

Chapter 2

Project Setting, Factors Influencing Management, & Development

2.1. INTRODUCTION

Public Lands

The Rock Island District within the navigation impoundments of the Mississippi River administers over 55,000 acres of public owned lands. These areas include wetland communities in the floodplain along the banks of the navigation pools and islands. The U.S. Fish & Wildlife Service (USFWS), Iowa Department of Natural Resources (IADNR), Illinois Department of Natural Resources (ILDNR), and Missouri Department of Conservation (MDC) partner with the Corps to manage significant portions of these lands for conservation, maintenance and management of fish and wildlife under General Plans and associated Cooperative Agreements. Additional lands are leased to other agencies, municipalities, and other entities for recreation and other uses.

Prior to and during construction of the 9-foot channel project, the United States Government acquired fee title to approximately 93,600 acres of river lands as part of the navigation project. Since acquisition of land and establishment of the 9-foot channel, many physiographic changes have occurred along the river. The maps accompanying the Master Plan reflect such changes, and have been developed from the most accurate data available. Acreage figures, given in the following chapters, have been calculated from these maps for recreational and general land use planning only and should not be considered accurate for legal purposes.

Public Waters

Navigational Servitude is defined by 33 CFR Ch. II, Part 329 as the “constitutional power given to the federal government to regulate navigable waters” for the purposes of improving and regulating navigation. It includes submerged lands and water flowing over them and also pertains to all lands below the ordinary high water mark of a navigable river. Servitude is a concept of authority, not of property and expresses the notion that the right of the public to use a waterway supersedes any claim of private ownership.

The Mississippi River Project within the navigation impoundments of the Mississippi River includes over 161,000 acres of Project waters.

Shoreline

Shoreline areas and islands under federal fee ownership provide numerous recreational opportunities available on the navigation pools. This includes providing recreation areas managed by the Corps, other agencies, commercial concession, and other entity. The Project, because it was constructed before 1975, also includes allowance for privately owned recreational structures on Project lands in specified areas such as cottage lease sites and Shoreline Management limited development areas. 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 master plan.

Flowage Easement

Approximately 12,131 acres of flowage easement rights were purchased by the Government during the original acquisition which restrict certain private use and development activities. More details on flowage easement are provided in Chapter 2 page *** and Chapter 4.

2.2. DESCRIPTION OF NAVIGATION POOLS

The principal engineering feature of the project is a system of locks and dams spaced at irregular intervals dependent on the slope of the river, the location of major population centers, and the navigation approach to the locks. Twelve locks and dams are located, operated, and maintained within the Rock Island District. In addition, there are roughly 1,200 channel regulating structures, such as wing dams, that are also an integral part of the navigation infrastructure.

The dams on the Project are single purpose navigation dams built to provide 9-foot depths for river traffic at low water with the exception of Dam No. 19. The Mississippi River navigation dams have movable gates with the concrete gate sill on the bed of the river. During low flows, the movable gates are in the water and have only two or three foot openings between the bottom of the gates and the gate sill on the bed of the river. No. 19, at Keokuk, was built by a private power company for power generation. Dam No. 19 is a high sill dam that utilizes lift gates which are opened to pass excess river flow at times when the flow exceeds the capacity of the electrical generating water turbines.

The navigation dams, in general, are operated to maintain a constant pool elevation, or stage, at the dam or other designated location during low and medium low flows. They are not designed for flood storage. *Table 2-1* summarizes information for the 12 navigation pools under the management of Mississippi River Project.

Table 2-1. Principal Features of the Navigation Pools 11-22 on the Mississippi River.

Pool	Length of Pool (mi)	Pool Surface Area (ac)	Drainage Area (sq mi)	Original Acquisition	Current Fee Title (ac)	GP Lands (ac)	Total Shoreline (mi)	Federal Shoreline (mi)	Monumented Boundary(mi)
11	32.1	19,613	81,600	9,514	4,809	4,308	312	170	50.9
12	26.3	10,500	82,400	8,489	5,865	4,291	280	203	33.9
13	34.2	29,103	85,500	25,285	10,233	7,632	503	274	78.1
14	29.2	10,450	88,400	6,615	5,100	4,480	277	151	28.8
15	10.2	3,740	88,500	9			38	7	0
16	25.7	12,047	99,400	7,005	4,746	2,610	231	49.5	41.1
17	20.1	8,312	99,600	11,379	7,039	7,476	202.5	178.2	21.8
18	26.6	16,300	113,600	12,315	9,879	5,380	279	249	57.6

19	46.3	30,845	119,000	2.88	2.88	0	248	0	0
20	21.0	7,542	134,300	236	178	0	93	5.25	6.7
21	18.3	6,350	135,000	8,627	8,450	6,028	146	121	29.4
22	23.7			6,183		5,296			43.7

Within the Rock Island District the main locks have a clear chamber width of 110 feet and are 600 feet in length, except for lock No. 19, located at Keokuk, Iowa, which has a clear width of 110 feet and a length of 1200 feet. Also, an auxiliary lock with a clear chamber width of 110 feet and a length of 360 feet is located parallel and adjacent to the main lock at lock No. 15. The LeClaire Lock built originally as part of the 6 foot Channel Project is utilized as an auxiliary lock at lock No. 14 and has a chamber width of 80 feet and a length of 360 feet. *Table 2-2* summarizes the Project navigation facilities and infrastructure.

