Information Sheet on Ramsar Wetlands (RIS)

2009-2012 version

1. Name and address of the compiler of this form:

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DD MM YY

Designation date | Site Reference Number

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2. Date this sheet was completed/updated:

15 October 2008

3. Country:

United States of America

4. Name of the Ramsar site:

"Upper Mississippi River Floodplain Wetlands"
(Upper Mississippi River National Wildlife and Fish Refuge, Trempealeau National Wildlife Refuge and selected contiguous federal and state-managed floodplain wetlands associated with mouths of tributary rivers and streams)

5. Designation of new Ramsar site or update of existing site. This RIS is for:

a) Designation of a new Ramsar site: X

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area (New RIS)

The Ramsar site boundary and site area are unchanged:

7. Map of site:

a) A map of the site, with clearly delineated boundaries, is included as:

i**) a hard copy** (required for inclusion of site in the Ramsar List): X;
Map sets of federal lands appended to two refuge Comprehensive Conservation Plans, plus supplemental maps identifying contiguous state-managed wetlands.

ii**) an electronic format** (e.g. a JPEG or ArcView image) X;
ArcMap format on CD ROM with Geo-Referenced Boundary File
(Refuge boundaries also showing contiguous state-managed wetland boundaries)

iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** X.
On-line GIS shape-files of Upper Mississippi Refuge can be downloaded at:
http://midwest.fws.gov/planning/uppermiss/index.html
http://midwest.fws.gov/planning/trempealeau/index.html

b) Describe briefly the type of boundary delineation applied:

Several federal and state-managed areas containing wetlands associated with the main stem of the Upper Mississippi River and mouths of tributary rivers and streams have been included in this proposal for designation, including the Upper Mississippi River National Wildlife and Fish Refuge, Trempealeau National Wildlife Refuge, Effigy Mounds National Monument, managed by the National Park Service, and the following units managed by state departments of natural resources:

Minnesota: McCarthy Lake, Pool 4, Root River, Thorpe and Whitewater Wildlife Management Areas,
Great River Bluffs and John Latsch State Parks, and
Kellogg-Weaver Dunes Scientific and Natural Area.
Wisconsin: Tiffany Bottoms, Whitman Dam and Van Loon Wildlife Areas,
Merrick, Perrot and Wyalusing State Parks, and the
Wyalusing Unit, Lower Wisconsin State Riverway.
Iowa: Pool Slough, Green Island and Princeton Wildlife Management Areas.

The proposed Ramsar site consists primarily of backwater wetlands and other floodplain habitats that are generally defined by railroad tracks and roads that extend almost the entire length of the Upper Mississippi River National Wildlife and Fish Refuge, just above normal high water levels, on both sides of the river (see maps).

8. Geographical coordinates (latitude/longitude, in degrees and minutes) at approximate mid-point:

Approximate mid-point of proposed site opposite Marquette, IA is located at:
91° 10' W, 43° 3' N

Approximate northern end of proposed site bordering Wisconsin's Chippewa River is located at::
92° 5' W, 44° 24' N

Approximate southern end of proposed site above Princeton, IA is located at:
90° 20' W, 41° 41'N

9. General location:
Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

Borders Southeastern Minnesota, Southwestern Wisconsin, Northeastern Iowa and Northwestern Illinois. Refuge District Offices are located in major river communities of Winona (MN), La Crosse (WI), McGregor (IA) and Savanna (IL). See state location in Ramsar Vicinity Map.

From Refuge mid-point at Marquette, IA, distances in mi/km to major cities by highway are as follows:

Chicago 246/396 St. Paul/Minneapolis 212/341 Des Moines 218/350 Madison 104/167

10. Elevation: (in metres: average and/or maximum & minimum - MSL)

From approximately 202 meters MSL at upstream end (Pool 4) near Nelson, WI, to approximately 173 meters MSL at downstream end (Pool 14) near Rock Island, IL. Navigation locks and dams at the lower ends of the pools create a staircase effect.

11. Area: (in hectares)

Total proposed for designation: 122,357

12. General overview of the site:

Natural floodplain backwaters of the Upper Mississippi River were enlarged and enhanced by construction of locks and dams to improve commercial and recreational navigation in the 1930s. Elimination of wetlands throughout the surrounding Upper Mississippi River Basin for agriculture and urban development tended to concentrate waterfowl and many other migratory birds in floodplain marshes and channel island forests of the Upper Mississippi River National Wildlife and Fish Refuge (created to protect waterfowl and aquatic habitats in 1924). Refuge wetlands remain hydrologically and biologically connected to the river.

The Refuge and Upper Mississippi River Wetlands played an important role in the recovery of the Bald Eagle (*Haliaeetus leucocephalus*), which was placed on the Endangered Species List in 1967 and removed from the list in 2007. In 1972, as a result of habitat degradation and pesticide use across the continent, only one active eagle nest could be found on the refuge. In 1986, nine nests produced a total of nine young. And in 2005, 167 active territories produced 279 young, 98 more eaglets than the previous year. The Higgins eye pearlymussel *(Lampsilis higginsii)* was placed on the Endangered Species List in 1976 due to population declines resulting from commercial over-harvest, river channel dredging, water quality degradation, loss of appropriate fish hosts for larval mussel propagation, and colonization by invasive exotic zebra mussels. Nearly all of the remaining habitat for this species exists within the Upper Mississippi's 9-foot navigation channel, and four of the ten Essential Habitat Areas identified by the Recovery Team are located within the Ramsar site. Additional candidate species for threatened or endangered species designation include the Eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) and the sheepnose (*Plethobasus cyphyus*) and spectaclecase (*Cumberlandia monodonta*) mussels.

The Upper Mississippi River Wetlands are at the core of the Mississippi Flyway, through which an estimated 40 percent of North America's waterfowl migrate. The refuge has been designated a Globally Important Bird Area, and is considered a critical migration corridor for 10 waterfowl species, including tundra swan (*Cygnus columbianus*), ring-necked duck (*Aythya collaris*), and hooded merganser (*Lophodytes cucullatus*). The other seven species are on the Refuge Resource Conservation Priority List. In addition to those species that use the Upper Mississippi River Wetlands as a stop-over for resting and feeding during migration, the area supports significant breeding populations of Canada geese (*Branta Canadensis),* wood ducks *(Aix sponsa)*, mallards (*Anas platyrhynchos*) and hooded mergansers.

13. Ramsar Criteria:

1 •	2 •	3 •	4 •	5 •	6 •	7 •	8 •	9
❑	X	X	X	X	X	X	X	X

14. Justification for the application of each Criterion listed in 13 above:

Criterion 2: The proposed Ramsar site provides riverine channel habitat essential for the survival of the federally-endangered Higgins' eye pearly mussel *(Lampsilis higginsii)* and two other candidate mussel species for federal listing, the sheepnose mussel *(Plethobasus cyphyus)* and the spectaclecase mussel (*Cumberlandia monodonta).* The massasauga rattlesnake (*Sistrurus catenatus catenatus)* is also a candidate for listing under the U.S. Endangered Species Act.

Criterion 3: The proposed Ramsar site is perhaps the most important corridor of fish and wildlife habitat remaining in the central United States, at the central core of the Mississippi Flyway, on North America's most significant river. The importance of this aquatic resource has increased over time as habitat losses and degradation have accelerated elsewhere. There have been 306 bird, 119 fish, 51 mammal, 31 reptile and 14 amphibian species recorded, as well as 42 species of freshwater mussels and an enormous variety of invertebrates and plants. This site represents the core of a uniquely rich biodiversity reservoir within the ecologically impoverished "bread-basket" region of the country.

