution

Land use is a major factor affecting water quality. In the project area of the UMR Watershed, land use ranges from row crop agriculture in the west to residential suburbs and urban industry in the northeast. More than 90 percent of the wetlands present prior to European settlement have been drained to accommodate cropland. The lack of wetlands prevents water retention on the landscape and leads to increased storm water runoff and discharges that can destabilize streambanks and increase sediment loads. Similarly, in urban and suburban environments, impervious surfaces send huge volumes of water into storm drains and nearby bodies of water.

Due to human development within the floodplain over the last 100 years, the erosion process has accelerated, increasing the sediment load of the river and the turbidity of the water. Over the last 60 years, the Natural Resources Conservation Service (NRCS), the Corps, and other agency partners have been working to reduce these processes to tolerable levels. Some success in sediment reduction has become apparent, particularly in the past 25 years, but more effort is needed to further control this problem. Agricultural runoff is a difficult problem to solve; and remediating the source is not within the scope of the 2020 Master Plan.

Agricultural runoff can introduce tremendous amounts of sediment into the river system. The runoff from livestock feedlots add nitrates and other nutrients to the system, which effects dissolved oxygen

and other water quality parameters, which in turn affect the aquatic habitat and other uses of the water. Agricultural field runoff also introduces additional agricultural chemicals into the system, such as inorganic fertilizers. Some of these chemicals settle out and are incorporated into the bottom substrate. Other chemicals join the water column and course down the Mississippi River to the Gulf of Mexico. The high concentration of nitrates within the water column is a primary cause of the hypoxia phenomenon in the Gulf of Mexico known as the “Dead Zone.”

A Total Maximum Daily Load (TMDL) is the calculation of the maximum amount of a pollutant allowed to enter a body of water so that the body of water will meet and continue to meet water quality standards for that particular pollutant. The TMDL identifies all sources of a pollutant and determines a pollutant reduction target in order to meet the standard in addition to allocating load reductions necessary for the source(s) of the pollutant. Once a body of water is added to a state’s impaired waters list, a TMDL must be developed for it. After impaired waters are listed, the state organizes them into TMDL projects. Each project may contain one or more waterbodies or segments of a waterbody. The Minnesota Pollution Control Agency (MPCA), Wisconsin Department of Natural Resources (WDNR), and Iowa Department of Natural Resources (IADNR) each maintain a list of approved TMDLs and projects.

Federal and state regulations and programs also require implementation of restoration measures to meet TMDLs. The measures must be completed within one year after the EPA approves a TMDL study.

Environmental Spills

Many sources of potential spills exist throughout the UMR, including highway and railroad crossings, pipelines, municipal and industrial plants, barge traffic, and terminals. Potential spill sources are discussed in detail in the Upper Mississippi River Spill Response Plan and Resource Manual (Upper Mississippi River Basin Association, 2014). In addition, it describes resources available for responding to a spill. Hazardous materials with the highest bulk movement and thus highest probability for a spill are chemicals, chemical products, fertilizer, petroleum products, and coke petroleum pitches.

2.2.7 TOPOGRAPHY, GEOLOGY, AND SOILS*

The overall physiography of the UMR Basin contains large variability. Over 400 million years ago, the Midwest was covered by a shallow, inland sea. Over time, sediments accumulated from sand, silt, clay, and biologic organisms within the sea formed into sandstone, shale, limestone, and dolomite rocks. Over the next millennia, the UMR and its tributaries significantly eroded those less resistant such as sedimentary rocks; however, those deposits resistant to weathering such as limestone and dolomite remained. Bedrock formations exist throughout the UMR Basin and are important in the development of its landscape, often determining the width and course of the UMR. As the river meets more resistant bedrock, the valley is relatively narrow. Consequently, where weaker formations occur, the valley is wider, and a more extensive floodplain develops.

Events during the Wisconsin Glaciation (35,000 to 10,000 years ago) had the most significant impact on the UMR (Madigan & Schirmer, 2001). Glaciation is characterized by ice advance into areas such as the Great Lakes, UMR Valley, and upper Wisconsin River Valley (Jalbert & Michael, 2002). As the ice sheets advanced, thick valley deposits were created. These deposits were eventually downcut as the ice retreated, and glacial meltwater flowed from the retreating ice masses, cutting the valley deep and wide. Initially the glacial meltwater caused large incisions within the valley but as their intensity decreased, the river system responded by constructing a floodplain through deposited clay,

silt, sand, and gravel (Jalbert & Michael, 2002). During each glacial period, different glacial lakes drained through the UMR Valley resulting in multiple downcutting events through glacial deposits that had previously developed.

Ultimately the landscape that formed out of these glacial meltwater events was of significant and varied relief. After the glacial meltwater slowed and disappeared with the final retreat of glaciers, the landscape that remained was relatively stable with few periods of cutting and channel migration. Valleys gradually began filling in with sediments largely from precipitation events (e.g., rainfall, snowmelt), which would have caused erosion of upland surfaces throughout the river valley (Jalbert & Michael, 2002). Sediments stored in tributary valleys were also transported to the UMR building fan deltas. One of the more significant deltas occurred at the confluence of the Chippewa River and Mississippi River. Lake Pepin is a major geomorphic feature within Pool 4 that formed when the delta of the Chippewa River effectively dammed the Mississippi River.

Evidence of glacial events, however, is not uniform throughout the valley. South of the glaciated region is the Driftless Area, which refers to an area not impacted by the Wisconsin Glaciation and is identified through deeply carved river valleys. This area begins within Pool 4, extends to encompass sections of southeastern Minnesota, southwestern Wisconsin, and northeastern Iowa, and is lacking in glacial deposits. This landscape has been largely influenced by the bedrock with resistant bedrock formations causing steep sided bluffs adjacent to the floodplain. Thousands of years of hydraulic erosion created high bluffs and deeply narrow river valleys. Karst topography, which is characterized by underground drainage systems with sinkholes and caves, is indicative to the Driftless Area. In contrast, areas where less resistant bedrock is located, the river valley is wide and filled with outwash sediments.

Geomorphology and Soils

The current topography and soils of the UMR floodplain are driven mainly by erosional and depositional processes associated with an active river floodplain. In the UMR, a set of Landform Sediment Assemblages (LSAs) describe the distribution of sediments and features in relation to hydrogeomorphic processes. Assemblages have been created based on grouping of sediments with similarities in “spatial distribution, physical characteristics, and geomorphic processes” (Randazzo, 2013). An extensive description of the process for delineating these LSAs can be found in *Geomorphological Mapping and Archaeological Sites of the Upper Mississippi River Valley* (Madigan & Schirmer, 2001). LSAs can help to indicate the restoration suitability of landscapes in the UMR.

Several LSA study groups have developed within the UMR. These are separated into Glaciofluvial, Fluvial, Eolian, Lacustrine, Mass Wasting/Colluvial Slope, and Anthropogenic LSAs.

Glaciofluvial LSA – This group formed during the Late Wisconsin Glaciation to early Holocene Epoch time and consists of glaciofluvial terraces, channels, and scarps. Glaciofluvial terraces are split into three types: high terrace starting near St. Anthony Falls and continuing to the confluence of the St. Croix River near Hastings, Minnesota, intermediate terrace located throughout Pools 1 through 10, and low terrace located throughout Pools 2 through 10. High and intermediate terraces occur well above the highest historical flood stage. Low terraces are often separated from the valley wall by a paleochannel system, which forms an island. Examples of low terraces include Grey Cloud Island, Prairie Island, and Red Oak Ridge Island. Glaciofluvial LSA channels are created through meltwater draining through the Mississippi River during the Wisconsin Glaciation Stage. Scarps are steep, abrupt slopes on the outer margin of glacial outwash terraces.

Fluvial LSA – Consists of several groupings including Minor/Inactive Channel, Main Channel, Island, and Tributary Stream.

- **Minor/Inactive Channel LSA** – This LSA group forms low-lying, relatively flat to gently rolling, well to poorly drained, bowed-shaped surfaces on the floodplain and are most often associated with inactive channels on tributary streams. These LSAs mark the position of paleochannels and distributary channels within the early to middle Holocene floodplain. Features of this group include closed depressions, cutoff channels, oxbows, lakes, wetlands, meander scrolls (ridge-and-swale topography), vertical accretion marshes and lakes, and other undifferentiated types. In the meander scrolls, soils are variable and show evidence of regular redistribution of sediments, with a higher incidence of sands and gravels than in the other types in this LSA group. Vertical accretion areas are characterized by fine silts that are very poorly drained due to the slow movement of water.
- **Main Channel LSA** – Consists of low-relief, gently rolling, moderately well to poorly drained surfaces typically located 1 to 3 meters above the level of the active channel. They are associated with fluvial processes operating in the main channel during the Holocene Epoch. Lateral accretion in this LSA group is primarily due to the movement of the main channel and consists of primarily coarse-grained materials forming natural levees. Some vertical accretion associated with the main channel occurs in low spots along the main channel and can be coarser grained due to the high energy of main channel flows. Finer materials in this LSA group are generally deposited farther from the main channel in areas where lower energy flows are more prevalent.
- **Island LSA** – Consists of main channel and minor channel islands. Main channel islands within the project have formed by different fluvial processes. The majority were formed by a combination of lateral and vertical accretion deposits separated from landforms from the valley wall. Some islands are also erosional remnants of Late Wisconsin Glaciation terraces or bedrock remnants. Main channel islands are influenced by the flow of the active channel and are overtopped during flooding. Sediments are typically silty clay loam and silt loam in the center of the island grading to sand or gravelly sand on the edges.
- **Tributary Stream LSA** – Fluvial activity by tributary streams has had a profound effect on the geomorphic development of the floodplain. Tributary streams increase discharges of waters and sediment into the main river channel, thereby changing channel configurations, blocking drainages of the river and causing lakes to form, and by extension, developing unique LSAs in and adjacent to the valley. These features vary in shape and size but can take the form of either fans that overlay older sediments or deltas that form new land in water. They are elevated above the level of the floodplain and subject to flooding. Marshes may occur in these LSAs and can be heavily influenced by groundwater.

Eolian LSA – The Eolian LSA is mapped only as large, primarily wind-deposited complex covering terrace surfaces. This LSA can include both erosional and depositional landforms. They can consist of thin sheets of sand or loess distributed across the ground surface. There have been several episodes of eolian activity in the Upper Midwest during the Holocene Epoch.

Lacustrine LSA – Lake Pepin is a unique feature within the UMR Valley that has a complex history caused by fluctuating water levels during the Holocene Epoch and gradual infilling by sediment transport into its headwaters. Two different LSAs, beaches and cusps, are developed along the lake

because of geomorphic processes operating on the shoreline. The shoreline consists of beaches and cusps, which are created by wind currents and motorized boat traffic generating waves that transports sediments.

Mass Wasting/Colluvial Slope LSA – Uplands are the oldest geomorphic units in the UMR Basin. They are predominately used for agriculture, which has resulted in significant surface erosion washing down valley sides to form colluvial deposits of redistributed sediments through mass movement.

Anthropogenic LSA – Identified as Made/Modified LSA, these are mapped in locations where original geomorphic characteristics cannot be determined. Often this LSA is associated with heavily populated areas but also includes development such as fisheries and dredge spoil deposits.

2.2.8 CLIMATE AND WEATHER

The climate of the UMR Basin is typically continental, having long cold winters, warm humid summers, and short fall and spring seasons. The climate of the UMR Valley downstream from Pool 4 is moderated because the floodplain is only about 550 feet above sea level and is flanked by bluffs that rise as high as 650 feet above the valley floor. Winters are less severe at Winona, Minnesota, for example, than they are 45 miles to the west in Rochester, Minnesota. The average temperature varies from about 48.9 F in Guttenberg, Iowa (Lock and Dam 10) to 47.1 F in St. Paul, Minnesota (Table 2-1). Average precipitation is lower in St. Paul (32.0 inches/year) than in Winona (Lock and Dam 6) and Guttenberg (34.2 inches). Precipitation is highest during the summer months, especially June through August, though lower portions of the St. Paul District see slightly higher rainfall precipitation in spring. Generally, summer winds are southerly, bringing tropical air to the region. Winter winds bring cold arctic air masses.

Table 2-1. Monthly temperatures for St. Paul and Winona, Minnesota, and Guttenberg, Iowa, from 1981–2010 (<http://www.usclimatedata.com>).

St. Paul, Minnesota												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high in F	26	31	43	58	71	80	85	82	73	59	42	29
Average low in F	7	12	24	38	50	59	64	62	53	41	27	13
Av. precipitation in inch	0.79	0.67	1.54	2.87	3.7	4.21	4.41	4.76	3.27	2.91	1.81	1.1
Winona, Minnesota												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high in F	26	33	44	60	73	81	85	83	74	62	44	30
Average low in F	9	16	27	40	51	61	66	64	54	43	30	16
Av. precipitation in inch	1.46	0.75	1.77	3.54	3.94	4.17	4.41	4.72	3.86	2.17	2.17	1.3
Guttenberg, Iowa												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high in F	28	34	46	60	71	80	84	82	74	61	46	31
Average low in F	11	16	28	40	51	60	65	63	54	42	30	16
Av. precipitation in inch	1.06	1.1	1.81	3.5	4.25	4.88	4.33	4.06	3.07	2.4	2.24	1.54

Climate change impacts within the project would likely revolve around increased temperatures and increased precipitation leading to further altered (flashier) hydrologic conditions. Annual average temperatures across the Midwest show a trend towards increasing temperatures with a calculated increase of 1.5 F over the 1895–2012 period (Table 2-1, Figure 2-8). Any changes in hydrologic conditions occurring within the basin would likely result from less frequent but more intense warm-

weather precipitation events, moderately to severely reduced summer flow conditions, and degraded water quality, less winter ice cover, and more cold weather erosion events (Iowa Climatology Bureau, 2011). The character of riparian habitats may also change, and invasive species may move into the area with changing climate (Pryor, 2014). Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure. The range and distribution of fish and other aquatic species will likely change, and an increase in invasive species would also likely occur (Pryor, 2014).

Temperatures are Rising in the Midwest

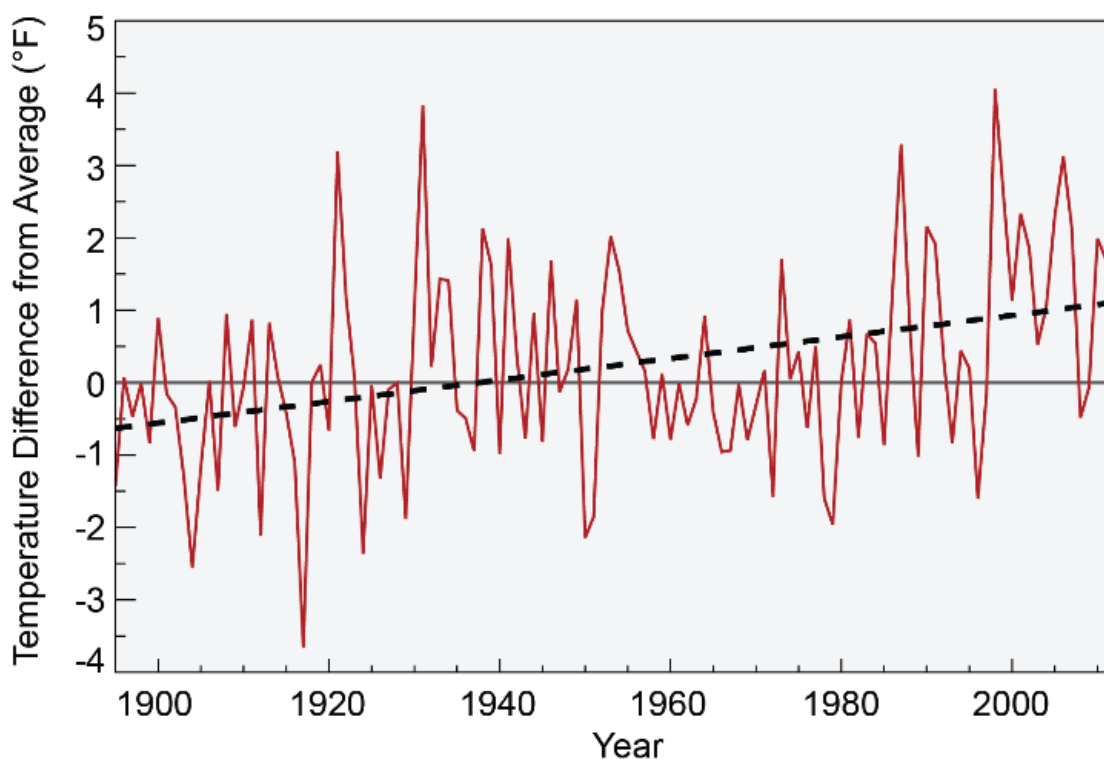


Figure 2-8. Annual average temperatures of the Midwest (red line), which indicates a trend of increasing temperatures. The dashed line, a calculation from 1895–2012, is an increase of 1.5 F (Kunkel et al. 2013).

The U.S. Global Change Research Program completed its Third National Climate Assessment (Pryor, 2014). It states: “In the Upper Midwest extreme heat, heavy downpours, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will tend to amplify existing risks climate poses to people, ecosystems, and infrastructure. Direct effects will include increased heat stress, flooding, drought, and late spring freezes. Climate change also alters pests and disease prevalence, competition from non-native or opportunistic native species, ecosystem disturbances, land-use change, landscape fragmentation, atmospheric and watershed pollutants, and economic shocks such as crop failures, reduced yields, or toxic blooms of algae due to extreme weather events. These added stresses, together with the direct effects of climate change, are projected to alter ecosystem and socioeconomic patterns and processes in ways that most people in the region would consider detrimental.”

2.3 NATURAL RESOURCE CONDITIONS

Environmental stewardship, authorized through the Corps' Environmental Stewardship Program, allows for the protection, preservation, and restoration of significant ecological resources across project lands and Civil Works projects. The Natural Resource Management (NRM) mission of the Corps is to manage and conserve natural resources using ecosystem management principles, while providing quality public outdoor recreation to meet the needs of present and future generations. The natural resources within the project are vast, plentiful, and managed by multiple state and federal agencies. For this reason, it is important to have some form of inventory or understanding of the available resources for management decisions.

Ecological Setting*

An ecosystem is a complex of biological organisms (including humans), their physical environment, and all the included interactions in a particular unit of space. The Corps' position on ecosystem management is a proactive, goal-driven approach focused on sustaining ecosystems and their values. The Corps manages ecological communities within project lands of the UMR with a view toward sustaining the native ecosystems and promoting regional environmental values. The project encompasses a vast distance of river habitat (240 miles), making it difficult to establish an exact ecological setting. Given that even small riparian systems develop complex mosaics of ecological communities based on slight variations in hydrology, geomorphology and elevation, the ecological complexity of a system as large as the UMR prevents simple descriptions of the ecological setting. Ecological attributes vary substantially even at very local spatial scales, meaning that summaries at the level of multiple or single pools may be representative of regional or landscape level conditions but may not accurately describe conditions at a local scale. A single backwater lake in an individual pool may contain ecological attributes not represented elsewhere in the pool, while forest succession in an individual forest patch may be driven more by the hydrology of a small tributary than by hydrologic patterns of the river pool. Regardless, a broad description of ecosystems and communities will be identified within the Level One inventory, the resource objectives and land-use classifications contained in the 2020 Master Plan.

2.3.1 RESOURCE ANALYSIS (LEVEL ONE INVENTORY DATA)*

Comprehensive analysis of biological resources provides quantitative and qualitative data for determining resource management needs. Level One inventories provide baseline general plant and animal information. Inventories can be used to determine acreage of dominant vegetative types, wetlands, soil types, land use, and presence of special status species and their critical habitat occurring on project lands. The Level One inventory was completed in 2019 using available information from a variety of sources, such as USGS land classes, USFWS, the National Park Service (NPS), and state DNR. Geographic Information System (GIS) software and the Corps' real estate maps were utilized to determine acreages of certain habitat types, while federal (USFWS, NPS) and state (Minnesota, Wisconsin, Iowa) online resources were used to identify the number of species and species listed. The total number of mammal, bird, amphibian, and reptile species within the project are not currently known. To represent this area, a combination of species lists from the Mississippi National River and Recreation Area (MNRRA) — a unit of the NPS, and the Upper Mississippi River National Wildlife and Fish Refuge (USFWS, 2006a) were utilized.

Fish and Wildlife Resources*

The project has a great variety of habitat types that support a wide range of fish and wildlife species. Complex aquatic habitat mosaics throughout the project make it an area with some of the highest fish species diversity and largest overall numbers of fish within the United States. The floodplain forest, marsh, and wetland habitats within and bordering the UMR provide ideal habitat conditions for many species of birds and migratory waterfowl. The area and the habitats within are so important that in 1986, Congress designated the Mississippi River "...as a nationally significant ecosystem and a nationally significant commercial navigation system." The UMR is the only river with such designation (Public Law 99-662, 1986).

The USFWS, via the cooperative agreement (CA), has been given authority to manage the fish and wildlife resources on portions of the project land that occur within refuge boundaries. The Corps NRM program generally incorporates the fish and wildlife objectives in the Upper Mississippi River National Wildlife and Fish Refuge Comprehensive Conservation Plan (CCP), Habitat Management Plan (HMP) and other refuge guiding documents as the Corps' fish and wildlife objectives. Also, HMPs contain environmental resources of concern. The states also retain rights and responsibilities related to management of wildlife and fish populations. However, no agreements or authorities preclude the Corps from managing fish and wildlife resources, and the policy guiding implementation of the Corps' NRM program directly provides authorization for the Corps to manage these resources. On project lands not included in the CA or other management agreements, the Corps maintains sole responsibility for management of wildlife and habitat.

Generally, the Corps works collaboratively with the USFWS and the states regarding management decisions related to fish and wildlife resources on project lands. The Corps' project staff most often plays a supporting role in operational management decisions related to fish and wildlife, as the USFWS and the states maintain the primary staff expertise in fish and wildlife biology. Conversely, the USFWS and the states generally look to the Corps for leadership in forestry management, as this is the primary staff expertise that the Corps maintains. Federal and state agencies will continue to work together in the future on developing sound management practices for the enhancement of fish and wildlife resources on project lands. Full lists of different species guilds (e.g., mammals, birds) can be found in Appendix D – State Listed Species and Other Species Lists.

MAMMALS

Mammal species within the project and the entirety of the UMR play an important role in the ecology, recreation, and economy of the area (USFWS, 2006a). The USFWS determined within their Upper Mississippi River National Wildlife and Fish Refuge CCP that there are 51 species of mammals present within the Refuge (USFWS, 2006a). There are another nine species of mammals that are either unconfirmed (4) or historic (5) and are no longer present (see Appendix D for a full mammal species list). Similarly, within the MNRRA corridor, which covers parts of the upper three project pools, approximately 54 mammal species are either present (47) or probably present (7) (National Park Service, 2016).

BIRDS

The project is located within the Mississippi Flyway, a vital corridor for bird species that migrate from their breeding grounds in Canada and Northern United States to their wintering habitat in the Gulf of Mexico or Central and South America. According to the National Audubon Society, more than 325 bird species travel along this flyway, making it a vital resource for migratory bird species. The section of the Mississippi Flyway that the 2020 Master Plan encompasses is particularly

important to waterfowl, as it's used by an estimated 40 percent of the continent's migrating waterfowl (USFWS, 2006a). The project contains 26 migratory bird species that are protected under the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act, most of which are viewed as Birds of Conservation Concern (Table 2-2).

Not only is the project vital to migratory birds and waterfowl alike, it is also home to many native terrestrial bird species. Many of these bird species rely on terrestrial habitat types on which the 2020 Master Plan is focused, such as floodplain forests. According to the NPS, approximately 321 species are either present year-round, migrate to, or through the MNRRA corridor.

Table 2-2. Migratory bird species protected under the Migratory Bird Treaty Act within the project, their protection status, and breeding season.

Common Name	Scientific Name	Protection	Breeding Season
American bittern	<i>Botaurus lentiginosus</i>	BCC – BCR	Apr 1 – Aug 31
American golden-plover	<i>Pluvialis dominica</i>	BCC – Rangewide	Breeds elsewhere
Bald eagle	<i>Haliaeetus leucocephalus</i>	Non-BCC	Oct 15 – Aug 31
Black tern	<i>Chlidonias niger</i>	BCC – BCR	May 15 – Aug 20
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	BCC – Rangewide	May 15 – Oct 10
Bobolink	<i>Dolichonyx oryzivorus</i>	BCC – Rangewide	May 20 – July 31
Buff-breasted sandpiper	<i>Calidris subruficollis</i>	BCC – Rangewide	Breeds elsewhere
Cerulean warbler	<i>Dendroica cerulea</i>	BCC – Rangewide	Apr 21 – July 20
Dunlin	<i>Calidris alpina arctica</i>	BCC – BCR	Breeds elsewhere
Eastern whip-poor-will	<i>Antrostomus vociferus</i>	BCC – Rangewide	May 1 – Aug 20
Golden eagle	<i>Aquila chrysaetos</i>	Non-BCC	Breeds elsewhere
Golden-winged warbler	<i>Vermivora chrysoptera</i>	BCC – Rangewide	May 1 – Jul 20
Henslow's sparrow	<i>Ammodramus henslowii</i>	BCC – Rangewide	May 1 – Aug 31
Hudsonian godwit	<i>Limosa haemastica</i>	BCC – Rangewide	Breeds elsewhere
Kentucky warbler	<i>Oporornis formosus</i>	BCC – Rangewide	Apr 20 – Aug 20
Least bittern	<i>Ixobrychus exilis</i>	BCC – BCR	Aug 16 – Oct 31
Lesser yellowlegs	<i>Tringa flavipes</i>	BCC – Rangewide	Breeds elsewhere
Long-eared owl	<i>Asio otus</i>	BCC – Rangewide	Mar 1 – Jul 15
Prothonotary warbler	<i>Protonotaria citrea</i>	BCC – Rangewide	Apr 1 – Jul 31
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	BCC – Rangewide	May 10 - Sep 10
Ruddy turnstone	<i>Arenaria interpres morinella</i>	BCC – BCR	Breeds elsewhere
Rusty blackbird	<i>Euphagus carolinus</i>	BCC – Rangewide	Breeds elsewhere
Semipalmated sandpiper	<i>Calidris pusilla</i>	BCC – Rangewide	Breeds elsewhere
Short-billed dowitcher	<i>Limnodromus griseus</i>	BCC – Rangewide	Breeds elsewhere
Willow flycatcher	<i>Empidonax traillii</i>	BCC – BCR	May 20 – Aug 31
Wood thrush	<i>Hylocichla mustelina</i>	BCC – Rangewide	May 10 – Aug 31

BCC: Birds of Conservation Concern, BCR: Bird Conservation Region, Rangewide: protected throughout its range in the continental U.S., Non-BCC: warrants attention, protected under the Bald and Golden Eagle Protection Act. Information from this table was derived from the USFWS Information for Planning and Consultation website (<https://ecos.fws.gov/ipac/>, 12/21/2020).

FISH

The aquatic habitat diversity throughout the project makes it suitable for many different fish species. According to the UMRCC (Steuck, Yess, Pitlo, Van Vooren, & Rassmussen, 2010), there are a total of 118 fish species that are either abundant, common, occasional, uncommon, rare, probably occurring, or historic within the pools of the project (Table 2-3). Each of these fish species holds an ecological function and purpose throughout the river system. Aside from being ecologically important, many of these fish species are sought after by anglers throughout the surrounding area, making the UMR fishery an important economic resource.

Table 2-3. Total number of fish species within each pool of the project based on relative abundance (Steuck et al., 2010).

Occurrence	Pools										
	1	2	3	4	5	5A	6	7	8	9	10
Abundant	8	2	5	8	11	8	7	7	4	11	11
Common	2	4	6	15	9	10	2	4	11	13	12
Occasional	8	12	12	20	12	10	17	15	18	15	14
Uncommon	16	19	17	9	12	15	11	14	16	18	17
Rare	14	24	24	24	21	21	20	19	19	15	15
Probable*	11	13	18	23	23	23	24	23	25	23	23
Historic	3	4	4	7	7	7	7	8	9	11	11
Total Species	62	78	86	106	95	94	88	90	102	106	103

*Indicates species that probably occur as strays from tributary or inland stocking.

MUSSELS

Mussels are a vital resource within the UMR due to their ability to filter feed, resulting in decreased turbidity and increased water clarity. Mussels reside throughout the river bottom of the UMR, with large concentrations residing in mussel beds. Mussel beds are unique areas within the river that offer suitable substrate, river conditions, and host species. These beds usually have high species richness with both rare and non-rare species. Within the project there are a total of 42 extant species of mussels and four species that were historically present (Table 2-4, (Kelner, 2017). Mussels have been viewed as one of the most at-risk groups of animals, with 55 percent of species being in danger of extinction and only 25 percent considered stable (UMRCC, 2004). This endangerment is attributed to over exploitation, water pollution, habitat alteration and invasive species (USFWS, 2006a).

Table 2-4. Distribution of mussel species throughout the project pools (Kelner, 2017).

Pool	Live Species	Historic Species	Total Species
Lower Minnesota River	11	28	39
Lower St. Croix River	39	3	42
USAF*	18	0	18
LSAF*	12	4	16
1	17	2	19
2	32	9	41
3	30	11	41
4	34	9	43
5	30	5	35
5A	25	10	35
6	28	10	38
7	30	7	37
8	30	8	38
9	33	4	37
10	35	8	43
Total (no duplicates)	42	4	46

*Upper St. Anthony Falls Pool (USAF) extends above the falls at Upper St. Anthony Falls Lock and Dam upstream to Coon Rapids Dam. Lower St. Anthony Falls Pool (LSAF) extends from the Lower St. Anthony Falls Lock and Dam to the Upper St. Anthony Falls Lock and Dam.

AMPHIBIANS AND REPTILES

Amphibians and reptiles within the project are mostly frogs, salamanders, turtles, and snakes. According to the USFWS' Upper Mississippi River National Wildlife and Fish Refuge CCP, 13 species of amphibians and 22 reptilian species are present within the Refuge (USFWS, 2006a). Similarly, according to the NPS there are approximately 14 amphibian and 22 reptilian species that are either present or probably present within the MNRRRA corridor.

Threatened and Endangered Species*

In 1973, Congress passed the Endangered Species Act (Act) to protect and recover imperiled species and the ecosystems on which they depend. The purposes of the act are to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved and to provide a program for the conservation of such federally listed species. Section 7 of the Act states that all federal departments and agencies shall seek to conserve threatened and endangered species and utilize their authorities in furtherance of the purposes of the Act. Also called interagency cooperation, Section 7 is a mechanism by which federal agencies ensure the action they take, including those they fund or authorize, do not jeopardize the existence of a listed species.

The USFWS is the lead agency administering and enforcing the Act. In accordance with Section 7, it is the policy of the Corps that all project lands and waters are managed in a manner that assists in the overall conservation of federally listed threatened and endangered species, and the ecosystems upon which they depend. Species and/or their critical habitats that occur on water resources development projects shall be protected and/or conserved in accordance with the Act, as amended and with existing statutes. Species that are candidates for listing will also be given consideration. Conservation

methods and procedures will be utilized, which will enable the inventory and protection of these species of special concern and their habitat, as well as the participation in their recovery.

Apart from federally listed species, individual states are authorized by their state legislature to identify species that are at greatest risk to disappear from their state. State law directs state conservation departments to alert resource managers and the public of these species and the actions that can help preserve the species in question.

FEDERALLY THREATENED AND ENDANGERED SPECIES

Eighteen threatened and endangered species of plants and animals have been determined to potentially reside within the section of the UMR that is incorporated by the 2020 Master Plan. These species either reside within the floodplain, spend a portion of their life cycle within the river or occupy adjacent habitats. A species list and status within the project and associated states were generated using the USFWS' Information for Planning and Consultation (IPaC) website (<https://ecos.fws.gov/ipac/>) on 20 December 2021 (Table 2-5).

Table 2-5. Federally listed species by state within the project.

Common Name	Scientific Name	Group	Status	State Presence		
				MN	WI	IA
Northern long-eared bat	<i>Myotis septentrionalis</i>	Mammal	Threatened	x	x	x
Whooping crane	<i>Grus americana</i>	Bird	EXPN*	x	x	x
Eastern massasauga	<i>Sistrurus caenatus</i>	Reptile	Threatened	x	x	
Higgins eye pearlymussel	<i>Lampsilis higginsii</i>	Mussel	Endangered	x	x	x
Sheepnose mussel	<i>Plethobasus cyphus</i>	Mussel	Endangered	x	x	x
Snuffbox mussel	<i>Epioblasma triquetra</i>	Mussel	Endangered	x	x	
Spectaclecase mussel	<i>Cumberlandia monodonta</i>	Mussel	Endangered	x	x	x
Winged mapleleaf	<i>Quadrula fragosa</i>	Mussel	Endangered	x		
Iowa pleistocene snail	<i>Discus macclintocki</i>	Snail	Endangered			x
Hine's emerald dragonfly	<i>Somatochlora hineana</i>	Insect	Endangered		x	x
Karner blue butterfly	<i>Lycaeides melissa samuelis</i>	Insect	Endangered	x	x	
Rusty patch bumble bee	<i>Bombus affinis</i>	Insect	Endangered	x	x	x
Monarch butterfly	<i>Danaus plexippus</i>	Insect	Candidate	x	x	x
Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	Insect	Threatened		x	x
Mead's milkweed	<i>Asclepias meadii</i>	Plant	Threatened		x	x
Northern wild monkshood	<i>Aconitum noveboracense</i>	Plant	Threatened	x	x	x
Prairie bush-clover	<i>Lespedeza leptostachya</i>	Plant	Threatened	x	x	x
Western prairie fringed orchid	<i>Platanthera praeclara</i>	Plant	Threatened		x	x

*EXPN denotes an experimental population that is non-essential

STATE THREATENED AND ENDANGERED SPECIES

Though the Corps does not mitigate for state listed species, Corps personnel cooperate with the states to protect these species where possible. Between the three states in the project area, there are 543 unique state listed species (Table 2-6). The complete list of each state's threatened and endangered species can be seen in Appendix D – State Listed Species and Other Species Lists.

Table 2-6. Threatened and endangered state listed species of each state based on group. Data is based on counties that are within the project area.

Group	Minnesota	Wisconsin	Iowa	Total (No Duplicates)
Amphibian	3	3	1	5
Bird	16	27	7	36
Fish	19	17	12	34
Fungus	5	0	0	5
Insect	20	44	15	70
Mammal	9	7	2	11
Mussel	25	20	8	28
Plant	108	120	141	318
Reptile	7	15	4	18
Snail	1	10	8	18
Total	213	263	198	543

Resources of Concern

The USFWS through their HMPs distinguish specific species, habitat types, and communities that can act as surrogate species or habitat types for the other species and habitat types present within the Refuge. These resources of concern (ROC) are the focal point of the USFWS' HMPs and help determine the management objectives and habitat requirement within the Refuge. The teams in charge of developing the latest HMP (2019) determined that there are 24 priority ROCs within the Refuge. Priority ROCs can be used as indicators of the overall habitat management and benefits to other species that utilize the same habitat and be used to dictate resource management on the Refuge. A list of the priority ROCs for the Refuge and their habitat associations can be found in Table 2-7 below. More information pertaining to priority ROCs can be found with the USFWSs most recent 2019 Refuge HMP.

Invasive Species*

The introduction of species into areas outside of their native ranges, whether intentional or accidental, has resulted in both economic and ecological harm. When non-native species become established, grow or spread quickly, and displace native species they are labelled as exotic invasive species (USACE, 2011). Exotic invasive species will often outcompete native species for resources and persist due to their lack of competition and predators. Invasion of exotic species is often triggered or accelerated within a natural system that is disturbed or degraded (USFWS, 2006a). Once exotic invasive species are established, they are difficult to control and almost impossible to remove. For these reasons, exotic invasive species are thought to be the second greatest driver in species endangerment and extinction after habitat destruction (Pejchar & Mooney, 2009).