Table 2-2. Principal Features of Locks and Dams 11 to 22 on the Mississippi River.

Lock(s)	Main Lock Chamber Dimensions (ft)	Auxiliary Lock (ft)	Gate (#, Width in ft)	Gate type(s)	Non-Overflow Dike (ft)	Overflow Dike (ft)	Year Placed in Operation
11	110x600	n/a	4-20'X80' 8-20'X40'	Roller & Tainter	3400 ft	none	November 1937
12	110x600	n/a	7-20'X64' 3-20'X100'	Tainter & Roller	2- No Foot amount available	3- No Foot amount available	1938
13	110x600	n/a	10-20'X64' 3-20'X100'	Tainter & Roller	3- No Foot amount available	3- No Foot amount available	1939
14	110x600	80x370	13-20'X60' 4-20'X100'	Tainter & Roller	None	1- No Foot amount available	1940
15	110x600	100x360	11-100'	Roller	None	None	1934
16	110x600	n/a	15-20'X40' 4-20'X80'	Tainter & Roller	None	1-No Foot amount available	1937
17	110x600	n/a	8-20'X64' 3-20'X100'	Tainter & Roller	1- No Foot amount available	2- No Foot amount available	1939
18	110x600	n/a	14-20'X60' 3-20'X100'	Tainter & Roller	1- No Foot amount available	3- No Foot amount available	1937
19	110x1200	n/a	119	No Info	No Info	No Info	1913- Private 1957 – Lock
20	110x600	n/a	3-20'X60' 40-20'X40'	Tainter & Roller	No Info	150 ft	1935
21	110x600	n/a	10-20'X64'	Tainter &	None	3- No Foot	1939

			3-20'X100'	Roller		amount available	
22	110x600	n/a	10-20'X60' 3-25'X100'	Tainter & Roller	None	3- No Foot amount available	1939

2.3. RIVER HYDROLOGICAL CHARACTERISTICS

The Mississippi River tends to meander as it flows downstream. This meandering creates havoc with the navigation channel which must be maintained at a nine-foot depth. This happens most often where side channels are already in existence. The river, having traveled for years on one side of a grove of trees or small sandbar begins to flow heavier on the other side of the land area. If allowed to continue, the current will eventually be diverted from the main channel which will fill with sediment. Ultimately a new channel is formed.

The river also tends to cut new channels in areas where it makes sharp turns. In places where the current hits a protruding river bank, it begins to wear down the exposed bank eventually forming a side channel and much later a main channel.

Pooled River

Early in the twentieth century, Congress directed the Corps to design and construct a series of Locks and Dams to provide safe and efficient transportation via a dependable navigational channel.

Before the Corps built the lock and dam system on the Mississippi, navigation on the river was intermittent. During low-flow periods, the river had many shallow reaches which limited or curtailed water transportation on the Upper Mississippi River. The low river depths not only limited river navigation, but also limited recreational development.

Extensive work by the Corps since the 1930s has allowed for the integrated system which utilizes the resources of the Mississippi, Illinois, and Ohio Rivers for transportation. For over 60 years, this river transportation system has had the desired result of providing a safe and dependable navigation system and has also provided various other benefits as well.

The locks and dam system has been operated successfully since the dams went into operation mostly around 1940. From St. Anthony Falls, MN, to St. Louis, the Mississippi resembles a downward staircase with each of the steps represented by a navigation pool. The locks which accompany the dams allow river traffic to “step” from pool to pool. Regulation of the pool levels is a major responsibility of the Corps.

A portion of the land parcels purchased by the federal government along the river are submerged (below normal pool levels) as a result of construction and operation of the navigation project. Erosion has also led to the reduction of some of the islands and riparian areas.

In the middle and upper parts of the pools, some islands were created after the lock and dams were implemented. Some of these “new” islands were created through sedimentation/accretion.

Mississippi River within the Project

From river mile 614.0, the upper limit of the Rock Island District, to Muscatine, IA, mile 455.4, the course of the Mississippi River is through a comparatively narrow valley bordered by wooded hills and bluffs and affording picturesque scenery. Throughout the lower portion of the District, from Muscatine, IA, river mile 455.4, to Saverton, MO, river mile 300.5, the valley is generally wide and flat with extensive flood plain lands utilized for agricultural purposes. A system of levees provides flood protection to a major portion of these floodplain lands. Lands which were acquired in connection with the navigation project consist, for the most part, of a strip of land along each bank along with the islands or portions of islands in the river. In several instances all or portions of certain drainage districts were also acquired. Such lands are, in general, subject to overflow by the operation of the navigation pools and virtually all are subject to direct flooding during natural high water stages of the river. The river follows a meandering course with wide, sweeping bends. Its most important flow characteristics are the relatively regular annual cycles, and the infrequency of sudden rises of any magnitude.

Annual River Discharge

The long term average annual hydrologic pattern on the UMRS is one of high river flows in the spring followed by a low summer flow followed by an increased flow in fall and a low flow in the winter. On average the Mississippi River at Rock Island shows the highest mean discharges in April and May and the lowest discharge in December and January. Variations in precipitation, topography, regulation, flood control works and land use practices cause fluctuations in discharge.