Criterion 4: The proposed Ramsar site provides necessary aquatic and terrestrial habitats to sustain Mississippi Flyway bird populations during spring and fall migrations. Up to 40 percent of the continent's waterfowl use this Flyway, and at least 40 percent of the world's canvasback ducks (*Aythya valisineria*) and over 20 percent of the North American eastern population of tundra swans *(Cygnus columbianus)* use these wetlands for feeding and resting (especially important in fall for juvenile birds) during migration. The site also provides the mid-continent's most extensive forested floodplain corridor, supplying critical habitat for migrating neo-tropical songbirds, as well as nesting and feeding areas for resident land bird species. Examples of important neo-tropical migrants include cerulean warbler (*Dendroica cerulea*), scarlet tanager (*Piranga olivacea*), and Acadian flycatcher (*Empidonax virescens*); important year-around resident species include pileated woodpecker (*Dryocupus pileatus*), great horned owl (*Bubo virginianus*), and black-capped chickadee (*Poecile atricapillus*). This site should help mitigate some climate change impacts to both resident and migratory species, as they are forced to adapt to warmer and drier conditions by moving up latitudinal gradient to find conditions more suitable for survival.

Criterion 5: The proposed Ramsar site supports hundreds of thousands of migrating water birds for weeks during spring and fall, as they stop to rest and feed. Tundra swans and canvasback ducks peak at over 50 thousand and 250 thousand, respectively, representing sizeable portions of continental populations. Wood ducks *(Aix sponsa)* breed in the floodplain forests, and have recovered and sustained huntable populations, since this species was nearly extirpated in the early 1900s. While local population estimates for wood ducks are unavailable at this time, waterfowl breeding area surveys and hunter harvest data provide a framework for detecting overall population trends in order to set appropriate bag limits.

Criterion 6: Over 4,000 active great blue heron *(Ardea herodias)* nests have been recorded in about 14 colonies on the Refuge. There are no great blue heron population estimates available for the "Driftless Area" Ecologic Subregion (222L), which encompasses the Upper Mississippi River Wetlands, although suitable nesting areas in this biogeographic region are typically sited in wooded floodplains that are isolated from agricultural or urban development. Some sample migration peak waterfowl counts (from 2006) and approximate percentages of populations are as follows: eastern North American population of tundra swans - 52,070 (50%); canvasback - 250,280 (25%). Over 60 percent of canvasbacks in the Eastern United States during the Coordinated Fall Survey are counted on the Refuge.

Criterion 7: The proposed Ramsar site supports significant populations of over 100 native fish species, including primitive paddlefish *(Polyodon spathula)* and lake sturgeon *(Acipenser fulvescens).* Commercial fishing and sport fishing industries have grown strong from the resource base provided by this reach of the Mississippi River. Examples of important commercial fish include common carp (*Cyprinus carpio*), bigmouth buffalo (*Ictiobus cyprinellus*) and channel catfish (*Ictalurus punctatus)* ; examples of popular sport fish include walleye (*Sander vitreus vitreus)*, largemouth bass *(Micropterus salmoides)* and bluegill sunfish *(Lepomis macrochirus).*

Criterion 8: Critical spawning, nursery, feeding and wintering habitats, as well as migration routes, are provided at this proposed Ramsar site for a variety of native fishes, including smallmouth bass (*Micropterus dolomieu*), white crappie (*Pomoxis annularis*), freshwater drum (*Aplodinatus grinniens*), longnose gar (*Lepisosteus osseus*), mooneye (*Hiodon tergisus*) and spotted sucker (*Minythrema melanops*). Without the exceptional degree of lateral as well as longitudinal habitat connectivity for a large river system that the Upper Mississippi provides, this diversity of species could not exist.

Criterion 9: The proposed Ramsar site, as mentioned under Criterion 2 above, provides five of ten Essential Habitat Areas for the federally endangered Higgins' eye pearly mussel. The Upper Mississippi River occupies the central portion of its Midwestern range, which is considered to be about half of its original extent. (U.S. Army Corps of Engineers 2004 Biological Assessment of the Upper Mississippi River- Illinois Waterway System Navigation Study. Rock Island, St. Louis and St. Paul Districts. April 2004 193pp.)

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15. Biogeography:

a) biogeographic region:

The proposed Ramsar site is situated within an area that is commonly known as the eastern broadleaf forest region, which encompasses the transition zone between mixed hardwood forests and tall-grass prairies. The Ecologic Sub-Region known

as the "Driftless Area" (222L) contains rugged, stream-dissected, limestone karst topography that drains into the Upper Mississippi River, creating a large buffer zone for refuges that is especially rich in native biodiversity.

b) biogeographic regionalisation scheme:

"Decription of Ecological Subregions: Sections of the Coterminous United States"
Compiled by W.H. McNab, D.T. Cleland, J.A. Freeouf, J.E. Keyes, G.J. Nowacki, and C.A. Carpenter
United States Department of Agriculture, Forest Service
General Technical Report WO-76B
January, 2007

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16. Physical features of the site:

The proposed site lies within the Mississippi River floodplain, an ancient river valley partly filled with alluvial material (mud, sand, and gravel) carried and deposited by surface water. The river and its tributaries traverse sedimentary rock formations (dolomite, sandstone, and shale) that accumulated under inland seas during the early Paleozoic Era about 400 to 600 million years ago.

In more recent geologic times, the river valley has been shaped by the presence or absence of glacial activity. Global warming ended the last Ice Age, about 12,000 years ago, and melted glaciers creating huge fresh water lakes. Glacial Lake Agassiz covered much of northern Minnesota, the Dakotas, and central Canada. Most of that lake emptied to the south via the post-glacial River Warren. The torrent continued for about 3,000 years, leaving today's Upper Mississippi River valley more than two kilometers wide and nearly 200 meters deep.

Once the flow from glacial lakes subsided, the river lost much of its velocity and sediment transport capabilities. Sediment deposition ensued, and the valley partially refilled with sand, gravel and layers of rich organic soils eroded from surrounding prairies and woodlands. Episodes of flushing and filling of the river valley continue. Sand terraces that presently flank the river valley are remnants of ancestral floodplains not completely scoured during the most recent postglacial floods.

Much of the upland surrounding the site is covered by loess, a silty soil deposited by postglacial winds. This erodes off farmland and developed areas, contributing a major source of the fine silt deposited in floodplain wetlands, particularly during floods. Other soils within the site generally range from silty clay to sand. Sand terraces, occurring at slightly higher elevations border the floodplain in some areas. And the rounded, polished gravel from glacial outwash is exposed along faster flowing channels.

Specifically, the soils of the refuge floodplain from Pools 4 through 6 are alluvial in origin. The composition of the soil at any particular location depends upon the manner in which it was deposited. These irregular strata are composed of clay, silt, sand and gravel. The sands and gravels border many sloughs, while heavy silt loams underlain by sand or gravel can be found on higher terrain between sloughs.

Soils of Pools 7 and 8 are derived from a wider variety of parent material, ranging from weathered bedrock to glacial till, alluvium and loess. The weathering of the predominant till has taken place under different vegetative influences, resulting in several distinctly different soil types. Podzolic soils have formed under deciduous trees with grass cover. The bog soils are represented by muck and peat, formed by decomposition of sedges and grasses at the wet lower margins of sand terraces exposed by river meanders. Regisols consist of deep, soft mineral deposits. Alluvial soils consist of water-borne materials recently deposited on the floodplain. A loess cap of silty particles covers most of the parent material.

Pool 9 parent materials also include loess, alluvium and drift. Pockets and fans of glacial outwash were formed as ice melted at the end of the most recent glacial period, known as the Wisconsin epoch. Sediment subsequently delivered to Pool 9 by the Upper Iowa River has caused extensive siltation in backwaters and channels. The primary soil type of islands and upland peninsulas in this area is Dorchester silt loam, which is a light-colored soil that lacks a B-horizon. It forms on relatively flat sites over black soils that are usually flooded annually after spring thaw or after heavy rains.

Some of the high terraces bordering Pool 10 have sandy loam soils developed under prairie or savanna vegetation. The bottomlands have diverse soils of alluvial origin that are composed of sand, silt and clay layers deposited by flood events. In areas of annual flooding, there is little soil development, since humus is mostly removed or covered. Higher elevation terraces may have a thin layer of humus over sandy material. A grey layer of sticky, fine clay with blue-green mottling from reduced iron is present on bottomland soils, indicating poor internal drainage and anaerobic soil conditions.