Exotic species enter the UMR through a number of different paths, with one of the largest threats being the Great Lakes Basin and the connected Chicago Area Waters System (CAWS). Historically, the Great Lakes Basin and UMR were separate, but this changed in the early 20th century with the creation of canals in the CAWS. One of the larger introductions of exotic species into the Great Lakes Basin and subsequently the UMR is through ballast water carried by transoceanic vessels (Costello, Drake, & Lodge, 2007). Other introductions of exotic invasive species were done deliberately to serve a purpose. Accidental and deliberate introductions have resulted in a number of exotic invasive species that could compromise the native species of the UMR. Vegetative exotic species threats include reed canarygrass, buckthorn, Japanese hops, barberry, Japanese knotweed, garlic mustard, crown vetch, and honeysuckle. These species can significantly alter native ecosystems. Trees are also very susceptible to invasive species, as evidenced by the emerald ash borer, oak wilt, gypsy moth, and Dutch elm disease. Diligent monitoring and swift reaction are key to successful invasive species management. Eradication is rarely attainable, but control is critical to managing invasive species. A list of invasive species within the UMR can be seen below (Table 2-8), which was made by using the USGS' Nonindigenous Aquatic Species generator.

Table 2-7. Priority ROCs and their habitat associations for the Upper Mississippi River National Wildlife and Fish Refuge (USFWS, 2019).

Priority Resource of Concern	Broad habitats	Taxa Group or Example Species
Midwestern Forests and Woodlands	Upland forest	Native plant community
North-central Bur Oak Openings	Savanna	Native plant community
Grassland birds	Grassland	Bird
Orate box turtle		Reptile
Native invertebrate pollinators		Invertebrate – including native butterflies, moths, bees, and flies
Midwestern Tallgrass Prairie		Native plant community
Red-shouldered hawk	Bottomland forest	Bird
Cerulean warbler		Bird
Prothonotary warbler		Bird
Transient Neotropical migrant passerines		Bird – including chestnut-sided warbler, northern waterthrush, and Nashville warbler
Tree-roosting bats		Mammal – including northern long-eared bat and Indiana bat
Midwestern Wooded Swamps and Floodplains		Native plant community
Eastern massasauga	Wet meadow	Reptile
Midwestern Wet Prairie and Meadow		Native plant community
Dabbling duck guild	Wet meadow and marsh	Bird - including mallard, gadwall, American wigeon, northern pintail, green-winged teal, blue-winged teal
Black tern	Marsh	Bird
Tundra swan		Bird
Secretive marsh birds		Bird –including pied-billed grebe, American bittern, least bittern, sora, king rail, Virginia rail, common gallinule
Canvasback	Lentic backwater lakes and impounded areas	Bird
Lesser scaup		Bird
Limnophilic native mussels		Mussel –including paper pondshell and giant floater
Limnophilic native fish	Lotic main channel border, secondary channel, tertiary channel	Fish – including mud darter, weed shiner, pugnose minnow, central mudminnow, and pirate perch
Fluvial-dependent native mussels		Mussel – including Higgins eye pearlymussel
Migratory fluvial-dependent native fish		Fish – including paddlefish and sturgeon spp.

Table 2-8. Invasive species established within the project. This table was generated via point maps and collection information gathered from the USGS' Nonindigenous Aquatic Species generator.

Common Name	Scientific Name	Group	Species Origin
Freshwater jellyfish	<i>Craspedacusta sowerbyi</i>	Coelenterates-Hydrozoans	Exotic
Scud	<i>Echinogammarus ischnus</i>	Crustaceans-Amphipods	Exotic
Waterflea	<i>Daphnia lumholtzi</i>	Crustaceans-Cladocerans	Exotic
Rusty crayfish	<i>Faxonius rusticus</i>	Crustaceans-Crayfish	Native Transplant
Grass carp	<i>Ctenopharyngodon idella</i>	Fishes	Exotic
Common carp	<i>Cyprinus carpio</i>	Fishes	Exotic
Silver carp	<i>Hypophthalmichthys molitrix</i>	Fishes	Exotic
Bighead carp	<i>Hypophthalmichthys nobilis</i>	Fishes	Exotic
Black carp*	<i>Mylopharyngodon piceus</i>	Fishes	Exotic
Asian clam	<i>Corbicula fluminea</i>	Mollusks-Bivalves	Exotic
Zebra mussel	<i>Dreissena polymorpha</i>	Mollusks-Bivalves	Exotic
Quagga mussel	<i>Dreissena rostriformis bugensis</i>	Mollusks-Bivalves	Exotic
Faucet snail	<i>Bithynia tentaculata</i>	Mollusks-Gastropods	Exotic
Chinese mysterysnail	<i>Cipangopaludina chinensis</i>	Mollusks-Gastropods	Exotic
Japanese mysterysnail	<i>Cipangopaludina japonica</i>	Mollusks-Gastropods	Exotic
Water lettuce	<i>Pistia stratiotes</i>	Plants	Cryptogenic
Water-cress	<i>Nasturtium officinale</i>	Plants	Exotic
Flowering rush	<i>Butomus umbellatus</i>	Plants	Exotic
Parrot feather	<i>Myriophyllum aquaticum</i>	Plants	Exotic
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	Plants	Exotic
Purple lythrum	<i>Lythrum salicaria</i>	Plants	Exotic
Reed mannagrass	<i>Glyceria maxima</i>	Plants	Exotic
Reed canarygrass	<i>Phalaris arundinacea</i>	Plants	Native Transplant
Floating waterhyacinth	<i>Eichhornia crassipes</i>	Plants	Exotic
Curly-leaf pondweed	<i>Potamogeton crispus</i>	Plants	Exotic
Narrow-leaved cattail	<i>Typha angustifolia</i>	Plants	Exotic
White cattail	<i>Typha X glauca</i>	Plants	Exotic Hybrid
Black locust	<i>Robinia pseudoacacia</i>	Plants	Native Transplant
Siberian elm	<i>Ulmus pumila</i>	Plants	Exotic
White mulberry	<i>Morus alba</i>	Plants	Exotic
Buckthorn species	<i>Rhamnus spp.</i>	Plants	Exotic
Russian and autumn olive	<i>Elaeagnus angustifolia, E. umbellata</i>	Plants	Exotic
Winged burning bush	<i>Euonymus alatus</i>	Plants	Exotic
Japanese barberry	<i>Berberis thunbergii</i>	Plants	Exotic
Oriental bittersweet	<i>Celastrus orbiculata</i>	Plants	Exotic
Honeysuckle	<i>Lonicera spp.</i>	Plants	Exotic
Japanese hops	<i>Humulus japonicus</i>	Plants	Exotic
Vetch	<i>Coronilla varia, Vicia spp.</i>	Plants	Exotic
Purple loosestrife	<i>Lythrum salicaria</i>	Plants	Exotic
Spotted knapweed	<i>Centaurea maculosa</i>	Plants	Exotic
Leafy spurge	<i>Euphorbia esula</i>	Plants	Exotic

Common Name	Scientific Name	Group	Species Origin
Bird's-foot trefoil	<i>Lotus corniculata</i>	Plants	Exotic
Garlic mustard	<i>Alliaria petiolata</i>	Plants	Exotic
Moneywort	<i>Lysimachia nummularia</i>	Plants	Exotic
Asian knotweeds	<i>Polygonum sachalinense</i> , <i>P. cuspidatum</i>	Plants	Exotic
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	Plants	Exotic

*Represents a species not yet present within the project but has the potential to be a future threat.

Terrestrial Habitat (Forest)

HISTORIC CONDITION

Floodplain forests along the UMR cover only a small portion of the area that they did before European settlement (Nelson, Redmond, & Sparks, 1994; Yin, Nelson, & Lubinski, 1997). Extensive settlement of the floodplain, utilization of wood for fueling steamboats, and agricultural development between the arrival of the first Europeans and the establishment of the lock and dam system greatly altered the landscape and likely shifted successional patterns by preferentially removing long-lived, slower growing tree species and creating large open areas in the floodplain. The structure and function of the UMR floodplain forest further changed after the construction of the locks and dams, which caused a shift to more flood-tolerant vegetation in many areas. In addition, agricultural lands that were abandoned at the time of government acquisition in the 1930s were recolonized by even-aged stands of silver maple and cottonwood. The rapid spread of Dutch elm disease in the second half of the 20th century decimated American elm, largely removing it from the forest canopy, and the emerald ash borer has virtually eliminated ash as a component of floodplain forests.

Quantitative information regarding historic forest conditions is sparse, but some data is available from the original General Land Office (GLO) survey witness tree dataset, primarily collected in the 1840s and from broad classifications recorded on 1890 Mississippi River Commission maps.

From the 1840s to the 2010s, it appears that there has been a substantial decrease in the prevalence of hard mast species (oak, hickory, and walnut) and a corresponding increase in light mast species (silver maple, cottonwood, ash, elm, birch, and willow). Soft mast species (hackberry, black cherry, basswood, and locust) have increased, but remain a very small proportion of the overall species composition (Table 2-9).

A few important clarifications of this data are necessary. Though light mast species have increased, the increase is almost completely due to the expansion of silver maple, which increased from about 17 percent of trees in the GLO records to 63 percent of trees in current inventory datasets. Other light mast species have also declined in prevalence, such as ash (-14 percent), elm (-7 percent) and birch (-11 percent). This compares to an 11 percent decline for swamp white oak/bur oak and a 6 percent decline for black/northern red oak. Ash will likely continue to decline due to substantial mortality from the emerald ash borer, and elm is unlikely to expand due to the presence of Dutch elm disease. Although the GLO dataset provides spatially explicit tree locations, the data was collected for general land survey purposes, and inherent bias for selection of species to record is present in the dataset. In particular, trees were selected that were seen as the most likely to survive the longest period of time. Consequently, the GLO surveys likely overestimate the abundance of long-lived species, such as oaks and hickories, and underestimate the abundance of shorter-lived species, such as silver maple and cottonwood.

Table 2-9. Change in tree species composition between the time of European settlement and the current time for Mississippi River forests in Wisconsin and Minnesota.

Mast type	1840s	2010s	Change
Hard	23%	5%	-18%
Light	76%	93%	+17%
Soft	1%	2%	+1%

CURRENT CONDITION

The St. Paul District hired its first full-time forester in the 1980s, at the beginning of the Mississippi River Project NRM program. Over the three decades that the program has been in existence, it has overseen the planting of thousands of trees, management of invasive species on hundreds of acres, and restoration of dozens of sites degraded by past human activity on district-managed lands. The implementation of the Upper Mississippi River Restoration (UMRR) program has had a further beneficial effect on forests along the UMR through the restoration, creation, and enhancement of floodplain forest habitat. Future restoration work under both the operational NRM program and the UMRR program, as well as work conducted by the states and USFWS, will further benefit floodplain forests within the UMR Basin.

Current forest conditions are generally similar across pools when summarized at the pool level, though some variation does exist even at this scale. For example, pools 3, 4, 9, and 10 have over 40 percent of stand basal area in trees greater than 24 inches in diameter at breast height. Pools 5, 6, and 7, in contrast, have a relatively even distribution of size classes (Figure 2-9). Species composition varies similarly across pools, with pools 3, 4, 9, and 10 being heavily dominated by maple and maple-ash-elm forests, while pools 5, 7, and 8 have a more even distribution of forest types (Figure 2-10). Pools 9 and 10, which have the highest basal area in large diameter trees, also have the greatest number of plots classified as maple or maple-ash-elm.

Today's forest conditions are driven by a range of factors. The variability in species composition and structure among pools is likely the result of variable historic land use practices as well as variation in land elevation and hydrology. Many stands dominated by light-seeded species established following agricultural abandonment at the time of federal acquisition and represent an early-successional stage of floodplain forest development. Some of these stands are likely to transition over time to more mixed stands, if seed source is available and annual inundation is relatively low (De Jager, et al., 2019). Other stands at lower elevations or where a diverse seed source is lacking, are likely to transition from forest into marshy habitats or wet meadows dominated by reed canarygrass. Flooding over the last 30 years has become more variable, and forested sites have experienced longer periods of annual growing season inundation, making the establishment of regeneration challenging. In addition, many sites with inundation dynamics conducive to long-term forest development lack the necessary seed sources to establish later-successional forest conditions.

Without active management, continued degradation of forests is likely. Some of the anticipated changes include (Guyon, 2012):

- A reduction in pioneer species such as cottonwood and willow.
- More open forest canopies as trees die and canopy gaps are invaded by herbaceous vegetation and/or grasses (e.g., reed canarygrass).
- Continued loss of forest in the lower parts of navigation pools due to island erosion.
- Conversion of forest to other vegetation types in midpools due to elevated water tables.

- Continued dominance of low-diversity forest, with associated vulnerabilities to forest loss from introduced pests or a changing climate.
- Gradual conversion of forest to non-forested habitat, and the associated loss of critical habitat for floodplain forest dependent species (e.g., prothonotary warbler, red-shouldered hawk, wood ducks, etc.).

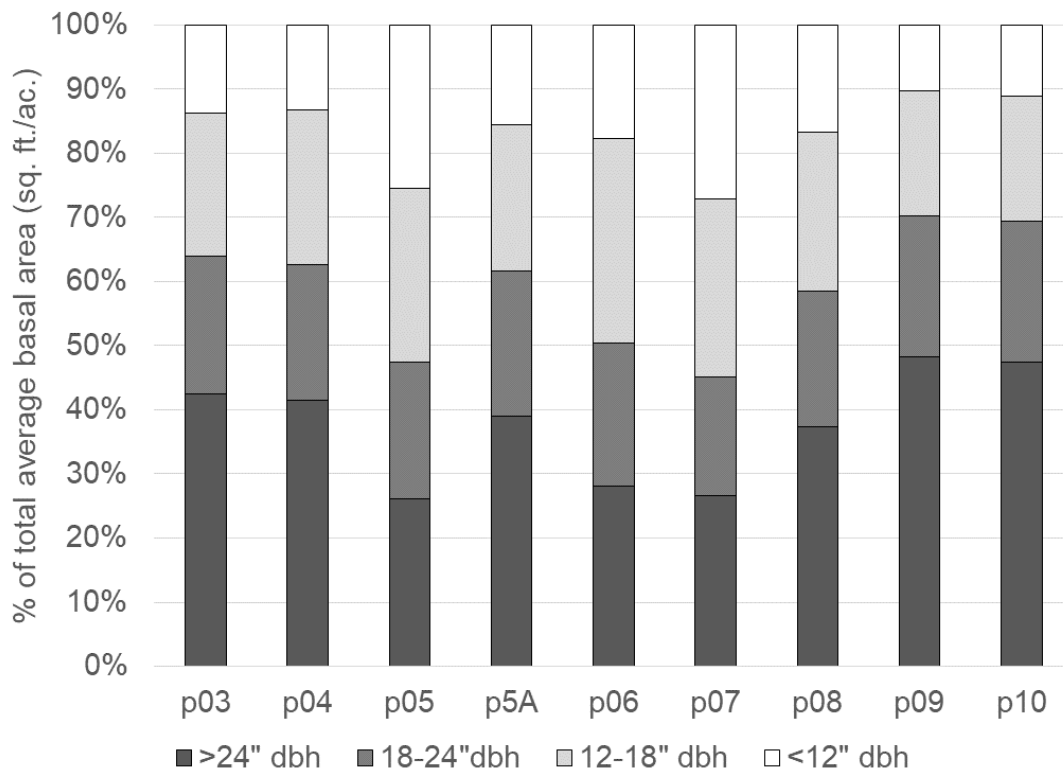


Figure 2-9. Distribution of tree basal area by diameter class and pool. Phase II Forest Inventory Data from 6,119 forest inventory plots, 2008–2018.

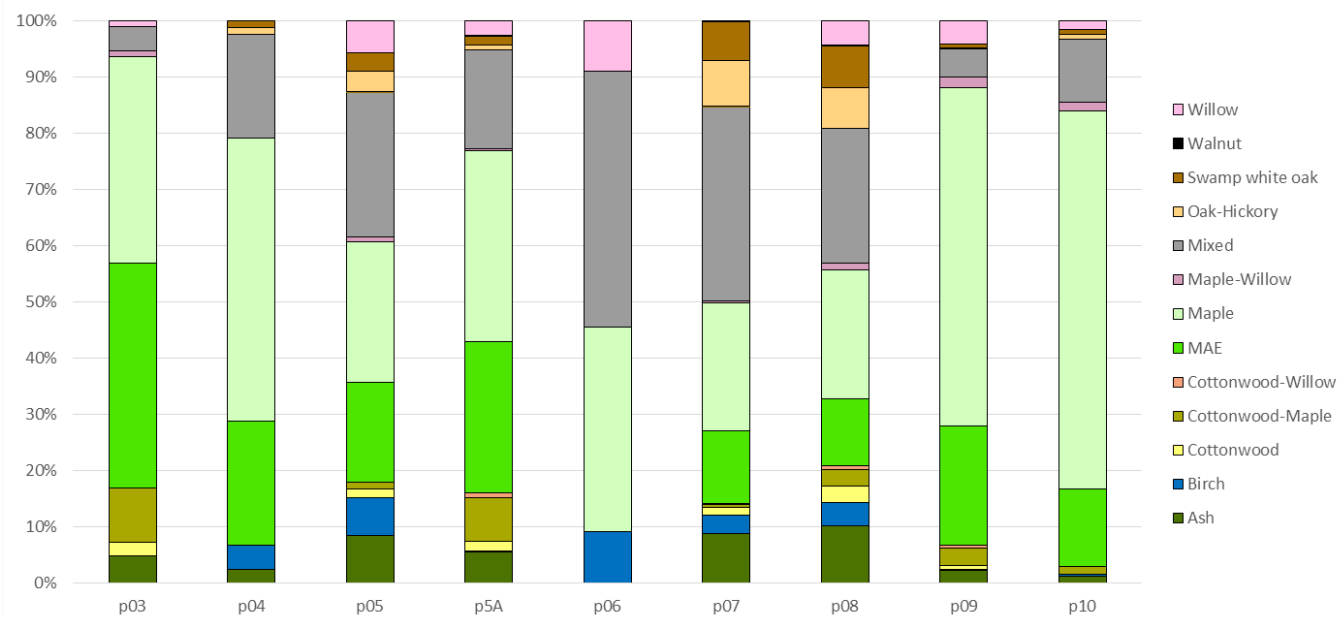


Figure 2-10. Distribution of plot-level forest community type by pool. MAE = maple-ash-elm. Phase II Forest Inventory Data from 6,119 forest inventory plots, 2008–2018.

Vegetative and Wetland Resources*

The Long Term Resource Monitoring (LTRM) program, an authorization on the Water Resources Development Act of 1986, was implemented to better understand the biological resources of the UMR. The LTRM is housed in and coordinated by the USGS-Upper Midwest Environmental Sciences Center (UMESC), an office of the USGS, with funding provided by the Corps through the UMR program. A major initiative of the LTRM has been to quantify current and historic UMR land cover at a very high resolution, with mapping units as small as one acre (Dieck & Robinson, 2004). Historic datasets cover time periods from 1890 to 2000, with the most recent iteration of the land-cover mapping completed in 2010. A summary of the 2010 land-cover acreages by pool is provided in Table 2-10.

Table 2-10. Land cover acreage on Corps and USFWS land within each pool of the project area based on the updated land acreages for the 2020 Master Plan. Cover types are derived from USGS UMESC LTRM 2010.

Land Cover Types (UMESC LTRM 2010)	Pool												Total (Acres)
	1	2	3	4	5	5A	6	7	8	9	10	11	
Agriculture ‡	-	-	6	15	9	1	-	151	134	-	1	-	316
Deep marsh †	-	-	7	30	87	70	21	122	410	1,905	478	40	3,170
Developed †	19	18	35	120	100	35	23	90	219	69	52	8	789
Grass/forbs †	-	-	9	23	204	23	8	94	121	3	-	-	485
Open water ‡	3	6	11	25	53	13	8	13	57	55	15	2	259
Road/levee †	-	4	33	51	64	76	41	45	121	144	47	25	651
Rooted floating aquatics ‡	-	-	0	7	8	4	2	2	32	45	2	1	104
Sand/mud ‡	-	1	28	97	37	5	19	16	35	7	4	-	248
Shallow marsh †	-	5	304	410	306	460	140	888	1,642	2,333	898	7	7,394
Shrub/scrub ‡	-	-	-	6	30	1	7	6	-	-	-	-	50
Submersed aquatic veg. †	-	2	5	32	19	13	7	10	96	149	50	2	386
Upland forest †	4	1	3	100	134	4	0	229	39	-	12	-	526
Wet forest ‡	2	47	1,692	4,141	2,990	2,837	793	4,449	5,199	11,719	7,661	509	42,039
Wet meadow ‡	-	-	142	638	217	189	37	1,202	2,152	1,467	503	16	6,562
Wet shrub ‡	-	-	26	143	39	35	17	437	27	25	43	5	798
Total (Acres)	28	85	2,301	5,837	4,296	3,767	1,124	7,753	10,284	17,921	9,767	615	63,778

† Represents wetland vegetation cover types

‡ Represents terrestrial vegetation cover types

2.3.2 CULTURAL RESOURCES*

Information presented in the cultural resource section is primarily based on review of existing data on file at the Minnesota, Wisconsin, and Iowa, state site file databases in addition to surveys conducted internally by a Corps archaeologist in support of a previous feasibility study or project. Historic property significance is not always considered when assigning state site numbers, and many sites have not been field verified. In addition, field surveys do not cover the entirety of Corps or USFWS' fee title. Traditional Cultural Property (TCP) studies or natural resource surveys of plants and animals that may be fundamental to a tribe's cultural identity and hold spiritual, economic, and subsistence values have not been completed. Ethnographic studies to include interviews with local informants or tribal members have not been captured in previous research. These data and analytical gaps cannot be addressed in connection with this 2020 Master Plan revision; however, ongoing research and continued surveys of the Corps' fee title lands would allow for additional characterization of cultural resources present within the UMR Basin.

Historic properties are integral, nonrenewable elements of the physical landscape. A historic property is any precontact or historic district, landscape, site, building, structure, TCP, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). Used interchangeably with cultural resources, the term includes artifacts and materials, historic records, photographs, and other historic items that represent significant events or people, lifeways, traditions, and ceremonies of communities. Historic properties contribute to our knowledge of the past, and preserving or minimizing the degradation of these important resources is one of the responsibilities of the Corps and other agencies.

Historic properties are a major component of the UMR Basin. Collectively, the archaeological record indicates continual human occupation along the UMR for approximately 13,000 years, after glaciers receded making the area habitable for people. The river has been central to humans and their subsistence, travel, and exchange of material ideas. This is reflected in the material culture remaining today in the form of cultural resource sites that are located throughout the river. Several sites have been located on the Corps' fee title lands substantiating the fact that the river was extensively used by people for its resources. Archaeological and historic contexts used today were developed to group information about related cultural resources together based on theme, geographic limits, and chronological periods. They allow us to interpret the past and are used to identify significant patterns or trends and summarize them within the history of a given area. Cultural affiliations, contexts, or components, in addition to site types, were developed for better identification, evaluation, and treatment of individual cultural resources; however, they are artificial constructs.

Precontact Context

Paleo Context (13,000–9,500 B.P.)

The first people to utilize the Mississippi River are referred to as the Paleo people. Paleo sites are limited within the UMR Basin, with only one being identified on the Corps' fee title lands (Figure 2-11). The reason for the lack of sites associated with this context may be due to the sample of material culture associated with the Paleo context being very small. It is also biased by its size and focus on lithic or stone artifacts and the poor preservation of organic material. The artifacts most distinctively linked to this period are large, lanceolate (leaf-shaped) projectile points. Paleo populations consisted of small groups of highly mobile hunter-gatherers who seasonally followed big game herds; although a variety of wild resources were exploited.

Archaic Context (9,500–2,500 B.P.)

Similar to the Paleo, the Archaic context is recognized primarily through its diagnostic lithic material. The difference between Paleo and Archaic is largely the result of better-documented Archaic sites. During this time, significant warming and drying occurred with the complete retreat of glaciers to the north. There would have been a widespread lowering of water tables. In addition, by 7,500 B.P., there were vegetation changes with prairie fields expanding into Minnesota, Iowa, and parts of Wisconsin, eventually becoming similar to what we see today. Ultimately, the overall environment became more stable resulting in the development of specific resources such as animal and plant communities. Compared to the Paleo context, the number of people living in small settlements increased, sometimes forming small villages; however, people were still highly mobile and used areas for short durations. A greater diversity of lithic tools including the use of stone material from nonlocal resources is evident. More diverse animal use and plant production appear in the archaeological record. Although not as prevalent, ceramic use and mound building were used by Archaic people; however, they are not readily used to identify Archaic sites. Several Archaic sites including habitation, burial mound, rock-shelter, and artifact scatter have been identified on the Corps' fee title lands (Figure 2-11).

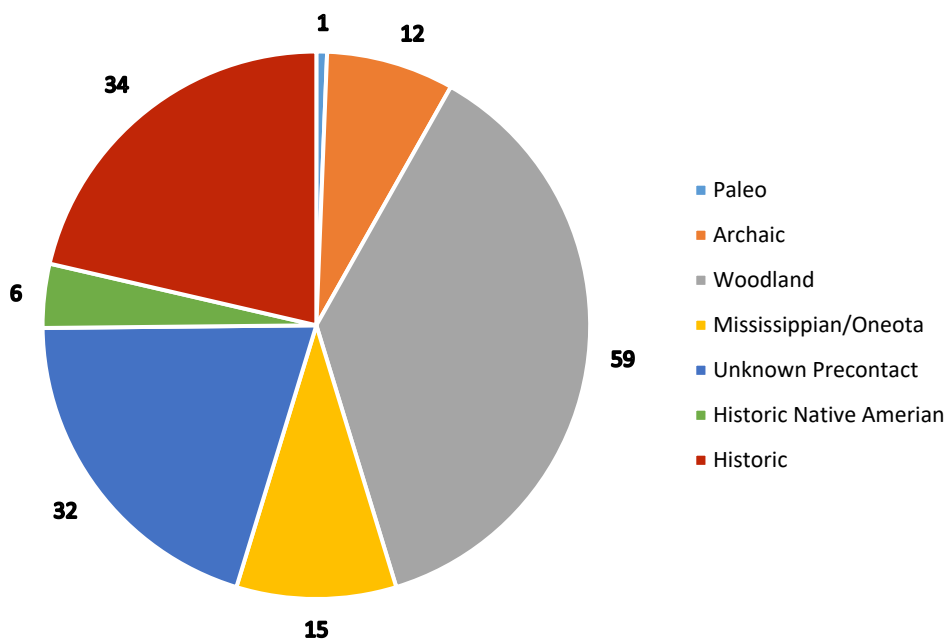


Figure 2-11. Associated periods/traditions of cultural resources on the Corps' fee title lands.

Woodland Context (2,500–400 B.P.)

Although some crop domestication occurred during the later period of the Archaic context, not until the Woodland context did farming intensify. This reliability on crops meant that people could live at one location longer since there was a dependable food supply. Village size increased, food storage pits became common, and ceramics were developed to aid in food processing. By the latter half of the Woodland context, maize (corn) was prevalent in the archaeological record indicating that not only was it becoming a significant aspect to people's diet but more time was dedicated to its cultivation resulting in more permanent living patterns. The focus on lithics for identification began to shift during the Woodland context to include evidence of ceramics, earthworks, and plants

(Madigan & Schirmer, 2001). A greater variety of exotic raw materials and finished goods could be found, showing that trade networks became increasingly complex. The largest number of sites identified on the Corps' fee title lands within the UMR Basin are associated with the Woodland context and includes habitation, artifact scatter, mound, and rock-shelter (Figure 2-11).

Mississippian and Oneota components have also been identified on the Corps' fee title lands in the UMR Basin (Figure 2-11). Mississippian settlement and subsistence patterns are the main difference from Woodland context patterns (Madigan & Schirmer, 2001). The most noticeable difference is the heavy reliance on maize agriculture within and adjacent to the floodplain and away from village sites. This reliance resulted in dietary exclusion of plants formerly cultivated, reduction in red meat, and focus on lowland resources versus upland resources (Madigan & Schirmer, 2001). Oneota is identified through distinct shell-tempered ceramics and lithic assemblages from Woodland context assemblages. Oneota also place emphasis on clamshells, often having their village sites surrounded by shell middens, wild rice, and floodplain horticulture. Most Oneota sites occur in terrace locations adjacent to extensive floodplain areas (Madigan & Schirmer, 2001). Some later-dating Oneota sites were occupied during the protohistoric or early historic periods. Protohistoric refers to a transitional era, when European trade goods were reaching a region — in this case, the UMR Basin — but there was no face-to-face contact between native groups and Europeans.

There are presently no defined TCPs on the Corps' fee title lands; however, several TCPs are recognized by Native Americans on the UMR adjacent to Corps lands. According to the U.S. Department of Interior, National Park Service National Register Bulletin 38, a traditional cultural property can be defined generally as one that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that is (1) rooted in that community's history, and (2) important in maintaining the continuing cultural identity of the community. Often many Native Americans consider mounds, mound groups, and mortuary features to possess traditional cultural value. TCPs are not limited to Native Americans but could be associated with any community. No systematic effort has been made to define TCPs on the Corps' fee title lands.

Historic Context

The UMR is within the ancestral homelands of several tribes that utilized the natural resources of the region. There is no single narrative to capture Native American presence within the Mississippi River. Although each nation has distinct languages and dialects, customs, and material culture, those living along the Mississippi River, prior to Europeans arriving, to a varied degree used the river's resources in similar ways. They all practiced cultivation to some degree, although some utilized plant gathering (e.g., wild rice) and preferred hunting wild game over cultivation and fished the rivers and lakes. Some utilized other local resources such as maple syrup or favored specific animals such as bison or deer. This largely didn't change until the arrival of Europeans.

Native Americans were the people Europeans first met in the UMR Basin. The beginning of the Habitat Management Plan historic context or post-contact period began with the age of French exploration in the 1600s when encounters between those arriving and those already living within the area were documented. There may have been earlier contact between Native Americans and Europeans within the region; however, these encounters are undocumented. The arrival of Marquette and Joliet to the UMR in 1673 represents the first known European contact with Native Americans. The Mississippi River was an important route for many well-documented European explorations; sometimes, the explorer's journals and related maps mentioned specific tribes. There were several Native American groups living within the UMR Basin when Europeans arrived including the Great

Sioux (Dakota), those tribes of the Algonquian language family (Anishinaabe-Ojibwe, Meskwaki-Sauk (Sac and Fox), Kickapoo, Menominee, Potawatomi, and Miami), Ho-Chunk/Winnebago, Ioway, and the Huron, Ottawa, and allies. Within the Driftless Area, five major tribes have been identified to have strong ties to the Driftless Area: the Ioway, Meskwaki-Sauk (Sac and Fox), Eastern Dakota, and Winnebago (Vogel & Thompson, 2003).

The east side of the Mississippi River was predominately under control of the Sauk and Meskwaki from the Des Moines River to the Wisconsin River (along with Kickapoo and Potawatomi), the Ho-Chunk from the Wisconsin River to the Black River (near present-day La Crosse), and the Anishinaabe from the Black River to the St. Croix River. The Dakota inhabited much of Minnesota and lived along the Mississippi River. Significant changes occurred to Native American lifeways, culture, and geographical location as Euro-American settlers continued to arrive within the region. Tribes signed treaties with the United States in which they ceded land but retained rights to hunt, fish, and gather in those ceded territories. These treaty rights, however, were largely ignored as states assumed statehood and began regulating their natural resources. Treaties were used between 1774 until 1871 to establish borders or acquire land, secure alliances, and prescribe conditions of behavior between both parties in exchange for retained rights. Congressional policy, in 1804, stated that land had to be purchased or ceded to the United States from Native Americans before being surveyed (Benn & Halvorson, 2001). By 1805, land was purchased at the mouth of the Minnesota River for establishing a military reservation.

Very little is known about cultural resources recorded as historic Native American sites on the Corps' fee title lands (Figure 2-11). These sites are typically identified as cemetery or village sites and are often associated with a precontact or historic Euro-American context. Often these sites have not been field verified. The most well documented historic site on Corps fee title lands within the UMR Basin is within portions of and adjacent to Blackhawk Park, Vernon County, Wisconsin. The Battle of Bad Axe, an incident that ended the Black Hawk War of 1832, is associated with several natural landmarks adjacent to Blackhawk Park. Although it is labeled as a "battle," the event can be more appropriately labeled as a massacre. The Black Hawk War of the early 1830s was a series of skirmishes and small battles that occurred across northern Illinois and southern Wisconsin. On August 1-2, 1832, militia and regular Army troops caught a band of Sauk, Fox, and Kickapoo people led by the Sauk warrior Black Hawk while they were attempting to cross the Mississippi River. Several hundred of Black Hawk's followers were killed or captured in the ensuing conflict. The exact location of the Battle of Bad Axe has been subject to controversy, but it is believed parts of the conflict overlap with portions of Blackhawk Park. Although several archaeological investigations have occurred within the park, none have identified material associated with the clash between troops and Native Americans.

The earliest written record of people living in the Upper Mississippi River was in 1642, and is believed to refer to the Dakota people (Overstreet, 1986). The Great Sioux (Dakota) Nation were identified as "Sioux" by the French fur trappers. The entire Great Plains tribal system is referred to as Oceti Sakowin (Seven Council Fires). Within this system there are three tribal divisions (Dakota, Lakota, and Nakota) with several bands that make up each division. Each division is distinguished through distinct dialects and lifestyles. The Eastern division is known as Isanti/Santee (Dakota), Dakota meaning "friends" or "allies." The original homeland of the Dakota was considered to be the Michigan, Iowa, Minnesota, and Missouri Rivers and North Dakota. Within the UMR Basin, the Dakota hunted wild game, fished in rivers and lakes, gathered wild rice, and aligned their daily living with the seasons.

The Anishinaabe-Ojibwe people are part of a large language group of Native American and Canada First Nation people known as the Algonquin “family.” Algonquin is a linguistic designation that refers to a variety of Native American groups that speak Algonquian languages. The original homeland of the Ojibwe in the United States included the northeastern corner of North Dakota, northern Minnesota and Wisconsin, most of Michigan, and part of northern Ohio. Within the UMR Basin, they traditionally lived by hunting, trapping, and fishing and by gathering wild rice and making maple sugar. Other bands within the Algonquin language family include the Meskwaki-Sauk (Sac and Fox), Kickapoo, Menominee, Potawatomi, Miami, and Mascouten. Each of these tribes came to be in the UMR Basin because of European aggression resulting in many of them becoming displaced from their original homelands. They established new homelands between the Great Lakes and the Mississippi River.

Similar to the bands within the Algonquin language family, the Huron and Ottawa were also displaced from their original homelands and took refuge in the UMR Basin.

The Ho-Chunk are one of two of the First Nations in Wisconsin. Up until 1993, the Ho-Chunk Nation was known as the Wisconsin Winnebago Tribe. The term “Winnebago,” however, is a misnomer derived from the Algonquian language. The Ho-Chunk Nation was originally named the Winnebago by the French in the 1600s. The Ho-Chunk are Siouan-speaking people who call themselves “Hochungra” meaning “People of the Big Voice.” Their original homeland included parts of Wisconsin, Minnesota, Iowa, and Illinois. Within the UMR Basin, the Ho-Chunk/Winnebago were farmers. They also fished, collected wild rice, made maple sugar, and hunted local resources. Today, two federally-recognized tribes make up the Ho-Chunk people, the Ho-Chunk Nation of Wisconsin and the Winnebago Tribe of Nebraska.

With the arrival of Europeans, the river’s role substantially shifted and became one of a political object (Madigan & Schirmer, 2001). The Mississippi River was a borderland region where French, Spanish, British, Americans, and Native Americans converged (Benn & Vogel, 1995). Fur trade was to become the center of all economic activity on the Mississippi River (Jensen, 1992). European interaction through trade led to a change in living standards for Native Americans. Some experienced an increase in political power, territorial holdings, and populations while others experienced a decrease. This created intermittent tensions and territorial disputes. Native American land use patterns, however, did not substantially change until Euro-American settlers moved into the region with the end of the War of 1812 (Madigan & Schirmer, 2001).