2.4. SEDIMENTATION AND SHORELINE EROSION

Banklines 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 bankline along the fast moving side of the river is exposed to the current, scouring and eroding the bank. The river bank 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 bankline stability.

In more recent years (1998-2009), most of the stations within the Mississippi River Basin (MRB) have continued to show downward changes in suspended sediment loads, concentrations, and stream flows, although not statistically significant (Heimann et al, 2011).

Historically, the use of dikes to maintain a navigational channel and the resulting sediment build up assisted in narrowing the channel. Today, river engineering techniques are employed to achieve navigation objectives without the buildup of sediment through modification of the navigation structures. However, even without the use of various river training structures, sedimentation is a naturally occurring phenomenon and is primarily managed through the use of dredging in many stretches of the river.

According to a USDA-NRCS study conducted from 2003-2006, agriculture covers 52% of the UMRB with most of it being in corn or soybean production. Approximately 2.8 million acres of cropland in the UMRB is in CRP (Conservation Reserve Program; 69% of which is highly erodible land). Within this program participants are required to plant grasses, trees, or wildlife habitat on the previously cultivated area. Within the basin 96% of all cropped acres apply management and/or structural practices to reduce erosion. Forty-five percent of all agriculture within the basin control water erosion with structural practices and 28% use no till practices (USDA-NRCS, 2012).

2.5. WATER QUALITY

Non-Point Source Pollution

Erosion of the streambanks and islands is a natural process within the river system. Due to human development within the floodplain over the last 200 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 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 the source is off Project lands. Agricultural runoff can introduce tremendous amounts of sediment, nitrates, and phosphorus into the river system. The runoff from various agricultural, residential, and industrial practices add point and non-point pollutants into the system, which has effects on turbidity, dissolved oxygen and other water quality parameters which in turn affect the aquatic habitat and other uses of the water. Some of these chemicals settle out and are incorporated into the bottom substrate. Other chemicals join the water column and course down the Mississippi to the Gulf of Mexico.

Point Source Pollution

Point source pollution discharges are not as prevalent as they were forty years ago. The development of the National Pollution Discharge Elimination System (NPDES) was a major advancement. The Clean Water Acts created the NPDES permit system which regulated industrial and municipal discharges. This did not totally eliminate point source problems but did greatly reduce the impacts to the quality of the water and sediment within the river system.

Environmental Spills

Many potential sources of spills exist throughout the river system, 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 (UMRBA, 2006). In addition, it describes resources available for responding to a spill. Hazardous material with the highest bulk movement and thus highest probability for a spill are chemicals, chemical products, fertilizer, petroleum products and coke petroleum pitches.

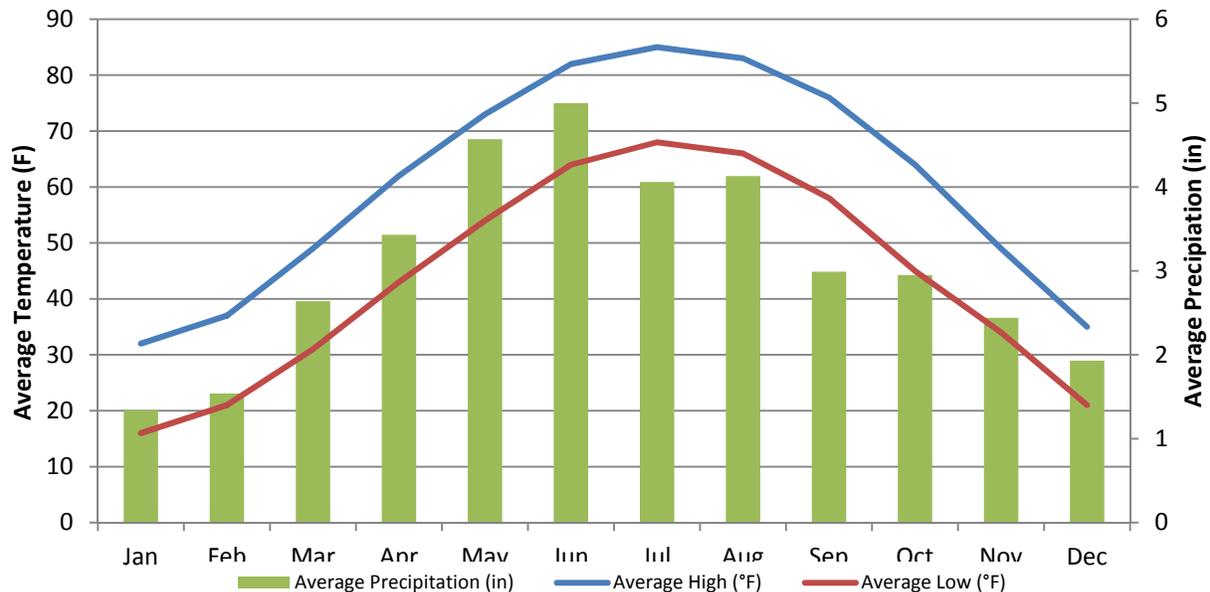
2.6. CLIMATE AND WEATHER

The Project is located at approximately Latitude 39 to 42.5E north and Longitude 90 to 91E west. The topographic relief within the region has limited influence on climatic conditions. Continental climatic conditions prevail in the Project because of its latitudinal and interior location. The region has four distinct seasons without the undue hardships of prolonged periods of extreme high or low temperatures.