In the lower portion of the refuge (pools 11-14), three major zones have been identified: the streamside buffer zone, a higher elevation natural levee zone, and a lower elevation floodplain zone.

The buffer zone is an area close to the stream bank that is distinguished by floodplain edges and point bars. This zone is subjected to a rapidly aggrading alluvium, harsh stream velocities, and heavy debris accumulation. Common soil textures include coarse loams or sandy loams which have poor moisture holding capacity and high infiltration rates causing rapid drainage after flooding cessation. This zone has the most dynamic land/water interfaces.

Natural levee areas are associated in or near buffer zones. The elevation is often higher than the surrounding floodplain due to high silt aggradation. Soil textures are often fairly coarse loams and are moderately drained to well drained sites. Even though levees are relatively close to the stream, they flood less frequently and soils have high infiltration rates and are often dissected with drainage channels which facilitate rapid removal of flood waters.

The lower elevational floodplains consist of more poorly drained silty loams and silty clay loams best suited for moderately flood tolerant to very tolerant bottomland hardwoods. These flood plains are often inundated for longer periods due to their low elevation and high soil moisture holding capacity.

People began making structural changes to enhance navigation on the Mississippi River during the 1830s when a 5-foot channel was blasted through the Des Moines Rapids. Snags were pulled, wing dams installed, and channels dredged to 4, 4.5, and 6 feet deep between 1866 and 1907. The current structure originated in 1930 when Congress authorized the 9-foot navigation channel project for the Upper Mississippi River System to be constructed, operated, and maintained by the U.S. Army Corps of Engineers. This navigation system, including 29 locks and dams on the Mississippi River and eight on the Illinois River, has brought the most significant change to the river ecosystem since European settlement.

The navigation dams were completed by the late 1930s, creating a stairway of reservoirs (navigation pools) from Minneapolis, Minnesota, to St. Louis, Missouri that allowed boats and barges to pass obstacles and readily traverse this potion of the river. The navigation pools permanently raised water levels and inundated thousands of acres of floodplain habitat. Water depths ranged from less than a meter in the backwaters to several meters in the main channel, where at least three meters is maintained by dredging in areas where bed load accumulates. The newly created backwater wetlands and shallow lakes immediately supported an abundance of fish and wildlife adapted to this new water regime. Some existing plant and animal species did not survive the change, including some migratory fish and associated mussels.

Average maximum (June-August) temperatures (La Crosse, WI – Moline, IL) range between 28.3 and 28.8 degrees Celsius, while average minimum temperatures (December-February) average between -11.6 and -8.8 degrees Celsius across the site. The average annual precipitation (La Crosse, WI – Moline, IL) across the site ranges from 81.3 to 96.5 cm, while the average snowfall component of this precipitation ranges from 88.9 to 111.8 cm.

Most of the wetlands within the site, and the river channel itself, freeze solid each winter. Fish are usually able to move out of areas that become oxygen depleted in winter, due to lack of light penetration and plant photosynthesis resulting from excessive snow cover in some areas. Frozen wetlands restrict food availability for waterfowl and can speed migration.

The global warming trend documented nationally and globally in recent years has affected precipitation patterns in the Midwest, resulting in unusual flooding intensity and duration. Such flooding has been noted on the Upper Mississippi River over the past decade by Professor James Knox at the University of Wisconsin in Madison.

The research by Knox and others indicates that climate is less stable and predictable than people previously thought, and this means that resilience must be a primary consideration in making management decisions. Resilience requires a largely preventive or precautionary approach that leaves an adequate margin for error. The floodplain marshes and forested islands or bluffs of the Upper Mississippi River corridor will have important future roles to play in excess nutrient processing and carbon sequestration, as a means of mitigating effects of climate change.

According to the U.S. Geological Survey report titled "Status and Trends of Selected Resources in the Upper Mississippi River System" (Technical Report LTRMP 2008-T002, Johnson and Hagerty editors), hydrology and water quality provide key indicators of ecosystem health. Mean annual discharge has increased throughout the system since about 1970, and from 1993-2004 has increased slightly in the impounded portion of the river, compared with the previous 22 years. Over three evaluation periods between 1950 and 2004, mean annual discharge at Winona, Minnesota increased from approximately 29,000 to 38,000 cfs. Total nitrogen concentrations (TN) have increased substantially over the past century due to the industrialization of agriculture, and total phosphorous (TP) generally exceeds guidelines, due to sewage treatment plant output as well as livestock manure and crop fertilization, increasing algae production and turbidity. Environmental Protection Agency aquatic life support guidelines for the Upper Mississippi are .6-2.18 mg/l for TN and .01-.08 mg/l for TP. At long-range monitoring sites in pools 4, 8 and 13, values ranged up to 5 mg/l for TN and .3 mg/l for TP from 1994-2003. Turbidity can suppress the aquatic plant growth in the river and nutrient loading can increase hypoxia, which threatens fisheries and aquatic life in the Gulf of Mexico. Total suspended solids (TSS) (from eroded soils and algae) is improving slightly in the upper impounded portion of the Mississippi River, and it has been recommended that a standard of 25 mg/l be widely adopted to sustain tuber production of wild celery, and vitality of other aquatic plants that produce food and cover for waterfowl and fish. TSS values from 50-100 mg/l have been recorded during periods of peak flow at monitoring sites on pools 4, 8 and 13 from 1994-2003. Dissolved oxygen (DO) can be a limiting factor affecting survival of certain fish species, depending on location, season and time of day. More stagnant backwater areas can become hypoxic during periods of restricted flow, excessive plant growth and decomposition due to excessive nutrients during summer months, and when snow cover restricts light for plant photosynthesis during the winter. A DO minimum standard of 5 mg/l for aquatic organism survival has been adopted by Upper Mississippi Basin Association member states. During the sampling period from 1994-2002 at long-term monitoring sites in pools 4, 8 and 13, DO failed to reach the 5 mg/l standard 10-14 percent of the time in backwater areas at mid-day during the winter, and 12-21 percent in backwater areas at mid-day during summer.

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17. Physical features of the catchment area:

The Upper Mississippi River Basin (489,997 km^2) pumps life-giving – and during times of flood, life-taking - water, sediment and nutrients into the refuge's floodplain ecosystem. The surrounding gently rolling to flat terrain, characterized by productive prairie soils, over the past 200 years has become the nation's agro-economic "bread basket," where most corn and soybeans - as well as sediment and nutrients - are produced.

The southern portions of the basin, where retreating glaciers left gently rolling till plains, remain dotted with small wetlands, or "potholes." Prairies and wetlands were mostly eliminated by cultivation and drainage, while many waterfowl species were forced to alter migration patterns and find new nesting and migration habitats on refuge lands.

Water flow across the basin is influenced by agriculture, urban development and even the thousands of reservoirs installed throughout the basin. The Corps of Engineers has 76 reservoirs, holding 40 million-acre feet of water; this volume would take three months to flow past St. Louis at average discharges. An estimated 3,000 more reservoirs with unknown capacity also occur in the basin.

The colder northern portions of the Basin remain largely forested, with deep fishing lakes that attract millions of tourists during summer months – many come from surrounding metropolitan areas, such as Chicago and Minneapolis. Instead of having agriculture-supported communities, the northern portions of the Basin have outdoor recreation-supported communities.

The Driftless Area is that portion of the landscape that is mostly lacking "glacial drift," the rock and gravel deposits left when the last glaciers retreated, over 10,000 years ago. While the last ice sheets missed this ancient landscape, torrents of

glacial melt water did descend from the north, carving wide river valleys over 150 m deep into limestone, sandstone and shale, deposited over one-half billion years ago across the Paleozoic seabed that then covered much of the continent.

The resulting "karst" landscape of fractured limestone bedrock, with relatively impervious "confining layers" of shale, is characterized by deeply incised spring-fed trout streams. Looking up from the broad floodplains, steep, forested "blufflands," rough outcrops, cliffs and dry meadows, or "goat prairies," suggest mountainous terrain. Yet if one climbs to the top in many areas, it is surprising to discover relatively flat farmland, gently rising toward the far horizon.