Westward movement and large-scale Euro-American settlement on the Mississippi River exponentially grew with the end of the War of 1812 (Benn & Vogel, 1995). It was the land and the resources within the land that most attracted these settlers. Land for farming, minerals for mining, and resources, such as timber, attracted large numbers of Euro-Americans. Concentrations of settlers formed in areas most advantageous for farming and transportation such as navigable rivers, existing land routes, and margins of valley forests and prairies. The arrival of these settlers came at a cost for Native Americans with many of them being removed from the UMR Basin to other areas including other states (e.g., North Dakota, Oklahoma, Nebraska). As river towns developed, they became major aspects of Mississippi River settlement. They promoted and grew with surrounding agricultural settlements and were the location for commercial, civic, and social functions. These towns were dependent upon river traffic. Later, industry transformed these river towns. Only those with steamboat terminals and later rail connections continued to have economic importance. The location of early mills and manufacturing plants on the river were dependent on waterpower and transportation (Benn & Vogel, 1995). Development of transportation readily began in the late 1840s. Prior to this, transportation was specific for fur trade and military supplies (Jensen, 1992). Congress

organized the Wisconsin Territory in 1836 and the Minnesota Territory in 1849, which spurred river traffic into the northern stretches of the UMR above Guttenberg, Iowa.

The use of the river as a transportation corridor spurred the need for river management and improvement to make a navigable waterway. This task was assigned to the St. Paul District. Congress enacted hundreds of appropriations for channel improvements including authorizing the district to clear and maintain a 4-foot draft navigation channel (Table 2-11). The St. Paul District traces its origins to this authorization in 1866. Not only was the district to create and maintain a 4-foot channel, but it conducted surveys on the UMR and tributaries and constructed the first wing and closing dams in the area.

These first measures ultimately proved inadequate to the growing commercial needs of Minneapolis and St. Paul, and therefore, Congress authorized the Corps to construct six dams in the headwaters between 1880 and 1907. Flour millers at St. Anthony Falls especially pushed for reservoirs above the falls, recognizing that the release of water from the reservoirs for navigation in the later summer and fall would increase the flow of water to keep their mills turning longer and more consistently. In its 1895 annual report, the Corps reported that releasing the water from the headwaters reservoirs had successfully raised the water level in the Minneapolis by 12 to 18 inches, helping navigation interests and the millers. The district also continued building wing dams and miles of shore protection.

Despite the Corps' substantive channel improvement efforts and construction of six dams in the headwaters, navigation ceased on the UMR. By 1918, virtually no traffic moved between St. Paul, Minnesota, and St. Louis, Missouri. Fearing that the Midwest would suffer economically without a vibrant and diverse transportation system, business interests initiated another movement to revive river transportation. Around 1925, businesses lobbied Congress and eventually gained support in 1930 for an Upper Mississippi River 9-Foot Channel Navigation Project, which authorized the construction of 23 locks and dams on the UMR.

Table 2-11. History of Corps, St. Paul District within the UMR (Merritt, 1979).

Date	Period	Description
1830–1877	Steamboat Era	Making navigation safer without significantly changing the natural character of the river (e.g., rapids, sand bar, shoal and dangerous rock removal, snag and wreck removal).
1878–1906	4½ -Foot Channel	Authorized by Congress to clear the channel by dredging, closing bypasses, and building lateral canals.
1907–1930	6-Foot Channel	Authorized by Congress to maintain a 6-foot channel through improved dredging and construction of channel structures (e.g., wing dams, cutoffs).
1930–1939	9-Foot Channel	Authorized by Congress to construct navigation pools through a system of locks and dams.
1940–Present	Commercial and Recreation	Focus on operating and maintaining the locks and dams, dredging the channel, and providing public access to recreational facilities.

Historic Euro-American sites are prevalent throughout the UMR Basin (Figure 2-11). These sites include a wide range of different types including fur-trade posts, early settlement townsites, industry sites (e.g., lumber mills, kilns, clamming middens, quarries), railroad sites, and river transportation-related sites. Submerged shipwrecks, navigational markers, and related structures are present throughout the project and on the Corps' fee title lands. Although the number cannot be fully determined, there are 64 possible terminal wrecks located within the UMR (Jensen, 1992). Thirteen

of these wrecks overlap with the Corps' fee title lands (Table 2-12). In addition to archeological resources, there are significant districts, buildings, structures and objects, including those related to the lock and dam system, fish hatcheries, Civilian Conservation Corps (CCC), and Works Progress Administration (WPA) efforts.

Table 2-12. Documented wrecks overlapping the Corps' fee title lands (Jensen, 1992).

Wreck Name	Year Sunk	Approximate River Mile
Fanny Harris	1862	811
Kentucky N.2	1858	811
Hartford	1881	749
Captain Kidd	1890	747
Argo	1847	726
Wreck 173	Unknown	705
Ben Coursin	1857	703
City of Hudson	1906	688
Northern Light	1866	687
Lady Franklin	1856	682
Barge 9	1895	681
Barge 6	1859	680
J.A. Rhomberg	1883	667

The Upper Mississippi River 9-Foot Channel Navigation Project, built by the WPA in the 1930s, was determined eligible to the NRHP as a multiple property listing under Criteria A and C, for its association with a major federal river navigation improvement and depression relief project. This multiple property listing includes the locks and dams 3 through 10 complexes. Although the NRHP nomination identified the lock and dam complexes as being eligible, specific contributing elements could also be associated with the multiple property listing but have not been specifically identified. These elements include other structures (boat harbors/yards, bridges, dikes, guide wall extensions, hoist towers, levees, a traveling crane), buildings (control stations, a lock operator's house, power houses, a restroom, storage houses), and objects (wall control stands, stage recorders, patterns). Two historic buildings are eligible for listing on the NRHP because they are a component of the overall lock and dam complex. They include the Lock and Dam 10 lockmaster house and the Lock and Dam 7 control house. The lockmaster house was constructed between 1937 and 1938. It is the last house of its type that remains in its original location along the UMR, down through St. Louis, Missouri. All other lockmaster houses have been removed. Currently, the Corps leases the lockmaster house to the Guttenberg Heritage Society to operate a museum out of the house. Similar to the lockmaster house, the Lock and Dam 7 control house is also one of the only control houses remaining along the UMR. The control house is currently used as a seasonal Corps visitor center.

As a collective entity, the surviving wing dams and closing dams within the UMR have been determined potentially eligible for listing to the NRHP under Criterion A for their contributions to the broad patterns of our history in navigation and transportation and Criterion C as an engineering achievement. Over 1,300 wing dams and closing dams were constructed within the UMR between the 1870s and 1930s in support of the 4½-foot and 6-foot channel navigation projects. Several of these wing dams are still present today; however, many of them were modified or removed as the result of channel maintenance dredging and construction of the Upper Mississippi River 9-Foot Navigation Channel Project (Pearson, 2003).

Previous Investigations

The UMR locality has a long history of archaeological investigations. The earliest systematic archaeological work in the Upper Midwest was completed by Lapham in the 1830s; however, studies have predated his work (Madigan & Schirmer, 2001). By the time Lapham published his 19 years' worth of investigations, research by Hill was just beginning in Minnesota, and by 1881, Hill teamed with Lewis to begin the Northwestern Archaeological Survey, which extended into Minnesota, Wisconsin, and Iowa (Madigan & Schirmer, 2001). This work by Hill and Lewis was never fully published. Thomas began work for the Smithsonian Institute in 1894, which focused on the states of Wisconsin and Iowa. The Wisconsin Historical Society and Milwaukee Public Museum led studies along with the Bureau of American Ethnology and Minnesota Historical Society. These early investigations in the 1800s and early 1900s mapped upland sites and excavated burial mounds (Thomas, 1894; Lewis, 1884-85).

With the passing of the National Historic Preservation Act of 1966, preservation in the United States became formalized and professionalized. There had been previous measures for preservation (i.e., Antiquities Act of 1906, Historic Sites Act of 1935); however, the NHPA was to be the most influential. Federal projects, or projects with federal funding, were now subject to Section 106 review in which federal agencies were required to consider the impact of their actions on historic properties. The NHPA would change how the Corps would review projects on the Mississippi River and with it, the focus of studying upland areas started to shift to floodplain areas. By the 1970s, the St. Paul District had hired its first professional archaeologist and began funding surveys on the river for various projects including dredge material placement and flood control. The majority of surveys completed in the 1970s by the Corps on the Mississippi River were for dredge placements sites or dredge cuts; however, some surveys were connected to the development of recreation areas and the construction of flood control projects like the Mankato Flood Control Project. By the 1980s, surveys by the Corps continued for these types of projects but expanded to geomorphology studies and the preservation and management of known cultural sites. The Corps has continued to fund several surveys within the Mississippi River including pool-wide studies, shoreline protection and erosion monitoring studies, drawdown surveys, and environmental management programs (Benn D. , 1975; Boszhardt R. , 1982; Boszhardt & Moffat, 1994; Benn & Lee, 2005; Jensen, 1992; Florin & Madigan, 2000; Wahls, 1990).

Even with the significant number of investigations within the project, only a small fraction of Corps lands in comparison to the entire UMR Basin has been subject to investigation. Often, these surveys were specific to the operation and maintenance of recreation areas or associated with projects for the operation and maintenance of the river (Overstreet, 1986; Boszhardt, Benden, & Pauketat, 2010; Thompson & Anderson, 2017). The accumulation of surveys completed on the Corps' fee title lands has resulted in the identification of 147 historic properties, 127 of them being archaeological sites and the remaining being historic buildings or structures (e.g., locks and dams). This does not include known shipwreck boundaries that overlap with the Corps' fee title lands (Figure 2-12).

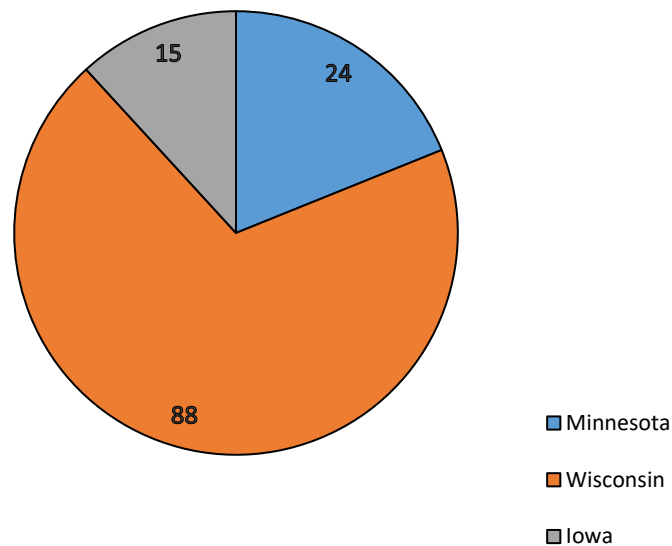


Figure 2-12. Cultural resource sites identified on the Corps' fee title lands (excluding historic structures and wrecks).

Cultural Resources Within the UMR Basin and Their Historic Impacts

Cultural resource sites exist on a variety of landforms and at a variety of elevations throughout the UMR Basin. In addition to upland areas, cultural resource sites occur on terraces, islands, and natural levees within the floodplain as well as within the river channel (Madigan & Schirmer, 2001; Boszhardt R. , 1995).

Prior to the historical development over the last 100 years, the Mississippi River was an unmanaged, unpredictable river. During floods, the river was deep flowing and turbulent, but there were also long dry periods that made the river shallow and dry. This can be seen through the distribution of sites and their associated use. Temporary, seasonal sites used for resource gathering are often located within the floodplain, while more permanent village sites and burial mounds are often located adjacent to the river on high terraces and bluffs or on tributary rivers of the Mississippi River. There are some exceptions to the more permanent sites with some being located within the floodplain along shorelines; however, these sites are associated with stable Holocene landforms and would have been well above the water elevation prior to the construction of the lock and dam system.

Major impacts to cultural resource sites within the UMR Basin are because of Euro-American settlement, which resulted in significant changes to the river channels and floodplains. Notable changes related to the river itself is the result of historical development over the last 100 years including extensive agricultural land clearing resulting in sedimentation and aggradation within the river and the construction of the lock and dam system. Agricultural activity has increased runoff and flooding in addition to erosion and sediment load in streams while the lock and dam system has modified the original morphology of landforms (e.g., island and sandbar movement, surface water increase due to impoundment, inundation of landforms). Raising and lowering of pool levels in addition to wave action has caused extensive bank erosion.

Construction of the 9-foot navigation channel has affected many cultural resource sites. Shoreline erosion continues to scour sites away. That being said, sedimentation buries some sites in historic

alluvium, effectively sealing their deposits. As a result, cultural resource sites could remain in relatively undisturbed contexts, such as high terrace landforms.

Today, impacts to historic properties may result from a number of factors, including natural environmental processes, maintenance and operation activities required for the continued management of the UMR for navigation, or modifications/changes needed to continue to manage the Corps' fee title lands for specific purposes such as recreation and forest management. Recreational use by the public and those who continue to hold a Corps license/lease also have the potential to impact cultural resources. It is the Corps' responsibility to be aware of potential or imminent adverse effects and to avoid, minimize, or mitigate those effects whenever possible.

Natural environmental processes such as shoreline erosion, saturation and slumping, vegetation disturbance from things such as shrub and tree roots, rodent disturbance through digging or burrowing, and biochemical impacts to soil chemistry have the potential to impact cultural resources sites. With the construction of the project, pools were created resulting in significant water elevation changes. Higher water levels have caused pre-dam environments that were naturally high, to now, be at water level or submerged and be directly affected by these natural processes.

Operation and maintenance projects (e.g., dredging, dredge placement, facility maintenance, beach nourishment, tree planting or removal, bank stabilization) and other ground-disturbing activities have the potential to impact cultural resource sites. Recreational and commercial use (e.g., camping, boating/shipping, facility construction) along the UMR has the potential to cause significant impacts. Erosion induced by boaters is a significant concern.

Although limited, the Corps has taken protective measures at different locations along the UMR. Bank stabilization is a common measure the Corps has taken to minimize and prevent continued island and shoreline loss from erosion, protecting significant cultural resources. In addition, when significant resources are known and may be negatively affected by recreation use, the Corps has taken measures to protect and preserve these resources by removing them from recreational use.

2.3.3 TRIBAL TRUST

As part of the Corps' tribal trust responsibility, the Corps takes into consideration the relationship between Native American tribes and the federal government on various operational elements of the 2020 Master Plan. All federally-recognized tribes are sovereign governments and are responsible for their own governance and management. Sovereignty is the foundation of tribal governments, and their sovereign status gives them special recognition and treatment under federal law.

Lakes and streams, as well as the plants and animals associated with them, can hold spiritual, economic, and subsistence value to various tribes. Natural resources are a fundamental aspect of their cultural identity. Under the federal trust doctrine, the Corps has a legal or ethical relationship of trust with tribes. The nature of this relationship depends on the underlying substantive laws (e.g., treaties, statutes, agreements) establishing it. Where the Corps' actions may affect tribal lands or off-reservation treaty rights, the trust doctrine includes a substantive duty to protect these lands and treaty rights "to the fullest extent possible."

2.4 SOCIOECONOMIC CONDITIONS

This section provides an overview of the demographic, economic, and recreational use of the project. The topics covered are population characteristics, distribution and trends, economic conditions, educational opportunities, aesthetic qualities, and recreation characteristics.

2.4.1 AESTHETIC VALUE

Congress established the Mississippi National River and Recreation Area as a unit of the National Park System on November 18, 1988 (Public Law 100-696). In doing so, Congress stated: “(1) The Mississippi River Corridor within the Minneapolis-Saint Paul Metropolitan Area (Metro) represents a nationally significant historical, recreational, scenic, cultural, natural, economic, and scientific resource;” and, “(2) There is a national interest in the preservation, protection, and enhancement of these resources for the benefit of the people of the United States.”

Millions of people for thousands of years have and continue to consider the Mississippi River their home and significant part of their heritage. The river provided the setting for a spectacular literary heritage as well as a rhythmic blues highway from Memphis to St. Louis to St. Paul. It nurtured and inspired American genius, artists, and explorers with names such as F. Scott Fitzgerald, Mark Twain, William Faulkner, Tennessee Williams, Louis Armstrong, B.B. King, John James Audubon, Zebulon Pike, Charles Schultz, and Elvis Presley.

Below the Upper and Lower Saint Anthony Falls to St. Paul, the UMR enters its most confined reach on the entire river. This stretch is known as the gorge. Here the bluffs crowd in against the river, allowing little room for a floodplain. Below St. Paul, the bluffs get higher and spread apart, hinting at the force generated by the glacial River Warren as it sculpts the Minnesota River Valley and the UMR Valley below the Minnesota River’s mouth. Here, surviving fragments of the broad floodplain are ecologically rich. In some places along the corridor, geologic layers, millions of years old, lay exposed to see and touch (National Park Service, 2016). The “Driftless Area” of the upper Mississippi River valley is the unglaciated region located at the corner where Minnesota, Wisconsin, and Iowa meet. While glaciers encroached on the region from north, west, and east, the karst geology of the region is thought to have limited the flow of glacial ice during the most recent glaciation (Wisconsinan) over this area bordering the Mississippi River. The result of the exposed karst topography has been a landscape with porous and fractured sandstone and limestone and impervious shale layers in horizontal strata overlain by shallow soils and deeply carved by hydraulic erosion from the outflows of the great glacial lakes (National Trout Center, 2019).

Many people recognize the importance of this environmental resource, as evidenced by people engaged in organizations and communities that focus on projects and activities supporting and enhancing the vibrancy and sustainability of the river for now and future generations. Such projects and activities often involve membership or volunteer labor in an organization, financial contributions to resource-related efforts, and promotions and outreach engagements regarding the importance and sustainability of the resource. While there are numerous friends’ groups within the UMR Basin, the vision written for the Friends of the Mississippi River Strategic Plan expresses the broad public recognition of the UMR as an important resource.

“Friends of the Mississippi River envisions a river that is recognized and celebrated for its intrinsic values. Imagine with us a river where the water is clear and clean and safe to swim in, where fish and wildlife are healthy and abundant, and where scenic bluffs and cultural treasures are protected. This is a river where residents and visitors can escape the rush of

daily life to find solitude in a hidden backwater, mystery beside ancient mounds, and the wonder of paddling past towering bluffs. Here you can catch fish that are healthy to eat. You can stroll through oak savannas and sand prairies alive with the diversity of our natural heritage. Here historic sites speak to the timeless connection between people and the river.” (Friends of the Mississippi River, 2016)

2.4.2 DEMOGRAPHICS

There are 18 counties that border the project along the UMR. Eight are in Wisconsin, two are in Iowa, and eight are in Minnesota. Table 2-13 provides a comparative summary of population trends within these counties. The continued evolution of the population’s demographic characteristics will drive changes in recreation participation. As the population continues to age, urbanize and diversify, participation rates and frequencies in outdoor recreation will change.

Table 2-13. Population trends within the project by county.

County	Pool Location	Population 2017	Population 2010	Change
Hennepin County, Minnesota	1	1,249,512	1,152,425	8.4%
Ramsey County, Minnesota	1, 2	546,317	508,640	7.4%
Dakota County, Minnesota	2, 3	422,580	398,552	6.0%
Washington County, Minnesota	2, 3	256,905	238,136	7.9%
Goodhue County, Minnesota	3, 4	46,562	46,183	0.8%
Wabasha County, Minnesota	4, 5	21,393	21,676	-1.3%
Winona County, Minnesota	5, 6, 7, 8	50,769	51,461	-1.3%
Houston County, Minnesota	8	18,761	19,027	-1.4%
Pierce County, Wisconsin	3, 4	41,480	41,019	1.1%
Pepin County, Wisconsin	4	7,383	7,469	-1.2%
Buffalo County, Wisconsin	4, 5, 6	13,703	13, 587	0.9%
Trempealeau County, Wisconsin	6	29,452	28,816	2.2%
La Crosse County, Wisconsin	6, 7, 8	118,675	114,638	3.5%
Vernon County, Wisconsin	8, 9	30,112	29,773	1.1%
Crawford County, Wisconsin	9, 10	16,707	16,644	0.4%
Grant County, Wisconsin	10	52,725	51,280	2.8%
Allamakee County, Iowa	8, 9, 10	13,884	14,330	-3.1%
Clayton County, Iowa	10	17,637	18,129	-2.7%
Total		2,954,557	2,771,785	6.6%

Population

Geology, geography, Native American presence, effects of explorers and traders, and the focus on a variety of economic activities all played a role in how the towns and cities formed and grew (National Park Service, 2016). Some cities today began as Native American villages, expanded to fur trading posts, transitioned to river towns or railroad towns, and eventually became suburban communities, while other communities declined to represent a small part of what they once were. Similar to national trends, the population of the surrounding counties is increasingly urban, more ethnically and culturally diverse, and older.

The Minneapolis-Saint Paul metro area, with seven counties, is the population and economic hub of the region. However, the numerous small river communities have the most influence on project operations. The metro can be characterized as heavily populated (3.7 million according to the 2010 census) with a high per capita income in an intensely urbanized environment. It accounts for

approximately 84 percent of the project population. The seven-county region is comprised of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties. However, the official Minneapolis-Saint Paul metropolitan statistical area recognized by the U.S. Census Bureau consists of 16 counties - 14 in Minnesota and two in Wisconsin. Of this 16-county area, only four counties are adjacent to the project. These four counties have seen an average growth of 7.4 percent in population since the 2010 census. The downstream rural counties account for only 16 percent of the region's population and are primarily agricultural areas that are either losing population or growing slowly. According to the 2010 U.S. Census, the La Crosse, Wisconsin area is the only significant and growing population center on the river corridor outside of the metro and within the project area.

The U.S. Census Bureau conducts the 10-year (decennial) census and is the source for all data (e.g., 1990, 2000, 2010). The intervening years are population estimates from the American Community Survey data. All the data in this section was retrieved from the U.S. Census Bureau website (<https://www.census.gov/quickfacts>).

Race and Origin

Table 2-14 displays the ethnic composition of the population for each county, from the U.S. Census Bureau website (2019).

Table 2-14. Population by race and origin 2015.

County	White	Black	American Indian and Alaska Native	Asian	Native Hawaiian, Other Pacific Islander	Hispanic or Latino Origin
Hennepin County, Minnesota	68.6%	13.6%	1.1%	7.5%	0.1%	7.0%
Ramsey County, Minnesota	61.4%	12.6%	1.0%	15.3%	0.1%	7.6%
Dakota County, Minnesota	77.7%	7.0%	0.6%	5.2%	0.1%	7.4%
Washington County, Minnesota	82.2%	4.9%	0.5%	6.2%	0.1%	4.3%
Goodhue County, Minnesota	91.8%	1.4%	1.5%	0.7%	0.1%	3.5%
Wabasha County, Minnesota	94.6%	0.7%	0.3%	0.7%	<0.05%	2.9%
Winona County, Minnesota	91.0%	1.9%	0.5%	2.7%	<0.05%	3.1%
Houston County, Minnesota	96.0%	0.7%	0.3%	0.6%	<0.05%	1.2%
Pierce County, Wisconsin	94.0%	0.9%	0.3%	1.3%	<0.05%	2.1%
Pepin County, Wisconsin	96.4%	0.6%	0.5%	0.4%	<0.05%	1.9%
Buffalo County, Wisconsin	95.6%	0.5%	0.4%	0.5%	<0.05%	2.2%
Trempealeau County, Wisconsin	89.1%	0.6%	1.3%	0.7%	0.1%	8.8%
La Crosse County, Wisconsin	89.7%	1.6%	0.5%	4.7%	<0.05%	2.0%
Vernon County, Wisconsin	96.2%	0.5%	0.3%	0.5%	<0.05%	1.6%
Crawford County, Wisconsin	94.1%	2.3%	0.3%	0.7%	<0.05%	1.7%
Grant County, Wisconsin	94.9%	1.5%	0.3%	1.0%	<0.05%	1.8%
Allamakee County, Iowa	90.0%	1.7%	0.7%	0.5%	0.3%	7.0%
Clayton County, Iowa	95.8%	0.9%	0.2%	0.3%	0.1%	2.0%

Income and Education

Table 2-15 displays median household income and percentage level of education attained by county from the U.S. Census Bureau website (2019)

Table 2-15. Income and education 2013–2017.

County	Median Household Income	Persons Below Poverty Level (%)	High School Graduates (%)	Bachelors or Higher (%)
Hennepin County, Minnesota	\$71,154	10.5%	93.0%	48.2%
Ramsey County, Minnesota	\$60,301	14.0%	90.1%	41.5%
Dakota County, Minnesota	\$79,995	5.8%	94.7%	41.1%
Washington, County, Minnesota	\$89,598	4.2%	96.1%	42.3%
Goodhue County, Minnesota	\$62,431	8.0%	93.8%	24.7%
Wabasha County, Minnesota	\$61,970	7.0%	92.4%	21.6%
Winona County, Minnesota	\$53,975	13.8%	92.8%	29.6%
Houston County, Minnesota	\$56,837	7.6%	94.2%	23.2%
Pierce County, Wisconsin	\$66,772	7.8%	94.5%	27.7%
Pepin County, Wisconsin	\$51,470	10.7%	91.7%	19.1%
Buffalo County, Wisconsin	\$54,753	9.4%	91.7%	17.9%
Trempealeau County, Wisconsin	\$54,009	8.8%	89.6%	19.7%
La Crosse County, Wisconsin	\$54,127	12.0%	94.2%	33.0%
Vernon County, Wisconsin	\$49,996	17.0%	88.7%	21.6%
Crawford County, Wisconsin	\$47,331	12.4%	90.3%	16.8%
Grant County, Wisconsin	\$50,522	13.6%	91.7%	21.5%
Allamakee County, Iowa	\$47,895	11.0%	86.9%	17.5%
Clayton County, Iowa	\$51,114	9.6%	91.2%	15.7%

Housing

Table 2-16 portrays selected housing characteristics related to number of units, median value, vacancy rate, and size of household, from the U.S. Census Bureau website (2019).

Table 2-16. Housing characteristics 2013–2017.

County	Total Housing Units 2018	% Owner Occupied	Median Value (Owner occ.)	Avg. Household Size
Hennepin County, Minnesota	537,756	62.4%	\$245,400	2.40
Ramsey County, Minnesota	220,680	59.3%	\$208,700	2.51
Dakota County, Minnesota	168,117	74.4%	\$238,000	2.59
Washington, County, Minnesota	99,459	81.3%	\$264,300	2.69
Goodhue County, Minnesota	20,692	74.6%	\$191,400	2.34
Wabasha County, Minnesota	10,257	80.9%	\$167,300	2.39
Winona County, Minnesota	21,237	70.0%	\$158,400	2.44
Houston County, Minnesota	8,777	80.3%	\$164,200	2.27
Pierce County, Wisconsin	16,693	72.8%	\$193,300	2.52
Pepin County, Wisconsin	3,692	81.2%	\$143,800	2.39
Buffalo County, Wisconsin	6,839	75.30%	\$150,400	2.29
Trempealeau County, Wisconsin	13,218	72.10%	\$147,000	2.44
La Crosse County, Wisconsin	50,569	63.80%	\$161,300	2.39
Vernon County, Wisconsin	14,204	77.20%	\$148,900	2.48
Crawford County, Wisconsin	9,007	76.10%	\$127,000	2.35
Grant County, Wisconsin	22,179	69.20%	\$137,200	2.46
Allamakee County, Iowa	7,823	76.5%	\$122,800	2.25
Clayton County, Iowa	9,139	75.6%	\$116,500	2.28

2.4.3 RECREATION FACILITIES, ACTIVITIES, AND NEEDS*

The UMR has long served as a source of recreational opportunity with its scenic environment, fish, wildlife, water resources, and temperate climate. Endowed with the basic requirements for outdoor activities, the project has further enhanced the water-based recreational potential of the area. No longer do periods of drought reduce river stages to the point where navigation becomes hazardous or impossible, and the relatively stable pools created by the project provide large water areas with water-based recreational activities. Numerous marinas and boat launches situated along the shores of the pools make recreational boating safer and more pleasurable. The project area is one of the largest areas of public land in the region. In addition to the refuge, a number of popular state parks and natural areas occur along the corridor.

Bordering the project on the east and west is the Great River Road National Scenic Byway, which connects hundreds of towns and cities in the project area. Federal designation as a National Scenic Byway recognizes the outstanding Great River Road assets including culture, history, nature, recreation, and scenic beauty, drawing visitors from all 50 states and around the world.

Another recreational feature along the UMR is the Mississippi River Trail. The Mississippi River Trail courses along the Mississippi River from the headwaters of Itasca, to the Gulf of Mexico, offering approximately 3,000 miles of on-road bikeways and pedestrian and bicycle pathways. This trail provides recreational enjoyment, health, conservation and tourism development of river communities, river states and the nation.

The recreational developments at the project provide opportunity for outdoor recreation activities such as sightseeing, fishing, boating, camping, and picnicking (Figure 2-13). Areas along the river have been developed to provide both extended and day use opportunities. A description of land use and recreational development is presented in chapter 5.

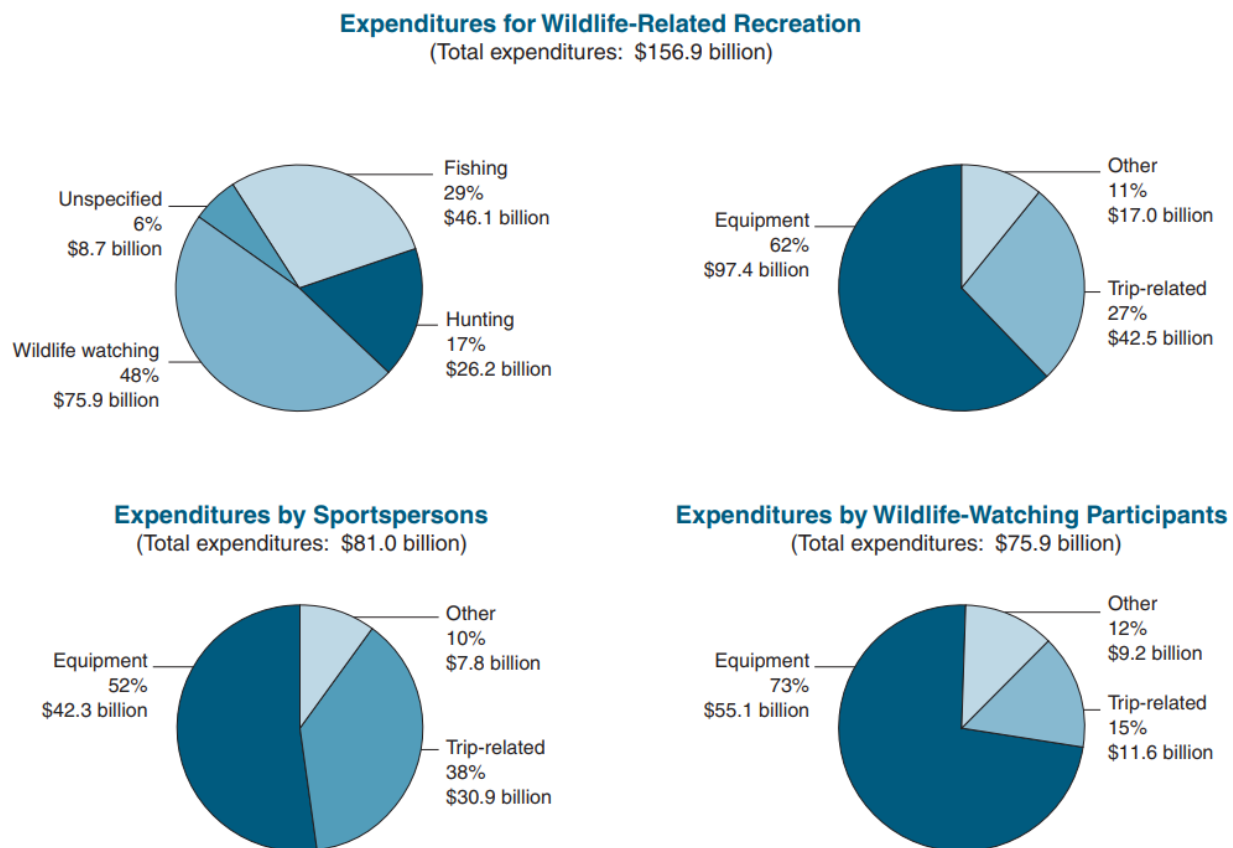


Figure 2-13. National expenditures for sportspeople versus wildlife-watching persons in 2016 (USFWS, 2017).

Zones of Influence*

The majority of trips to the project were from adjacent counties, ranging from 66 to 75 percent for all types of access. Project visitors cite two dominant reasons for choosing areas to recreate: the convenience of the site's location and the aesthetic appeal of the site. Other reasons for choosing sites included the quality of the buildings, campsites, or other facilities; accessibility of the river through boat ramps; personal referrals recommending the site; and selection due to overcrowding at other sites (Carlson, 1995).

Quality of fishing or hunting opportunities is also a main driver of project use (Carlson, 1995). Approximately 90 percent of all anglers fished in their resident state, while an additional 25 percent of anglers also fished out of state. A large majority of participants, 96 percent, hunted within their resident state in 2016. Only 16 percent hunted in another state (U.S. Fish and Wildlife Service, 2017).

Residents of the metropolitan area had half the participation rate (13 percent) of non-metropolitan area residents (26 percent) in fishing-related recreation but composed 89 percent of all anglers. Participation rates for hunting were also the lowest among residents of the largest metropolitan statistical areas and were the highest among non-metropolitan residents (USFWS, 2017).

Visitation Profile*

The project is a popular recreational location due to the large variety and number of recreation sites as well as close proximity to the Minneapolis-St. Paul and La Crosse metropolitan areas. The majority of the visitors to the project come from within a 60-mile radius. The UMR between USAF and Lock and Dam 10 averages 157,000 visits per year to Corps sites (Table 2-17). Peak visitation occurs between May and September but is not limited to these months due to the popularity of ice fishing, cross country skiing, and snowshoeing.

Table 2-17. Corps day use area visitations based on the Corps' Visitation Estimation and Reporting System (2019).

Location	2014	2015	2016	2017	2018	2019
Lock and Dam 1 Public Use Area	22,128	28,725	20,613	13,867	11,179	10,858
Lock and Dam 2 Public Use Area	35,460	35,668	34,786	39,823	35,046	40,575
Lock and Dam 3 Public Use Area	5,608	4,357	3,157	3,947	3,303	5,673
Lock and Dam 4 Public Use Area	17,848	17,346	15,934	13,474	13,282	9,669
Lock and Dam 5 Public Use Area	17,272	8,285	8,077	9,883	6,945	13,526
Lock and Dam 5A Public Use Area	n/a	n/a	8,322	8,322	8,322	5,362
Lock and Dam 6 Public Use Area	75,485	41,921	39,610	23,796	22,819	10,724
Lock and Dam 7 Public Use Area	14,241	9,649	9,017	13,130	16,166	22,706
Lock and Dam 8 Public Use Area	3,360	4,481	4,601	4,995	4,408	7,340
Lock and Dam 9 Public Use Area	12,606	6,963	5,534	7,477	5,802	8,734
Lock and Dam 10 Public Use Area	16,149	8,679	9,504	10,305	9,206	12,906
Pool 9 Bad Axe Landing	2,093	7,670	6,379	6,951	6,336	2,418
Pool 9 Millstone Landing	4,597	10,255	9,633	11,848	9,788	8,324
Pool 10 Jays Lake Access	2,670	5,746	7,307	7,836	5,393	3,694
Total	229,517	189,745	182,474	175,654	157,995	162,509

The visitor population consists of those who utilize day use areas and the campgrounds. The diverse population consists of visitors who utilize campgrounds, hunters, marina customers, day users, adjacent residents, and cottage site leases. The UMR is the primary location for water-related recreation in the area. It provides the public a location for boating, sailing, kayaking, paddle boarding, fishing, and swimming.

Around 75 percent of national wildlife refuge (NWR) visitors in the project area (Table 2-18) are local residents (within 50-mile radius), with the exception of the La Crosse District, which has 44 percent non-resident visitors (Caudill, 2019). Uniquely, the La Crosse District hires two seasonal naturalists to provide information on the fall waterfowl migration at heavily visited overlooks on the UMR.