Table 2-4. Climate Averages at Quincy, Rock Island, and Dubuque, 1981-2010 (<http://www.usclimatedata.com>).

	Quincy, IL	Rock Island, IL	Dubuque, IA
Average High Temperature	63.1 F	60.6 F	56.4 F
Average Low Temperature	43.8 F	43.4 F	38 F
Average Temperature	53.45 F	52 F	47.2 F
Average Annual Precipitation	36.74 in	37.02 in	36.33 in
Average Annual Snowfall	-	-	42 in

Figure 2-11. Average Monthly Temperatures for Rock Island, IL from 1981-2010 normal (<http://www.usclimatedata.com/climate.php?location=USIL1011>).



2.7. TOPOGRAPHY, GEOLOGY, & SOILS

There were four main events in the geologic history of the study area, which account for the bedrock distribution, structural features, and the surface materials found in the uplands and alluvial valleys.

Sedimentary rock units, some 4,000 to 5,000 feet thick, were deposited over Precambrian extrusive and intrusive igneous rocks by alternate inundation and regression of semitropical or tropical seas. The marine phases were the most persistent.

During the Paleozoic Era, the area to the east of the Mississippi River began to subside. A spoon-shaped depression was formed which became the Illinois Basin. Thus, the rock which comes to the surface at Alton is several thousand feet under the surface in Central Illinois. Also, during the Paleozoic Era, the Ozark dome began to rise and the Lincoln Fold was formed.

Beginning during the Pleistocene Epoch or Ice Age, about one million years ago, great continental ice sheets moved into the mid-latitudes of the United States, and the Midwest was overrun by a series of glacial phases known as the Nebraskan, Kansan, Illinoian, and Wisconsinan glaciers. The last glacial phase, the Wisconsinan, receded approximately 12,000 years ago. These glaciers deposited drift on the uplands and filled the alluvial valleys with outwash.

During and after the Wisconsinian period, dry winds dominantly from the west, blew across exposed glacial outwash in the Mississippi, Illinois and Kaskaskia valleys. This lighter weight material was carried eastward and deposited loess on the upland part of the region. Loess is the parent material for most of the present soils on the upland part of the region.

During the Holocene Stage (recent), the upland surface has been eroded and modern soils created. The age of the surficial bedrock is Ordovician to Cretaceous and is overlain with a mantle of younger Pleistocene and Holocene drift and soils. In the alluvial valleys, some of the valley fill has been scoured away and subsequent river changes and flooding have created the present day floodplain morphology and alluvial soils.

Geomorphology

The present day geomorphology of the Upper Mississippi River valley is a result of water, wind and ice over time acting under gravitational forces to sculpt the river, floodplain and valley walls. During the last two hundred years human settlement and development in the river valley has further affected the morphology of the river and floodplain.

Soils

Soils of the project lands are, generally, first bottom soils originating from alluvial deposits and almost all are subject to inundation during periods of high water. During these periods, erosion or deposition of material may produce soil changes which are dependent primarily on the elevations of the various areas, the duration of inundation, and sediment load. Detailed soil analyses for inclusion herein are considered impractical. For the purpose of this Plan soils resources have been classified into two broad groups: riverwash and alluvial. Stability of the land and frequency of overflow are the major criteria in distinguishing between these groups.

Areas formed from recent deposits of fine and coarse water-borne materials are classified as riverwash, and cannot be regarded as true soil because of the heterogeneous mixture of materials. In some locations sand bars are formed, while in others mudflats develop. Such areas are very

unstable and high water may change or completely remove the existing deposits. Although sparse growths of grasses and native woody plants may develop on some of the better sites, no direct management other than planned dredging and dredge-spoil disposal of these materials will be practiced.

Although distinct soil types exist, this general classification is considered adequate for the purpose of the Plan. Varying more in their capabilities than the riverwash type, some alluvial soils are low in fertility while others are capable of supporting a wide variety of vegetation. More stable than riverwash soils and less susceptible to overflow, such soils vary in texture and drainage. However, the susceptibility to overflow overrides the properties limiting their true potentials. Soils of this type support considerable native vegetative growth and generally are suitable for development as public recreational sites.

Management of project soils will be effected indirectly through management of forest, wildlife, and recreational resources. Susceptibility to overflow and change resulting thereby, limited access, and relatively small areas, make a management program impractical for the soils resource exclusively. Channel maintenance dredge spoil will be placed, when feasible, to improve or expand existing recreation sites or areas scheduled for future development.

2.8. RESOURCE ANALYSIS (Level I and II Inventories)

The Corps environmental stewardship responsibility is to manage, conserve, and protect this natural resource for sustained use by future generations. Natural Resource inventories are required on Project lands and waters to provide quantitative and qualitative data for use in determining resource management needs. There are two types of inventories: Level One and Level Two.