This 74,320 km² Ecological Sub-Region (222L) represents the "heart" of the Upper Mississippi River Basin. It also provides a "buffer zone" that serves to protect the Upper Mississippi River Wetlands. Through surface water runoff and springs tapping deep groundwater aquifers, the tributary streams of the Driftless Area help replenishes the river and its backwaters, bringing cool, clear water, while building deltas and islands of productive habitat. Perennial native vegetation - such as forests, prairies and wetlands, as well as pastures and hay fields on diversified small farms - is key to retarding runoff, maximizing infiltration, filtering out nutrients and contaminants, and protecting fish and wildlife habitats.

The proposed site extends from just above Lock and Dam 4 to just above Lock and Dam 14. The Driftless Area, which drains lands immediately surrounding the site, is comprised of Major Land Resource Areas 104 and 105, which are a highly diversified and highly erosive agricultural region, known for corn and soybean production, as well as scenic forests and cold-water streams.

Detailed maps of the site are available at the web links appended to this document.

18. Hydrological values

Flow through the river and backwater wetlands has been altered by installation of 37 dams, thousands of wing dams, and 8,000 miles of levees. Since 1933, the long-term average hydrologic pattern on the Upper Mississippi River System shows an approximate 11-year cycle of low and high flow, an apparent long-term increase in flow, and an increase in the frequency and amplitude of multiyear fluctuations in flow.

Flood heights have increased and the number of days water elevations are above flood stage is increasing; present day floods on the Mississippi River at St. Louis tend to be 9 feet higher than historic floods at the same discharge (780,000 cfs). Major floods at St. Louis now occur once every six years.

The lock and dam system has permanently inundated lands previously rejuvenated through annual drying and "flood pulse" cycles. While initially the pools supported flourishing, productive wetlands, within a few decades the vast marshes became decadent as they filled with fine sediments, and turbidity from rough fish and wave action suppressed growth of aquatic plants. To compensate for degradation, attempts are now being made to simulate natural cycles of drought with periodic pool draw-downs and to assist island or channel creation with specially designed habitat projects in cooperation with the Corps of Engineers and the states.

Because of the surrounding steep and steam-dissected terrain, more concentrated land ownership and intensifying agricultural production and urban development, and extreme weather patterns, runoff, flooding and stream bank erosion have been accelerating, with predictably negative impacts on fish and wildlife habitat. Fortunately, economic development and environmental quality are no longer seen as mutually exclusive pursuits, and it is becoming clear that good environmental stewardship through multi-benefit management an enhance profits and the quality of life.

The impounded floodplain wetlands of the Mississippi River serve as an enormous sediment trap, and sediment accumulation is gradually converting many wetland communities into terrestrial ones. Increased land conservation throughout the surrounding watersheds means better water infiltration, spring flow, and moderated runoff, reducing sedimentation impacts and prolonging the useful life of refuge wetlands.

Some additional ecosystem services provided by the area, though not yet adequately studied and quantified, include water supply, flood damage reduction or avoidance, carbon sequestration, transport and dilution of domestic, municipal, industrial and agricultural wastes, including de-nitrification of manure and anhydrous ammonia fertilizer, breakdown of pesticides, and sediment burial of toxic compounds. In addition to capturing carbon, sediment and nutrients, while providing drinking, industrial and agricultural water sources, the ecosystem represents a world-class scenic attraction, with more annual visitation than Yellowstone Park. The refuge portion alone generates between $46 and $60 million per year in economic value from recreation. In addition, commercial fishing and trapping generate one to two million dollars in gross revenue each year.

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19. Wetland Types

a) presence:

Inland: **L • M • N • O • P • Q • R • Sp • Ss • Tp Ts • U • Va •**
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

The site encompasses 11 navigation locks and dams constructed during the 1930s, creating very large shallow to moderately deep-water impoundments, designed to maintain sufficient depth in the river's main channel to allow passage of multiple barge tows, drafting 2-3 meters. While commercial traffic significantly impacts the river ecosystem, fish and wildlife have historically benefited from the increased extent of backwater marshes. These rich backwaters are enhanced by cold-water springs and seeps that enter from the surrounding limestone karst region, which is extremely fragile and susceptible to human impact. Convergent natural conditions and cultural traditions help define a unique area, where conservation, recreation and navigation activities are required to coexist under the law. Millions of dollars in annual funding have already been provided to support collaborative management and restoration of degraded habitats, through the Water Resources Development Act (WRDA) and other laws.

b) dominance:

At least 530 of approximately 1,300 streams occurring in the upper basin feed directly into this portion of the Upper Mississippi River. These steep gradient tributaries deliver large quantities of sediment to the main river, building natural deltas, levees and islands. Dominant wetlands include flowing main and side channel habitats, large shallow to moderately deep backwater marshes, often with emergent and submersed vegetation beds, a complex matrix of seasonally or intermittently flooded floodplain forests and shrub-dominated communities, as well as wet meadows, or less commonly, mesic prairies on better drained and occasionally burned or grazed terraces.

Wetland and non-wetland composition, corresponding to the Ramsar classification system summarized in the tables below, is as follows, in hectares: Open Water: 64,679; Tree or Shrub Dominated Wetland: 33,463; Herb-Dominated Wetland: 9,272; Wet Meadow: 1,830; Other Non-Wetland: 13,113; Approximate total : 122,357, based on GIS analysis of National Land Cover Dataset within designated public lands survey boundaries.

Vegetation Classification Crosswalk

		Federal Lands (Hectares)			
National Land Cover Dataset (NLCD)	**Ramsar Classification for Wetland Type**	**Upper Mississippi River National Wildlife Refuge**	**Trempealeau National Wildlife Refuge**	**Effigy Mounds National Park**	**TOTAL Federal**
Open Water	M	61,506	1,656	33	63,195
Woody Wetlands	Xf	25,276	213	178	25,667
Emergent Herbaceous Wetland	Tp	6,136	507	16	6,659
Grassland/Herbaceous	Ts	919	24	35	978
Perennial Ice/Snow	Non-Wetland	2,860	244	762	3,866
Developed, Open Space					
Developed, Low Intensity					
Developed, Medium Intensity					
Developed, High Intensity					
Barren Land					
Deciduous Forest					
Evergreen Forest					
Mixed Forest					
Scrub/Shrub					
Pasture/Hay					
Cultivated Crops					
	TOTAL =	**96,697**	**2,644**	**1,024**	**100,365**

Vegetation Classification Crosswalk					
		State Lands (Hectares)			
National Land Cover Dataset (NLCD)	**Ramsar Classification for Wetland Type**	**Minnesota Department of Natural Resources (8 units)**	**Wisconsin Department of Natural Resources (7 units)**	**Iowa Department of Natural Resources (3 units)**	**Total State**
Open Water	M	102	956	426	1,484
Woody Wetlands	Xf	384	5,357	2,055	7,796
Emergent Herbaceous Wetland	Tp	1,038	787	788	2,613
Grassland/Herbaceous	Ts	319	86	447	852
Perennial Ice/Snow	Non-Wetland	2,619	3,013	3,615	9,247
Developed, Open Space					
Developed, Low Intensity					
Developed, Medium Intensity					
Developed, High Intensity					
Barren Land					
Deciduous Forest					
Evergreen Forest					
Mixed Forest					
Scrub/Shrub					
Pasture/Hay					
Cultivated Crops					
	TOTAL =	**4,462**	**10,199**	**7,331**	**21,992**

Totals by Ramsar Wetland Type (Hectares)	
Ramsar Classification for Wetland Type	**Hectares**
M	**64,679**
Xf	**33,463**

Tp	**9,272**
Ts	**1,830**
Non-Wetland	**13,113**
	TOTAL = 122,357

20. General ecological features:

This is a dynamic, diverse, and constantly evolving ecosystem, which has proven to be amazingly resilient after more than a century of increasingly heavy recreational use and industrial interventions, ranging from highway, railroad and bridge construction to channel maintenance, obstruction or snag removal, and construction of "wing-dams" to concentrate flow, as well as a series of navigation locks and dams to facilitate barge passage. Periodic droughts and floods constantly influence water depths and modify rates and patterns of plant growth.