Table 2-18. Upper Mississippi River National Wildlife and Fish Refuge Districts and Trempealeau NWR 2017 recreation visits (Caudill, 2019).

	Residents	Non-Residents	Total
Trempealeau NWR	56,825	22,323	79,148
La Crosse District	465,283	368,860	834,143
McGregor District	296,350	115,450	411,800
Winona District	799,400	251,300	1,050,700
Total	1,617,858	757,933	2,375,791

In 2012, the Corps launched an agency-wide initiative to improve the accuracy of project visitation estimates and reporting. This effort, known as VERS (Visitation Estimation and Reporting System) Modernization, takes new visitor monitoring technologies and estimating methods into account, which were previously unavailable or unevaluated in the original VERS system established in the 1990s. VERS modernization is ongoing and incorporates best practices and estimation methods that ensure the number of guests to the Corps visitor areas are being accounted for in an accurate, transparent, and defensible manner.

In 2017, the St. Paul District's Blackhawk Park located in De Soto, Wisconsin, had 2,517 camping reservations, who stayed an average of three days per reservation. Wisconsin residents made 55.97 percent of camping reservations, Iowa residents made 21 percent of camping reservations, Illinois residents made 5.78 percent of camping reservations, and Minnesota residents made 5.5 percent of camping reservations at Blackhawk Park in 2017. The remaining 11.75 percent of reservations were made by residents in other states or countries.

Recreation Analysis*

The value of the UMR as a national resource is being more widely recognized. To learn more about the monetary value of recreational use along the UMR, Congress authorized a study in 1986 (Public Law 99-88) to measure the economic importance of recreation as part of the UMRR-EMP. The study estimated that over 12 million daily visits by recreationists took place during 1990 within the 1,300 miles from Cairo, Illinois, to Minneapolis, Minnesota. These visits resulted in direct and secondary expenditures of over \$1.2 billion that helped maintain over 18,000 jobs nationwide (Carlson, 1995). Within the St. Paul District, the study had an estimated 1,652,853 visitors to the project in 1990 (Carlson, 1995). Recreational visits to the project exceeded 11 million trips in 2000 (UMRBA, 2003). It is estimated that recreation and tourism employ approximately 143,000 people within and adjacent to the project.

Visitor spending was measured for items consumed on trips as well as for more durable items (e.g., boats, trailers) used on trips. Visitors spent over \$190 million on items consumed on trips during the study year, with spending on durable items that amounted to over \$150 million during the study year (Carlson, 1995). The average spending per visitor, per day for items consumed on trips was \$15.84 (1990 price levels) or \$31.04 in 2019 price level. Most of this spending was for food, gas, lodging, and boating expenses (Carlson, 1995).

Recreational activity on the UMR during the study year resulted in direct and secondary expenditures of \$1.2 billion that helped maintain 18,500 jobs nationwide. Recreational activities in the 76 counties bordering the UMR during the study year resulted in direct and secondary expenditures of \$400 million that helped maintain 7,200 jobs (Carlson, 1995). Service industries, retailers, manufacturers, and finance and insurance providers were affected most.

From an economic perspective, the refuge provides a variety of environmental and natural resource goods and services used by people either directly or indirectly. The use of these goods and services may result in economic effects to both local and state economies. Of the 162 sites sampled, two of the top 10 National Wildlife Refuges, ranked by economic outpost, are within the La Crosse and Winona Districts. Combined, the McGregor District, La Crosse District, Winona District, and Trempealeau NWR had a combined 2,376,000 recreational visits in 2017. Total expenditures were \$192.7 million. The contribution of recreational spending in local communities was associated with about 1,208 jobs, \$28.9 million in employment income, \$7.5 million in total tax revenue, and \$101.7 million in economic output (Caudill, 2019).

In 2018, approximately 21,500 boaters visited the three Corps managed boat landings/accesses, (Table 2-17) spending approximately \$1.2 million (adjusted for inflation using the Bureau of Labor Statistics consumer price index from 2009 to 2019 dollars). In 2018, there were approximately 136,500 visitors to the locks and dams public day use areas (Table 2-17), spending approximately \$3.8 million (adjusted for inflation using the Bureau of Labor Statistics consumer price index).

Nationally, wildlife recreationists spent \$157 billion in 2016 on their activities, which was almost 1 percent of the Gross Domestic Product (Figure 2-14). Of the total amount spent, \$42.5 billion was trip-related, \$97.4 billion was spent on equipment, and \$17.3 billion was spent on other items such as licenses and land leases/ownerships. People participating in sport activities spent a total of \$81.0 billion in 2016 (i.e., \$46.1 billion on fishing, \$26.2 billion on hunting, and \$8.7 billion on items used for both hunting and fishing) (USFWS, 2017).

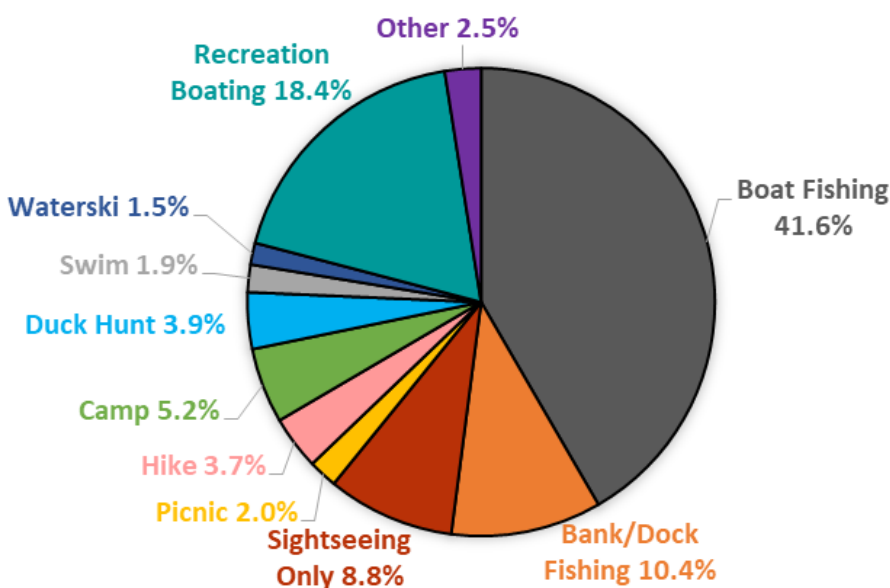


Figure 2-14. Participation by activity within the UMR Basin in 1990 (Carlson, 1995).

Recreation Trends

NATIONAL

Through a partnership with the U.S. Census Bureau, the USFWS issues national survey data on fishing, hunting, and wildlife-associated recreation and trends. In the 2016 findings, fishing still remains one of the most popular outdoor recreation activities in the United States with 35.8 million participants 16 and older. The 2016 survey also identified 11.5 million people who hunted. National data for wildlife watching indicates that over 86 million people, 16 years and older, participated in feeding, photographing and observing wildlife.

A five-year comparison of estimates from 2011 to 2016 shows a 16 percent increase in the total number of people 16 years and older participating in wildlife-related recreation activities in the United States with the primary increase among those who watched wildlife (USFWS, 2017).

According to the American Recreation Coalition, the boating industry saw a six percent increase in 2016 sales, a trend which is expected to continue (American Recreation Coalition, 2018). This indicates an increased interest in both motor boating and canoe/kayaking. The USFWS reports that more than 3.7 million of the nation's 12 million registered boats are found in the Midwest region.

Although overall participation in outdoor activities is increasing, one the major trends for nature-based recreation over the last 10 to 20 years has been the decreasing involvement of young adults and their children, while the older adults have maintained or increased involvement (Gramann, 2006). This trend is broad based and national in scope. Evidence for this trend comes from national parks, Minnesota state parks, state non-motorized trails, and hunting and fishing licenses (Gramann, 2006; Minnesota Department of Natural Resources, n.d.). Public agencies are encouraging visitation, including a major outreach to families with children through the NPS' "Every Kid in a Park" program. This important program, founded in 2015, is focused on getting all four million 4th graders and their families across the country to a state, national, or local park and then encouraging return visits throughout the year with a free entrance pass for federal sites.

REGIONAL

More than 21.7 million recreational party trips to the UMR were made to developed areas, sightseeing or visitor center areas, marinas, and permitted docks during the study period (Carlson, 1995). Boating, fishing, and sightseeing were the most popular activities, with over half of all visitors utilizing boats (Figure 2-15). More than 60 percent of the people made their trips to developed areas, with the remaining trips being made to marinas (26 percent), sightseeing or visitor center areas (7 percent) and permitted docks (4 percent). Single day trips were dominant (around 75 percent) when compared with trips that included overnight stays. Average party sizes were larger for trips to permitted docks and marinas. Even after the marinas shut down for the winter, visits by permitted dock owners during the winter totaled 13.9 percent (Carlson, 1995).

The trends identified in both the Wisconsin and Minnesota Statewide Comprehensive Outdoor Recreation Plan (SCORP) and the Outdoor Recreation in Iowa Plan indicate new and emerging trends within the region. These serve as a management tool to help decision makers by providing information that promotes better understanding and prioritizes the use of recreational resources statewide. The SCORPs and Iowa Plan are used by the Corps to better understand and adapt to the current and future recreation trends and needs specific to the states of Wisconsin, Minnesota, and Iowa.

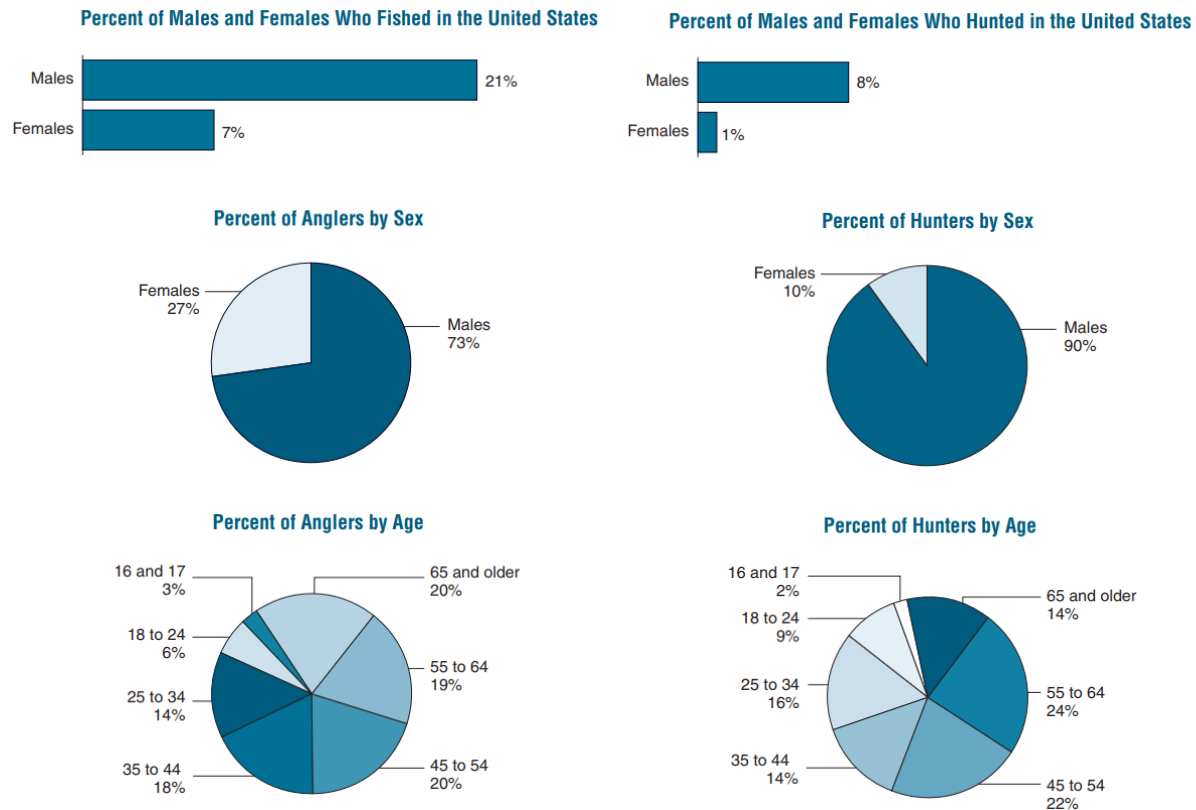


Figure 2-15. Percent of anglers and hunters by sex and age (USFWS, 2017).

The 2019–2023 Wisconsin SCORP divided the state into eight regions based on similarities in their recreation attributes, visitation patterns, natural resources, and general features. Findings from the SCORP showed that campsites and dog parks are in high demand in the project area. It also showed that hiking/walking/running trails, biking trails, public shore access, and boat launches are in moderate demand. The strongest trends are biking (winter fat tire and mountain), camping (RV and pop-up camper), and riding all-terrain vehicles (ATVs) or utility-terrain or -task vehicles (UTVs) (Table 2-19). Existing data suggest that the increase in older residents will drive an increase in the popularity of activities such as hiking, dog walking, bicycling, ATV and UTV riding, nature photography, and bird watching (Wisconsin Department of Natural Resources, 2019). Minnesota reports new and emerging nature-based recreation activities such as geocaching, skijoring, pet friendly parks and trails, archery, and shooting sports (Minnesota Department of Natural Resources, n.d.).

Table 2-19. Recreation trends at county park properties within Wisconsin regions (Wisconsin Department of Natural Resources, 2019).

This table is based on responses to a questionnaire sent to all county park systems in 2018.

The values are mean responses of trends in participation over the last five years *at county park properties* where opportunities are available.

Activity	REGION								STATE
	Great Northwest	Northwoods	Upper Lake MI Coastal	Lake Winnebago Waters	Western Sands	Miss. River Corridor	Southern Gateways	Lower Lake MI Coastal	
Bicycling - winter/fat tire biking	↑↑	↑↑↑	↑↑	↑↑↑	↑↑↑	↑↑↑	↑↑	↑↑↑	↑↑↑
Camping - RV/pop-up	↑↑	↑↑	↑↑↑	↑↑↑	↑↑↑	↑↑↑	↑↑↑	↑	↑↑↑
Bicycling - mountain biking	↑↑	↑↑	↑↑↑	↑↑↑	↑↑↑	↑↑↑	↑↑	↑↑↑	↑↑↑
Riding ATVs or UTVs	↑↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑↑↑	↑↑	*	↑↑↑
Canoeing/kayaking	↑	↑↑	↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑↑	↑↑
Bicycling - recreational/rail-trail biking	↑↑	↑	↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑↑	↑↑
Use of picnic areas/day use areas/beach areas	↑↑	↑	↑↑	↑↑	↑↑	↑↑	↑↑↑	↑↑	↑↑
Paddle boarding	↑↑	↑	↑↑	↑↑	↑↑	↑↑	↑↑↑	↑↑	↑↑
Dog walking on trails	↔	↑	↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑	↑↑
Hiking/walking/running on trails	↑	↑	↑↑	↑↑↑	↑↑	↑↑	↑↑↑	↑	↑↑
Fishing	↑	↔	↑↑	↑↑	↑	↑	↑↑	↑	↑↑
Motor boating (including pontoon boats)	↑	↔	↑↑	↑↑	↑	↑	↑↑	↔	↑
Snowshoeing	↔	↑↑	↑	↑	↑	↑	↑↑	↔	↑
Target firearm shooting at designated ranges	↑↑	↑	↔	↔	↑↑	↑↑	*	*	↑
Target archery at designated ranges	↑↑	↑	↑	↑↑	↔	↔	*	↑↑	↑
Bird/wildlife watching	↑	↔	↔	↑	↔	↔	↑↑	↑↑	↑
Nature photography	↑	↔	↔	↑↑	↔	↔	↑↑	↑	↑
Swimming in lakes/ponds/rivers	↑	↔	↑	↑↑	↔	↔	↑↑	↑	↑
Cross-country skiing - on groomed trails	↑	↑↑	↑↑	↔	↑	↑	*	↓	↑
Driving 4WD vehicles	↔	↔	↑	*	↑	↑	*	*	↔
Horseback riding	↑	↑↑	↑	↔	↑	↑	*	↓↓	↔
Gathering berries, mushrooms, etc.	↑	↔	↔	↔	↔	↔	↑↑	↔	↔
Hunting - turkey	↑	↑	↔	↔	↔	↔	↑↑	↓	↔
Camping - tent	↑	↔	↓↓	↑	↓	↓	↑↑↑	↑	↔
Hunting - small game	↔	↔	↓	↓	↔	↔	↑↑	↓	↔
Hunting - migratory birds	↔	↔	↑	↓	↔	↔	↔	↔	↔
Riding dual-sport motorcycles	↑	↑	↔	*	↓	↓	*	*	↔
Hunting - big game	↓	↓	↓	↓	↔	↔	↑↑	↓	↔
Cross-country skiing - on ungroomed trails	↔	↔	↔	↔	↔	↔	↓↓	↓↓	↓
Trapping	↔	↓	↔	↓	↔	↔	↓↓	↓↓	↓
Snowmobiling	↔	↑	↓	↓↓	↓↓	↓↓	↓↓	↓↓	↓↓

On County Park properties:

Strong increase	↑↑↑
Moderate increase	↑↑
Slight increase	↑
About constant	↔
Slight decrease	↓
Moderate decrease	↓↓
Few or no opportunities	*

An estimated 95 percent of Wisconsin adults and 86 percent of Iowa adults participated in some type of outdoor recreation in the past year (Wisconsin Department of Natural Resources, 2019; Iowa Department of Natural Resources, 2018). Most visitors participated in activities requiring little preparation or travel time but provided a high-quality experience within a limited amount of time. These activities include hiking and walking on trails, fishing, bicycling, dog walking, and bird and wildlife watching. Although many people travel to seek out unique recreation experiences, most people have limited time for leisure activities and tend to participate most frequently in activities for which opportunities are located nearby. As a result, urban residents participate in ball sports, bicycling, running, visiting dog parks, and other similar activities at higher rates than rural residents. Conversely, rural residents participate in hunting, fishing, trapping, ATV/UTV, and snowmobile riding at higher rates than urban residents (Wisconsin Department of Natural Resources, 2019).

For the Midwest, the percent of the population that participated in fishing was 16.5 percent and 7.5 percent in hunting (USFWS, 2017). In general, males participate in more outdoor activities than females and more frequently (Figure 2-15). Hunting is one of the outdoor activities most skewed towards men. In Wisconsin for example, almost 75 percent of hunters are male (Kelly, 2011). Additionally, males have a higher degree of interest in activities such as fishing, shooting sports, and golfing than females (Iowa Department of Natural Resources, 2018). Women have a higher degree of interest and tend to participate more in things such as nature photography, walking, wildlife watching, and dog-related activities.

The National Marine Manufacturers Association reports nearly 496,000 boats registered in the seven congressional districts surrounding the UMR. The percent of respondents who participated in boating (any type of craft) in Iowa increased from 32 percent in 2012 to 45 percent in 2018. According to Iowans surveyed, when asked to think about areas of outdoor recreation priorities, 87 percent indicated that they would like to see increased access for natural water-based recreation including boating as a high or medium priority (Iowa Department of Natural Resources, 2018).

PROJECT AREA

The project's recreation areas, trails, campgrounds, and water features give visitors an appreciation for the outdoors. While visitation in recreation areas remains strong, there is new demand for upgraded facilities and non-traditional recreation opportunities. Since the development of recreation areas within the project and the 1988 Master Plan, recreation has evolved into a modernized, high-tech activity, and there is a demand for services meeting the technology needs such as 50-amp electrical hookups and wireless internet. The trending popularity of cabins, all-season shelters, water-related recreation activities, biking, natural surface trails, dog parks, archery ranges, and educational centers is not unique to the project. They are also seen within other federal, state, county, and municipal parks in the region. There is also an increasing demand for water-related recreation activities.

These are examples of unmet recreation demands at the project area. Many of these items may be desirable by the visiting public but the reality and practicability to establish them in the project may be limited. Examples of limiting factors are the lack of contiguous land ownership with ideal topography for trails and regular high-water events. The limiting factors may lead to potential damage along with high costs for cleanup and repair of post high-water events.

Within the Refuge, non-consumptive use accounted for the majority of visits (Figure 2-16). The La Crosse District currently provides a number of interpretive programs for the public including, but not limited, to guided prairie walks, canoe tours, night hikes, guided bike tours, and many other themed

programs. Other recreation activities within the refuge include camping, pleasure boating, skiing (snow and water), swimming, beach use, picnicking, and snowshoeing.

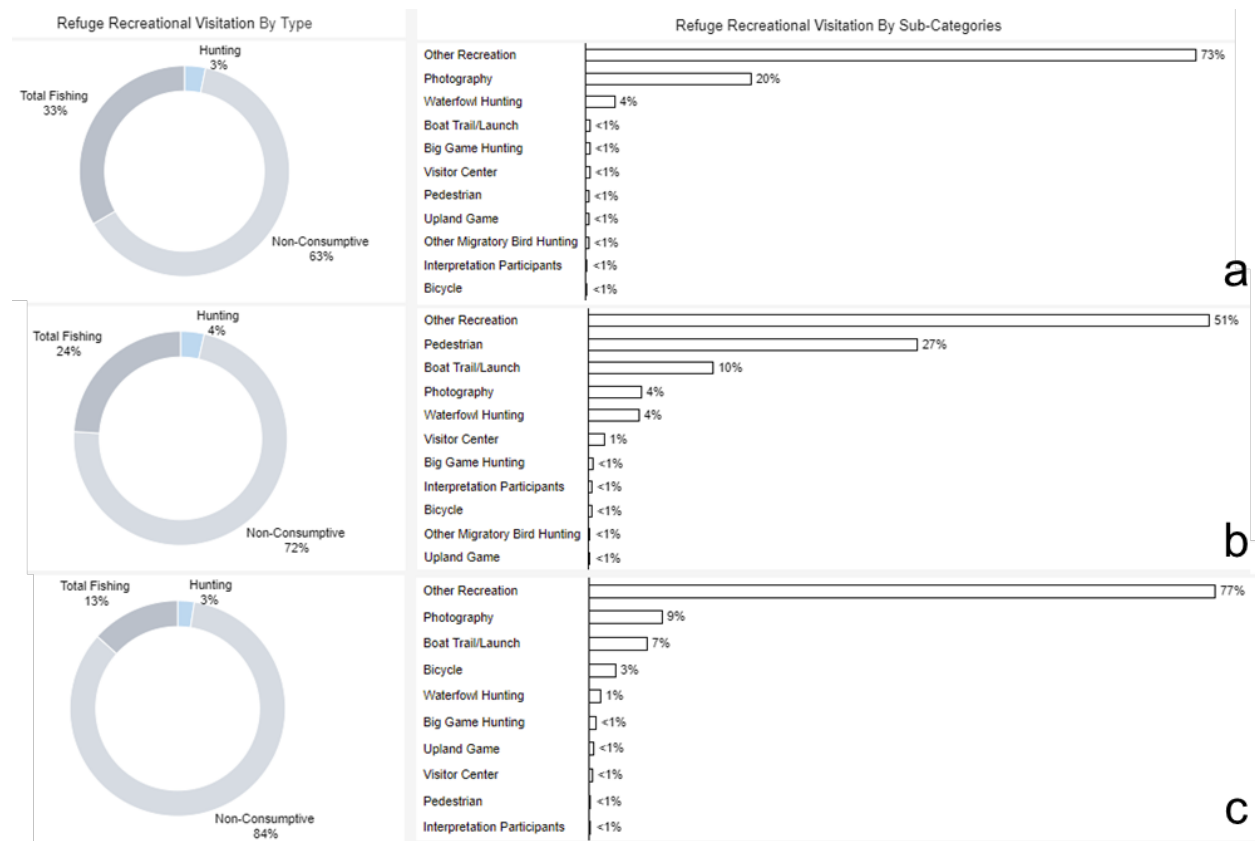


Figure 2-16. Refuge recreation visit profile for the Winona District (a), La Crosse District (b), and McGregor District (c) of the Upper Mississippi River National Wildlife and Fish Refuge (Caudill, 2019).

The Corps maintains the only federally-managed campground in the project area at Blackhawk Park in Pool 9. Table 2-20 documents camping visitation numbers at Blackhawk Park from 2014 to 2018. The table shows there has been an increase in the number of camping reservations over time.

Table 2-20. Day use and overnight visitation at Blackhawk Park.

Year	Day Use Total	Overnight Total	Totals
2014	28,343	9,484	37,827
2015	43,041	19,477	62,518
2016	41,309	18,887	60,196
2017	39,220	19,694	58,914
2018	37,093	16,318	53,411

Table 2-21 documents the results from written comments that were collected from visitors in project parks and day use areas via the Corps' administrated comment card program. A summary of customer satisfaction levels received in 2018 are provided below.

Table 2-21. Comment card survey 2018.

Customer Satisfaction Item	No. of Visitor Responses	Mean Response (1–5 Scale)
Overall satisfaction with my visit to this area.	202	4.8
Overall value received for any visitor fees paid.	114	4.7
Overall feeling of safety and security in the park.	201	4.8
Overall waiting times needed to access park facilities and services.	187	4.8

Overall, visitors are satisfied with the current facilities; however, some individual comments indicate upgrades or repairs to facilities and services including:

- Additional flush toilet/shower facilities (*Blackhawk*)
- Water at individual campsites (*Blackhawk*)
- Road maintenance/improvements (*Blackhawk, Millstone Landing*)
- Dog off-leash area (*Blackhawk*)

Recreational Carrying Capacity*

In recreation management, carrying capacity refers to the level of use that a recreation area can receive without suffering negative impacts to its environmental resources or the visitor experience. Overcrowding and overuse of recreation facilities within the project area are a concern for the water-based recreation opportunities. Currently, the carrying capacity is unknown for the recreation facilities in the project.

Participants in Carlson's surveys (1995) were asked the following question: "What do you believe is the most important issue that affects the management of the Upper Mississippi River Basin?" By far, the most common concerns were related to the environmental quality of the UMR. Over 40 percent of all respondents identified concerns relating to water quality, pollution and debris, protecting wildlife, and other similar concerns. Other important issues identified, accounted for nearly another 40 percent, were water levels, boat traffic-related concerns (e.g., boat wakes, boat safety), and channel maintenance dredging. The remaining responses fell under the following general areas of concern: law enforcement and regulations, shoreline and access improvement, balancing river uses, river stakeholder interaction, maintenance and improvement of facilities, and tax/money issues (Carlson, 1995).

With the population increasing, more demand for public access to recreation facilities may also increase. The Corps uses historic visitation data and best professional judgment to manage and address its recreation facilities that may be considered overcrowded, overused, underused, or well balanced. The project will continue to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices and campsite management using data from the Visitation Estimation and Reporting System and Recreation One Stop, the Corps reservation service and web-based resource for information about recreational opportunities.

There is also an increasing demand for water-related recreation activities. Overall, the availability of locations to launch boats appears adequate. There are places that reach capacity or are near capacity during holiday weekends, but on an average weekend, most facilities are adequate in providing for visitors' needs of launching watercraft and parking their vehicles. Project staff will continue to evaluate the carrying capacity of the recreation facilities as the number of visitors increase.

2.4.4 REGIONAL CONNECTING TRAILS

There are many bike, pedestrian, snowmobile, cross-country ski, and equestrian trails within the project. The Mississippi River Trail (MRT) is a 3,000-mile national bicycling route consisting of on-road bikeways and off-road trails that extend from the river's headwaters in Minnesota to the Gulf of Mexico. The Great River State Trail is a 24-mile finely crushed limestone surface suitable for walking and bicycling for much of the year and snowmobiling, cross-country skiing, and snowshoeing in winter. It is built on an abandoned Chicago-Northwestern railroad line and managed by Wisconsin DNR.

Throughout the regional master planning process, a consistent theme was to have greater connectivity between sites and the project as well as additional trails for recreation. Several other entities along the UMR are also exploring how to better connect trails. Efforts are underway to connect the Great River State Trail in Trempealeau County to Winona, Minnesota, with a 3.9-mile crushed limestone trail. The proposed Flyway Trail in Buffalo County recommends trail alignments along the Lock and Dam 5 dike and a link to the Whitman Dam Wildlife Area. These trail expansions would increase connectivity and increase recreational opportunities in the area (Figure 2-17). While the St. Paul District does not manage much of the land between the areas, it could leverage its relationship with USFWS and states to collaborate on connecting trails.



Figure 2-17. Segment 8 trail alignment of the proposed Flyway Trail. Access to the Whitman Dam Wildlife Area and Lock and Dam 5 (Alta Planning + Design, 2016).

Using ATVs and snowmobiling are popular outdoor recreation activities within the UMR Basin. Numerous snowmobile clubs maintain a network of snowmobile trails that connect cities across the region. These trails are located primarily on privately-owned land with easements to support their use and maintenance and with clubs also having easements passing through district lands.

The Mississippi River is a destination for non-motorized boating opportunities such as kayaking and canoeing. Currently there are several formal designated water trails within the project that support these activities and are managed by other agencies at a local level. None of the current water trails transverse the entire 250 Mississippi river miles of the project.

2.4.5 REAL ESTATE*

Prior to the construction of the 9-foot navigation channel, the Corps acquired project lands by direct purchase or by exercising the government's right of eminent domain. These lands are managed primarily by the St. Paul District's Environmental Section natural resource management staff, though areas designated for recreation are managed by the Mississippi River Recreation Section. Both sections are in the Operations Division, Recreation and Natural Resource (RNR) Branch. Though the lands are managed by RNR, the Real Estate Division (RE) ultimately maintains responsibility for maintenance of land records and execution of any real estate actions associated with the ownership. The RNR sections provide on-the-ground guidance and support and identify high-priority areas for RE involvement.

Acquisition Policy*

Project lands were acquired primarily in the 1930s with the authorization and construction of the project. These lands were acquired so that navigation infrastructure could be placed on them or to allow for flooding either directly from pool water or indirectly by raising the water table. Additional lands may only be acquired as deemed necessary to support those original project purposes for the navigation features, dredged material placement areas, or as deemed necessary for mitigation of loss of statutory wetland habitat on current fee title lands. Additional lands may also be added by leases as a requirement for land mitigation because of non-recreation lease impacts, in accordance with the 2009 Non-Recreational Lease Policy or congressionally authorized land exchanges. Navigational servitude, state water laws, and case laws also allow for select accreted riparian lands to be included as project land.

Fee Title

Fee title is land where the federal government holds the fee-simple title to a specific legal description, subject to existing easements for public roads and highways, public utilities, railroads, and pipelines. Fee title is a permanent and absolute tenure of an estate in land with freedom to dispose of it at will. Within the project, fee-title lands include areas that were inundated when the 9-foot navigation channel was constructed along with multiple areas that were acquired for Project purposes.

Outgrants on Public Lands

Outgrants of Corps' land to agencies, organizations, businesses, or individuals have been made for the purpose of providing access to recreational opportunities, marina services, utilities, and assisting riverine-related industry or local municipalities through the use of real estate instruments such as leases and easements.

Public Recreational Leases – Recreation opportunities in the form of access and parks have been developed by state or local governments. The Corps' real estate instrument for public recreational areas is the public park and recreation lease. State recreation areas range from small access areas to large state parks. Four of the project's current ten marina concessions hold a public park and recreation lease.

Commercial Concession Leases – Commercial concessions on public ground offer marina services for the public. Six of the project's current ten marina concessions hold a commercial concession lease.

Private Recreational Leases for Cottage Sites – In 1944, Section 4 of the Flood Control Act, authorized the Secretary of the Army to grant leases of lands at water resources development projects for such periods, and upon such terms and for such purposes as the Secretary of the Army may deem reasonable in the public interest. Because of this, the government advertised certain sites along the Mississippi River to be developed as recreational cottage sites in the early 1950s. More information on cottage site leases is included in chapter 6.

Special Use Licenses for Shoreline Management Structures – Licenses for privately-owned land-based recreational structures or activities in support of boat moorage and shoreline access in certain locations on Corps-owned land are also permitted, as described in the Shoreline Management Plan (SMP).

Boundaries and Encroachments

It is the policy of the St. Paul District to protect all resources — natural, historical, developed, and cultural — on public lands administered by the Corps and maintain the integrity of public lands by preventing encroachments. The term encroachment applies to all unauthorized land uses whether they are encroachments, trespasses, or any other violation applicable to the entry and/or use of public fee lands.

Boundaries on the project are not patrolled on a regular basis outside of those included in the SMP. Other areas are reviewed as needed during the day-to-day work by project personnel while conducting natural resource management activities throughout project lands. The Corps' boundaries on the Mississippi River use two different types of signs. The most common is the refuge sign that is used on all lands designated for wildlife. As part of the CA, the refuge agreed to maintain signage on boundaries that are within the refuge; as a result, the large majority of the Corps' boundary displays refuge signs. Shoreline management areas are generally not included in refuge boundaries. The 1988 Shoreline Management Plan directed that most developed shoreline areas have a Corps signage designating a "boundary line" or "boundary corner." These signs are spaced at intervals that allow for continuous line of site viewing of the boundary.

The St. Paul District will resurvey boundaries where chances of the encroachments are the greatest, where suspected encroachments need to be verified, and as funding allows.

2.4.6 CORPS EASEMENTS ON PRIVATE LANDS

Flowage Easement

Flowage easements were purchased for improvement of the river for navigational purposes around the time of the establishment of the 9-Foot navigation channel in the 1930s and reflect Corps policy for flowage easements at the time. Easements may vary by location and type so the language of individual easements should be directly referenced to identify their specific provisions. They provide the government with the right to occasionally overflow and submerge the property. These easements provide the right to overflow permanently or intermittently, to excavate and remove material, and to cut, remove, and dispose of all timber and other natural or artificial obstructions, which shall at any time and in any manner interfere with use of the land for navigation purposes.

However, easements typically involve the right to clear timber, right to overflow, and right to access by the government. One example deed reads: "...the full, complete and perpetual right, power, and privilege to overflow the property hereinabove more particularly described and designated as tracts ... both inclusive, together with the right to clear out and remove all brush, timber and other natural

or artificial obstructions located thereon; and the full, complete and perpetual right, power and privilege to overflow the property hereinabove more particularly described and designated as”

No permit program for structures on easement lands will be administered at the project. Regardless, structures or other impediments to flow or operation of the navigation project placed on flowage easement lands will be at the risk of the property owner. There are no government-owned facilities on flowage easement areas.

Cases involving structures that interfere with the right to overflow or submerge easement property for navigational rights at the project shall be referred to the Real Estate Division for the St. Paul District’s coordination and resolution.

2.4.7 NEW NON-RECREATIONAL OUTGRANT PROPOSALS

In executing the Corps’ missions, districts receive numerous and diverse proposals for use of lands and waters at Corps projects. The Non-Recreational Outgrant Policy was developed jointly by the Real Estate and Operations communities of practice in 2009, with the purpose to establish a consistent, nationwide policy that would be applied to evaluate non-recreational real estate requests for use of federal lands and waters.

The policy is consistent with the project outgrant management philosophy and shall be implemented for all future non-recreational outgrant requests on project lands and waters. For more information on the non-recreational outgrant proposal process, refer to Chapter 5.

CHAPTER 3:

RESOURCE OBJECTIVES*

3.1 INTRODUCTION

The following goals and objectives have guided the St. Paul District in formulating management alternatives and land use allocations. These objectives will provide direction for long-range development plans such as the Shoreline Management Plan and Operation Management Plan (i.e., private exclusive use of Corps-owned or administered lands through the implementation of the Shoreline Management Plan). This framework seeks to prepare a sensitive and balanced land use plan that the managing agencies are actively committed to follow for all federal lands along the UMR.