The Level One inventories are general in nature and are conducted to provide baseline general plant and animal information. Inventories are conducted to determine acreage of dominant vegetative types (*Table 2-6*), wetlands (*Table 2-7*), soil types, land use capabilities, and presence of special status species and their critical habitat occurring on Project lands and waters. A Level One inventory was completed using available information from a variety of sources, such as USGS maps (LTRM), county soil surveys, USFWS information, aerial photography, Corps real estate maps, project planning and design memorandums, and state DNR resource information in 2011.

The Level Two inventories are prepared in support of the resource objectives and/or land use classifications and are generally more detailed or specific. These inventories are required for the effective development, execution and evaluation of specific natural resources management prescriptions. The Mississippi River Project has conducted inventories for forest habitat, wetland habitat, and some endangered species, Level Two inventories for habitats and endangered species still require continual collection to update to current conditions as required for decision making needs. Completion of these inventories are a funding priority of the

		Area Acreage
Pool	11	
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2.8.3 Threatened & Endangered Species

The 1973 Endangered Species Act (Act) states that all federal departments and agencies shall seek to conserve endangered (E) and threatened (T) species and shall utilize their authorities in furtherance of the purposes of the Act. 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.

The USFWS is the lead agency administering and enforcing the Act here in the Midwest. It is the policy of the Corps that all Project lands and waters will be managed in a manner which assists in the overall conservation of federally-listed endangered and threatened 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 which 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. Corps personnel will cooperate in the management of state-listed and protected species where feasible.

Endangered Species Recovery Plans shall be followed to protect and conserve federally listed species or their critical habitat on Project administered lands and waters. Recovery plans will be reviewed and assessments made of potential Project natural resource management actions identified in each recovery plan, including a determination of reasonableness for each action and incorporation into Operational Management Plans.

Federal Threatened and Endangered Species

Nineteen species (plant and animal) have been determined to be potentially occurring within the floodplain or spending a portion of their life within the river or adjacent habitats and are designated as endangered, threatened, or candidate under the authority of the 1973 Federal Endangered Species Act. These species are listed in the table .

Common Name	Scientific Name	Federal Status	Listed in One or More Counties* Located in Project Area			
			WI	IA	IL	MO
Indiana Bat	<i>Myotis sodalis</i>	Endangered		X	X	X
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened	X	X	X	X
Gray Bat	<i>Myotis grisescens</i>	Endangered			X	X
Least Tern	<i>Sterna antillarum</i>	Endangered				X
Piping Plover	<i>Charadrius melodus</i>	Threatened				X
Red Knot	<i>Calidris canutus rufa</i>	Threatened				X
Higgins Eye (pearlymussel)	<i>Lampsilis higginsii</i>	Endangered	X	X	X	X
Sheepnose Mussel	<i>Plethobasus cyphus</i>	Endangered	X	X	X	X
Spectaclecase (mussel)	<i>Cumberlandia monodonta</i>	Endangered	X	X	X	X
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	Endangered				X
Eastern Massasauga	<i>Sistrurus catenatus</i>	Candidate		X		
Decurrent False Aster	<i>Boltonia decurrens</i>	Threatened			X	
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	Threatened		X	X	X
Mead's Milkweed	<i>Asclepias meadii</i>	Threatened	X			
Northern Wild Monkshood	<i>Aconitum noveboracense</i>	Threatened	X	X		
Prairie Bush-clover	<i>Lespedeza leptostachya</i>	Threatened	X	X	X	
Western prairie fringed orchid	<i>Platanthera praeclara</i>	Threatened		X		
Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	Endangered	X			
Iowa Pleistocene Snail	<i>Discus macclintocki</i>	Endangered	X	X		
<p>*Mississippi River Master Planning Project Area Counties</p> <ul style="list-style-type: none"> -Wisconsin: Grant -Iowa: Clayton, Dubuque, Jackson, Clinton, Scott, Muscatine, Louisa, Des Moines, Lee -Illinois: Jo Daviess, Carroll, Whiteside, Rock Island, Mercer, Henderson, Hancock, Adams, Pike, Calhoun -Missouri: Clark, Lewis, Marion, Ralls <p>Source: USFWS IPac September 2015</p>						

Wisconsin, Iowa, Illinois and Missouri Special Concern, Threatened, and Endangered Species

The States of Wisconsin, Iowa, Illinois and Missouri have developed lists of species that are considered endangered, threatened, rare and scarce within their respective states. These designations have similar definitions as the federal definitions, except that the status is at a state level. Many of the state-listed species are common over a much larger geographical area and are considered rare within a particular state because the area lies on the periphery of the species range and have smaller populations. There are some species, however, where the population decline occurs over the entire range of the species.

In addition to the endangered, threatened and rare designations, each state has another category called “Special Concern”. Special concern species are those species that are not rare, threatened, or endangered, but are extremely uncommon in an area or have unique or highly specific habitat requirements and deserve careful monitoring. Species on the periphery of their range, that are not listed as endangered or threatened, may be included in this category along with those species that were once listed as endangered or threatened but now have increasing protected or stable populations.

There are approximately 214 state listed species of special concern, threatened, or endangered plants and animals found on Mississippi River Project lands and waters.