Consequently, a continuing cycle of disturbance and recovery helps assure that portions of the area at different times of year have exposed sand or mud, vast beds of aquatic plants, or forests at different stages of succession, interspersed with and threatened by dense stands of invasive reed canary grass.

Submerged aquatic vegetation includes plants that grow below the surface of the water and are usually anchored to the bottom by their roots. Examples are wild celery *(Vallisneria americana),* water milfoil *(Myriophylum sibericum),* and sago pondweed *(Potamogeton pectinatus).*This group of plants generate dissolved oxygen, filter suspended material, stabilize bottom sediments, and cycle nutrients.

Submerged aquatics provide crucial fish habitat, provide substrate for invertebrate growth, and are important foods for mammals and migratory birds. They are most often found in backwater areas of low water velocity, adequate light penetration and relatively stable water levels.

Prior to locks and dams most species that are now present occurred in localized wetland pockets and channel border areas, but their group was not a major component of the floodplain vegetation community. Many aquatic areas dried up by the end of the summer growing season. At that time, floodplain forests dominated the river bottoms with hundreds of lakes and ponds scattered through the wooded areas. Wet meadows and hay fields were also present.

After inundation, the stabilized water levels created shallow and deep water wetlands that supported an abundance of submerged plants. The response by wetland fish and wildlife was phenomenal in its diversity and abundance. In the 1940s, refuge biologist, Bill "Doc" Green noted that he could find "two dozen species of submergent plants in a matter of minutes anywhere in the better marshes and aquatic beds."

Backwater sport fish and diving ducks utilize submerged plants extensively. Beginning in the 1960s and 1970s, river scientists and users noted declines in submerged (and emergent) vegetation cover in many pools. Factors included wind and wave action, poor light penetration due to highly turbid water conditions, sedimentation and filling of backwaters, major flooding events, and long term inundation with few drying periods.

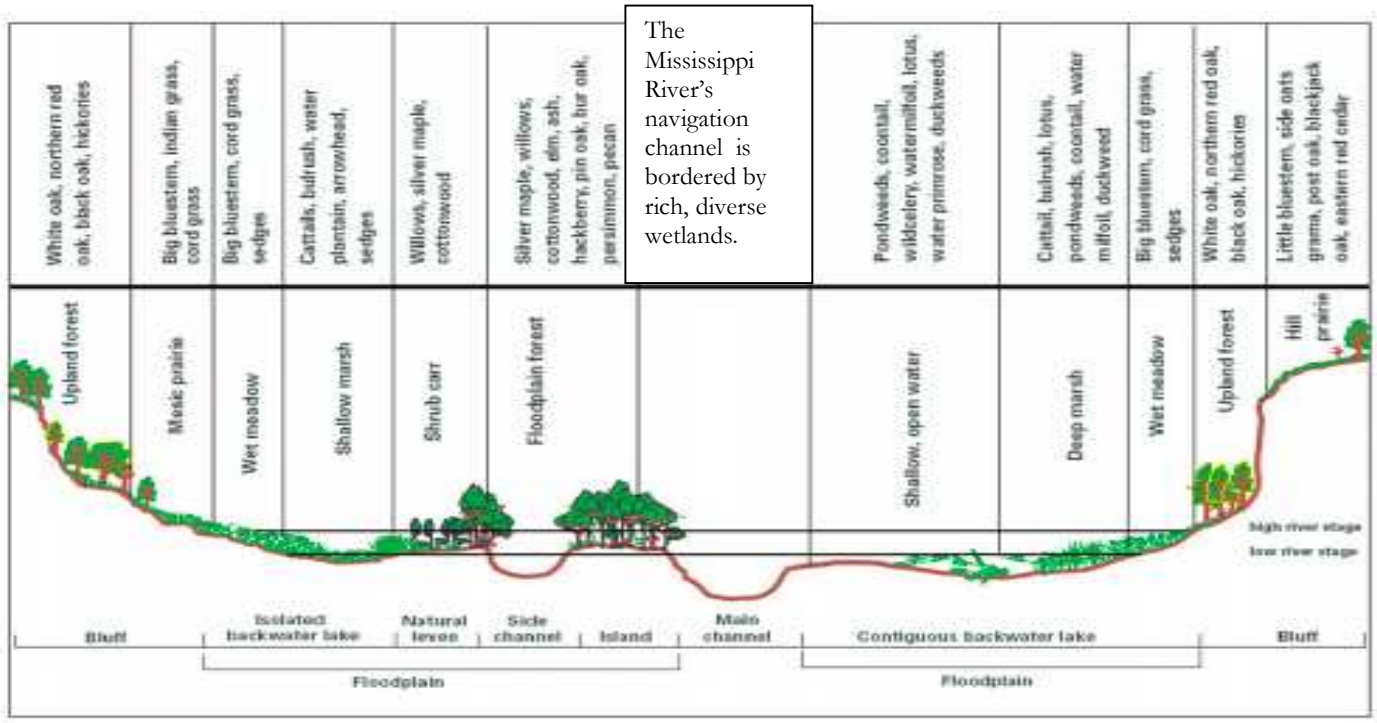
Due to these factors, there is an uneven distribution of submerged plants through the length of the site. Recovery of lost submerged plant beds has occurred naturally or through habitat rehabilitation projects in Pools 4, 5A, 7, 8, 9, and 13. More work is necessary in other pools to gain a more even distribution of aquatic plant growth and associated fish and wildlife.

Emergent aquatic vegetation (emergents) are plants whose roots are anchored under water with much of the plant extending above the water surface. They include coon cattail *(Typha latifolia),* river bulrush *(Scirpus fluviatilis),* giant reed grass *(Phragmites*

australis), bur-reed *(Sparganium natans),* arrowheads *(Sagittaria)* and wild rice *(Zizania).* They are backwater plants adapted to low water velocities and shallow- to deep-water marsh conditions.

Prior to the lock and dams, river bulrush was the most abundant marsh species and continues to be prominent today. Cattail was uncommon, as it is today on the floodplain. Bur-reed was common before inundation, became abundant soon after, but has since declined. The arrowheads were present before, but after became widespread and abundant, until suffering declines since the 1970s. The arrowheads (rigid and "duck potato") are important waterfowl and muskrat foods.

Generalized Cross-Section of Aquatic and Adjacent Terrestrial Habitats (see CCP Appendix for scientific names of plants):



The Mississippi River's navigation channel is bordered by rich, diverse wetlands.

21. Noteworthy flora:

Extensive beds of aquatic plants including arrowhead *(Saggitaria)* and wild celery *(Vallisneria)* provide tubers sought by tundra swans and canvasback ducks, respectively, during migration. Water lily (*Nymphea),* coontail *(Ceratophyllum),* lotus *(Nelumbo)* and a pondweeds (*Potamogeton)* provide nursery and foraging areas for a variety of native warm water fishes, including large-mouth bass, bluegill and others.

Extensive floodplain forests of silver maple *(Acer),* cottonwood *(Populus),* river birch *(Betula)* and willow *(Salix)* may flood for several weeks in the early spring to a depth of up to three meters without adverse effects, providing insect-rich early foraging areas for neo-tropical songbirds and nesting areas for both resident and migratory passerines, forest raptors and colonial nesting herons, egrets and cormorants *(Phalacrocorax auritus).*

In total, 591 plant species occur within the proposed site. 36 species are not indigenous to North American, and 15 of these are considered invasive.