3.1.1 MASTER PLAN GOALS

1. To adhere to and follow all applicable laws, regulations, policy guidance, authorizations, and formal agreements as they relate to management of recreation, land, and resources on Corps-owned or administered lands.
2. To enhance the integrity of the UMR by incorporating a collaborative management approach that emphasizes proactive and regular engagement with partnering agencies, tribes and other entities in the decision-making process for all Corps-owned or administered lands.
3. To manage all Corps-owned or administered lands as multiple-use properties, balancing recreation, cultural, environmental, and navigation interests to provide the most equitable, safe, and publicly beneficial use of these lands, while retaining existing commitments for recreation, resource management, and private structures.
4. To conserve, restore, and maintain the ecological structure and function of the UMR to achieve long-term sustainability of the economic uses and ecological integrity of the system.
5. Provide, maintain, and enhance safe public outdoor recreation experiences to serve the needs of both present and future generations while being consistent with ecosystem management principles.
6. To minimize user conflicts and adverse effects while providing for public access and safety.
7. To foster public understanding of the Corps' multiple purpose missions: recreation, water safety, navigation, and environmental stewardship.
8. To collaborate widely with non-governmental entities, including community stakeholders, non-profits, academic institutions, and the public at large to maximize the public value of the multiple resources on Corps-owned or administered lands.

3.1.2 ENVIRONMENTAL STEWARDSHIP RESOURCE OBJECTIVES

Natural Resource Management

1. Proactively manage habitats to protect threatened, endangered, and species of special concern.
2. Implement recommendations from the 2012 Upper Mississippi River Systemic Forest Stewardship Plan and subsequent updates, including development of inventory and

monitoring procedures and related datasets to document and interpret current and historic conditions of native vegetation community types and distributions of undesirable invasive and exotic species in the context of defined targets.

3. Utilize the most recent data and best available science to prioritize management areas to maintain, enhance, and establish important native forest and other plant community types where best suited to maintain diversity, health, and sustainability on project lands.
4. Evaluate opportunities to improve and increase terrestrial and aquatic habitat connectivity where fragmentation is identified as a management concern.
5. Document distribution of pollinator habitats and enhance these habitats where feasible through incorporation of pollinator friendly plants in management and restoration plans.

Shoreline and Other Land Management

1. Carefully evaluate land use requests and eliminate unauthorized uses that may alter current or future habitat conditions and functions to avoid unnecessary natural resource damage, fragmentation, and permanent loss of ecological integrity or public value.
2. Minimize encroachments and trespassing by maintaining an easily recognized federal property boundary line and performing periodic inspections of the boundary.
3. Maintain contact with federal, state, county, and local government staff; adjoining landowners; real estate agents; and developers to help ensure understanding of Corps and managing agency roles, responsibilities, and policies. Take prompt action or coordination as appropriate to help resolve encroachments and trespassing.

General Environmental Stewardship

1. Protect known cultural resources, and practice good stewardship to reduce negative environmental and human impacts; seek funding and develop, update, and enforce the project's Historic Property Management Plan; and identify significant cultural sites with high risk of degradation, including development and maintenance of a historic properties database.
2. Ensure natural resource management activities are done in a manner that ensures safety for all users of project lands and waters.
3. Actively lead, engage and participate with team members, partners, and stakeholders in communication, collaboration, and exchange of knowledge related to environmental stewardship of project lands and waters.
4. Collaborate with other Corps elements, partners, and stakeholders to plan, implement, and monitor pool drawdowns and other opportunities to use water level management techniques to optimize habitat conditions based on ecological need, balanced with navigation need and funding availability.

3.1.3 RECREATION RESOURCE OBJECTIVES

1. Maintain and improve day use and campground facilities through the addition of modern amenities that are in accordance with Americans with Disabilities Act regulations, as well as sound environmental, public health, and safety standards, while reducing maintenance costs through flood proofing infrastructure.
2. Improve and expand opportunities for human-powered recreation such as hiking, birding, biking, cross country skiing, snowshoeing, paddling, swimming and nature study by providing and maintaining high quality trails and wildlife viewing stations.
3. Maintain and update visitor areas, amenities, and interpretative opportunities at lock and dam public viewing areas.

4. Provide interpretive services and educational opportunities through facility design, signage, and community outreach programs, collaborating with partners where feasible.
5. Provide and maintain river access to enhance fishing, boating, and hunting opportunities in areas that can be efficiently and feasibly managed by providing adequate boat ramp and parking facilities in designated areas.
6. Capture, evaluate and monitor current recreational trends, and proactively manage resources to balance beneficial recreational use and environmental impact.
7. Plan and coordinate with management partners to maintain select historic dredged material placement sites that provide opportunities for camping and day use activities while creating low impacts to fish and wildlife habitat.
8. Protect cultural resources by applying applicable Historic Property Management Plan and/or a Cultural Resource Management Plan and other proven methods, while practicing good stewardship by consulting with tribal members about the development of recreational areas adjacent to significant tribal sites.

CHAPTER 4:

LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE, AND PROJECT EASEMENT LANDS*

4.1 INTRODUCTION

When updating a master plan, the land allocation and land classifications are updated in order to ensure consistency with the authorized purpose of the land. Sections 4.2 Land Allocations and 4.3 Land Classification define and describe the recently updated land allocation and land classification derived from EP 1130-2-550, Recreation Operations and Maintenance Policies (30 January 2013). Section 4.5 of this chapter describes the current land classification breakdown for each pool within the project, as defined in the 2011 Land Use Allocation Plan (LUAP). The proposed changes to land allocation and classification for each pool, using the latest engineer pamphlet, will be described within Chapter 5. The environmental impacts of these changes will be described in Chapter 6.

4.2 LAND ALLOCATION*

In accordance with EP 1130-2-550, land allocations identify the congressionally authorized purposes for which Corps lands were acquired. There are only four land allocation categories applicable to the project. These include operations, recreation, fish and wildlife, and mitigation. More detail for each category is provided below.

4.2.1 OPERATIONS

Lands that are acquired for the congressionally authorized purpose of constructing and operating the project. Most project lands are included in this allocation.

4.2.2 RECREATION

Lands that are acquired specifically for the congressionally authorized purpose of recreation. These lands are referred to as separable recreation lands. Lands in this allocation can only be given a land classification (see section 4.2.2 Recreation).

4.2.3 FISH AND WILDLIFE

Lands that are acquired specifically for the congressionally authorized purpose of fish and wildlife management. These lands are referred to as separable fish and wildlife lands. Lands in this allocation can only be given a land classification of “wildlife management.”

4.2.4 MITIGATION

Lands that are acquired specifically for the congressionally authorized purpose of offsetting losses associated with development of the project. These lands are referred to as separable mitigation lands. Lands in this allocation can only be given a land classification of “mitigation.”

4.3 LAND CLASSIFICATION*

Land classification corresponds to the primary use for which project lands are managed. Classifying lands further provides for development and resource management consistent with authorized purposes and other federal laws. Project lands are zoned for development and resource management consistent with authorized project purposes and the provisions of other federal laws. project plates delineating land according to the land classifications below are within Appendix C – Land Allocation and Land Classification Plates of the 2020 Master Plan.

4.3.1 PROJECT OPERATION

Lands required directly for infrastructure or maintenance of the project (i.e., locks and dams, embankments, dredged material placement sites, emergency spillways, offices, maintenance facilities), and other areas that are used to operate and maintain the project. When compatible with operational requirements, project-operation lands may be used for wildlife habitat management or recreational use. Licenses, permits, easements, or other outgrants are issued only for uses that do not conflict with operational requirements.

4.3.2 HIGH DENSITY RECREATION

Lands designated for intensive levels of recreational use to accommodate and support the recreational needs and desires of visitors. They include lands on which existing or planned major recreational facilities are located and allow for developed public recreation facilities, concession development, and high density or high impact recreational use. In general, any uses of these lands that interfere with public enjoyment of recreation opportunities are prohibited. Low-density recreation and wildlife management activities compatible with intensive recreation use are acceptable, especially on an interim basis. No agricultural uses are permitted on those lands except on an interim basis for maintenance of scenic or open space values.

4.3.3 MITIGATION

This classification is for lands that were acquired specifically for the congressionally authorized purpose of offsetting losses associated with development of the project.

4.3.4 ENVIRONMENTALLY SENSITIVE AREAS

This class may overlap with other designated classes and consists of areas where features of high scientific, ecological, cultural, or aesthetic importance have been identified. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act, or applicable state statutes. These areas must be considered by management to ensure they are not adversely impacted. Typically, there is limited or no public use development on these lands. These areas are typically distinct parcels located within another, and perhaps larger, land classification area. A brief narrative should be provided describing the associated resource analysis and/or inventory used in making the classification. More information

pertaining to environmentally sensitive areas and why it will not be utilized in the 2020 Master Plan can be seen in section 5.1.1 Classification and Justification.

4.3.5 MULTIPLE RESOURCE MANAGEMENT LANDS

This classification allows for the designation of a predominant use within an area with the understanding that other compatible uses may also occur within these lands. These additional sub-classifications are shown as land classifications on the map plates in Appendix C – Land Allocation and Land Classification Plates (i.e., low-density recreation and wildlife management), along with the land classifications of project operations and high-density recreation. The potential sub-classifications of multiple resource management lands are described below.

Low-Density Recreation

Lands designated for dispersed and/or low-impact recreation use. Development of facilities on these lands is limited. Emphasis is on providing opportunities for non-motorized activities, such as walking, fishing, hunting, or nature study. Site-specific, low-impact activities like primitive camping and picnicking are allowed. Facilities may include boat ramps, boat docks, trails, parking areas and vehicle controls, vault toilets, picnic tables, and fire rings. Man-made intrusions, including power lines, non-project roads, and water and sewer pipelines may be permitted under conditions that minimize adverse effects on the natural environment. Vegetation management, including agricultural activities that do not greatly alter the natural character of the environment, are permitted for a variety of purposes, including erosion control, retention and improvement of scenic qualities, and wildlife management. Hunting and fishing are allowed pursuant to potential fish and wildlife management regulations and where these activities are not in conflict with the safety of visitors and project personnel.

Wildlife Management

Lands designated for stewardship of fish and wildlife resources. These lands are generally open for public hunting and fishing activities.

Vegetative Management

Management activities in these areas focus on the protection and stewardship of forest and prairie resources and other native vegetative cover. This sub-classification was not used in the 2020 Master Plan, as wildlife habitat management was determined to be the primary focus and many actions taken for wildlife management would support and promote vegetative management within the project.

Future or Inactive Recreation Areas

Lands with site characteristics compatible with potential future recreational development or recreation areas that are currently closed to the public. Until there is an opportunity to develop or reopen these areas, they are managed for multiple resources. This sub-classification was not used in the 2020 Master Plan.

4.3.6 WATER SURFACE

If the project administers a surface water zoning program, it is to be classified within the 2020 Master Plan of which does not classify waters; therefore, no water surface classifications are included.

4.4 PROJECT EASEMENT LANDS*

These are lands that the Corps holds as easement interest but do not hold a fee title. The use and management of easement lands are determined by the terms and conditions of the easement estate acquired for the project. Easement lands are acquired for specific purposes (described below) and therefore do not convey the same rights or ownership of other Corps fee lands. While easements are covered under Real Estate, they are not shown in the plates included in this plan.

4.4.1 OPERATIONS EASEMENT

The Corps retains the rights to these lands in order to complete necessary project operations (e.g., access).

4.4.2 FLOWAGE EASEMENT

The Corps retains the right to inundate these lands when necessary for project operations.

4.4.3 CONSERVATION EASEMENT

The Corps retains the right to these lands for aesthetic, recreation, and environmental benefits.

CHAPTER 5:

RESOURCE PLAN*

5.1 INTRODUCTION

The information presented in this chapter and potential future recommendations identified were developed to support the goals and objectives presented in Chapter 3 of this document. The 2020 Master Plan is based on available resources and public needs. It provides guidance on what types of development and activities are permitted, providing for full utilization while protecting project resources.

5.1.1 CLASSIFICATION AND JUSTIFICATION

Land classifications: *

- Project Operations
- High Density Recreation
- Mitigation
- Environmentally Sensitive Areas
- Multiple Resource Management Lands
 - Low Density Recreation
 - Wildlife Management
 - Vegetative Management (classification not used in the 2020 Master Plan update)
 - Future or Inactive Recreation Areas (classification not used in the 2020 Master Plan update)
- Water Surface (classification not used in the 2020 Master Plan update)

*Details are located in section 4.3, Land Classification.

The identified land classifications and the proposed management to be used in order to achieve the purpose of each classification are presented in broad terms in the 2020 Master Plan. A more descriptive plan for managing these lands can be found in the Project Operation Management Plan (OMP) and Shoreline Management Plan (SMP). Management tasks described in the OMP must support the resource objectives, land classifications, and resource plan set forth in the 2020 Master Plan.

Changes to land use and classification have occurred from what was documented in the 2011 Land Use Allocation Plan (LUAP) to what is currently occurring within the project today. The new land classifications and brief descriptions of proposed changes are documented below.

See Table 2-1 of the EA within Appendix A – Environmental Assessment for land classification changes from the 2011 LUAP to the new land classification changes.

See Appendix C – Land Allocation and Land Classification Plates for plates showing the various land classifications found throughout the project.

Total acres for each land classification for the updated 2020 Master Plan can be found in Table 5-1, Table 5-2, and Figure 5-1.

The landforms and topographic data were updated in the 2020 Master Plan to reflect the changing shoreline and islands. A concurrent review of real estate parcels and federal ownership boundaries have enhanced the accuracy of the 2020 Master Plan. The calculated acreages for land classifications shown in the 2020 Master Plan are based on Geographic Information System (GIS) polygon data and more accurate legal survey, when available. Though GIS technology has improved, there are inherent errors in the calculations.

Table 5-1. Total acres for each land classification of the 2020 Master Plan update.

Land Classification	Corps	USFWS	Total Acres
Multiple Resource – Wildlife Management	22,707.91*	41,503.65 [†]	64,211.56
Project Operations	882.01	203.79	1,085.80
Recreation (High Density)	708.61	-	708.61
Multiple Resource – Low Density Recreation	162.52	27.95	190.47
Total Acres	24,461.05	41,735.39	66,196.44

*Includes 562 acres of mitigation land on the Rush and Trimbelle Rivers.

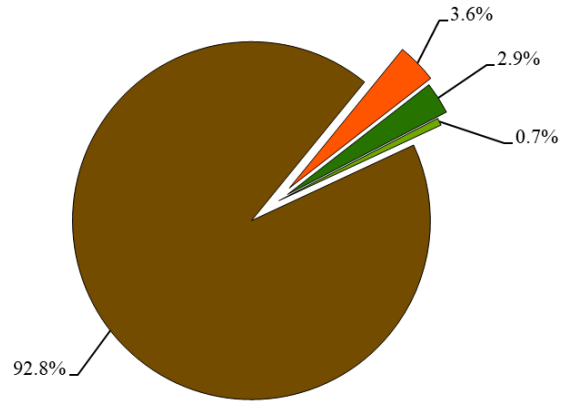
[†]Includes 573 acres of managed land that is owned by the city of Winona, Minnesota.

Table 5-2. Total acres of land classified for the 2020 Master Plan update, segmented by pool, land classification, and agency.

Area/Location	Multiple Resource – Wildlife Management		Project Operations		Recreation (High Density)		Multiple Resource – Recreation (Low Density)		Total Land Managed	
	Corps	USFWS	Corps	USFWS	Corps	USFWS	Corps	USFWS	Corps	USFWS
Pool 1*	3.0	-	25.1	0.0	0.0	0.0	0.0	0.0	28.1	-
Pool 2	10.8	-	72.4	0.0	2.8	0.0	0.0	0.0	86.0	-
Pool 3	2,582.1	-	49.1	0.0	16.2	0.0	13.2	0.0	2,660.6	-
Pool 4	1,248.0	4,753.9	134.5	89.7	9.5	0.0	5.1	4.6	1,397.1	4,848.2
Pool 5	2,046.3	1,971.7	276.2	0.0	6.8	0.0	26.7	1.2	2,356.0	1,972.9
Pool 5a	2,251.2	1,393.7	86.9	10.2	5.0	0.0	3.2	1.7	2,346.3	1,405.6
Pool 6	300.7	1,401.2	73.2	0.3	14.7	0.0	8.0	1.0	396.6	1,402.5
Pool 7	2,115.7	5,519.6	24.9	15.2	20.1	0.0	64.4	2.0	2,225.1	5,536.8
Pool 8	3,294.4	6,914.6	78.0	21.3	417.8	0.0	21.6	8.7	3,811.8	6,944.6
Pool 9	6,127.3	11,589.5	37.7	36.7	155.8	0.0	1.6	7.9	6,322.4	11,634.2
Pool 10	2,092.3	7,677.8	20.9	30.3	55.1	0.0	18.8	0.8	2,187.1	7,709.0
Pool 11-Portion	74.7	281.5	3.1	0.0	4.8	0.0	0.0	0.0	82.6	281.5
Mitigation Lands	561.5	-	0.0	0.0	0.0	0.0	0.0	0.0	561.5	-
Total Acres	22,708.0	41,503.5	882.0	203.8	708.6	0.0	162.5	28.0	24,461.2	41,735.2

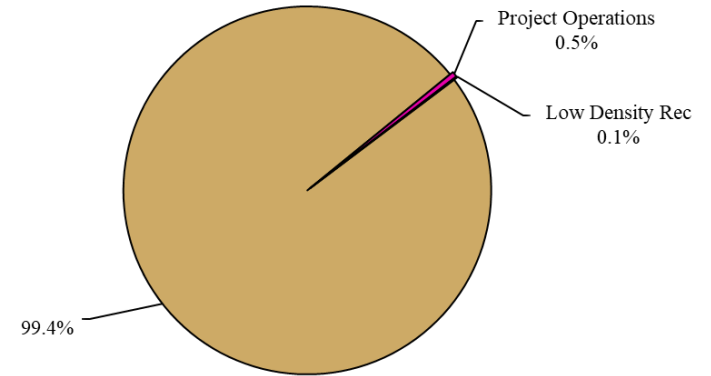
*Includes Project Operations land from Upper and Lower Saint Anthony Falls.

Corps of Engineers - Land Classification



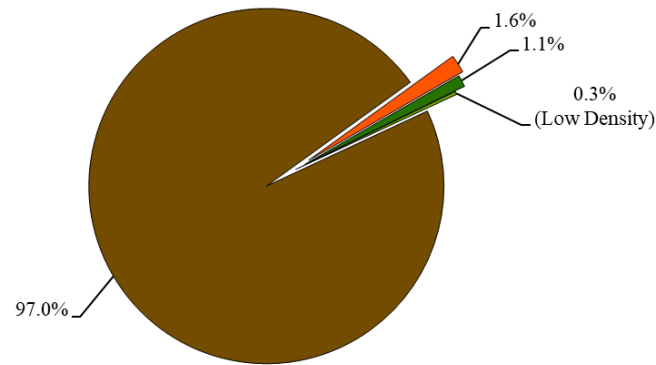
■ Wildlife Management ■ Project Operations ■ High Density Rec ■ Low Density Rec

U.S. Fish and Wildlife - Land Classification



■ Wildlife Management ■ Project Operations ■ Low Density Rec

Total Project - Land Classification



■ Wildlife Management ■ Project Operations ■ High Density Rec ■ Low Density Rec

Figure 5-1. Percentage of land represented by land classification for the Corps, USFWS, and both combined.

Project Operations

This category includes those lands required for the operation of the project. Examples of management activities for these lands include renovating and updating facilities and aging infrastructure with modern, energy efficient technology. The 2020 Master Plan does not provide any recommendations or priorities for improvements or upgrades of project operation areas, except where there is a natural resource or recreation objective that can complement project operations.

Management for wildlife, natural resources, and recreational use may be conducted on these lands as long as there is no conflict with operational requirements. Examples of wildlife, natural resources, and recreational use management include modernizing interpretive information and facilities, recreation trails, and protecting culturally sensitive areas. Lands specific to project operations have, for the most part, remained unchanged during the master plan update.

High Density Recreation

Lands developed for intensive recreational activities include day use areas and campgrounds. The facilities in these areas will accommodate the recreation needs of visitors in concentrated numbers while also offering open space lands to provide more complete and attractive recreation areas.

The majority of the high-density recreation lands were classified in the 2011 LUAP. Public comments, via comment cards and personal communication with project visitors indicate visitors would like upgrades and modernization of the Corps' operated facilities. Improvement recommendations include adding Wi-Fi and cell phone boosters, providing additional electric and sewer hookups, and installing camper cabins. Facility upgrades such as installing new restrooms and showers, providing water, shelters, picnic areas, play structures, off-leash dog areas, and improving roads, boat launches, and parking areas are all items visitors have consistently identified as needing attention. Any improvements to high density recreation areas would be specifically addressed in future OMPs.

Mitigation

Mitigation for adverse impacts to project resources (such as placing fill in waters of the United States or permanent loss of forested habitat) may require statutory and/or non-statutory mitigation to ensure that public resources suffer no net loss of value and function. Statutory mitigation may be required for the fill of waters of the United States under Section 404 of the Clean Water Act. Non-statutory mitigation is any other mitigation effort made in promotion of offsetting negative impacts to project resources. Statutory mitigation for permanent impacts to project lands typically cannot be fully mitigated on other existing project lands. The moderate enhancement of project lands does not necessarily equate to the permanent loss of wetland or forested wetland habitat. The acquisition of additional project lands should be a primary consideration when statutory mitigation is required or potentially for other permanent loss of habitat on project lands.

The existing mitigation sites on project lands (Trimbelle and Rush rivers) involved creating, restoring and/or enhancing roughly 300 acres of land into floodplain forest (see Figure 1-1). These mitigation sites are restricted from development or other active impacts. If development of these sites cannot be avoided, the additional mitigation would typically be calculated at a higher rate. These existing areas should be specifically mapped and documented to ensure the knowledge is retained regardless of current staffing. The 2020 Master Plan update map plates and associated digital mapping layers should be used during project and St. Paul District review of development to avoid impacting mitigation areas.

Multiple Resource – Low Density Recreation

Low density recreation refers to lands with minimal development or infrastructure that supports passive public recreational use, for example: hiking trails, fishing, hunting, and wildlife viewing. Existing or future development may occur within these areas; however, development will be limited in scope. Accordingly, wildlife management and vegetation management can easily coexist with recreational accommodations. Other factors that may determine this classification include access, past use, and the level of development on neighboring private lands. Resource objectives for low-density recreation include environmental stewardship activities that achieve natural resource management goals while also recognizing the compatibility of limited development for recreational pursuits. The management plan for low-density recreation areas is to maintain and modernize where appropriate for public use and enjoyment. This may include constructing trails, developing partnerships to enhance passive recreation areas, and providing recreational opportunities like geocaching, birding, and other wildlife viewing.

Multiple Resource – Wildlife Management

These lands are designated for stewardship of fish and wildlife resources. Wildlife management may occur under other land classifications, but for this classification, wildlife habitat is the primary focus. Habitat priorities in areas classified as wildlife management will be consistent with habitat management objectives of partner agencies; in the case of the refuge, Corps management will emphasize enhancements for resources of concern identified in the 2019 Refuge Habitat Management Plan. The vast majority of management actions taken by the Corps on areas classified as wildlife management will be management of vegetation associated with forest habitat improvement and restoration. Direct measures to benefit specific wildlife species will be undertaken intermittently and as opportunities arise, such as installing artificial nesting cavities or planting native prairie.

The wildlife management classification saw the greatest increase in acreage compared to the 2011 LUAP as many areas once classified as low-density recreation were changed to the primary purpose of wildlife management. All new parcels acquired by the USFWS since the 2011 LUAP were designated as wildlife management. One notable change to this classification includes the removal of USFWS land within the Trempealeau National Wildlife Refuge (NWR), as this area is not covered within the Cooperative Agreement (CA). This land accounted for roughly 2,644 acres of land classified as wildlife management in the 2011 LUAP. Other changes include lands within Pool 6 that are owned by the city of Winona, Minnesota, that will be managed by the USFWS for wildlife management. For more information on the changes of total wildlife management acres between the 2011 LUAP and the 2020 Master Plan update, see Table 2-1 of the EA (Appendix A – Environmental Assessment).

ENVIRONMENTALLY SENSITIVE AREAS

The goal of environmentally sensitive area (ESA) management is to protect and preserve known areas that contain significant scientific, ecological, cultural, or aesthetic features. The project encompassed in the 2020 Master Plan is unique in that most of the Corps-owned land resides within the refuge. Project lands and the species that reside within the refuge are protected by the National Wildlife Refuge System Improvement Act of 1997. This amendment to the National Wildlife Refuge System Administrative Act of 1966 provided the USFWS with a mission, policy direction, and management standards for the lands and species within their jurisdiction (USFWS, 2006b), meaning that lands within the refuge already have stronger legal framework for protection of critical resources

than would an ESA classification through the 2020 Master Plan. For this reason, ESAs will not be utilized as a classification for the 2020 Master Plan.

Prior to the decision above, the Corps developed a scoring matrix to identify biologically and culturally sensitive areas throughout the UMR project. This matrix utilized a variety of federal and state sensitive information to delineate ESAs throughout the project area. Though this information will not be publicized in the 2020 Master Plan, it will be kept internally to assist the Corps and its partners with future decisions on these lands.

RESEARCH NATURAL AREAS

Research natural areas are federally-designated lands (non-Corps) that contain all major ecosystem types or contain other outstanding physical or biological phenomena. These areas are most closely related to an ESA; however, neither research natural areas will not be displayed as a land classification for the 2020 update. Research natural areas are intended to provide research and educational opportunities to scientists and others through observation, study and monitoring of the environment. These lands also contribute to the preservation of a full range of genetic and behavioral diversity for native plants and animals, including threatened and endangered species (USFWS, 2006b). The refuge contains four research natural areas, two of which reside with the project area for the 2020 Master Plan. These two research natural areas are Nelson-Trevino (Pool 4) and Reno Bottoms (Pool 9). These areas are labeled as a “natural areas” overlay on the Land Classification Plates (Appendix C – Land Allocation and Land Classification Plates).

Multiple Resource – Vegetative Management

The 2011 LUAP did not include a subdivision for vegetation management, and, to maintain consistency with wildlife habitat management objectives, and with previous management plans, it was determined that all lands classified as wildlife management in 2011 would continue to be classified as such, unless they were switched to a recreation or project operations classification. Thus, there are no proposed land classifications in this category.

Multiple Resource – Future or Inactive Recreation Areas

These areas have site characteristics compatible either with future recreational development or recreation areas that are closed. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources.

The 2020 Master Plan does not classify any land to future/inactive recreation. The proposed recreation initiatives and development within the UMR Basin (e.g., bike trail, hiking trails) are all compatible with the current wildlife management classification. Any additional outgrant requests or easements will be considered by the Real Estate office and coordinated with project staff when this 2020 Master Plan is updated.

5.2 CORPS-OWNED RECREATION AREAS (MANAGED AND OUTGRANTED)

The master plan provides guidance for the orderly development, use, and management of project resources. Resource planning takes into consideration authorized project purposes, public interests, regional needs, and opportunities and constraints that influence development and management. All proposed development is designed to be compatible with the project’s natural and cultural resources. project planning and land classification addresses several factors: seasonal flooding, soils, ecological

conditions, existing and projected recreation demand, state and local participation and interest, and applicable laws, regulations, and policies.

A description is provided for each area and includes a general overview of the site and proposed future recommendations.

Outgranted areas are independently managed by the leaseholder and operate in accordance with Corps' policies and regulations. Outgrant holders are to submit proposals for development to the Corps' Recreation and Natural Resource (RNR) Management who will then coordinate reviews and approvals with the Corps' Regulatory, Real Estate, and other applicable offices. Any active proposal will be listed with the description of the site, if only a description is listed than the outgrant holder has not submitted any proposals.

5.2.1 UPPER SAINT ANTHONY FALLS

Upper Saint Anthony Falls (USAF) Lock and Dam is located on the right descending bank of the UMR within Minneapolis, Minnesota, at River Mile (RM) 853.9, adjacent to the St. Anthony Falls Historic District. Unlike the other locks and dams on the UMR, Upper and Lower Saint Anthony Falls were authorized as part of the Rivers and Harbors Act of 1937. Construction on USAF Lock and Dam started in 1959 and was completed in 1963. This action allowed for navigation up to RM 857.6. The lock is connected to a 2,045 foot-long horseshoe dam that is owned and operated by Xcel Energy. The pool downstream of the lock is the shortest within the UMR as Lower Saint Anthony Falls (LSAF) Lock and Dam is only 0.6 miles downstream.

Section 2010 of the Water Resources Reform and Development Act of 2014 (WRRDA 2014), dated June 10, 2014, directed USAF be closed to navigation within one year of the enactment of the act. Although USAF is closed to navigation, Section 2010 of WRRDA 2014 allows the Corps to execute emergency lock operations at USAF as necessary to mitigate for flood damage. The Corps is currently working on a disposition study to evaluate whether USAF should be deauthorized and if the associated real property and government-owned improvements should undergo disposal. After a determination is made on USAF, the Corps would determine if LSAF and Lock and Dam 1 should also be deauthorized.

Corps Managed Facilities

DAY USE AREAS

USAF Lock and Dam – The Upper St. Anthony Falls Visitor Center (also known as the Morgan J. Tschida Visitor Center) (Figure 5-2) exists at this lock site and provides visitors an excellent view of the lock and dam, falls, and the Stone Arch Bridge that crosses the river. The facility contains informational kiosks that depict Saint Anthony Falls' place in Minnesota history. In addition, the visitor center includes interpretive and educational displays, public restrooms, and parking facilities. While at the visitor center, patrons can receive a guided tour from the lock walls by a park ranger. The St. Paul District granted the NPS a five-year real estate agreement in 2015 to use the visitor center and provide tours from Memorial Day weekend through Labor Day weekend (Table 5-3). Prior to the real estate agreement, the St. Paul District oversaw the visitor center and guided tours.

Table 5-3. Visitation numbers at Upper Saint Anthony Falls Visitor Center.

Year	Visitor Totals
2015	2,516
2016	15,986
2017	22,356
2018	19,341
2019	24,471



Figure 5-2. The Visitor Center at Upper St. Anthony Falls.

5.2.2 LOWER SAINT ANTHONY FALLS

Lower Saint Anthony Falls (LSAF) Lock and Dam is located on the right descending bank of the UMR within Minneapolis, Minnesota, at RM 853.3. Construction on LSAF Lock and Dam began in 1950 and was completed in 1956. Next to the main lock chamber is a hydropower facility that is co-owned by Brookfield Renewable Energy and Spaulding Consultants and operated by Brookfield Renewable Energy. As stated under the USAF description, the operation and authorization of LSAF is currently being looked at as part of the disposition study. LSAF Lock and Dam is currently authorized for navigation, recreation, and flood control management. The construction of LSAF Lock and Dam creates the current upper end of Pool 1 of the UMR. There are currently no Corps-owned or outgrant facilities open to the public at LSAF Lock and Dam.

5.2.3 POOL 1

Pool 1 of the UMR starts at LSAF at RM 853.3 and ends at Lock and Dam 1 at RM 847.9, making it one of the smaller pools in the UMR at 5.4 miles. Originally known as the Ford Dam or Twin Cities Lock and Dam, Lock and Dam 1 is located about 2 miles upstream of Fort Snelling (RM 847.6). Prior to the construction of Lock and Dam 1 in 1917, this stretch of river was primarily composed of unnavigable rapids. As part of the project, a number of islands and debris from the gorge and Saint Anthony Falls were removed. Reconstruction took place in 1929, and a second lock was completed in 1933. The dam consists of a 574-foot-long concrete overflow spillway with an inflatable crest. The locks are 56-feet wide by 400-feet long. Today, much of the commercial navigation within Pool 1 has ceased; however, recreational boaters still use the pool.

All of Pool 1 for this plan is within the Mississippi National River and Recreation Area (MNRRA), a unit of the NPS and the state-designated Mississippi River Corridor Critical Area (MRCCA). Both the federal and state designations cover the same 72-mile corridor from the mouth of the Crow River, at Dayton and Ramsey, Minnesota, (above Coon Rapids Dam) to below Lock and Dam 2 in Hastings,

Minnesota. In 1988, Congress conferred the federal designation in order to preserve and protect the natural, cultural, historic, economic, scenic, and recreational values of this 72-mile stretch of the Mississippi River. The MRCCA was designated a state critical area in 1976 to preserve and protect its many resources.

Pool 1 reach is entirely within the metropolitan area and represents a significant corridor of open space and habitat for both aquatic and terrestrial plants and animals. A large portion of Pool 1 is bordered by Mississippi Gorge Regional Park, which is managed by the Minneapolis Park and Recreation Board. The landscape of the pool consists of steep cliffs from the natural gorge, leaving very little useable shoreline. For this reason, there are very few buildings within the gorged area of Pool 1.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 1 – The facility is open seasonally with a walk-through interpretive display and an observation deck for watching lock usage by recreation and commercial craft (Figure 5-3). The observation deck provides a great vantage point for viewing local wildlife. In addition, there is a viewing apparatus on the crib wall of an artificial nesting box for Peregrine Falcons. Public restroom facilities are available seasonally.

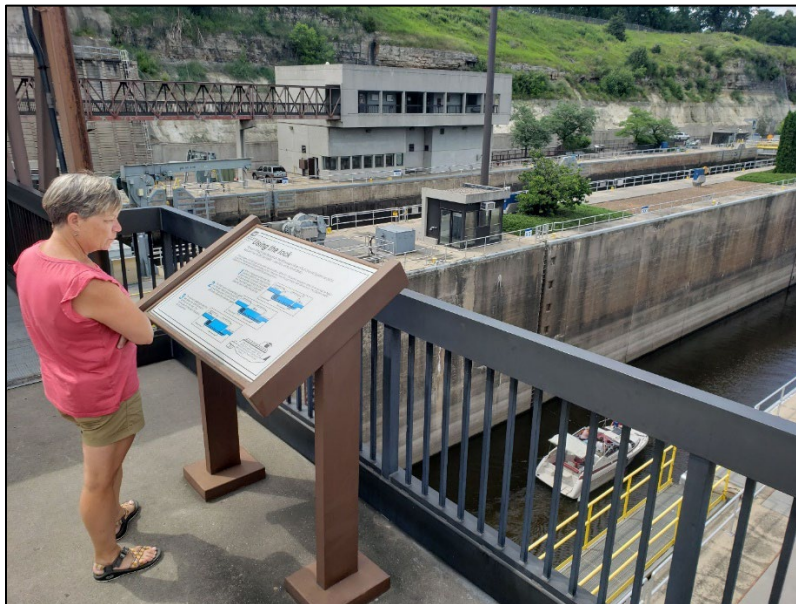


Figure 5-3. A visitor to Lock and Dam 1 observes a recreational boat entering the lock chamber.

5.2.4 POOL 2

Pool 2 is an impoundment of the UMR from Lock and Dam 1 (RM 857.6) downstream to Lock and Dam 2 in Hastings, Minnesota, at RM 815.2. Construction of Lock and Dam 2 was completed in 1930 and refurbished in 1948 due to settlement of the lock walls. The lock is 110-feet wide and 600-feet long. On average, 12,000 recreation craft and 11 million tons of cargo pass through the lock annually (USACE, 2016a). Pool 2 is one of the most engineered stretches of the Mississippi River, containing 300 wing dams prior to the implementation of the project. The entirety of Pool 2 resides

within the boundary of the state of Minnesota as well as the MNRRA. Portions of Pool 2 are within the Minnesota Valley NWR and Fort Snelling State Park.

Pool 2 is unique in that it encompasses a variety of different habitats, including urban, suburban, and rural settings. Just below Lock and Dam 1, Pool 2 continues through a steep-sided gorge, which was originally rapids from St. Anthony Falls. At RM 844, the Minnesota River enters the Mississippi River Basin at the east end of Pike Island within Fort Snelling State Park. The introduction of the Minnesota River greatly changes the water chemistry of the UMR, due to the high sediment and nutrient loads associated with the Minnesota River. Other contamination sources within the pool are from landfill sites and industrial waste prior to the implementation of the Clean Water Act of 1972. From the confluence of the Minnesota River, the UMR continues through a highly industrialized urban setting that contains several floodplain lakes including Pigs Eye Lake, which is a degraded backwater that the Corps intends to restore with islands through the beneficial use of dredged material.