	WI	IA	IL	MO	Total (no duplicates)
Plants	9	35	17	22	68
Birds	16	12	17	9	34
Fish	16	9	8	6	25
Mussels	15	10	12	5	24
Insects	7	16	4	3	24
Mammals	6	6	3	5	13
Amphibians	2	2	2	2	7
Reptiles	7	11	8	5	19
Total	78	101	71	57	214

For a full list of species considered for this table by state go to Appendix . Wisconsin = 1 County; Iowa = 9 Counties; Illinois = 10 Counties; Missouri = 4 Counties

The State Listed and Species of Concern data was compiled from records of species known to occur within and adjacent to the river floodplain corridors. The information was cross referenced using USFWS Refuge Habitat Management Plans, Refuge CCP’s, Natural Heritage Databases and county-level records of occurrence from website databases maintained and administered by the Wisconsin Department of Natural Resources (2015), Iowa Department of Natural Resources (2015), Illinois Department of Natural Resources (2015) and Missouri Department of Conservation (2015). These data are not based on comprehensive inventories of the states, and the lack of records for a particular area should not be interpreted to mean that significant resources are not present. Further, the type of information tracked and recorded in each database varies by state.

2.8.4 Invasive Species

Infestations of invasive plants, diseases, animals, and insects are fast becoming one of the greatest threats to the earth's biological diversity, as well as human health. Invasive species are defined as species that do not naturally occur in a specific area and whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. Exotic species did not evolve with the ecosystem they invade and their introduction usually irreversibly degrades the native ecosystem, and may ultimately affect the survival of native species. There are a number of invasive plant species that suppress regeneration in the floodplain forest whether they are exotic or native in origin. They do this by out-competing the native vegetation for water, sunlight, nutrients, and space.

While the overall number of invasive plant species is very large and continues to grow, a select number of invasive species are of special concern. These plant species include reed canary grass *Phalaris arundinacea*, Japanese hops, bur cucumber *Sicyos angulatus*, white mulberry *Morus alba*, amur honeysuckle *Lonicera maackii*, tree of heaven *Ailanthus altissima*, garlic mustard *Alliaria petiolata* and oriental bittersweet *Celastrus orbiculatus*. Additional species of special concern include emerald ash borer *Agilus planipennis*, gypsy moth *Lymantria dispar dispar*, and big head and silver carp *Hypophthalmichthys nobilis* and *molitrix*. This is NOT an all inclusive invasive species list for the Project, but instead a handful of the hundreds of invasive species that have already infested and continue to arrive in the UMRS. The list of invasive species will likely grow in the future and managers must remain vigilant and act quickly as new threats arise. Asian long-horned beetle and thousand canker disease are threats not yet within the Project area, but have the potential to be in the future. The Mississippi River Project Operational Management Plan contains additional information on the invasive species.

2.8.5 Ecological Setting

The Upper Mississippi River basin is the result of intricate sculpting by massive glaciers during the Ice Ages.

A drier climatic period with strong winds followed the retreat of the glaciers, depositing fertile silt (loess) on top of the glacial drift that the sliding ice islands dropped as they melted. Like many large rivers, the Mississippi's cut its course meandering slowly and aimlessly through a broad and worn-down floodplain with little elevation drop.

A river's flood pulse or natural river hydrograph, refers to the entire annual cycle of the water level, from low flow to flood crest and back to the low elevation (Junk et al. 1989). The annual flood pulse in the river valley controls the composition of the floral and faunal communities and recharges the floodplain with water, nutrients and sediments. In return, riparian communities donate nutrients to the river in the form of organic matter.

There may be more than one flood per year. During great floods, the floodplains do not merely store water, they become part of the flowing river itself, conveying water slowly downstream through the forests and Marshes. Over millennia, plant and animal species have adapted to exploit, tolerate or escape seasonal flood pulses. Exceptional great floods and droughts further

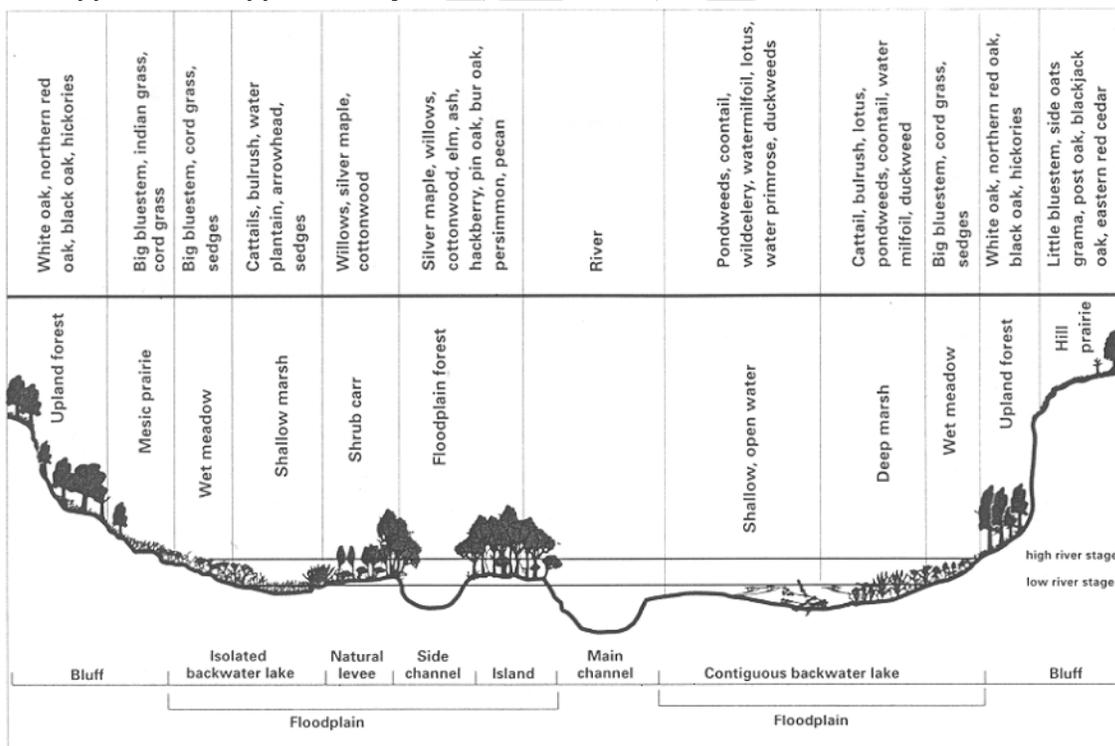
create habitat and species diversity as well. The riparian vegetation zones or types are directly related to elevations from the river, and to the frequency, duration, and depth of flooding.