22. Noteworthy fauna:

The proposed Ramsar site provides a resting, feeding and staging area for North American (N.A.) migratory waterfowl, shorebirds and wading birds - for example, aerial surveys during the fall migration have shown peak canvasback numbers to range between 245,000 to 346,000 birds during the six-year period of 2002 to 2007. This is 55 to 82% of the total counted during the interagency Coordinated Canvasback Survey for eastern North America. Similarly, tundra swan numbers range from 19,000 to 52,000 birds, or one quarter to one half of the eastern North American population. Lesser scaup (*Aythya affinis*), a species of concern because of declining populations, has registered peak numbers fluctuating from 55,000 to 144,000 birds during the same six year period.

Over 4,000 active great blue heron *(Ardea herodias)* and great egret (*Ardea alba*) nests have been recorded in about 14 colonies on the Refuge. There are no great blue heron population estimates available for the "Driftless Area" Ecologic Subregion (222L), which encompasses the Upper Mississippi River Wetlands, although suitable nesting areas in this biogeographic region are typically sited in wooded floodplains that are isolated from agricultural or urban development. Approximately 2,200 double crested cormorant (*Phalacrocorax auritus*) nests occur in six colonies on the Refuge. The proposed site is also known for its production of bald eagles *(Haliaeetus leucocephalus),* with up to 180 active nests in recent years. White pelicans *(Pelecanus erythrorhynchos)* began nesting here in 2007. Sandhill cranes *(Grus canadensis)* have also recently restored their local nesting status, and endangered whooping cranes *(Grus americana),* have begun to visit the area from propagation facilities at nearby Necedah National Wildlife Refuge. Neo-tropical migrant songbirds, either passing through the area or staying to nest, include many species of warblers, vireos, flycatchers, orioles, tanagers and thrushes.

Resident mammals include beaver (*Castor Canadensis)*, river otter (*Lontra canadensis)*, muskrat (*Ondatra zibethicus)*, mink (*Neovison vison*), long-tailed weasel *(Mustela frenata),* racoon *(Procyon lotor),* red fox *(Vulpes vulpes),* coyote *(Canis latrans),* skunk *(Mephitis mephitis),* as well as white-tailed deer *(Odocoileus virginianus),* cotton-tail rabbits (*Sylvilagus floridanus*), woodchucks *(Marmota monax),* squirrels and assorted bats, mice and voles.

Individual black bears*(Ursus americanus)* and timber wolves *(Canis lupus),* have been verified along highways bordering the Refuge – possibly venturing out from Necedah National Wildlife Refuge, about one hour to the east. Upper Mississippi River wetlands also provide habitat for at least ten kinds of frogs, a toad, three salamanders, nine turtles and thirteen snakes, including the massasauga rattlesnake *(Sistrurus catenatus catenatus)*, a candidate species for federal listing.

Unusual and noteworthy fishes include paddlefish, lake sturgeon, short-nosed garfish *(Lepisosteus platostomus)* and several new species of invasive Asian carp, including black carp (*Mylopharyngodon piceus)* which feed on plankton or native mussels. Of the 42 freshwater mussel species recorded from the Mississippi and tributaries area, several are threatened or endangered. Sport fish include walleye, northern pike *(Esox lucius*), large mouth bass, bluegill and others.

One federally endangered pearly mussel (Higgins' Eye*, Lampsilis higginsii)*) is known to still exist on the refuge. Propagation techniques using larval inoculation of host fishes are being tested, as part of a major mussel recovery effort. A major concern affecting the viability of native mussel beds is the invasive zebra mussel, *(Dreissenia polymorpha),* which attaches itself to the shells of native species by the millions and smothers them.

23. Social and cultural values:

Paleo-Indians were hunting big game, including giant bison and mammoths in this region at least 12,000 years ago, based on surface finds of fluted spear-point artefacts and bones. About 6,000 years of habitation by Archaic hunter-gatherers followed, with well established trade routes and distinctive natural-knoll burial practices. Approximately 3,000 years prior to European settlement, the Woodland tradition become firmly established throughout the area, with larger semi-permanent villages, horticulture, pottery and large mound burials. Early explorers and traders established contact with the descendants of this tradition, and the probable ancestors of the Eastern Dakota. Today, least three dozen tribes of the Chippewa, Sioux, Potawatomi, Ho Chunk and other tribes have cultural resources, sacred sites or traditional hunting, fishing or gathering grounds within this area. The Crow Creek band of Dakota, descended from the band of Chief Wapasha, return each year

from reservations in the Dakotas and Manitoba badlands to their ancestral home at Winona, Minnesota, which still bears the Dakota name meaning "first-born daughter."

Over the past 150 years, several generations of European-Americans descended from this area's first settlers and more recent arrivals have spent at least a portion of their lives also hunting, fishing, trapping, farming and gathering edible fruit and mushrooms in season from the area. Those who still take the traditions seriously are known affectionately as "river rats," and some of these self-taught naturalists still invest considerable time and energy educating young people about the values associated with outdoor experience and self-sufficiency. This they hold in common with their Native American counterparts, and a new organization called "The Diversity Foundation," has been established in Winona, Minnesota, to promote ongoing cultural exchange.

In post-settlement decades, entire white pine forests were logged and floated in enormous rafts down the Upper Mississippi to saw mills in the larger river towns. Today, hardwoods such as oak, ash and walnut are harvested, primarily from private farm lands. Trees harvested from the Mississippi floodplain to improve habitats for certain species of wildlife are usually less valuable - cottonwood, willow or silver maple. Generally, the limestone bluffs bordering the river are more forested than they were prior to and following European settlement. Natural fires and Indian burns, farmers clearing land for pastures and fuel wood, and early cash farming of wheat, and later corn and soybeans held back succession until conservation programs got started.

In the early 1900s, concern about loss of forests and declining migratory bird populations began to spread. President Theodore Roosevelt established the first National Wildlife Refuge at Pelican Island, Florida in 1903. The Migratory Bird Treaty Act became law in 1918, formalizing the Convention between the U.S. and Canada, later joined by Mexico. From the beginning, outdoor enthusiasts including hunters, fishers, hikers, campers and birders were instrumental in creating and supporting conservation programs, including the Upper Mississippi River National Wildlife and Fish Refuge, which was established in1924, thanks in large part to the lobbying efforts of the newly-formed conservation group that called itself the Izaak Walton League. Today, outdoor traditions on the Mississippi remain strong and coalitions of conservation organizations continue to support the refuge and proposed Ramsar designation of floodplain wetlands.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? YES (X)

i) This site provides a model of wetland wise use that demonstrates the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland. Uses range from commercial fishing, clamming, furbearer trapping and hunting.

ii) Specific areas along the Mississippi which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland are generally located off the floodplain of the river, and therefore are located outside of the area proposed for designation.

iii) However, local communities along the river continue to strongly value the ecological character of these wetlands, and their prehistoric relevance to indigenous peoples is interpreted at nearby centers, such as Effigy Mounds National Monument, administered by the National Park Service near McGregor, IA.

iv) Effigy Mounds (a Native American burial site) typifies a contiguous management area, with floodplains and wetlands at the mouth of the Yellow River, where relevant non-material values - including sacred significance - are interpreted through National Monument displays, programs and literature for local schools and visitors. Interpretive programs are designed to provide direct experience of river habitats and historic cultural values that encourage the maintenance of the ecological character of floodplain wetlands.

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24. Land tenure/ownership:

a) within the proposed Ramsar site in hectares: (100,365 federal and 21,992 state)

Refuge lands, as described in Comprehensive Conservation Plans, are federally owned and managed. Contiguous state-managed areas proposed for designation have their own conservation provisions which are implemented in close coordination and cooperation with the refuges.

b) in the surrounding area:

Beyond the floodplain boundaries of the proposed site, lands are either under local jurisdiction of county or municipal governments, or are in private ownership, usually individual, sometimes corporate.