Below the Interstate 494 bridge (RM 832.5), Pool 2 is generally in a more natural condition and widens slightly. This area features several flowing side channels, a wooded island, and floodplain lakes. The section of Pool 2 contains two scientific natural areas: Pine Bend Bluffs Scientific and Natural Area and Grey Cloud Dunes Scientific and Natural Area. The lower end of Pool 2 is wide, impounded, and indicative of a typical downstream stretch of a pool on the UMR. This area contains submerged land that is wind and wave swept, preventing submerged aquatic plants from growing and has submerged side channels that are slowly filling in with sediment. These submerged lands often are stump fields created when timber was harvested by the Corps at the time of project construction and then later flooded by the project.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 2 – This facility is open seasonally and contains an observation deck for land-bound visitors. The area is known for quality eagle observations, as many bald eagles and other raptors will hunt below the dam. Visitors are also able to utilize a section of the Mississippi River Regional Trail, a portion of which goes over the embankment side of the dam. Part of this day use area also includes sections of the Hastings River Flats, a 216-acre area containing floodplain forest, emergent marsh, prairie, and parklands.

5.2.5 POOL 3

Pool 3 is an impoundment of the UMR from Lock and Dam 2 (RM 815.2) downstream to Lock and Dam 3 north of Red Wing, Minnesota, at RM 797. Construction of Lock and Dam 3 was completed in 1938. Major rehabilitation occurred from 1988 to 1991. On average, 10,000 recreation craft and 11 million tons of commercial cargo pass through the lock annually (USACE, 2016b). The St. Croix River enters the UMR within Pool 3 at RM 811.4 and establishes the border between Minnesota and Wisconsin.

The project area within Pool 3 encompasses 17,950 acres and represents a significant corridor for aquatic and terrestrial organisms. Along with the St. Croix River, other tributaries within Pool 3 include the Vermillion River and several small creeks. Several large floodplain lakes within the pool include lakes Rebecca, Conley, and Isabelle; Mud Hen, Sharp Muskrat, North, Sturgeon, Nelson, Larson, Goose, Birch, Wildcat, and Jones lakes; and Twin Lakes. The lower section of the pool contains the Gores Pool #3 WMA, which is managed by the MNDNR. Communities bordering

this pool include Hastings, Minnesota; Prescott and Diamond Bluff, Wisconsin; and the Prairie Island Indian Community located in Minnesota. Significant facilities include a nuclear power plant on Prairie Island owned and operated by Xcel Energy and Treasure Island Resort and Casino owned and operated by the Prairie Island Indian Community.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 3 – This facility is open seasonally and contains an observation deck for watching lock usage by recreation and commercial craft and public restrooms when open.

Outgranted Facilities

DAY USE AREAS

Lake Rebecca Park – This recreation area is located at the north end of Pool 3 within the Hasting River Flats, an area south of Lock and Dam 2. The park is situated next to Lake Rebecca, an abandoned side channel lake of the UMR prior to the implementation of the locks and dams. The park is managed by the city of Hastings, Minnesota, and includes a boat launch, fishing pier, and picnic area. In addition, the Corps constructed a water control structure in the early 1980s to regulate flow in and out of Lake Rebecca. The control structure is currently operated by the city of Hastings. Adjacent to Lake Rebecca Park is Jaycee Park. The park, also managed by the city of Hastings, has picnic tables, park benches, and a boat launch providing access to Pool 3 of the UMR. The city of Hastings released a master plan for the two parks in 2007, which included proposals for an interpretive center, band shell, festival grounds, and outdoor based activities.

Sturgeon Lake Landing – This water access point is located on Prairie Island, approximately two miles north of Lock and Dam 3 at RM 799.4. This is a boat landing with approximately 20 vehicle, with trailer, parking spots and is managed by the MNDNR.

North Lake Public Access – This water access point is located on Prairie Island, at RM 804.7. This is a boat landing with approximately 10 vehicle, with trailer, parking spots and is managed by the MNDNR.

5.2.6 POOL 4

Pool 4 is an impoundment of the UMR from Lock and Dam 3 (RM 796.9) downstream to Lock and Dam 4 north of Alma, Wisconsin, at RM 752.8. Construction of Lock and Dam 4 was completed in 1935 and rehabilitated from 1988 to 1994. Pool 4 is the largest pool within the project in terms of river miles (44.1) and water surface area, encompassing approximately 62,000 acres. A section of the pool encompasses Lake Pepin, a natural main channel lake that was formed via deposition from the Chippewa River. Other major tributaries that enter Pool 4 include the Vermillion River in Minnesota, the Rush and Buffalo rivers in Wisconsin. Minnesota communities surrounding Pool 4 include Red Wing, Lake City, Reads Landing, and Wabasha; while Wisconsin communities include Bay City, Maiden Rock, Stockholm, Pepin, Nelson, and Alma. Both the upper and lower sections of Pool 4 are characterized by extensive and productive floodplain lakes, side channels, and deltas.

Lake Pepin is 22 miles in length and 2.5 miles wide, making it the widest navigable section of the UMR. Lake Pepin and the surrounding corridor represent a significant habitat for both aquatic and terrestrial plants and animals. The river channels and backwaters above Lake Pepin provide spawning habitat for important sport fish that are utilized by local anglers, providing an important

economic resource to the area. Other backwater and floodplain lakes within the pool include Espen Lakes, Marsh, Gantenbein, Upper Round, Round, Little Goose, Cannon, Spring Creek, Mud, Goose, Dead Slough, Truedale, Big, Robinson, and Peterson lakes. Natural resource areas within Pool 4 include Frontenac State Park (MNDNR), Pierce County Islands WMA (WIDNR), Rush River Delta State Natural Area (WIDNR), Tiffany Bottoms State Natural Area (WIDNR), Nelson-Trevino Research Nature Area (USFWS) and the northern boundary of the Upper Mississippi River National Wildlife and Fish Refuge (USFWS), which begins near the mouth of the Chippewa River Delta.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 4 – This facility is open to the public seasonally from April through November and contains an observation deck for viewing lock usage and public restrooms when open (Figure 5-4).



Figure 5-4. Visitors enjoy watching commercial traffic from the observation deck at Lock & Dam 4.

Outgranted Facilities

RECREATION SITES

Rieck's Lake Parking Area and Campground – This facility is located north of the city of Alma, Wisconsin, on the Great River Road within the Buffalo River Delta. The 8.9-acre site is in the backwaters of the left descending bank of the river adjacent at RM 755. The recreation area is leased and managed by the city of Alma and includes a playground, picnic area, full restroom facilities (including showers), one viewing deck, multiple shelters, and campsites with electricity (no water). Shelters can be reserved for events, and campsites can be rented on a first-come, first-served basis. A

one-lane boat launch, called Buffalo River Landing, is located on the west side of state Highway 35, including a parking lot with 15 single, vehicle spaces and 15 vehicle, with trailer, spaces.

DAY USE AREAS

Indian Slough Landing – This water access point is located at RM 760.2 and is located between Wabasha, Minnesota, and Nelson, Wisconsin, just off Wisconsin State Highway 25. There is a boat landing with parking for about 20 vehicles with trailers. This landing is managed by the USFWS.

Nelson-Trevino West Parking Area – This parking area is located on the upstream side of the Nelson Dike across from Indian Slough Landing. The gravel parking area is large enough for roughly six vehicles.

Pontoon Slough Landing – This water access point is located at RM 760.2 and is located between Wabasha, Minnesota, and Nelson, Wisconsin, just off Wisconsin State Highway 25. There is a boat landing with parking for about 10 vehicles with trailers. This landing is managed by the USFWS.

Beef Slough Landing – This water access point is located at RM 760.2 and is located between Wabasha, Minnesota, and Nelson, Wisconsin, just off Wisconsin State Highway 25. There is a boat landing with parking for about 10 vehicles with trailers. This landing is on USFWS fee title land.

Nelson-Trevino Landing – This water access point is located on the upstream side of the Nelson Dike. This USFWS operated boat landing contains parking for roughly 15 vehicles with trailers.

Cedar Ridge Resort – Commercial concession lease from the Corps for a small boat landing/mooring area on Big Lake, Minnesota.

Peterson Lake Boat Landing – Located along County Road 24 near Kellogg, Minnesota. There is a boat landing with parking for about 10 vehicles with trailers. This landing is on USFWS fee title land and managed by the USFWS.

5.2.7 POOL 5

Pool 5 is an impoundment of the UMR from Lock and Dam 4 (RM 752.8) downstream to Lock and Dam 5 south of Minneiska, Minnesota, at RM 738.2. Construction of Lock and Dam 5 was completed in 1935 and rehabilitated with a new control building in 1988. On average, 9,000 recreation craft and 12 million tons of commercial cargo pass through the lock annually (USACE, 2010a). Other communities along the river of Pool 5 are Alma and Buffalo City, Wisconsin, making this reach of the project sparsely populated.

Pool 5 is 14.6 miles long and encompasses an area of approximately 12,300 acres. Significant tributaries that enter Pool 5 are the Zumbro (RM 750.2) and Whitewater (RM 744.2) rivers on the Minnesota side. Backwater and floodplain lakes within Pool 5 include Finger Lakes, a chain of six lakes directly below the Lock and Dam 4 embankment, Halfmoon Lake, Spring Lake, and Weaver Bottoms. Weaver Bottoms represents a significant backwater complex accounting for 5,500 acres of Pool 5. This complex provides ample habitat for migratory birds, fish species, and other aquatic life. Along with USFWS refuge lands there are a number of state management areas within Pool 5. MNDNR manages the McCarthy Lake WMA, Whitewater WMA, Kellogg Weaver Dunes Scientific and Natural Area, and John A. Latsch State Park.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 5 – This facility is open to the public seasonally from April through November and contains an observation deck for viewing lock usage and public restrooms when open.

Outgranted Facilities

RECREATION SITES

Great River Harbor – This property is leased to a private party and is located north of Buffalo City, Wisconsin, at RM 748.0. This site has a boat landing, restrooms, and camping.

DAY USE AREAS

Upper West Newton Landing – This water access point is located at RM 749.8 and is located south of Kellogg, Minnesota. There is a boat landing with parking for more than 10 vehicles with trailers. This landing is managed by the MNDNR. An active dredge material placement site shares this location.

Belvidere Slough Landing – This water access point is located at RM 746.9, north of Buffalo City, Wisconsin, just off state Highway 35. There is a boat landing with parking for about 10 vehicles with trailers. This landing is managed by the WIDNR.

Goose Lake Landing – This water access point is located at RM 746.8, south of Kellogg, Minnesota. There is a boat launch with parking for about 10 vehicles with trailers. This landing is managed by the MNDNR.

Weaver Landing – This water access point is located at RM 744.6, at Weaver, Minnesota, just off state Highway 61. There is a boat landing with parking for about 30 vehicles with trailers. This landing is managed by the USFWS and contains an observation deck at the landing.

Buffalo City Boat Landing – This water access point is located at RM 744.3, south of Buffalo City, Wisconsin. There is a boat landing with parking for 10 vehicles with trailers. This landing is managed by the town of Buffalo City.

Upper Spring Lake Landing – This water access point is located at RM 742.4, south of Buffalo City, Wisconsin. There is a small boat landing with parking for five vehicles with trailers. This landing is managed by the WIDNR.

Lower Spring Lake Landing – This water access point is located at RM 741.2, south of Buffalo City, Wisconsin. There is a boat landing with a large parking area for 30 vehicles with trailers. This landing is managed by the USFWS and contains an observation deck.

Lizzy Pond Way – This 1-acre site on Lizzy Paul's Pond is adjacent to Wisconsin State Highway 35 behind the left descending bank of the river near RM 748. WIDOT leases the site for use as a wayside park. One picnic unit and parking spaces for 10 vehicles are provided.

Alma Fish Float – Commercial lease fishing float adjacent to Wisconsin State Highway 35 and Lock and Dam 4 and provides freshwater fishing opportunities for a fee.

5.2.8 POOL 5A

Pool 5A is an impoundment of the UMR from Lock and Dam 5 (RM 738.2) downstream to Lock and Dam 5A by Winona, Minnesota, at RM 728.4. The Lock and Dam 5 embankment extends to RM 740.8, resulting in the pool extending to the Wisconsin side of the river. Construction of Lock and Dam 5A was completed in 1936 and rehabilitated with a new control building in 2000. Pool 5A has several sites routinely dredged to maintain a 9-foot navigation channel. Current dredged material placement sites, along with numerous historical placement sites, are located throughout the pool. On average, 11,000 recreation craft and 12 million tons of commercial cargo pass through the lock annually (USACE, 2010b). The Lock and Dam 5A embankment and levee extends northward to RM 732.1, providing flood risk management to the cities of Winona and Goodview, Minnesota. Other communities along the river of Pool 5A are Minnesota City, Minnesota and Fountain City, Wisconsin. An important feature to navigation within the pool is the Corps' Fountain City Service Base, which manages dredging operations within the project.

Pool 5A is one of the shortest in the UMR at 9.7 miles long and encompasses an area of approximately 17,700 acres. Tributary influence within Pool 5A include the Waumandee Creek Watershed draining in on the Wisconsin side and Garvin Brook on the Minnesota side. Larger backwater and floodplain lakes within Pool 5A include Snyder, Twin, and Polander lakes. This reach of the river has many smaller side channels, running sloughs, and backwater lakes on both sides of the main channel. Aquatic habitat and diversity within the pool allows for an abundant and unique fishery. Paddlefish are known to frequent the pool because the gate design at Lock and Dam 5A, where inter-pool movement is easier (Zigler et al. 2003). Pool 5A also contains portions of the Mississippi Flyway, making it vital resource to migratory birds. This reach also includes grassland and forested areas including upland and bottomland hardwoods. State-owned and managed lands within the pool include Whitman Dam Wildlife Area and Merrick State Park (WIDNR) and Thorpe WMA (MNDNR).

Outgranted Facilities

DAY USE AREAS

Minnesota City Boat Club – This is a small harbor located within Minnesota City on the north end of the Lock and Dam 5A embankment. The harbor has a launch, boat slips, gasoline, live bait, and provisions for shoreline anglers and boaters.

McNally Landing – This water access point is located at RM 728.7, just north of Lock and Dam 5A outside of Winona, Minnesota. There is a boat landing with parking for about 20 vehicles with trailers. This landing is managed by the USFWS.

Verchota Landing – This water access point is located at RM 730.8, just north of Lock and Dam 5A outside of Winona, Minnesota. There is a boat landing with parking for about 15 vehicles with trailers. This landing is managed by the USFWS.

5.2.9 POOL 6

Pool 6 is an impoundment of the UMR from Lock and Dam 5A (RM 728.4) downstream to Lock and Dam 6 by Trempealeau, Wisconsin, at RM 714.2. Construction of Lock and Dam 6 was completed in 1936. An upper guidewall extension was completed in 1950, and rehabilitation with a new control building was completed in 1999. Unique to the UMR, the Lock and Dam 6 has a spillway. On average, 12,000 recreation craft and 15 million tons of commercial cargo pass through the lock

annually (USACE, 2010c). Winona, Minnesota, and Trempealeau, Wisconsin, are the largest communities within Pool 6.

Pool 6 is 14.2 miles long and encompasses an area of approximately 22,000 acres. Levee construction around Winona, completed in 1967, and the Burlington Northern Santé Fe Railway embankment around Trempealeau NWR, have lowered the connectivity of the floodplain in Pool 6. Tributary influences within Pool 6 include the Trempealeau River on the Wisconsin side and Trout and Gilmore Creeks in Minnesota. This reach also is part of the Mississippi Flyway, making it an important resource to migratory birds. Pool 6 contains vast wildlife management areas including the Trempealeau NWR (USFWS) and Perrot State Park (WIDNR). This reach of the river has many smaller side channels, running sloughs, and shallow backwater lakes that constitute a large part of the Trempealeau NWR.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 6 – This facility is open to the public seasonally from April through November and contains an observation deck for viewing lock usage and public restrooms when open (Figure 5-5).



Figure 5-5. Aerial of Lock & Dam 6 facilities, Trempealeau Marina, and an upland dredge material placement site.

Outgranted Facilities

DAY USE AREAS

Prairie Island Park and Landing – This boat landing is just below the Lock and Dam 5A embankment and spillway located in Minnesota. Managed by the city of Winona, this landing provides fishing and boating access to Straight Slough and greater Pool 6. Amenities include a concrete boat ramp, dock, and parking lot.

Trempealeau Marina – This facility is located just east of Lock and Dam 6 in Trempealeau, Wisconsin, and is leased to the village of Trempealeau. The marina includes a boat launch, wet slips, and amenities for patrons.

5.2.10 POOL 7

Pool 7 is an impoundment of the UMR from Lock and Dam 6 (RM 714.2) downstream to Lock and Dam 7 at RM 702.5. Construction of Lock and Dam 7 was completed in 1937 and rehabilitated with a new control building in 1989. On average, 13,000 recreation craft and 15 million tons of commercial cargo pass through the lock annually (USACE, 2010d). Wisconsin communities lining the pool include Trempealeau, Onalaska, and parts of La Crosse. The Minnesota side of the pool includes the town of Dakota and is sparsely populated due to a narrow bedrock gorge with abrupt slopes and bluffs.

Pool 7 is 11.7 miles long and encompasses an area of approximately 58,000 acres. Major tributaries into the pool come from Wisconsin and include the Black River and its distributaries: Tank Creek, Shingle Creek, and Halfway Creek. The Black River Bottoms and Delta is a near 10-mile long contiguous bottomland forest and over 10,000 acres in size and constitutes one of the largest tracts of floodplain forest in the project. This area is comprised of private, state, and federal lands. Larger backwater and floodplain lakes within Pool 7 include First, Second, Third, Round, Long, and Big Marsh lakes and Lake Onalaska. Lake Onalaska constitutes a large portion of the impounded southern area of the pool, providing important habitat for overwintering game fish and migratory bird species. State-owned and managed wildlife areas within Pool 7 include the Trempealeau Lakes Fishery Area (WIDNR), Van Loon Wildlife Area (WIDNR), King's and Queen's Bluff Scientific and Natural Area (MNDNR) and Great River Bluffs State Park (MNDNR). The Great River State Trail is a 24-mile rail trail between Onalaska and Marshland, Wisconsin. Onalaska is home to a new trailhead, which is located near the spillway and runs along the entire length of the pool and beyond Lock and Dam 6 to Marshland, Wisconsin.

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 7 – This facility is open to the public seasonally from April through November and contains an observation deck for viewing lock usage and public restrooms when open. The control house has been refurbished into a visitor center and contains interpretive displays for the public to enjoy (Figure 5-6).



Figure 5-6. The old control house at Lock and Dam 7 serves as a visitor center.

Outgranted Facilities

DAY USE AREAS

Nelson Park and Landing – Located on the northernmost tip of French Island within the township of Campbell, Wisconsin. Other amenities include parking, picnic tables, grills, and a shelter.

Trempealeau Boat Landing – This water access point is located just south of Lock and Dam 6 in Trempealeau, Wisconsin, below the lock wall. This landing has a large parking lot and restrooms. This landing is managed by the WIDNR.

Round Lake Landing – This water access point is located at RM 713.4, outside of Trempealeau, Wisconsin. There is a boat landing with parking for about 10 vehicles with trailers. This landing is managed by the USFWS.

Long Lake Landing – This water access point is located at RM 713.3, outside of Trempealeau, Wisconsin. There is a boat landing with parking for about 10 vehicles with trailers. This landing is managed by the USFWS.

La Crosse Sailing Club – This marina has slips for sailboats and is leased to the La Crosse Sailing Club. It is located at the north end of French Island next to Nelson Park.

Upper Dike Landing – This water access point is located at RM 702.7, on the east side of French Island near the spillway. There is a boat landing with parking for about five vehicles with trailers. This landing is managed by the town of Campbell.

Fisherman's Road Landing – This water access point is located at RM 703.9, at the north east section of French Island. There is a boat landing with parking for about 10 vehicles with trailers. This landing is managed by the town of Campbell.

Fred Funk Boat Landing – This water access point is located off County Road ZB in Brice Prairie, Wisconsin, on the north end of Lake Onalaska. The facility is managed by the town of Onalaska, Wisconsin, and is often utilized by duck hunters to access the north side of the lake.

Mosey's Landing – Located off County Road Z in Brice Prairie, Wisconsin, just north of Rosebud Island. This boat landing is used by anglers and recreational boaters to access Lake Onalaska. This landing is managed by the town of Onalaska and contains parking, portable chemical restrooms, and an adjacent fishing pier.

5.2.11 POOL 8

Pool 8 is an impoundment of the project from Lock and Dam 7 (RM 702.5) downstream to Lock and Dam 8 in Genoa, Wisconsin, at RM 679.3. Construction of Lock and Dam 8 was completed in 1937, and it was rehabilitated and updated in 2002. On average, 9,000 recreation craft and 16 million tons of commercial cargo pass through the lock annually (USACE, 2016c). Urban areas within Pool 8 occur where flat terraces provide a buffer between the river and the bluffs of the UMR. In Wisconsin, this reach is bordered by the cities of Onalaska and La Crosse and the villages of Stoddard and Genoa. Located on the Minnesota side of the river are the cities of La Crescent and Brownsville, making this a rather densely populated reach of the UMR.

Pool 8 is 23.2 miles long and encompasses an area of approximately 44,300 acres. Major tributaries from Wisconsin include the Black River, La Crosse River, Coon Creek, Pammel Creek, and Mormon Coulee Creek. Tributaries from Minnesota are the Root River, Pine Creek, and Wildcat Creek. Most of the tributaries within Pool 8 flow through predominantly agricultural or urbanized areas, which has resulted in large suspended sediments loads within this reach. Larger backwater and floodplain lakes within Pool 8 include Round, French, Blue, Target, and Lawrence lakes. Pool 8 is typical of a navigation pool within the project, as the land ratio changes from north to south, with the northern section of the pool containing more islands and the south being impounded. South of La Crosse, Wisconsin, the reach contains many backwater sloughs, islands, and wetlands; the most predominant area is Goose Island. A portion of this large island is managed by La Crosse County and contains opportunities for camping and other outdoor activities. Goose Island also contains a very unique mosaic of forest types, and some of the largest contiguous tracts of swamp white oak dominated forest in the district. The impounded south portion of the pool has seen significant investments in habitat improvement through the UMRR program, with three phases of the Pool 8 Islands Habitat Rehabilitation and Enhancement Projects (HREP) being completed between 1993 and 2012. There is little state ownership in Pool 8, with natural areas being primarily federally owned; however, the Root River WMA, which occurs just to the west of the pool, is state managed (MNDNR).

Corps Managed Facilities

DAY USE AREAS

Lock and Dam 8 – This facility is open to the public seasonally from April through November and contains an observation deck for viewing lock usage and public restrooms when open.

Outgranted Facilities

RECREATION SITES

Goose Island County Park and Campground – This area is located on a large island 3 miles south of La Crosse, Wisconsin, just off of County Road GI. The park consists of approximately 771 acres of

varying floodplain habitat with winding backwaters and running sloughs. The campground is managed by La Crosse County and contains campsites that can be reserved by the public. The park offers a variety of outdoor activities with designated canoe and hiking trails that visitors can enjoy. Amenities within the park include three boat landings, electrical and water hook-ups, shelters, playground equipment, volleyball courts, and comfort stations. The county hosts a variety of special events throughout the camping season, many of which are focused on the outdoors. The southern part of the park, which is less developed, is targeted toward planting floodplain forests and other wildlife management goals.

Wildcat Park and Landing – Currently managed by Houston County, this facility is located south of Brownsville, Minnesota, off the Great River Road. The park contains campsites, picnic shelters, two boat landings, one fishing pier, and concessions. Two-thirds of the campsites are equipped with water and electrical hookups.

DAY USE AREAS

Stoddard Landing and Stoddard Village Park – This boat landing and adjacent park are located within and managed by the city of Stoddard, Wisconsin. The landing provides anglers and boaters access to the Stoddard Islands and the UMR. Amenities include a concrete boat ramp, shelter, baseball field, parking lot, and portable restrooms.

Brownsville Overlook – This site is located off of Minnesota State Highway 26 near RM 685.3. This overlook, which is managed by the USFWS, provides panoramic views of migrating waterfowl.

Lower Dike Landing – This water access point is located at RM 702.1 on the east side of French Island near the spillway. There is a boat landing with parking for about 15 vehicles with trailers. This landing is managed by the WIDNR.

Lawrence Lake Marina – This facility is located just north of Brownsville, Minnesota. The marina includes a boat launch, wet slips, and amenities for patrons.

5.2.12 POOL 9

Pool 9 is an impoundment of the UMR from Lock and Dam 8 (RM 679.3) downstream to Lock and Dam 9 south of Lynxville, Wisconsin, at RM 648. Construction of Lock and Dam 9 was completed in 1937 and rehabilitated in 1989 and 2006. On average, 7,000 recreation craft and 18 million tons of commercial cargo pass through the lock annually (USACE, 2010e). The northern section of Pool 9 is impacted by the Lock and Dam 8 embankment, which extends northward on the Minnesota side up to RM 680.5, creating the Reno Bottoms Research Natural Area (see Appendix C – Land Allocation and Land Classification Plates, Plate 50). This reach of the river contains the boundary between Minnesota and Iowa at RM 673.9. Communities within Pool 9 include New Albin and Lansing, Iowa; and Victory, De Soto, Ferryville, and Lynxville, Wisconsin.

Pool 9 is 31.3 miles long and encompasses an area of approximately 52,166 acres. Major tributaries within Pool 9 are the Bad Axe River and Rush Creek in Wisconsin, Winnebago Creek in Minnesota, and the Upper Iowa River in Iowa. Backwater and floodplain lakes within Pool 9 include Walter, Hayshore, Mud, Goose, Fish, Duck, Big, Conway, Phillipi, and Columbus lakes and Lake Winneshiek. A large section of the upper pool encompasses the Reno Bottoms complex, which is a contiguous backwater complex containing a mixture of secondary and tertiary channels, isolated backwaters, marshes, and wooded islands. The mostly forested areas in the most northern portion of the Reno Bottoms are generally thought to be some of the least disturbed floodplain forests in the project, and many large, old trees can be found there. Southward from Reno Bottoms is the Lansing

Big Lake Area, which contains a mix of channels, isolated and contiguous backwaters, and larger backwater lakes. Kains Switch, on the Iowa side of the river just south of the Upper Iowa River, is the largest contiguous tract of floodplain forest in the project. Other important features of Pool 9 include Blackhawk Park, Capoli Slough, and Lake Winneshiek. Large portions of the river are federally owned and managed for wildlife. Large numbers of waterfowl use Pool 9 during spring and fall migration, including a significant proportion of the continental canvasback duck population. Iowa-owned and managed wildlife areas within Pool 9 include Pool Slough WMA, Fish Farm Mounds WMA, and Lansing WMA. Wisconsin-owned and managed wildlife areas within Pool 9 include Battle Bluff Prairie State Natural Area, and Rush Creek State Natural Area.

Corps Managed Facilities

RECREATION SITES

Blackhawk Park – This Corps recreation site is located on a forested bend of the UMR on the Wisconsin side near RM 671 (Figure 5-7). Located near De Soto, Wisconsin, the park features a campground with 150 campsites, 73 of which have electrical hookups, making it the project’s largest public use facility in Pool 9. Facilities within the park include a beach, two picnic shelters, two boat landings, two playgrounds, a volleyball court, horseshoe pits, and fishing docks. The park contains diverse floodplain forest, native plants, and a variety of wildlife. Boating, kayaking, canoeing, fishing, and walking are some of the more popular forms of recreation within the park. The facility has several permanent park rangers and seasonal staff to maintain the park and provide a variety of programs and activities to visitors. Programs cover topics of recreation, local history, water safety, and the environment, while activities range from guided walks, campfire talks, and natural craft programs.

Future Recommendation – Continue routine O&M activities at the park. Continued work on shoreline protection projects and coordination of potential dredge placement at Blackhawk Park under the Channel Maintenance Management Plan (CMMP) to raise low areas of the park to reduce flooding impacts and road improvements, including paving and culvert replacement. These are all long-term projects that would greatly benefit the recreation site. Facility recommendations specific to public use include replacement of the upper loop privy with a water borne comfort station, providing additional flush toilet and shower facilities, providing water at campsites, and providing an off-leash dog area.



Figure 5-7. Blackhawk Park offers both camping and day use opportunities in Pool 9.

DAY USE AREAS

Lock and Dam 9 – This facility is open to the public seasonally from April through November and includes an observation deck for viewing lock usage and public restrooms when open.

Millstone Landing – This water access point is located north of New Albin, Iowa, just off Minnesota State Highway 26. Amenities of the landing include a concrete ramp, dock, parking area, and vault toilets. This landing is often utilized by waterfowl hunters accessing the UMR. The landing is often closed due to flooding in the spring.

Future Recommendation – Continue routine O&M activities at this site. Shoreline protection and erosion projects as well as road improvements, which may include elevating and paving, would likely alleviate much of the repair and maintenance labor associated with seasonal flooding and closure of this day use area.

Bad Axe Landing – This boat landing is located just south of the Great River Road Interpretive Center and Genoa National Fish Hatchery along the Great River Road on the Wisconsin side of the river. Amenities of the landing include a concrete ramp, parking area, vault toilets, and USFWS information kiosks. The landing is often closed due to flooding in the spring.

Future Recommendation – Continue routine O&M activities at this site. Shoreline protection, erosion projects, road improvements, which may include paving, boat ramp replacement, and potential dredging of the ramp access to the river would all be positive improvements to this day use area.

Outgranted Facilities

DAY USE AREAS

Visger's Landing – This water access point is located at RM 676.0, in Minnesota, north of New Albin, Iowa. There is a boat launch with parking for about five vehicles with trailers. This landing is managed by USFWS.

Winneshiek Landing – This water access point is located at RM 665.3, between Lansing, Iowa, and DeSoto, Wisconsin, on the Wisconsin State Highway 82. There is a boat landing with parking for about 20 vehicles with trailers. This landing is managed by the USFWS.

5.2.13 POOL 10

Pool 10 is an impoundment of the UMR from Lock and Dam 9 (RM 648) downstream to Lock and Dam 10 within Guttenberg, Iowa, at RM 615. Construction of Lock and Dam 10 was completed in 1937. On average, 7,000 recreation craft and 22 million tons of commercial cargo pass through the lock annually (USACE, 2010f). Communities on the Iowa side include Harpers Ferry, Marquette, McGregor, Clayton, and Guttenberg. Communities on the Wisconsin side include Prairie Du Chien, Wyalusing, Bagley, and Glen Haven.

Pool 10 is 33 miles long and encompasses an area of approximately 39,863 acres. Major tributaries within Pool 10 are the Yellow River in Iowa and the Wisconsin River in Wisconsin. Land use from the Yellow River Watershed is predominantly agricultural, resulting in higher suspended sediment loads within this reach. The Wisconsin River represents one of the largest tributaries within the UMR. Backwater and floodplain lakes within Pool 9 include Gimmel, Rittenhouse, Taylor, Mudhen, Spring, Big Missouri, Upper Doubles, Fish, Tilmont, Gremore, Marais, Sunfish, McGregor, Garnet, Norwegian, Methodist, Glass, Ferry, Hoosier, Jays, Duck, Frenchtown, and Bussey lakes. Large portions of the reach are federally owned and managed for wildlife. Pool 10 also contains the Effigy Mounds National Monument and Sny Magill Unit of Effigy Mounds, owned and operated by the NPS. This national monument contains 206 Native American mounds, 31 of which are effigies of bears or birds. This reach also contains a variety of state-owned and managed lands and wilderness areas. Iowa-owned and managed wildlife areas are Yellow River State Forest, Pikes Peak State Park, and the Sny Magill – North Cedar WMA. Wisconsin-owned and managed wildlife areas within Pool 10 include the Wyalusing State Park.

Corps Managed Facilities

DAY USE AREAS

Jays Landing – This water access point is located south of Bagley, Wisconsin, and provides access to Jays Lake and the greater Pool 10 area (Figure 5-8). Facilities include a concrete boat ramp, parking, and vault toilets.

Future Recommendation – Continue routine O&M activities at this site. Shoreline protection and erosion projects as well as road improvements, which may include paving, would be very beneficial to this day use area.

Lock and Dam 10 – This facility is open to the public seasonally from April through November and contains an observation deck to view lock usage. In addition, the last remaining lock and dam lockmaster house in its original location on the Upper Mississippi River is located here.

Outgranted Facilities

RECREATION SITES

River of Lakes Campground and Resort – Located within Bagley, Wisconsin, this privately managed resort and campground is located on the shoreline of Jays Lake. This facility has a variety of campsites and cabins available for rent.

DAY USE AREAS

Frenchtown County Park – This public day use area is located north of Guttenberg, Iowa. The park has an undeveloped boat ramp that allows access to the UMR and is managed by the Clayton County Conservation Board.

Willie's Resort – This is a commercial operation which has a boat landing just north of Guttenberg, Iowa, on Hwy 35.

Bussey Lake Boat Ramp – This water access point is located on the north side of Guttenberg, Iowa, on the southern end of Bussey Lake. The facility is managed by the IADNR and has a hard surface boat ramp, restrooms, and a fishing pier.

Lockmaster's Heritage House Museum – The Corps has a lease with the Guttenberg Heritage Society to operate a museum out of the house, which contains exhibits about the construction of the locks and dams and the rich history of Guttenberg, Iowa. This museum is open to the public seasonally from Memorial Day to Labor Day, providing interpretive displays and public restrooms when open.

Guttenberg Park – The city of Guttenberg, Iowa, leases 4 acres of Corps land along the levee in Pool 10. The site is adjacent to the city and immediately above Lock and Dam 10. Facilities provided for public use include restrooms, drinking water, 29 picnic units, and two parking lots.



Figure 5-8. Recreational kayakers pass through Lock and Dam 10.

Bagley Bottoms Landing – This water access point is located at RM 624.2, north of Bagley, Wisconsin. There is no developed boat launch, but the site provides access to the backwaters of Pool 10 and has limited parking. This access is managed by the USFWS.

Winegar Works Marina – This facility is located on the north end of Guttenberg, Iowa, near Bussey Lake Boat Ramp. The marina includes wet slips and amenities for patrons.

5.2.14 POOL 11

The section of Pool 11, that is covered under this 2020 Master Plan, extends from Lock and Dam 10 downstream to RM 614. This section of the pool includes the southern half of the city of Guttenberg, Iowa, and the area immediately below the Lock and Dam 10 embankment. This area contains Swift Slough, Big Pond, and the Guttenberg Ponds Moist Soil Units. This area also marks the start of Cassville Sough, an important habitat for native mussels. The Rock Island District Mississippi River Project Office assumes the Corps' management beginning at this section of the pool.

Outgranted Facilities

DAY USE AREAS

Guttenberg Marina – This marina contains 50 boat slips and is managed by the city of Guttenberg, Iowa. The facility has a visitor center with a variety of amenities available to patrons and visitors, including transient boat slips.

Guttenberg Landing – This water access point is located on the south end of Guttenberg, Iowa, near the marina. The facility is managed by the IADNR and has a hard surface boat ramp, restrooms, fishing pier, and large parking lot.

IADNR Fishing Access – This water access point is located along the lock wall of Lock and Dam 10 in Guttenberg, Iowa. The facility is managed by IADNR and has a boat ramp, limited parking, and paved walkway for shore fishing.

CHAPTER 6:

SPECIAL TOPICS, ISSUES, AND CONSIDERATIONS*

6.1 PARTNERSHIPS AND COORDINATION

The information presented in this chapter was developed in concert with the goals and objectives presented in Chapter 3 of this 2020 Master Plan.

6.1.1 PARTNERSHIPS AND COORDINATION

Partnership and coordination as it relates to management of the Corps' project lands takes two forms: (1) coordination related to existing agreements between the Corps and partner agencies, in particular the USFWS, for direct management of the 24,000 acres of Corps-owned land; and (2) participation in system-level coordination as part of various river-level working groups and programs.

Coordination related to existing agreements is generally the primary form, as this coordination directly impacts execution of project funding and is directly related to the mission of the Recreation and Natural Resource (RNR) Branch on the Mississippi River.

Participation in system-level coordination is an important component of project coordination as an avenue for project staff to provide input and leadership on projects and initiatives that impact the entire system, not only Corps-managed lands. System-level coordination also helps identify and secure additional funding outside of annual budgets to implement management activities. The Corps will engage with regional partnerships where feasible to increase the impacts of environmental stewardship activities.