Riparian communities are among the most diverse and productive on earth. Riparian ecosystems also provide habitat for animal species that use uplands; riparian zones depend on and fortify riverine environments. Therefore, they are inextricably linked to their neighboring ecosystems, and, because life on earth is one web of energy and matter exchanges, they are linked to all ecosystems.

The fauna of the riparian ecosystem are also related to water levels and floodpulsing and to water surface area losses due to natural and human-induced sedimentation.

In summary, the flood-adapted animals and plants, the seasonal flood pulses and infrequent great floods and droughts, the river and its channel, and the complex patchwork of floodplain habitats, together, constitute the dynamic and phenomenally productive river/floodplain ecosystem (Junk et al. 1989, Sparks 1995).

Figure 2-15. Hypothetical Floodplain Cross Section Illustration of Habitat Types Likely to Occur on the Upper Mississippi River System (Nelson, 2001).



2.8.6 Wetlands

Drafting

Table 2-7. Wetlands Level One Inventory on Mississippi River Project Lands.

WETLANDS LEVEL ONE INVENTORY

Pool	Actual Land Acreage	Wetland Acreage	Emergent Wetland	Forested/Shrub Wetland	Freshwater Pond	Lake	Riverine	Upland Acres
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

2.9. CULTURAL RESOURCES

The most recent revision to the Project's Historic Properties Management Plan occurred in August, 1995 (Benn 1995).

Located almost entirely within the Mississippi River alluvial plain, human habitation in and near the Project spans the past 13,000 years, from the retreat of glacial ice during the Paleoindian Period through the Archaic and Woodland periods, followed by occupations by Oneota tradition peoples, historic tribes and later, mostly European or Euro-American settlers.

Of great significance to the Project is landform sediment assemblage (LSA) modeling—LSAs are geologic units that define the river's Late Wisconsinan and Holocene alluvial fills. The most complete LSA maps in the entire Mississippi River basin are associated with the Project's Guttenberg, IA to Saverton, MO reach (Bettis et al. 1996). The LSA data provides baseline geologic information relating to the archeological potential of landforms throughout the precontact and historic periods, greatly assisting in managing the valley's cultural resources. For instance, in areas mapped as Kingston Terrace, archeological potential is exceptionally high, sometimes containing more than two dozen Precontact Era sites per square mile. Alternately, landforms comprised entirely of recent alluvium have no precontact habitation potential. This model is dynamic, refined with every new archeological project (e.g., Benn and Blikre 2010; Thompson 2014).

Archeological survey, testing and mitigation have occurred at Project lands, although some archeological work pre-dates the utilization of modern field methods. Only a small fraction of the Project's acreage has been subjected to archeological investigation. State site files and historic preservation offices document surveys on 24,712 land-based acres (Table 2.11a).

Table 2.11a. Archeological Survey Coverage on the Project's Lands.

State	Acres		
	Total Fee Title Area	Documented Archeological Survey	Percent Surveyed
Iowa	35,368	11,544	32.6
Illinois	49,073	11,035	22.5
Missouri	2,175	1,872	86.1
Wisconsin	6,283	261	4.2
Total	92,899	24,712	26.6

Construction has destroyed some recorded sites. Shoreline erosion continues to scour other properties away. However, sedimentation mantles some sites in historic alluvium, effectively sealing deposits. In many cases, archeological sites remain in relatively undisturbed contexts, such as high terrace landforms. Some of the Project's 227 U.S. Government fee-titled archeological sites are located underwater; others are situated along the river's periphery or on adjacent higher elevations.

Protective measures employed by the Corps at the Webster Village and Mounds site (11CA44) exemplify efforts to preserve significant Project sites. The Late Woodland Webster Site's mounds had not yet begun to erode into the river, but village-related features were being lost to riverbank erosion. Shoreline stabilization at the site utilized 7,100 tons of riprap placed along 700 feet of exposed cutbank (Benn and Bettis 1996; USACE 2001).