25. Current land (including water) use:

a) within the Ramsar site:

Conservation takes precedence within the proposed site, on both federal and contiguous state-managed properties, although significant quantities and varieties of outdoor recreation and commercial navigation are permitted, often within spatial or temporal constraints in order to assure trust resource compatibility. Examples illustrating the range of recreational and commercial activities include pleasure boating, ice fishing, canoeing, duck hunting, grain or coal barge passage, foliage photography and bird watching.

b) in the surroundings/catchment:

The working landscape bordering the river consists of a very diverse mosaic of land covers and land uses. Much of the land overlooking the river, due to its scenic beauty, is dedicated to residential housing, with a steadily increasing portion under easement to prevent destruction of forests and damage to steep slopes. Communities increasingly capitalize on their historic quaintness, naturally fitted to the scenic surroundings. Antique shops, Amish bakeries, bicycle and canoe rentals, art galleries, flower gardens and bed-and-breakfast inns enhance the small town atmosphere of river communities, while contributing to economic vitality. Farmlands often include cattle on neatly fenced pastures, brightly painted buildings, woodlands and ponds constructed to control gully erosion, as well as cropped fields. Larger, more industrialized farms and cities tend to create larger and more noticeable impacts on the Mississippi River its backwaters.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

Prior to settlement, the Upper Mississippi River bottoms would flood seasonally in response to snow melt in spring or heavy rainfall from summer storms, carried to the river by tributary streams. The river consisted of a complex network of braided channels, wooded islands, swamps flooded by beaver dams, and prairies or wet meadows created by periodic fires during droughts or scouring during floods. The Native American people managed some areas with fire, grew some food crops, and travelled primarily on foot or by canoe.

To facilitate navigation following settlement, "wing dams" were constructed to concentrate flow and deepen the river's main channel. During the Great Depression of the 1930s, the Works Progress Administration and the Civilian Conservation Corps were used to construct the "lock and dam" system that impounded the river, creating a series of permanently flooded navigation pools. Both positive and negative ecological effects were noted, as a result of this human intervention. In the short term, many species of native waterfowl and fish flourished, as marshy habitats developed, peaked and began to decline. But within a half-century, the loss of productivity was becoming apparent, as open-water lakes lost submerged vegetation

beds due to high turbidity caused by suspended sediment, wind and wave action, and exotic carp feeding activity. Gradually, the marshy habitats became choked with sediment, as aquatic habitats were converted into terrestrial ones.

The destructive farming and other land development practices that became disturbingly evident during the "Dustbowl" years of the 1930s, led to nation's first soil and water conservation programs. However, these historic achievements have been gradually outpaced by continuing expansion of highways and industrial or residential construction, agricultural intensification, including ditched or tiled drainage networks, large-scale livestock confinement and feedlots, increased use of fertilizers, chemicals, and deteriorating sewage systems. These and other impacts, collectively and cumulatively, have contributed to increased downstream flooding, sedimentation, stream bank erosion, habitat degradation and water quality deterioration – even as far away as the hypoxic "dead zone" in the Gulf of Mexico.

Cooperative conservation partnerships, originally piloted in the 1930s, have been recently expanded to help restore the functionality of watersheds surrounding selected tributary streams, but progress is slow. The system of locks and dams that was constructed during the 1930s to sustain commercial navigation on the Upper Mississippi, provided jobs and wages for displaced farmers and factory workers employed by the Works Progress Administration. But these aging dams and reservoirs continue to trap sediment, gradually filling in the lush marshes that were formed after lock and dam construction was completed. Recent legislation provides significant funding for environmental protection and enhancement, to be implemented in concert with navigation system improvements. New provisions of the Farm Bill, updated every 7 years by the U.S. Department of Agriculture, provide incentives for comprehensive conservation planning and a wide array of voluntary conservation practices.

As climate change brings about shifts in vegetation and farming patterns, it is expected that presently adequate rainfall patterns may become less adequate for some forms of agricultural production, base flow of steams may be reduced and water temperatures may rise. This could affect trout populations, as both drought and flood events may become more extreme. Recreation and tourism could suffer, as habitats change and species are forced to move or leave altogether.

Another concern has been the accelerating spread of invasive species, including both terrestrial and aquatic plants such as garlic mustard (*Alliaria petiolata)* and purple loosestrife (*Lythrum salicaria)*, fish such as the Asian black carp (*Mylopharyngodon piceus*), and invertebrates such as the zebra mussel (*Dreissena polymorpha)* and the invasive snail (*Bithynia tentaculata),* which carries a trematode parasite that causes waterfowl mortality.

b) in the surrounding area:

Wetland drainage has affected 10.5 million ha in the Mississippi River Basin. An estimated 34 to 85 percent of wetlands have been lost in Wisconsin and Minnesota and 85 to 95 percent in Iowa and Illinois. These losses are critical because wetlands help regulate hydrology (water movement to tributaries), filter nutrients from the water, and sustain highly diverse plant and animal populations.

Changing climate and more extreme weather patterns have combined with land use concentration and intensification to create increasingly devastating, and at times deadly, runoff and flood events. These cause infrastructure destruction, loss of life and property, erosion, sedimentation and nutrient runoff, as well as habitat loss on up-gradient private and down-gradient public lands. The most recent and locally damaging series of storms occurred from August 18-21, 2007, when over 17 inches (.43 meters) of rain caused a number of streams in the Winona area to overflow banks, wash out bridges, and flood many communities and farms. In June, 2008, Northeast Iowa's cities, towns, farms and wild bottomlands suffered even more extensive damage. Such events. exceeding historic precedents, suggest that a more preventive, precautionary and ecological approach to land management would be appropriate.

Initial pilot watershed partnerships undertaken the mid-1930s and mid-1980s on Coon Creek and the Whitewater River, respectively, have served as working models for subsequent watershed projects and basin alliances that currently cover most of the larger drainages in the adjoining states. Growing concerns over hypoxia in the backwaters and the Gulf of Mexico, the impact of expanded corn production for ethanol manufacturing, and the need to sequester carbon on wild or

permanently re-vegetated lands are leading the way toward more sustainable farming systems and better integrated communities and lifestyles.

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27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

Most of this proposed Ramsar site's boundary coincides with the boundaries of the Upper Mississippi River National Wildlife and Fish Refuge and Trempealeau National Wildlife Refuge, federally protected areas administered through the U.S. Fish and Wildlife Service. The contiguous federal or state-managed lands are afforded similar, permanent protection. There is no international designation at present, other than informal recognition of the refuge as a regionally and continentally "Important Bird Area," by the American Bird Conservancy and the National Audubon Society.

b) If appropriate, list the IUCN (1994) protected areas categories which apply to the site (tick the box or boxes as appropriate):

Three of the IUCN categories listed for protected areas currently apply, though no formal designations have been made:

IV. Habitat/Species Management Area
V. Protected Landscape
VI. Managed Resource Protected Area

By law, the protected status of this area is conditioned upon continued commercial and recreational use, under clearly established compatibility guidelines consistent with internationally defined wise use principles.

c) Does an officially approved management plan exist; and is it being implemented?:

Comprehensive Conservation Plans (15 year) for the Upper Mississippi River National Wildlife and Fish Refuge and Trempealeau National Wildlife Refuges were approved in 2006 and 2008, respectively, following extensive public review processes. Step-down management plans for specific activities such as hunting and trapping, as well as detailed multi-agency Pool Plans, are also either currently available or are under development/revision to provide additional context and more detailed implementation guidelines.

The Comprehensive Conservation Plan (CCP) for the Upper Mississippi River National Wildlife and Fish Refuge recommends Ramsar designation. See the last paragraph of CCP page 13 – see Item 34 below.

d) Describe any other current management practices:

The conservation partners managing Upper Mississippi River Wetlands have generally adopted an ecosystem approach, which strives to protect, restore and enhance populations of trust species and habitats; restore natural ecosystem processes, including hydrology and sediment transport, to maintain species and habitat diversity; promote awareness of the ecosystem and its needs, with emphasis on sustainable land use; identify water quality problems affecting native biodiversity; and reduce conflicts among users and uses that adversely impact trust resources.

Activities undertaken through a variety of agencies, programs and projects, aim to maintain the boundary integrity of the management area through enforcement and acquisition; to protect the surrounding "bluff lands" and watersheds through cooperative conservation and educational outreach; and to cooperatively monitor and manage essential wetland habitats.