Memorandum of Understanding/Agreement

Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA) are documents that the Corps can use to coordinate their authorized activities with other entities and partners. Each specific MOU or MOA outlines what each entity has to offer to the partnership and what each party has at stake. MOUs are typically used to state common goals within the partnership and do not involve the transfer of funds for services. MOUs are not legally binding as they are viewed as more of a mutual agreement on a given topic or goal. MOAs are conditional agreements between the Corps and a partner where the transfer of funds for services is anticipated. The Corps utilizes many MOUs and MOAs at a national and local level to help coordinate their authority and activities with many partners. The master plan will not go into any specific MOUs or MOAs that the St. Paul District has with its coordinating partners on the river.

6.1.2 ROLES OF COOPERATING AGENCIES FOR PROJECT LAND MANAGEMENT

Coordination of natural resource management activities on project lands is an ongoing process. Partner consultation is a critical component of the forest and recreation management process, and partners are engaged at multiple points throughout. Partner consultation is intended to ensure that

management objectives and treatments are acceptable to all responsible agencies, in particular USFWS on the Refuge and MNDNR on the Gores Pool #3 WMA, and to limit unanticipated impediments to project implementation. The specific relationship of each partner agency relative to the RNR responsibilities on project lands is described in section 1.3 project Purpose.

Agreement for the Cooperative Management of Project Lands with USFWS

Through the cooperative agreement (CA) between the Department of the Army (DA) and the Department of the Interior (DOI), Bureau of Sport Fisheries and Wildlife (now the USFWS), certain Corps lands and waters in the project area were made available to the DOI for conservation and wildlife management. Previous CAs were negotiated in 1945, 1954, and 1963. The most recent agreement was amended in 2001 and provides guidance for implementation of management activities and development of CA lands.

The CA makes a total of approximately 125,000 acres of project fee lands available to the USFWS “for the conservation, maintenance, and management of fish and wildlife habitat” consistent with management guidance within the National Wildlife Refuge System and also “consistent with navigation as the primary purpose of the project.” Approximately 41,442 acres (both land and water) of the project fee land made available are located within the St. Paul District, Pools 4 through 10.

THE SCOPES OF RESPONSIBILITY FOR THE CORPS AND USFWS UNDER THE TERMS OF THE COOPERATIVE AGREEMENT

A number of the Corps’ specific roles and responsibilities are directly applicable to natural resource management on project lands as set forth in the CA:

- USFWS is given the responsibility to post and maintain boundary lines associated with project lands included in the CA and to take appropriate action to prevent and resolve minor trespass and unauthorized use issues, while coordinating the response to major trespass or unauthorized land use with the Corps.
- USFWS is required to obtain appropriate permitting for any work covered by Corps regulatory jurisdiction.
- The Corps retains the right to develop lands covered by the CA for public and agency use in accordance with approved management plans or agency documents and, as appropriate, these actions will be coordinated with USFWS and the applicable states; USFWS will not have the right to refuse access to these developed areas.
- USFWS may administer agricultural leases, but these leases must be directed towards wildlife habitat management.
- USFWS shall administer the lands in accordance with current approved management plans for each agency, and must conduct an annual coordination meeting with each respective (Corps) district (Corps) to provide updates on actions related to the CA.
- The Corps retains responsibility to provide protection of forest or other vegetative cover on CA lands to promote future resources and to increase the value of these resources for conservation, recreation, and other beneficial use; any resulting plans will be subject to review by USFWS regarding impacts of actions on wildlife management.
- The USFWS will identify forest habitat goals and objectives to provide guidance to the Corps.
- Any timber sale revenue on project lands included in the CA will be credited to the Corps.
- The Corps retains the right to use and/or improve existing roads to access areas that the Corps administers.

It is important to emphasize that forest and vegetation management rights were explicitly not given to USFWS as part of the CA, and thus the Corps explicitly retains these rights on all CA lands. The Corps' forest management authorities and objectives are discussed in further detail in the OMP.

Approximately 95 percent of the Corps' administered land acquired for the project area within the St. Paul District is covered by the CA with the USFWS. The overlapping responsibilities of both agencies for management of CA lands dictates that management is a cooperative effort and that close coordination between the two agencies is imperative. The USFWS is given the responsibility of boundary postings and encroachment management on CA lands while the Corps' has the responsibility of those lands adjacent to the CA lands.

Coordination with Other Agencies

Relationships with other federal and state agencies who do not have land management agreements on Corps-owned land, but who remain important partners in the decision-making process, are described below.

U.S. GEOLOGICAL SURVEY

In conjunction with the UMRR program, the USGS, as part of the Upper Midwest Environmental Sciences Center (UMESC), is tasked with implementation of the Resource Trend Analysis and Long Term Resource Monitoring (LTRM) elements of the UMRR program. The UMESC provides scientific information to river resource managers in support of their management decision-making responsibilities.

STATE DEPARTMENTS OF NATURAL RESOURCES

The states of Minnesota, Wisconsin, and Iowa, are integral partners in the management of the UMR, having jurisdiction over aquatic and fisheries resources and providing law enforcement on the river. Management decisions are generally implemented in consultation with each of these state agencies. In addition, numerous working groups (e.g., the Fish and Wildlife Workgroup) and committees (e.g., the River Resources Forum) provide a platform in which state, federal, and local agencies can meet, along with other stakeholders, to promote cooperative management of river resources. Apart from the real estate license with MNDNR for the Gores Pool #3 WMA, no other formal real estate agreements are in place with state agencies.

NATIONAL PARK SERVICE

There are two main NPS facilities in or adjacent to the project area. The largest, the MNRRA, was established in 1988 and includes the Mississippi River Corridor in the Minneapolis-St. Paul Metropolitan Area, from the mouth of the Crow River to the mouth of the St. Croix River. The designation encompasses 69 miles of the Mississippi River and 4 miles of the Minnesota River at Fort Snelling. The MNRRA is distinct from many NPS-managed areas as there is very little NPS ownership in the corridor. Instead, the MNRRA primarily works with partner landowners to achieve its designated mission. The NPS is the major manager on the Upper St. Croix River as a unit of the wild and scenic rivers designation, and the Effigy Mounds National Monument along Pool 10 near McGregor, Iowa, is the largest NPS land ownership in the project (though only a small portion of the Monument falls within the project area). The NPS has provided tours of USAF since 2015 with rangers leading short walks from the visitor center out onto the lock walls to describe history and natural features of the falls.

UNIVERSITIES

Natural resource management on project lands requires adaptive management to uncertain and changing conditions, and effective adaptive management requires a strong scientific basis for decision making. Thus, there is a focused effort to engage not only with river-based federal scientists but also to incorporate researchers from interested universities in management-oriented research. The RNR Branch currently has active projects with the University of Minnesota and the University of Wisconsin-La Crosse to address specific management issues. Further engagement with universities is ongoing with an interest in developing a network of researchers who can provide research expertise as needed.

NON-GOVERNMENTAL ORGANIZATIONS

The Corps strives to maximize and leverage resources by entering into agreements with non-governmental organizations (NGOs) to promote the management of natural resources on project lands. Currently, the Corps has partnered with the National Audubon Society's Minnesota office to develop restoration projects on project lands that incorporate both Corps and Audubon funding and staff.

6.1.3 RELATIONSHIPS WITH UMR WORKING GROUPS AND COMMITTEES

The Corps' natural resource managers actively engage with all of the primary working groups and committees along the UMR (e.g., River Resources Forum, Fish and Wildlife Working Group, Upper Mississippi River Conservation Committee, Upper Mississippi River Restoration program) though collaboration and coordination is between managers of project lands. Engagement with federal and state agencies occurs via the mechanisms described in the preceding sections. Natural resource management actions within the project are generally not subject to review by any of the UMR coordination groups or working committees. Rather, natural resource staff engage with the river working groups in an advisory role and participate in project development teams for projects that require specific resource management expertise or that have the potential to impact project lands.

6.1.4 FORMALIZED COORDINATION WITH OTHER RIVER RESOURCE AGENCIES

One of the products of the Great River Environmental Action Team (GREAT) study within the St. Paul District is the interagency team called the River Resources Forum (RRF). The organization provides coordination for dredging and other navigation operations, habitat project planning, pool habitat plans, monitoring efforts, recreation planning, water level management (pool drawdowns), forestry, and education and outreach programs.

When GREAT I was completed in 1980, participating agencies realized that the cooperation and coordination process that was established during the GREAT study should continue. Agencies with river resource management responsibilities needed a mechanism for ongoing coordination of management proposals and related activities, so they joined together to form a partnership that started out as the Channel Maintenance Forum and later became the River Resources Forum in recognition of an increased emphasis on coordination of environmental and recreational resources. Participating federal agencies are: The Corps, USFWS, Coast Guard, EPA, NRCS, and NPS. State agencies include the DNR and DOT from Minnesota, Wisconsin, and Iowa; and the MPCA.

Representation is at the middle manager/policy maker level, which has been successful in achieving results, because participants can effectively represent the interests and positions of their respective agencies. In 1991, participating agencies entered into a formal partnership agreement that states:

"We, the partners involved in management of the Mississippi River, recognize the multiple uses and benefits provided by this diverse ecosystem and are committed to working together as a trusting, cooperative team to manage the river from a resource-balanced approach in the best interest of the public."

The group has several established goals and procedures for working together cooperatively that are described in the partnership agreement and accompanying operating procedures. The RRF is used to build consensus for proposed actions and to streamline administrative procedures. It provides a mechanism by which the St. Paul District can obtain the collective endorsement and support of other agencies when selecting management actions to be implemented on the river. The RRF is an advisory group that has no statutory or regulatory authority. Recommendations of the RRF are not binding upon any of the participating agencies nor does coordination of activities through the RRF eliminate the need for formal coordination and approval with the appropriate regulatory agencies. However, endorsement of a proposed action by the RRF is highly desirable and is often an important consideration element in the agency's review and approval process. The RRF meets three times per year, normally in April, August, and December. Field trips are sometimes arranged in conjunction with the meetings so that managers have an opportunity to observe activities firsthand.

The RRF also has subgroups for providing technical advice on matters related to fish and wildlife resources, navigation, recreation, and public information and education. These groups are used when issues are technically complex or more involved and the RRF cannot take the time necessary to investigate the details.

Each agency has designated representatives who are members of the on-site inspection team (OSIT). The OSIT visits field sites and makes professional recommendations concerning how projects should be implemented in the best interest of the overall health of the river. These teams also allow local communities and other organizations involvement in the program. This is a very valuable tool for providing information on proposed actions to agencies at a review level where it can be immediately evaluated for potential impacts. It allows the St. Paul District the opportunity to obtain advice and recommendations from local, subject matter experts as the activity is being planned. The district uses this input in formulating final decisions on a proposed action. The OSIT also facilitates the regulatory process by providing regulating agencies an early review of the action and allows the district an opportunity to obtain information related to regulatory procedures.

6.1.5 VOLUNTEERS AND PARTNERSHIPS

The Corps' volunteers and partners are people and organizations who want to give back to their communities and are interested in being involved in the Corps' natural resource management program. Whether it is an environmental ethic, a love of parks, or enthusiasm for the outdoors, like-minded volunteers and partners share their expertise, resources, time, and energy to work together toward common goals (Figure 6-1). Nationwide, in fiscal year 2018, 43 percent of the Corps' partnerships were for environmental stewardship projects, and 57 percent were for recreation projects. The average time served by a volunteer with the Corps is 52 hours per year; with St. Paul District, this number is 17.5 hours per volunteer served, with many volunteers attending day events and others spending hundreds of hours. Table 6-1 shows volunteers' numbers and hours for the district UMR project area.

Table 6-1. Volunteers' numbers and hours in the St. Paul District UMR project area.

Fiscal Year	Total Number of Volunteers	Hours Worked	Value of Services
FY 2010	145	2,036	\$42,450
FY 2011	89	1,143	\$24,415
FY 2012	93	889	\$19,371
FY 2013	17	401	\$8,878
FY 2014	4	580	\$13,079
FY 2015	49	1,016	\$23,439
FY 2016	81	1,135	\$26,741
FY 2017	1	537	\$12,963
FY 2018	25	582	\$14,370
Total	359	6,283	\$143,256

Volunteers at the Corps' day use areas help provide visitor assistance. Cooperating associations can hold special events, operate bookstores, provide interpretive programs, and serve as community advocates for the Corps. The numerous pool friend groups provide assistance in trail maintenance, hold trash cleanups, and host educational events. Many of the recommendations to improve natural resources called for in this plan can be accomplished with the assistance of individuals and community organizations. The Corps will work with individual volunteers and groups interested in assisting or carrying out natural resource management efforts by providing technical guidance, materials, equipment, and supplies as necessary.



Figure 6-1. Volunteers help Corps natural resource specialists plant seedling trees.

The visitor experience at the lock and dam day use areas can be improved through volunteer interpretation. Most of these facilities are open seasonally and contain interpretative signs and an observation deck for watching lock usage by pleasure and commercial craft. The historic control house at Lock and Dam 7 has been refurbished into a visitor center with interpretive signs for the public to enjoy. Although most visitor centers have no volunteers and volunteer training can require significant time, dedicated visitor assistance volunteers can greatly enhance the public's experience and would be a future recommendation, especially at locations where there are a higher number of visitors.

The Corps' Natural Resource Management mission is to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations. The challenges this mission presents require a new way of doing business — by increasing community engagement and collaboration to ensure we meet the needs of the public. While partners and volunteers are not a substitute for Corps management of the federal resources, they help accomplish programs and activities for which funding is not available and therefore would not normally be performed. The Corps welcomes participation and assistance in implementing this plan from volunteer organizations.

6.1.6 INTERPRETIVE PROGRAMING

The Interpretive Services and Outreach Program (ISOP) is an essential part of the Corps' Civil Works Program. Through this program, the Corps can consistently communicate missions and accomplishments, achieve management objectives, and foster environmental stewardship. As a management tool, it provides numerous opportunities to communicate with a wide variety of diverse audiences, which can improve visitor and employee safety, help with team cohesiveness, and enhance the visitor experience. It is one of the most effective tools the Corps has to connect with the public, user groups, partners, and stakeholders.

The Corps defines interpretation as communication and education processes provided to internal and external audiences which support the accomplishments of the agency's missions, tell the agency's story, and reveal the meanings of and the relationships between natural, cultural, and created environments and their features. The Corps' focus is to help people connect with the local environment, leading to their involvement and support. This outreach can be done through displays, brochures, visitor center exhibits, and interpersonal contacts.

Most of the Corps' projects only have a few rangers who actively engage in full-time interpretation while the remaining staff work in other programs (e.g., administration, maintenance, natural resource management). To the visiting public, however, all Corps employees are perceived to know everything pertaining to Corps projects and regulations. Interpretive training is important for every employee, and all employees should be prepared to engage with the public and interpret the agency and its resources and regulations.

The Corps communicates with the public using various resources, including social media, interactive programs, and displays. Every lock and dam location, with the exception of Lock and Dam 5A, has some form of interpretive display (e.g., outdoor signage, observation platform with kiosk). All locks and dams have brochures and a webpage on the St. Paul District's website. Visitor centers are located at Upper Saint Anthony Falls (currently managed by the National Park Service), Lock and Dam 1, Lock and Dam 7, and Lock and Dam 10 Lockmaster House (licensed to the Guttenberg Heritage Society to operate as a museum).

In addition to having rangers on staff, Blackhawk Park provides outdoor signage including a historic memorial and interpretive building. Rangers provide weekly campground programs within the park, host a kids' fishing derby and support events and activities put on by partners and stakeholders such as the Mississippi River Adventure Day and the Pool 9 cleanup organized by Friends of Pool 9. In 2018, the Rangers at Blackhawk Park reached over 7,000 individuals in outreach and programming events held throughout the year.

Reduced personnel and budget constraints have presented many challenges to providing interpretive services to the public. However, the increased popularity of social media has opened up many new possibilities to reach more people without direct interaction. Moving forward, the Corps understands that new technologies must be embraced to connect and communicate with the public. Although there are new ways to reach the public, face-to-face interaction remains one of the most effective means of communication. Each of these resources help the Corps communicate and educate the public and stakeholders.

6.2 SPECIAL TOPICS

This Section includes topics unique to the UMR planning area that are not discussed elsewhere in the 2020 Master Plan. This information is in addition to the special considerations discussed directly in the Resource Plan (see Chapter 5 above).

6.2.1 WATER-LEVEL MANAGEMENT

The purpose of this section is to recommend pool-wide drawdowns as the preferred water-level management technique within the project when feasible, and to recommend continued support from the project for development of water-level management strategies and plans that are able to accommodate commercial, recreational and environmental within the project area.

Since the implementation of the locks and dams system in the UMR, decreased aquatic vegetation and species diversity has been documented. This decrease has been attributed to the consistent high-water levels used for commercial navigation. For example, some plants require changes in water flow and depth in order to grow and reproduce. The stable water levels created by the navigation dams prevent vegetation from establishing and successfully growing to support fish and other wildlife. In 1995, the Water Level Management Task Force (WLMTF) was created to investigate and research various methods to improve aquatic vegetation growth during summer growing seasons (WLMTF, 2007a; WLMTF, 2007b).

One of the methods explored has been pool-wide drawdowns during the growing season. A pool-wide drawdown consists of lowering the summer water level to a depth that is still navigable for commercial traffic while allowing vegetation to establish and grow. With more growth, aquatic plants can better support a healthier and more diverse ecosystem and hopefully restore biodiversity in the UMR. Of the methods explored, pool-wide drawdowns were deemed the best option in terms of cost, feasibility, and benefit to the environment. Several pool-wide drawdowns have been conducted, including those in Pool 8 (2001 and 2002), Pool 5 (2005 and 2006), and Pool 6 (2010) in order to understand a drawdown's effect on the environment, public access, and its financial feasibility. Monitoring showed that the vigorous vegetation response has resulted in increased use by shorebirds, waterfowl, and other biota, which has increased opportunities for hunting, fishing, and bird watching.

Water level management is collaborative in nature and will be implemented only with extensive coordination with river partners (state and federal agencies, municipalities, and the general public). Comprehensive pre-project planning, modeling, engineering, monitoring, are necessary to ensure that

projects do not adversely impact commercial navigation, recreational usage, or fish and wildlife. The examples of drawdowns in the 2000s demonstrated that multi-purpose operation and maintenance of the UMR for both navigation and ecosystem restoration demonstrated could be successfully achieved.

6.2.2 BEACH PLANS / SANDBAR RECREATION

Historic 9-foot navigation channel dredging practices were the primary contributor to the creation of sandy beach sites along the main channel. Historically, channel maintenance activities kept many of the sites replenished with sand, free of woody vegetation and undesired plants and thus, were very popular for day use and camping by thousands of recreational users. Most of these beach sites were previously zoned as recreation/low-density in the 2011 Land Use Allocation Plan maps.

However, since the GREAT I study, changes in channel maintenance operations have impacted the historically established beach sites. Dredging volumes have decreased and plans such as the Channel Maintenance Management Plan (CMMP) have been developed to maximize beneficial use and to dispose of material in confined placement sites or out of the floodplain. Without the periodic placement of dredged material on the beaches, many of these sites have revegetated and/or eroded to a point where their use for recreation is greatly diminished.

In addition to the GREAT I study, user surveys and informational gathering forums recognize the value of these beaches by hearing the public's desire for well-maintained beach sites for recreating opportunities. At the direction of the RRF, the Recreation Work Group (RWG), a subgroup of the RRF has been tasked with updating and/or developing a recreation beach management plan for each pool within the project area. The ultimate goals of the plans are to accomplish beach management in a way that will minimize environmental impacts, reflect sound design, and be operationally practical and implementable. Not being able to depend solely on channel maintenance activities for beach management, the RWG is developing the plans with additional management options in mind such as placing smaller quantities of dredged material at the sites, regrading and/or reshaping existing material, and removing undesired vegetation. This work has not been funded or contracted by the district; instead, the RWG works with local groups and the state DNRs to secure funding and perform routine cleanup and maintenance.

Future beach planning recommendations resulted in a change in the land use classification within the master plan and the associated land classifications. The land classification change from low-density recreation to wildlife management does not change the public's ability to use sandbar beaches but reflects the Corps' and UFWFS' policy to restrict development of recreation infrastructure on these beaches. Year-to-year changes in sand distribution and deposition mean that many of the previously designated beaches are no longer beach-like, and many popular beaches are not reflected in Appendix C – Land Allocation and Land Classification Plates. Passive beach use is allowed in wildlife management areas as long as refuge policies are upheld by the visiting public. All plans will have endorsement from participating river management partners.

The refuge has defined its Beach Management and Maintenance Policy in the approved Comprehensive Conservation Plan. The policy reads as follows:

“The Refuge will play an active role in completing beach management plans with the Corps of Engineers and the states for all pools within the Refuge and supports active public involvement in the process. However, the Refuge will, in general, only concur with maintenance of beaches on remnant dredged material islands or existing dredged material placement sites adjacent to the main channel of the river that are designated “low-density

recreation” in current Land Use Allocation Plans, or those not otherwise closed to use. Maintenance should be limited to the minimum reshaping, leveling, and vegetation clearing needed to ensure safe access and to facilitate the camping experience. Top dressing with sand should only be done under special circumstances. The scope and extent of all maintenance will be on a site-by-site basis as determined by the respective district manager in consultation with the Corps of Engineers and the respective state. The Refuge will continue to request the closure of openings to dredged material placement sites after emptying on service-acquired lands and Corps-acquired lands due to concerns with crowding, large group behavior issues, steep slopes, and shoreline drop-offs. Enforcement of non-wildlife-related recreation in empty placement sites left open on Corps of Engineers-acquired lands will not be the responsibility of the Refuge.”

Recreation Work Group

In addition to the management of developed recreation areas, much emphasis is placed on managing recreational activities that occur on the river outside of these developed areas. Such activities include boating, swimming, and waterskiing as well as day use and camping on undeveloped island beaches. The RWG is charged with developing an approach to managing river-wide recreational activities that balance well with other resource uses such as fish and wildlife management and navigation. This group provides direction to the Corps and other resource agencies concerning all aspects of river wide recreation management.

One of the products produced by the RWG is a study of recreational boating use throughout the UMR system. This is an ongoing study that was initiated in 1989 and that continues to this day. The study consists of boating use data, which has been obtained from aerial photographs collected over the many years of the study. In general, aerial photographs have been taken every other year over the main channel of the river, and boats are counted and classified by type and activity. This data can then be used in determining management actions such as permitting new marinas or creating beach management plans.

6.2.3 UPPER MISSISSIPPI RIVER FOREST HABITAT MANAGEMENT PLAN

Forest management authority on project lands has been explicitly retained by the Corps where many other management responsibilities have been granted to other entities (as described in Section 6.1 Partnerships and Coordination). The explicit retention of this management authority is unique and important, necessitating a comprehensive description of this management responsibility and a robust planning and coordination process.

The general framework for the forest management program on project lands is described in the 2020 Master Plan. Greater detail is included in the step-down natural resource management OMP for the project.

Authority to Manage Forest on Project Lands

The Forest Cover Act of 1960 (Public Law 86-717) declares the policy that project lands “owned in fee under the jurisdiction of the Secretary of the Army and the Chief of Engineers shall be developed and maintained so as to encourage, promote, and assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation and accepted conservation practices, and to increase the value of such areas for conservation, recreation and other beneficial uses: provided that such development and management shall be accomplished to the extent practicable and compatible with other uses of the project.” The FCA also states that the Corps “shall

provide for the protection and development of forest or other vegetative cover and the establishment and maintenance of other conservation measures ... so as to ... improve such areas." Engineer Regulation 1130-2-540, Environmental Stewardship Operations and Maintenance Policies states "The Forest Cover Act provides a statutory mandate for multiple use forest management, or other vegetative cover management, on project lands and waters. Forest and woodland management will be applied to develop, maintain, protect, and/or improve vegetation conditions for timber, fish, wildlife, soils, recreation, water quality and other beneficial uses. The master plan will provide for multiple-use forest management wherever practicable and compatible with other uses of project land."

Though 95 percent of project lands are included in the CA with USFWS, the St. Paul District explicitly retained rights to vegetation management on those lands in the CA, and thus, the St. Paul District (through the project's environmental stewardship staff) is the lead agency in the implementation of forest management activities on all CA and non-CA project lands. However, regulations and the CA provide that the long-term sustainability of wildlife habitat is a key goal of forest and vegetation management, and that management should be implemented collaboratively on CA and other Corps-owned lands. Forest management on project lands, therefore, will be conducted in a collaborative manner.

Upper Mississippi River Systemic Forest Stewardship Plan

The UMR Systemic Forest Stewardship Plan (SFSP) was completed in 2012 (Guyon, 2012). The document is a collaboration between the project offices in St. Louis, Rock Island, and St. Paul Districts, with substantial input from the National Great Rivers Research and Education Center, USFWS, MNDNR, WIDNR, IADNR, Illinois DNR, Missouri Department of Conservation, and other federal agencies and NGOs. The plan provides a comprehensive assessment of current and desired conditions within the entire project, while defining a set of goals and objectives that are relevant at large system-wide scale to individual site level. The primary purpose of the SFSP is to "provide a guide for the sustainable management of project forests, including opportunities for their restoration, and to ensure that the project maintains its recognition as a nationally treasured ecological resource" (Guyon, 2012). The SFSP has been broadly accepted by partner agencies within the project and has been formally incorporated as a guiding document in the current iteration of the Refuge Habitat Management Plan 2019 (HMP).

The SFSP outlines four main goals for forest habitats of the project, based on the vision statement and overarching ecosystem goals defined by the Navigation Study Science Panel (Galat, 2007), updated by the Navigation Environmental Coordinating Committee (NECC), and adopted by the NECC and the Environmental Management Program Coordinating Committee (USACE, 2010g; USACE, 2010h).

The four main goals for forest habitats are:

1. A functional, sustainable floodplain ecosystem that includes a mosaic of native vegetation communities sufficient to support important wildlife habitat;
2. Restore and maintain forest diversity, health, and sustainability on federal lands;
3. Provide support for the restoration and maintenance of forest diversity, health, and sustainability on non-federal lands; and
4. Adaptive management: science-based decision making.

At the system-wide and landscape scale, these goals require integration of multiple-partner agencies and collaborators. Management actions are implemented only at the local-site level; however, and even at this local-site scale, coordination with partners is required.

Within each of these goals, the SFSP defines a series of concrete objectives to further the goals of maintaining and improving forest habitat in the project.

Desired Forest Conditions

The SFSP provides a set of desired forest conditions to provide targets for landscape and forest conditions on a local site scale within the project. These desired conditions were based in part on those developed by the 2007 Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group (LMVJV) and refined for the project based on input from local land managers (LMVJV, 2007). The desired conditions defined in the SFSP were based on the best available science at the time and were designed to be adapted and updated as more up-to-date information became available.

The SFSP's desired forest conditions and subsequent versions of the plan will be the primary quantifiable guide used to define the impact of management on landscape and project-site scale goals. They will also be the primary tool used to create site-specific targets for individual management prescriptions.

Forest Management Plan

A Forest Management Plan (FMP) is the primary document used to describe intended forest management activities. FMP development is a complex process that requires the selection of an appropriate silvicultural system and associated natural resource management prescriptions as well as the consideration of system, landscape and stand-level goals and objectives, existing forest conditions, management-partner priorities, environmental review of proposed actions, and integration of annual budgets (Figure 6-2). An FMP will only move on to implementation, including consultation with St. Paul District support offices, once these steps have been completed.

The FMP is the final forest stand-level guidance document for project forest management activities. Every FMP will be written concurrently with the underlying forest stand prescriptions and would include a 10-year work and monitoring plan. They would only be written for that subset of forest stands identified via partner consultations, data analysis, and stand reconnaissance as being the highest priority for treatments. In addition, an FMP will only be written for areas that have a high probability of being initiated within a 10-year window from the time of forest inventory collection in a stand.

The individual components of the FMP process are described in much more detail in the step-down natural resource management OMP for the project.

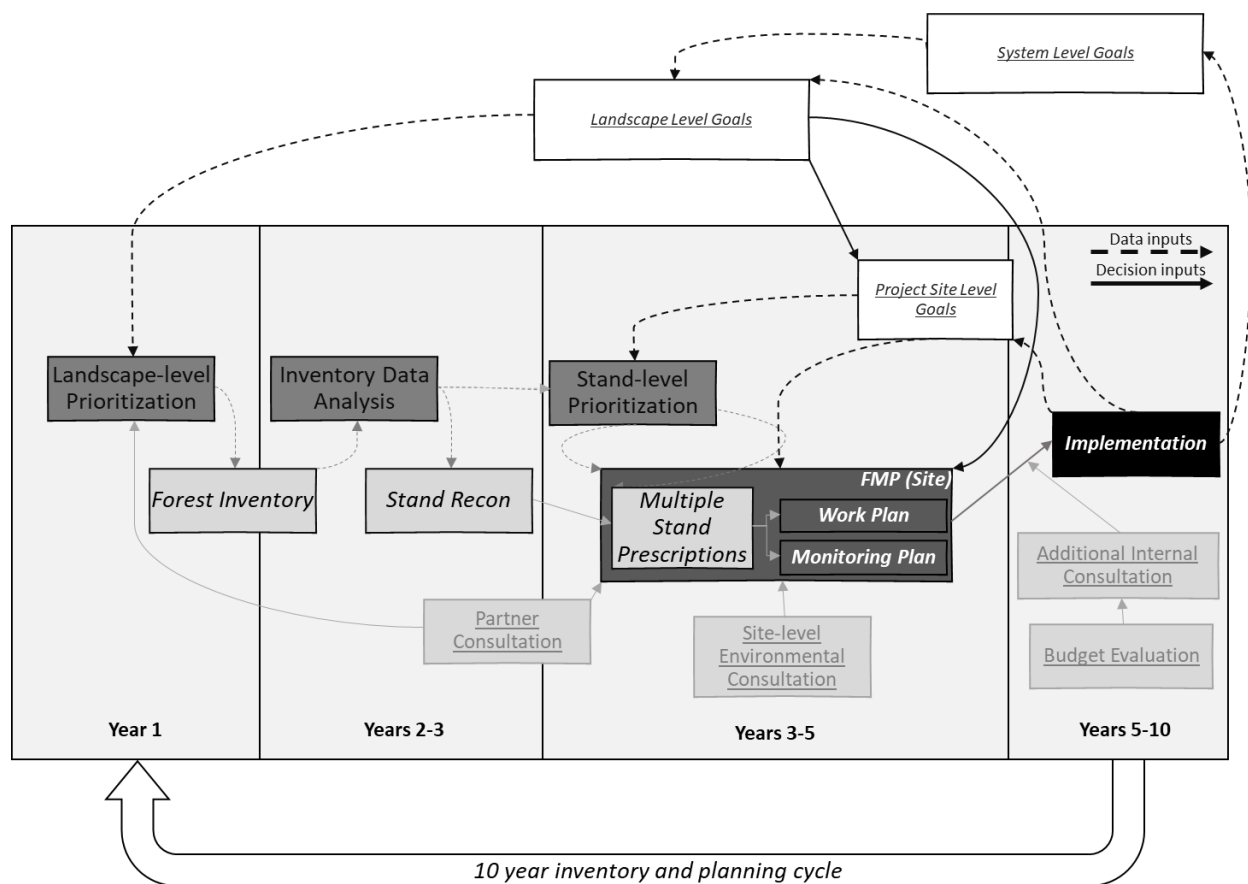


Figure 6-2. St. Paul District's 10-year Forest Management Planning framework.

Partner Consultations

Coordination of forest management activities on the project will be an ongoing process. Partner consultation is a critical component of the FMP process, and partners are engaged at multiple points throughout the FMP process. Partner consultation is intended to ensure that management objectives and treatments are acceptable to all responsible agencies; in particular, the USFWS on the Refuge and the MNDNR on the Gores Pool #3 WMA, and to limit unanticipated impediments to project implementation. Partners will be consulted, at a minimum, when determining priority areas for inventory, priority areas and objectives for stand prescriptions, and upon completion of each individual FMP. Consultation for management activities occurring outside of an FMP will be conducted informally, with either email or phone concurrence from the appropriate partners.

Prior to implementation of management prescriptions, coordination meetings will be held with the appropriate agencies with management jurisdiction. Review and comment on the work plan will be requested from the agencies in addition to input on prioritizing specific activities before they are implemented.

Forest Management and Wildlife Habitat

Under the 2001 amended cooperative agreement, Corps legal and policy guidance, and as validated in subsequent planning documents, Corps forest management will be conducted with the restoration, protection and enhancement of wildlife habitat as a primary objective. Additionally, forest

management activities have the potential to detrimentally impact some wildlife species while improving habitat for others.

The SFSP addresses many of the primary wildlife considerations for forest habitat and management. Various Refuge planning documents outline this further, with detailed guidance in the 2019 Refuge HMP for key habitat features for species determined to be priority Refuge resources of concern (ROC). The ROC will be used to guide FMP development as well as to inform environmental stewardship and forest management goals and objectives.

The ROCs in the HMP will be adopted as priority species for all lands under environmental stewardship management. However, environmental stewardship and forest management will be driven by the overarching system-wide goals defined in the SFSP and will focus on single-species management only where critical needs exist or where significant opportunities for habitat improvement for a single ROC species exist. Environmental stewardship may define habitat features and considerations for these ROCs differently than in the HMP.

Where knowledge is lacking regarding habitat needs for individual ROCs, the St. Paul District and the Refuge will continue to partner to implement monitoring and research activities related to wildlife populations, habitat usage, and habitat associations. The district will continue to actively pursue coordination and further development of management tools to improve habitat management on project lands.

Natural Resource Management Standards and Guidelines

To limit potential negative effects of management activities, a set of standards and guidelines for field operations were developed that are similar to the state's best management practices (BMPs). These guidelines are derived from multiple sources, including Minnesota, Wisconsin and Iowa BMP manuals and various local, regional, and national U.S. Forest Service manuals. Other guidelines are unique to district management needs on the UMR. A list of these standards and guidelines can be found in the OMP.

6.2.4 UPPER MISSISSIPPI RIVER RESTORATION PROGRAM

The Upper Mississippi River Restoration Environmental Management Program (UMRR-EMP) was first authorized in Section 1103 of the Water Resources Development Act (WRDA) of 1986 and amended by WRDA 1990 and WRDA 1992. Section 509 of WRDA 1999 reauthorized and amended the program to extend it without a termination date and with a report to Congress required every six years.

To implement the program, a partnership has been formed among the Corps, USFWS, USGS, and the states of Minnesota, Iowa, Wisconsin, Missouri, and Illinois. The Corps' St. Paul, Rock Island, and St. Louis districts manage the program within their respective boundaries.

The Habitat Rehabilitation and Enhancement Projects (HREP) are environmental restoration projects authorized and funded through this program. The authorization also includes LTRM. The habitat project component includes dredging backwater areas and channels, constructing dikes, creating and stabilizing islands, and controlling side channel flows and water levels. HREP design, construction, and monitoring costs are paid for through the program on federal lands and are cost shared at 35 percent on other non-federal public lands. This program involves separate funding from normal operations of the project. It also completes separate planning processes with full NEPA coordination with other agencies and the public, including public meetings. The master plan does not serve as a planning document for HREPs, as they are funded under a different authority than the natural

resource management plan. However, some of the lands within HREP projects are allocated and classified by the master plan, so natural resource management funds can be spent on the management of lands.

Within the Upper Mississippi River 9-Foot Channel Navigation Project, 28 HREP projects have now been completed: Island 42, Blackhawk Park, Lake Onalaska, Guttenberg Ponds, Pool 8 Islands (3 phases), Indian Slough, Finger Lakes, Bussey Lake, Lansing-Big Lake, Polander Lake, Pool 9 Island, Spring Lake Peninsula, Cold Springs, Peterson Lake, East Channel, Rice Lake, Small Scale Drawdown, Trempealeau Refuge, Mississippi River Bank Stabilization, Long Lake, Ambrough Slough, Spring Lake Islands, Pool Slough, Long Meadow Lake, Capoli Slough and Harpers Slough. Construction is ongoing at Harpers Slough Islands in Pool 9 and Conway Lake. Planning for McGregor Lake (Pool 10), Bass Lake Ponds (Minnesota River), Lower Pool 10 Islands, and Reno Bottoms (Pool 9) HREP projects are ongoing. Current information on the UMRR-EMP within the St. Paul District can be found at: <https://www.mvr.usace.army.mil/Missions/Environmental-Protection-and-Restoration/Upper-Mississippi-River-Restoration/Habitat-Restoration/St-Paul-District/>.