In addition, the Upper Mississippi River System Environmental Management Program (UMRS-EMP), a Federal-State partnership funded through the U.S. Army Corps of Engineers, helps restore and monitor the natural resources the river system through the Habitat Rehabilitation and Enhancement Program, the Long-Term Resource Monitoring Program and the Computerized Inventory and Analysis System. See comments under #28 below on NESP .

In total, 591 plant species occur within the proposed site. 36 species are not indigenous to North American, and 15 of these are considered invasive. These are aggressive species that adversely affect native species and habitats. Efforts are underway to monitor the spread of invasive organisms, and to implement biological and other control methods designed to prevent or mitigate habitat impacts. Various control techniques have been applied or are being tested, as described in the table below.

Invasive plants and their control on Upper Mississippi river refuges:

Plant Name (Native or non-native)	Scientific name	Control method	Comments
Purple loosestrife (non-native)	*Lythrum salicaria*	Biological control (*Galerucella* beetle and *Hylobius* weevil); pulling, herbicide (glyphosate); exchange program	Large-scale, refuge-wide problem. Biological control is effective.
Eurasian milfoil (non-native)	*Myriophyllum spicatum*	Public education to prevent spread to other bodies of water	Wide-spread, but not considered a major threat to aquatic habitats
Spotted knapweed (non-native)	*Centaurea maculosa*	Mowing	Increasing problem in Sand prairies
Garlic mustard (non-native)	*Alliaria petiolata*	Pulling	Widespread in shady upland habitats
Reed canary grass (native and non-native ecotypes)	*Phalaris arundinacea*	Mats around Rpm trees; mowing; herbicide	Wide-spread problem; threat to forest regeneration
Crown vetch (non-native)	*Securigera varia*	mowing	Widespread
Siberian or Chinese elm (non-native)	*Ulmus pimila*	Cutting; herbicide (Triclopyr)	Localized problem
Honey locust (native)	*Gleditsia tricanthos*	Cutting; herbicide (Triclopyr)	Localized problem
European (common) buckthorn (non-native)	*Rhamnus cathartica*	Cutting; herbicide; pulling	Widepsread
Leafy spurge (non-native)	*Euphorbia esula*	Biological control; pulling	Localized problem
Black locust (native, imported from Appalachia and the Ozarks)	*Robinia pseudoacacia*	Cutting; herbicide	Localized problem
Bush Honeysuckles (non-native)	*Lonicera tatarica* and others	Pulling; cutting	Localized problem
Japanese Bamboo (Japanese knotweed)	*Polygonum cuspdatum*	Pulling; grubbing roots; herbicides	Localized problem

One federally endangered pearly mussel (Higgins' Eye*, Lampsilis higginsii)*) is known to still exist on the refuge. Propagation techniques using larval inoculation of host fishes are being tested, as part of a major mussel recovery effort. A major concern affecting the viability of native mussel beds is the invasive zebra mussel, *(Dreissenia polymorpha),* which attaches itself to the shells of native species by the millions and smothers them.

To offset the steep decline in habitat value for key species, multi-agency cooperative research and management efforts have been undertaken over the past 30 years to create an ecological information baseline, assess damages and undertake programs and projects designed to sustain wetland functions and values. The Long Term Resource Monitoring and Environmental Management Programs helped accelerate planning and implementation of a variety of habitat restoration projects ranging from island replacement to pool-wide draw-downs of water levels to stimulate widespread emergent and submerged plant growth. This work is expected to accelerate under new funding initiatives.

In the future, these pilot habitat efforts on the Upper Mississippi River will be further refined and expanded.

28. Conservation measures proposed but not yet implemented:

Long-range **Environmental Pool Plans** have been developed by refuge staff and resource management partners, with public consultation to reach consensus on a 50-year vision for optimal management of land and waters surrounding each of the navigation impoundments within the refuge.

The **Navigation and Ecosystem Sustainability Program (NESP)** is a long-term program of navigation improvements and ecological restoration for the Upper Mississippi River System (UMRS) over a 50-year period that will be implemented in increments through integrated, adaptive management. This interagency effort will help address basin-wide needs.

29. Current scientific research and facilities:

The Upper Midwest Environmental Science Center (UMESC) of the U.S Geological Survey, a sister agency of the U.S. Fish and Wildlife Service in the Department of the Interior, serves as the research arm and data repository for the Upper Mississippi River, the refuge, and future Ramsar wetlands.

A full array of current research activities, ranging from developing biodiversity indices to conducting long-term monitoring activities of field offices on the Mississippi River in each of the bordering states, can be viewed at the web site: <umesc.usgs.gov>

In summary, these research activities range from studies of river ecology, contaminants and restoration of degraded habitats to research on declining groups and species, invasive exotic organisms and decision support systems. Specifically the Long-Term Resource Monitoring Program engages in studies of bathymetry, macroinvertebrates, vegetation, fish, wildlife and water quality.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

A refuge-wide "Friends," or citizen-support organization, with multiple chapters and hundred of members in each of the adjoining states, helps organize and carry out a variety of educational, interpretive and concession activities, in connection with special events, and in support of ongoing conservation projects.

Refuge public services staff specialists (3), plus additional interns and seasonal volunteers, are available at multiple locations throughout the year to provide information services, educational outreach to schools, interpretive signs, print materials and media designed to reach the diverse audiences of outdoor enthusiasts who visit and learn from wetland habitats each year.

Visitor facilities include designated diving routes, canoe routes and hiking trails, boat and canoe launch areas with parking and informational kiosks, and visitor contact facilities provided within the four UMR Refuge district offices and at the headquarters of Trempealeau National Wildlife Refuge.
Because most refuge lands are bordered by major highways offering scenic views, interpretive signs are the primary method of interpretation. A total of 66 interpretive signs are used along the National Scenic Byways, biking and walking trails, and overlooks. In addition, another 66 multi-paneled kiosks are provided at access points, and 30 official notice boards provide regularly updated regulations and other pertinent information.

Educational materials provided to local schools range from books and posters to videos and learning trunks with curriculum supplements and specimens, available on lean. In addition, staff assists other agencies and organizations with special events ranging from Birding Festivals to annual Refuge Week, to the Upper Mississippi River Festival. Each year, and average of 6,000 teachers and students participate in on and off-site educational activities and programs.

31. Current recreation and tourism:

Approximately three million visits occur each year on refuge lands and waters. Boating, camping and beach-related uses account for approximately 40 percent of total visitors. Actual numbers are uncertain because there are hundreds of public and private, urban and rural, points of entry along the Upper Mississippi River. Tourists seasonally observe and photograph wildlife and scenery from dozens of uncontrolled roadside observation points. Perhaps a million visitors fish from boats or river banks during warm months and through the ice in winter. Hunter visits to the refuge exceed one-quarter million each year, with 87 percent of them in pursuit of waterfowl.

32. Jurisdiction:

The United States Government owns refuge lands on the Upper Mississippi in states of MN, WI, IA, and IL.
The Department of the Interior, U.S. Fish and Wildlife Service, is the managing agency of the refuge, operating under a cooperative agreement with the U.S. Army Corps of Engineers (ACE). Contiguous state-managed wetlands included in this proposal for designation are managed by the respective Departments of Natural Resources (DNR) and Effigy Mounds National Monument of the National Park Service (NPS). Refuge headquarters and district office staffs consult continuously as needed with state DNR staffs and federal agency (ACE, NPS, etc.) staffs on regulations and management issues.

33. Management authority:

Donald Hultman, Refuge Manager
Upper Mississippi River National Wildlife and Fish Refuge
U.S. Fish and Wildlife Service, Department of the Interior
51 East 4th Street, Winona, MN 55987

34. Bibliographical references:

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A River That Works and a Working River

A Strategy for the Natural Resources of the Upper Mississippi River System
Written and Edited by Dan McGuiness
Upper Mississippi River Conservation Committee http://mississippi-river.com/umrcc/

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