6.2.5 POLLINATOR HABITAT

Presidential Memorandum of June 20, 2014, *Creating a Federal Strategy to Promote the Health of Honey Bees [sic] and Other Pollinators*, was signed to expand federal efforts in areas associated with pollinators and their habitat. Over the past few decades, there has been a significant loss of pollinators, including honeybees, native bees, birds, bats, and butterflies from the environment. The problem is serious and requires immediate attention to ensure the sustainability of our food production systems, avoid additional economic impact on the agricultural sector, and protect the health of the environment. Given the breadth, severity, and persistence of pollinator losses, it is critical to expand federal efforts and take new steps to reverse pollinator losses to help restore populations to healthy levels.

The St. Paul District is actively looking for ways to enhance and increase acreage pollinator habitat in the project. This includes partnerships with other federal, state, and local agencies or groups. As a continued effort, pollinator seed mixes and BMPs will be applied whenever the opportunity exists within the project.

6.2.6 BIOLOGICAL OPINION FOR THE UPPER MISSISSIPPI RIVER 9-FOOT CHANNEL NAVIGATION PROJECT

The Higgins eye Relocation Plan was developed in response to the 2000 Biological Opinion by the USFWS. This opinion stated that continued operation of the 9-foot navigation channel on the Upper Mississippi River System would likely jeopardize the continued existence of the federally-endangered Higgins eye mussel (*Lampsilis higginsii*) and result in the incidental take of winged mapleleaf (*Quadrula fragosa*) mussel. The USFWS determined that operation and maintenance of the navigation pools and project-dependent commercial barge transportation would encourage continued zebra mussel (*Dreissena polymorpha*) dispersion throughout the UMR system. Zebra mussels negatively affect the survival and recovery of these endangered mussels. Relocation sites have been established in Minnesota, Wisconsin, Illinois, and Iowa, using a variety of propagation and relocation techniques. The Higgins eye Relocation Plan will take 10 years to fully implement with long-term (20 years) monitoring continuing after the implementation period. In addition, federal and state agencies are leading the interagency effort to establish new mussel populations on the UMR. They are evaluating the opportunity for fish passage at locks and dams for fish species that are hosts of the Higgins eye and other native mussel young. Federal and state agencies are also funding

research to obtain more information about the little-studied winged mapleleaf and to develop a relocation plan.

6.2.7 HUNTING

Rules and regulations specific to hunting on Corps lands are described in 36 C.F.R. Part 327. On lands under cooperative management with other agencies (the Refuge and the Gores Pool #3 WMA), the cooperating agencies take responsibility for establishing hunting guidelines, delineating no hunting zones, and enforcing hunting regulations. Hunters should be aware that some of the lands surrounding the Corps' fee title lands are managed by other county, state, and federal agencies and different guidelines may apply. These guidelines are not always marked and made clear to public users. While hunters are responsible for recognizing private land boundaries and should not hunt on private land without permission of the landowner this boundary is not always evident.

6.2.8 PRIVATE USE OF FEDERAL LANDS

Management of Private Use

Section 4 of the Flood Control Act of 1944, 16 U.S.C. § 460d, authorized the Chief of Engineers to construct, maintain, and operate public park and recreation facilities at the Corps' water resource development projects. This law also authorizes the Chief of Engineers to lease project lands upon such terms for such purposes as he deems reasonable in the public interest.

In 1974, the Corps published a regulation (ER 1130-2-406) outlining its policy for management of the shorelines at the Corps of Engineers Civil Works projects. This ER states that the policy of the Chief of Engineers is to honor past written commitments regarding private facilities or uses on public lands. In addition, there is a grandfathering policy intended to consider the Corps' prior commitment implicit in the issuance of permits and the residual value of a permitted structure or uses. This means that no new additional structures or uses are allowed in the areas previously permitted. However, maintenance and renewal of the grandfathered items are allowed if the owner complies with the policies set forth in the Shoreline Management Plan (SMP).

The St. Paul District and the Midwest (Region 3) of the USFWS have implemented different policies concerning the granting of private rights to public lands for cottages, boathouses, private docks, and similar structures or uses. The policy of these two agencies differs because the Water Resources Development Act of 1986, Public Law 99-662, Section 1134(d) prohibits the Secretary of the Army from requiring removal of private structures that are legally licensed on Corps administered lands, except where necessary for immediate use for public purposes or other higher public use or for a navigation or flood control project. Structures that were in place at that time were given legal authority to remain as long as the licensing rules continued to be followed.

Structures on USFWS-managed land are subject to policy and public law pertinent to the USFWS. Since the late 1980s, the USFWS has had a consistent grandfathering policy. This policy honored existing licenses, grandfathering them so that the license holders may keep them as long as the holders or their spouses live and as long as the licenses meet federal guidelines. This policy will gradually eliminate existing private-use licenses, which by rule are not compatible with refuge purposes, without imposing hardship on current license holders.

COTTAGE, BOATHOUSE, AND OTHER PRIVATE STRUCTURE LEASES ON FEDERAL LANDS

Section 4 of the Flood Control Act of 1944 authorized the Secretary of the Army to grant leases of lands at water resources development projects for such periods, and upon such terms and for such purposes, as the secretary may deem reasonable in the public interest.

Because of this, the Corps advertised certain sites along the UMR to be developed as recreational cottage sites in the early 1950s. Leases were established in a limited number of locations. Within the St. Paul District, only 25 leases were advertised and executed. The intent of the program was to provide recreational cottages only, not permanent residences.

These cottage-lease sites gained further permanency in section 1134 of the WRDA 1986. The Secretary of the Army could only terminate use of a cottage lease site if, (A) the property covered by the lease is needed for immediate use for public park purposes or other higher public use, or for a navigation or flood control project; or (B) the leaseholder substantially violates a provision of the lease. It is highly unlikely in the foreseeable future that assigned lands would be terminated for a flood control or additional navigation project or for a higher public use. Therefore, the cottage lease program is likely to continue.

When the current leases expire, a new lease will be written for a 10-year lease term and be reissued to the current lessee. Regardless of term, all leases will be effective from 1 January to 31 December. The St. Paul District conducts an appraisal to establish the fair-market rental value every five years, and the lease consideration is due on 1 January each lease year.

Cottage leases can be reassigned to other lessees. This means that the cottage and any other appurtenances (e.g., outbuilding, etc.) can be sold repeatedly. The lessee realistically has private exclusive use of public property, which over time continues to increase the value of the private property in place.

The cottage lease program is overseen by the St. Paul District Real Estate Division. They are responsible for the paperwork associated with the leases, collecting the payments, and the annual inspections. Due to the lease sites being in proximity to the La Crescent field office, located in La Crescent, Minnesota, the Recreation and Natural Resource (RNR) Branch has become much more involved with the program at all levels. As an example, there now is a formal policy regarding possible expansions to the original structure as well as any requested additional buildings such as sheds or a garage. The RNR branch handles all questions regarding vegetation management at the lease sites.

From an environmental management perspective, the St. Paul District continues to phase out cottage lease sites as the opportunity allows and reverts these areas back to natural habitat conditions.

In addition to the cottages, boathouses also received protection from WRDA 1986. A boathouse can be described as a floating building that has a space for a boat (boat well) and, often, a small additional rustic-living space. These are usually held in place by spud poles and connected to shore with a walkway or ramp. These structures are stationary and should not be confused with the motorized and mobile houseboat. Boathouses are also generally located in clusters or groups much like land-based real estate and therefore are easily noticed as one travels the UMR. These structures are managed via a permit system under the SMP and directly fall under the purview of the RNR branch. The SMP regulates private exclusive use of the Corps' fee title shoreline by utilizing a simple fee-for-use permit system. The 9-foot navigation channel and the construction of the lock and dam system resulted in many miles of fee-owned shoreline, but it is far from inclusive. Unlike many Corps reservoir projects where all shoreline is owned in fee, the Corps' shoreline ownership in the

project is fragmented. The St. Paul District has just over 100 boathouses permitted under the SMP, and most are located within five clusters near Brownsville, Minnesota. Many more boathouses are present on the river and are not part of the SMP. Most of these are co-managed by the local municipalities and the corresponding state DNRs.

CHAPTER 7:

AGENCY AND PUBLIC COORDINATION

In December 2018, the Corps announced its decision to revise the master plan, which was last updated in 1988. Throughout the process, the Corps has involved the public and coordinated with federal, state, and local agencies, tribes, and communities. The following documents the coordination that occurred as part of the master planning process.

7.1 ENGAGEMENT ACTIVITIES

The Corps, along with river management partners and stakeholders, worked together to update the master plan. The plan strives to ensure effective management practices and be responsive to existing and future needs. This effort requires coordination with federal and state agencies, non-governmental organizations, and private interests. Public involvement has been solicited during the update process to ensure development of the plan is successful. Involvement of partners and stakeholders is necessary to develop an update that meets the needs of all interests, ensuring a reliable navigation channel, providing safe recreational opportunities, fostering stewardship of the environment, and delivering economic support to local river communities.

7.2 CONGRESSIONAL NOTIFICATION

Congressional representatives from the area were notified of the scoping meetings for the master plan in July 2018. An additional letter was sent to congressional representatives during the public review of the 2020 Master Plan. Copies of both letters can be found in Appendix B – Agency and Public Coordination.

7.3 PUBLIC COORDINATION

Three consecutive public scoping meetings were held in July 2019. The first meeting was on July 22 at the County Administrative Building located in Prairie du Chien, Wisconsin; the second was on July 23 at the Onalaska Library located in Onalaska, Wisconsin; and the third was on July 24 at the Red Wing Public Library in Red Wing, Minnesota. The format of each public scoping meeting was an open house in which the public was given the opportunity to provide official comments on the master plan update. Each meeting was advertised via the St. Paul District webpage, a news release, and social media posts.

Several different mediums were used to obtain public and agency input during the master planning process.

Webpage: The UMR Master Plan webpage invited comments using an online questionnaire. Fact sheets were posted along with a copy of the previous Master Plan.

Interactive Web Map: To better assist those who wanted to provide comments through the online questionnaire, a web map application was developed to provide a visual aid to the Master Plan boundary.

News Releases: In July 2019, news releases were emailed to local and state newspapers and radio stations in preparation for the public scoping meetings.

Comment Cards and One-on-One Communication: Questionnaires and master planning fact sheets were handed out to the public at the scoping meetings.

Material from the public scoping meetings is located in Appendix B – Agency and Public Coordination.

Comments were submitted in writing and by email. All written and verbal comments received are provided in Appendix B – Agency and Public Coordination. The list below includes general issues or concerns identified during the scoping process that are applicable to the 2020 Master Plan update:

- **Sandbar Beaches:** Generally, the public is in favor of more recreation beaches throughout the project.
- **Trail System:** Proper maintenance of trails, additional multi-use trails, and additional connectivity were mentioned for both hiking and cross-country skiing.
- **Bicycle Trail Expansion:** Identify where existing bike trails or the expansion of bike trail networks could be incorporated onto Corps' lands.
- **Non-Motorized Boat Access:** Improve access to the Mississippi River throughout the project, particularly under bridges where debris is snagged.
- **Sustainable Infrastructure:** Provide recreational infrastructure that is resilient to changing water levels and that is developed with consideration for climate change.

The comments received throughout the master planning process and from visitor comment cards collected were also translated to project maps. Plates in Appendix C – Land Allocation and Land Classification Plates document possible changes. Comments that were not germane to the Master Plan are included in Appendix B – Agency and Public Coordination and were forwarded to the appropriate agency or branch at the Corps and are not discussed in the 2020 Master Plan.

The draft 2020 Master Plan and Environmental Assessment was released for a 30-day public review and comment period on 13 August 2020, which ended on 17 September 2020. The Master Plan and Environmental Assessment were posted to the USACE St. Paul District website. One comment from the City of Minneapolis was received and can be found in Appendix B - Agency and Public Coordination.

7.4 AGENCY COORDINATION

On December 19, 2018, letters were sent to the WIDNR, MNDNR, IADNR, USFWS, and other partner agencies in addition to the State Historic Preservation Officers (SHPO) of the states of Minnesota, Iowa, and Wisconsin. The SHPO and agencies continue to be engaged throughout the planning process via interagency meetings, public scoping meetings, conference calls, and reviewing the draft report.

An agency scoping meeting was held on July 15, 2019 at the La Crescent Project Office in La Crescent, Minnesota. The following agencies were represented:

- Wisconsin Department of Natural Resources

- Minnesota Department of Natural Resources
- Iowa Department of Natural Resources
- U.S. Fish and Wildlife Service

Comments were submitted in writing, by email, and in person. Comments were received on a wide range of topics including endangered, threatened, and species of special concern in the states of Wisconsin, Minnesota and Iowa, and invasive species. Recreational sandbar beaches were also discussed. There were smaller meetings and calls that branched off from this original meeting in order to answer the discussion topics listed above.

Upon release of the Draft 2020 Master Plan and Environmental Assessment, agency partners were notified of the release. The USEPA and WIDNR submitted comments and the comments can be found in Appendix B - Agency and Public Coordination.

7.5 TRIBAL COORDINATION

In December 2018, letters were sent to 20 tribes identified as potentially having historical and cultural associations with the Master Plan's geographic location. These letters were addressed to the Tribal Historic Preservation Officers and/or cultural resource directors and if known, the environmental program and/or natural resources directors. Following the December letters, notification has been ongoing with a request for comment during the open comment period in April 2019 and an invitation to attend the scoping meetings in July 2019. The Draft 2020 Master Plan and Environmental Assessment was provided to tribal representatives on August 17, 2020. No comments were received. Letters, emails, and comments received are included in Appendix B - Agency and Public Coordination.

7.6 OUTGRANTEE COORDINATION

In April 2019, letters were sent to 32 lessees of a Corps recreation area or facility by the Corps' Real Estate Division, see Appendix B - Agency and Public Coordination for copies of the letters. These outgrant lessees operate and maintain areas and facilities for public use on Corps lands. The letters communicated the importance of direct involvement by lessees for the revision of the Master Plan to ensure that any interests they have are considered, particularly as it pertains to the public use area(s) that they lease from the Corps.

CHAPTER 8:

SUMMARY OF RECOMMENDATIONS*

The St. Paul District Upper Mississippi River Master Plan for Resource Management (2020 Master Plan) conceptually establishes and guides the orderly administration, maintenance, preservation, enhancement, and management of all natural, cultural, and recreational resources at the Upper Mississippi River 9-Foot Channel Navigation Project. The plan is stewardship-driven, seeking to balance navigation and recreational development and use with protection and conservation of natural and cultural resources. The land classification and recreation changes provided in this chapter support the overall goals and objectives represented in this document. They are influenced by changes in population, demographics, recreation, climate, flora, and fauna that may affect the resources, management decisions, and land use around the project.

The 2020 Master Plan would provide a management framework of project resources relating to current regional and local needs, resource capability and suitability, public interests consistent with authorized project purposes, and regulations. Moreover, this alternative would meet the Corps' current regulations and goals of regularly updating master plans.

8.1 LAND CLASSIFICATIONS CHANGES

The St. Paul District would replace the 1988 Master Plan with a revision that updates the land classifications with greater emphasis on balancing recreation and natural resources needs. An updated land classification system would replace the existing land classification system (ER 1120-2-400), that was utilized in the 2011 Land Use Allocation Plan (LUAP). This would result in more accurate land classifications and land–water distinctions within the project. As part of the 2020 Master Plan update, land classifications have been updated to meet the Corps' current regulations. The combination of the 2020 Master Plan and 2011 LUAP updates would drive better decisions on land use and management for both Corps and USFWS personnel. Through updated mapping technology, the Corps was able to reevaluate managed lands to determine the proper land classifications and produce more accurate boundaries. A comparison of land classifications between the 2011 LUAP and the 2020 Master Plan update can be found in the EA (Appendix A – Environmental Assessment, Figure 2-1).

The Corps and USFWS partnered on this effort to classify federally owned lands within the Upper Mississippi River (UMR) Basin and within the Corps' St. Paul District. Because so much of the federal land along the river is cooperatively managed by the Corps and the USFWS, the two agencies have worked together in the preparation of this land-use plan so that future management decisions are made cooperatively and in accordance with established policy.

8.2 RECREATION CHANGES

The Corps and USFWS will continue to be major providers of recreational opportunities and access along the UMR. The Corps will continue to build partnerships and work with local, state, and other federal agencies, as well as special interest groups, out-grantees, and other individuals towards

common goals. These goals can involve growing community events, expanding recreation opportunities, combating invasive species, and planning watershed-based efforts to improve water quality. The Corps can develop opportunities for volunteers to sustain a high standard of service and expand programs within its authorized missions. Partnerships and volunteering efforts provide benefits to all parties involved and, by collectively sharing knowledge and resources, all parties involved can do more with less.

This 2020 Master Plan update has resulted in the refinement of low-density recreation lands. Many of the low-density recreation lands depicted within the 2011 LUAP were intended to classify recreation beaches throughout the project. However, many of those classifications are misrepresented, as only a portion of those lands contained a beach that would be used by the public for recreation purposes. The refinement of lands in this update has resulted in a drop of total acres related to low-density recreation; however, there is no loss of recreation opportunities, as these lands (beach areas) are now better represented by the updated land classifications (Appendix C – Land Allocation and Land Classification Plates).

8.2.1 MODERNIZE RECREATION FACILITIES

One of the goals of this 2020 Master Plan update is to determine the appropriate balance between recreational development and protection of the resources. Modernization of recreation facilities provides people better access to water and more opportunities to enjoy the outdoors. The management goals and objectives outlined in Chapter 3 provide both traditional and nontraditional users the chance to connect with the environment. Modernization of recreation facilities allows the Corps to adapt to ever-changing recreation trends and demands, while better protecting the resources.

8.3 CULTURAL AND HISTORIC PROPERTY MANAGEMENT PLANS

As funding allows, a Cultural Resource Management Plan (CRMP) shall be developed and incorporated into the Operational Management Plan (OMP) in accordance with EP 1130-2-540. The purpose of the CRMP is to provide a comprehensive plan to direct the historic preservation activities and objectives within the project. A partial inventory of cultural resources at the project area has been completed in compliance with Section 110 of the National Historic Preservation Act (NHPA). In consultation with the respective State Historic Preservation Officer (SHPO), all currently known sites must be evaluated to determine their eligibility for the NRHP. In accordance with Section 106 of the NHPA, any proposed ground-disturbing activities or projects, such as those described in this 2020 Master Plan or as may be proposed in the future in OMP work plans or by others for right-of-way easements, will require coordination with the SHPO to locate and evaluate potential impacts to historic resources. Resources determined eligible for the NRHP must be protected from proposed project impacts, or the impacts must be mitigated. All future project undertakings must be coordinated with the SHPO and federally recognized tribes to ensure compliance with the NHPA, the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act.

The purpose of the Historic Property Management Plan (HPMP) is to support a comprehensive program directing the historic preservation activities and objectives within a project and to effectively manage and protect historic properties. The HPMP provides a working document for resource managers to promote the goals of consistency, efficiency, and continuity in cultural resources management. In order to accomplish this purpose, the HPMP provides information about Corps missions, its relationship to other plans, federal laws and regulations guiding cultural resources management, previous investigations, and a summary of the resources base and threats to that

resource base. The HPMP can be used to guide the cultural resources component of this 2020 Master Plan. The Corps has not developed the HPMP for the UMR; however, one was developed for Blackhawk Park in 2018.

8.4 FURTHER MANAGEMENT STUDIES

Further studies should focus on management of the project and be conducted by staff, partners, or through funding mechanisms such as Cooperative Ecosystem Studies Units. From a natural resource management perspective, these studies should focus on comprehensive analyses of the extensive forest inventory datasets that the Corps maintains to better understand forest ecosystem dynamics and to develop robust management recommendations that are based on the unique conditions present in floodplain forests. Studies should also focus on better understanding the relationships between forest habitat and key wildlife species, impacts of climatic uncertainty and higher annual flows on terrestrial habitats, and ways to better synchronize management of the project with ecosystem management. A recreational carrying capacity study would help determine if existing visitation rates create an appropriate balance between recreation and environmental stewardship and identify what effects additional visitation may have on wildlife.

CHAPTER 9:

BIBLIOGRAPHY*

- Alta Planning + Design. (2016). *Flyway Trail Feasibility Study, Buffalo County, Wisconsin*. Buffalo City, Wisconsin: Buffalo County Land & Trails Trust.
- American Recreation Coalition. (2018). *Outdoor Recreation Outlook 2018*. Washington, D.C.
- American Rivers. (2020, April 14). *American Rivers*. Retrieved from A Most Endangered Year: <https://www.americanrivers.org/2020/04/a-most-endangered-year/>
- Benn, D. (1975). *Upper Mississippi River Dredge Disposal Survey and Testing, Pools 9 & 10*. U.S. Army Corps of Engineers, St. Paul District.
- Benn, D., & Halvorson, P. (2001). *National Register of Historic Places Multiple Property Documentation Form with Associated Nomination Forms for Corps-owned Historic Properties along the Mississippi River in the States of Illinois, Iowa, Missouri, and Wisconsin*. BCA 475A. Cresco, Iowa: Bear Creek Archeology, Inc.
- Benn, D., & Lee, D. (2005). *Erosion Monitoring Program on Archeological Shoreline Sites Along the Upper Mississippi River on U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers, St. Paul District Lands Pools 3 and 7–10*. Cresco, Iowa: Bear Creek Archeology, Inc.
- Benn, D., & Vogel, R. (1995). *The Historic Properties Management Plan for the Mississippi River, Pools 11 Through 22 Rock Island District, Corps of Engineers*. Cresco, Iowa: Bear Creek Archeology, Inc.
- Boldin, B. (2010). *Response to December 2008 Water Level Management Task Force Water Management Program Recommendation*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- Boszhardt, R. (1982). *Archaeological Investigations in the Lowland Floodplain near Prairie du Chien, Wisconsin, Unpublished Master's Thesis*. Madison, Wisconsin: Department of Anthropology, University of Wisconsin-Madison.
- Boszhardt, R. (1995). *An Archaeological Survey of Navigation Pool 9, Upper Mississippi River, Including Portions of: Allamakee County, Iowa, Houston County, Minnesota, and Vernon and Crawford Counties, Wisconsin. Reports of Investigations No. 194*. La Crosse, Wisconsin: Mississippi Valley Archaeological Center, University of Wisconsin-La Crosse.
- Boszhardt, R. (1995). *Phase I Survey of a Portion of Pool 3 Near Diamond Bluff, Wisconsin*. La Crosse, Wisconsin: Mississippi Valley Archaeology Center.
- Boszhardt, R., & Moffat, C. (1994). *An Archaeological Survey of Ten Dredge Spoil Sites on the Upper Mississippi River, Reports of Investigations No. 174*. La Crosse, Wisconsin: Mississippi Valley Archaeology Center, University of Wisconsin-La Crosse.

- Boszhardt, R., Benden, D., & Pauketat, T. (2010). *The Mississippian Initiative: Year 1 2009 Investigations at the Fisher Mounds Site Complex Stoddard, Wisconsin*. La Crosse, Wisconsin : Mississippi Valley Archaeology Center, University of Wisconsin-La Crosse and University of Illinois.
- Carlson, B. D. (1995). "Economic impact of recreation on the Upper Mississippi River System." *Technical Report EL-95-16*. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.
- Caudill, J. A. (2019). *Banking on Nature 2017: The Economic Contributions of National Wildlife Refuge Recreational Visitation to Local Communities*. Falls Church, Virginia: U.S. Fish and Wildlife Service.
- Costello, C., Drake, J., & Lodge, D. (2007). *Evaluating an Invasive Species Policy: Ballast Water Exchange in the Great Lakes*. Ecological Applications.
- De Jager et al. (2015). "The Upper Mississippi River floodscape: spatial patterns of flood inundation and associated plant community distributions." *Applied Vegetation Science*, 19:164–172.
- De Jager et al. (2018). *Indicators of ecosystem structure and function for the Upper Mississippi River System: U.S. Geological Survey Open-File Report 2018–1143*.
- De Jager, N. R. (2011). "Spatial scaling of core and dominant forest cover in the Upper Mississippi and Illinois River floodplains, USA." *Landscape Ecology*, 26: 697–708.
- De Jager, N., Van Appledorn, M., Fox, T., Rohweder, J., Guyon, A., Meier, A., Vandermyde, B. (2019). "Spatially Explicit Modelling of Floodplain Forest Succession: Interactions Among Flood Inundation, Forest Successional Processes and Other Disturbances in the Upper Mississippi River Floodplain, USA." *Ecological Modeling*, 405: 15–32.
- Dieck, J., & Robinson, L. (2004). *General Classification Handbook for Floodplain Vegetation in Large River Systems. Chapter 1 of Book 2, Collection of Environmental Data, Section A, Biological Science*. Upper Midwest Environmental Sciences Center, U.S. Department of the Interior, U.S. Geological Survey. Retrieved from <https://pubs.usgs.gov/tm/2005/tm2A1/previous/tm2-1A.pdf>
- Florin, F., & Madigan, T. (2000). *Phase I Cultural Resources Investigation of Ambrough Slough Environmental Management Program Project: Mississippi River Pool 10, Crawford County, Wisconsin, Reports of Investigation No. 608*. Minneapolis, Minnesota: Hemisphere Field Services.
- Friends of the Mississippi River. (2016). *Strategic Plan*. St. Paul, Minnesota.
- Galat, D. e. (2007). *Environmental Science Panel Report: Establishing System-wide Goals and Objectives for the Upper Mississippi River System. Upper Mississippi River System Navigation and Ecosystem Sustainability Program Environmental Report 6*. U.S. Army Corps of Engineers, Rock Island, St. Louis, and St. Paul Districts.
- Gjerde, J. (1983). *Historical Resources Evaluation St. Paul District Locks and Dams on the Mississippi River and Two Structures at St. Anthony Falls*.
- Gramann, J. H. (2006). *Last child in the parks. Age trends in U.S.*

- Guyon, L. (2012). *Upper Mississippi River Systemic Forest Stewardship Plan*. U.S. Army Corps of Engineers.
- Iowa Climatology Bureau. (2011). *Climate Change Impacts on Iowa 2010: Report to the Governor and the Iowa General Assembly*.
- Iowa Department of Natural Resources. (2018). *Outdoor Recreation in Iowa Plan 2018–2023*.
- Jalbert, A., & Michael, K. (2002). *Phase I and Phase II Archaeological Investigations in Pools 9 and 10, Mississippi River, Crawford County, Wisconsin*. Sun Prairie, Wisconsin: Strata Morph Geoexploration, Inc.
- Jensen, J. (1992). *Gently Down the Stream: An Inquiry into the History of Transportation the Northern Mississippi River and the Potential for Submerged Cultural Resources*. Madison, Wisconsin : State Historical Society of Wisconsin.
- Johnson, B., & Hagerty, K. (2008). *Status and Trends of Selected Resources of the Upper Mississippi River System*. La Crosse, Wisconsin : U.S. Geological Survey, Upper Midwest Environmental Sciences Center.
- Kammerer, J. (1990). *Largest rivers in the United States: U.S. Geological Survey Open-File Report 87-242*.
- Kelly, T. (2011). *Observations on Minnesota's changing resident angler and hunter populations*. Minnesota Department of Natural Resources, Office of Management and Budget Services.
- Kelner, D. (2017). *Distribution and Relative Abundance of Upper Mississippi and Illinois River Mussels*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- Kunkel, K. E. (2013). *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment: Part 3. Climate of the Midwest U.S. NOAA Technical Report NESDIS 142-3*. Washington, D.C.: National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service.
- Lewis, T. (1884–85). *Northwestern Archaeology Survey - Lewis Notebooks*. St. Paul, Minnesota: Minnesota Historical Society.
- LMVJV. (2007). *Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat*. Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group.
- Madigan, T., & Schirmer, R. (2001). *Geomorphological Mapping and Archaeological Sites of the Upper Mississippi River Valley, Navigation Pools 1–10, Minneapolis, Minnesota to Guttenberg, Iowa*. Minneapolis, Minnesota: Hemisphere Field Services.
- Minnesota Department of Natural Resources. (n.d.). *Minnesota's State Comprehensive Outdoor Recreation Plan 2014–2018*.
- Minnesota Department of Natural Resources. (n.d.). *Minnesota Fishing, Hunting, Park Visitation, and Non-motorized Trail Studies*. Minnesota Department of Natural Resources.
- National Park Service. (2016). *State of the River Report*. St. Paul, Minnesota.
- National Research Council. (2008). *Mississippi River Water Quality and the Clean Water Act: Progress, Challenges, and Opportunities*. Washington, D.C.: The National Academies Press.

- National Trout Center. (2019). *About the Driftless Area*. Retrieved from <https://nationaltroutcenter.org/visit-ntc/driftless-area/>
- Nelson, J., Redmond, A., & Sparks, R. (1994). *Impacts of Settlement on Floodplain Vegetation at the Confluence of the Illinois and Mississippi Rivers*. Transactions of the Illinois State Academy of Science.
- Newton, T., Zigler, S., & Gray, B. (2015). Mortality, Movement, and Behavior of Native Mussels during a Planned Water-level Drawdown in the Upper Mississippi River. *Freshwater Biology*, 60:1–15.
- Overstreet, D. (1986). *Cultural Resources Literature Search and Records Review – Upper Mississippi River Basin Volume I: Introduction and Narrative*. Waukesha, Wisconsin: Great Lakes Archaeological Research Center, Inc.
- Pearson, M. (2003). *National Register Evaluation of the Channel Structures of the Upper Mississippi River, Pools 1–10 (From Saint Paul, Minnesota, to Guttenberg, Iowa)*. Minneapolis, Minnesota: Hess, Roise and Company.
- Pejchar, L., & Mooney, H. (2009). *Invasive Species, Ecosystem Services and Human Well-being*. Trends in Ecology and Evolution.
- Pryor, S. C. (2014). Chapter 18, "Midwest. Climate Change Impacts in the United States: The Third National Climate Assessment." *U.S. Global Change Research Program*, 418–440.
- Randazzo, T. (2013). *An Evaluation of Terrestrial Ecosystem Restoration Options for the Northern Ecoregion of the Upper Mississippi River System*. HDR Engineering. Retrieved from https://www.mvd.usace.army.mil/Portals/52/docs/regional_flood_risk_management/our_mississippi/UMR/USACE_HGM_UMRS_Northern_Ecoregion_Final_09222013.pdf
- River Resources Forum. (2004). *Environmental Pool Plans: Mississippi River Pools 1–10*.
- Steuck, M., Yess, S., Pitlo, J., Van Vooren, A., & Rassmussen, J. (2010). *Distribution and Relative Abundance of Upper Mississippi River Fishes*. Washington D.C.: Upper Mississippi River Conservation Committee.
- Thomas, C. (1894). *Report of the Mound Explorations of the Bureau of Ethnology*. Washington, D.C.: Bureau of Ethnology.
- Thompson, J., & Anderson, J. (2017). *Phase I Archeological and Geomorphological Investigations for Five Dredge Disposal Tracts in Blackhawk Recreation Area, Navigation Pool 9, Vernon County, Wisconsin*. Cresco, Iowa: Bear Creek Archeology, Inc.
- UMRBA. (2003). *River and Basin Facts*. Retrieved from Upper Mississippi River Basin Association: <http://www.umarba.org/facts.htm>
- UMRBA. (2011). *Upper Mississippi River Nutrient Monitoring, Occurrence and Local Impacts*. Upper Mississippi River Basin Association.
- UMRCC. (2004). *Conservation Plan for Freshwater Mussels of the Upper Mississippi River*. Rock Island, Illinois: Mussel Ad Hoc Committee, Upper Mississippi River Conservation Committee.

- Upper Mississippi River Basin Association. (2014). *Upper Mississippi River Spill Response Plan & Resource Manual*.
- USACE. (2010a). *Factsheet Lock & Dam No. 5 – Minnesota City, Minnesota*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010b). *Factsheet Lock & Dam No. 5A – Fountain City, Wisconsin*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010c). *Factsheet Lock & Dam No. 6 – Trempealeau, Wisconsin*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010d). *Factsheet Lock & Dam No. 7 – La Crescent, Minnesota*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010e). *Factsheet Lock & Dam No. 9 – Lynxville, Wisconsin*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010f). *Factsheet Lock & Dam No. 10 – Guttenberg, Iowa*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2010g). *Upper Mississippi River System Ecosystem Restoration Objectives 2009*. Rock Island, Illinois: NESP Regional Support Team. U.S. Army Corps of Engineers, Rock Island District.
- USACE. (2010h). *Reach Plan for UMRS Ecosystem Restoration – Upper Impounded Floodplain Reach*. NESP Regional Support Team and Upper Impounded Reach Planning Team, U.S. Army Corps of Engineers.
- USACE. (2011). *Non-Native Species of Concern and Dispersal Risk for the Great Lakes and Mississippi River Interbasin Study*. Great Lakes and Mississippi River Interbasin Study Natural Resources Team.
- USACE. (2012). *Upper Mississippi River Systemic Forest Stewardship Plan*.
- USACE. (2016a). *Factsheet Lock & Dam No. 2 – Hastings, Minnesota*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2016b). *Factsheet Lock & Dam No. 3 – Red Wing, Minnesota*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USACE. (2016c). *Factsheet Lock & Dam No. 8 – Genoa, Wisconsin*. St. Paul, Minnesota: U.S. Army Corps of Engineers, St. Paul District.
- USFWS. (2006a). *Upper Mississippi River National Wildlife*.
- USFWS. (2006b). *Upper Mississippi River National Wildlife and Fish Refuge Comprehensive Conservation Plan*. U.S. Department of the Interior, Fish and Wildlife Service.
- USFWS. (2017). *2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. U.S. Department of Interior, Fish and Wildlife Service. Retrieved from <https://www.census.gov/programs-surveys/fhwar.html>
- USFWS. (2019). *Upper Mississippi River National Wildlife Refuge Habitat Management Plan*. U.S. Department of Interior, Fish and Wildlife Service.

- USGS. (2003). *Nutrients in the Upper Mississippi River: Scientific Information to Support Management Decisions, Fact Sheet 105-03*. U.S. Department of Interior, U.S. Geological Survey.
- Vogel, R., & Thompson, J. (2003). *Cultural Resources Review for the Region Surrounding the Community of Lansing, Allamakee County, Iowa, and Adjoining Parts of Crawford County, Wisconsin*. Cresco, Iowa: Bear Creek Archeology, Inc.
- Wahls, R. (1990). *Phase I Archaeological and Historical Survey of the Shoreline of Pool 10, Upper Mississippi River 1988*. Madison, Wisconsin: University of Wisconsin-Madison.
- Wisconsin Department of Natural Resources. (2012, January 23). *Ecological Landscapes of Wisconsin*. Retrieved from <https://dnr.wi.gov/topic/Landscapes/>
- Wisconsin Department of Natural Resources. (2019). *Wisconsin Statewide Comprehensive Outdoor Recreation Plan 2019–2023*. Madison, Wisconsin.
- WLMTF. (2007a). *Upper Mississippi River Pool 8 Drawdown Results: A Summary of Research and Monitoring Results from the 2001 and 2002 Experimental Drawdowns of Pool 8*. River Resources Forum Water Level Management Task Force.
- WLMTF. (2007b). *Summary of Results of the Pool 5 and Pool 8 Drawdowns on the Upper Mississippi River*. River Resources Forum Water Level Management Task Force.
- Yin, Y., Nelson, C., & Lubinski, K. (1997). *Bottomland Hardwood Forests Along the Upper Mississippi River*. Natural Areas Journal.
- Zigler, S., Dewy, M., Knights, B., Runstrom, A., & Steingraeber, M. (2003). Movement and Habitat Use by Radio-tagged Paddlefish in the Upper Mississippi River and Tributaries. 23(1): 189–205.