Most of the Project's sites have no associated National Register of Historic Places (NRHP) eligibility determinations or NRHP recommendation provided by the investigating archeologist. NRHP-listed sites are limited to two properties: 47GT266 (the Woodland culture Hog Hollow site, which includes at least one house remnant) and the National Historic Landmark, 13DB9, a ca. 1780–1830 Meskwaki village, known as Kettle Chief or Peosta's Village. Other site determinations or recommendations include 36 NRHP-eligible, 29 potentially eligible, and 59 ineligible. The remaining 101 archeological sites on fee title lands have no recorded NRHP eligibility recommendation. An NRHP Multiple Property Documentation form that relates to the nomination of 38 prehistoric sites—many on Corps-owned land—was prepared, but not finalized (Benn and Halvorson 2001).

Table 2.11b depicts information on known fee title archeological sites. Site counts on surrounding lands are included as a reminder that other potentially significant sites may be situated in close proximity to Project lands.

Table 2.11b. Archeological Sites on and near the Project's Fee Title Lands.

State	Site counts		ESAs (fee title land only)	
	on fee title land	outside fee title, but within 500 m	Yes	No
Iowa	122	349	80	42

Illinois	69	244	58	11
Missouri	12	41	6	6
Wisconsin	24	141	24	0
Total	227	775	168	59

Only sites recommended or determined NRHP ineligible or that are verified as completely destroyed were eliminated from categorization as an Environmentally Sensitive Area (ESA). In one case (13LA38) the site has been determined NRHP ineligible, due to its apparent destruction. However, the site has yielded human remains, so it remains classified as an ESA for land management purposes. ESAs are further discussed in Chapter 4.

Seventeen sites have yielded human remains or are prehistoric mounds and therefore may contain human remains. These include four sites in Iowa, 12 in Illinois, and one in Wisconsin. There are no known mortuary-related sites on the Project's Missouri lands.

As shown on Table 2.11c, a single site may have been occupied at multiple points in time.

Table 2.11c. Cultural Affiliations of Archeological Sites on the Project's Lands (a single site may express more than one affiliation).

	Iowa	Illinois	Missouri	Wisconsin	Site Totals
Paleoindian	2	-	-	1	3
Archaic	17	5	-	1	23
Woodland	48	28	-	7	83
Mississippian	-	1	-	-	1
Late Prehistoric	16	-	1	-	17
Protohistoric	-	1	1	-	2
Precontact, unspecified	41	31	7	9	88
Historic American Indian	6	-	-	-	6
Historic other	57	17	7	7	88
Total sites	122	69	12	24	227
Total components	187	83	16	25	-

Known Paleoindian Period (12,000–9,500 B.P.) sites on Project lands are limited to the Osceola site, utilized from the Paleoindian through Woodland eras (47GT24; Overstreet 1984); Sand Run, with occupations extending through the Oneota tradition (13LA3); and Snively Access II (13LA99; Benn and Isenberger 2003). Paleoindian populations consisted of small groups of highly mobile hunter-gatherers who seasonally followed big game herds, although a variety of resources were exploited. The artifacts most distinctively linked this period are large, lanceolate (leaf-shaped) projectile points.

The Project's Archaic Period (9,500–2,500 B.P.) inhabitants are represented by at least 23 sites. Compared to the Paleoindian Period, the number of persons living in small settlements increased, sometimes forming small villages during the Archaic. A greater diversity of lithic (stone),

animal, and plant resources appear in the archeological record. More well-studied Archaic components are found at the Blanding Landing occupation site (11JD113; USACE 1985), Sand Run West (13LA38; Benn 1987), and at the Crooked Slough site (11JD125; Benn et al. 2005). This latter site is deeply buried (2.5 m below surface) and notable for the Archaic Durst phase and possible Preston phase components preserved in a floodplain setting.

Although some crop domestication occurred during the Late Archaic, not until the Woodland Period (2,500-400 B.P.) 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. A greater variety of exotic raw materials and finished goods can be found, showing that trade networks became increasingly complex. The Project lands include 83 identified Woodland sites, including mounds, villages, houses, and camps.

More well-studied predominantly Woodland era sites include the Black Sand variant Early Woodland habitation Lacey site (13LA288; Benn 2007); Thomson Causeway, an Early Woodland habitation and Middle Woodland mound (11CA11; Esarey and Carlson 1983; Ross and Anderson 1990); the Havana-Hopewell village of Putney Landing (11HE3; Markman 1988); and the Tippiess Lake late Late Woodland seasonal camp site (11JD132; Benn et al. 2005). The previously mentioned Crooked Slough site's Early and Late Woodland components are well-preserved atop Archaic horizons.

Seventeen Late Prehistoric sites are recorded at the Project, nearly all of which are identified as Oneota tradition (1,000–300 B.P.). Oneota sites typically contain distinctive, shell-tempered pottery. A preponderance of evidence suggests several modern tribes descend from Oneota peoples, including the Baxoje (Ioway), Ho-Chunk/Winnebago, Oto-Missouri, Omaha, and Ponca (for discussion, see Green et al. 2001). The most notable Late Prehistoric evidence on Project lands is a cluster of 16 sites along a nine-mile stretch of river in Louisa County, IA, with most of those sites located at Lake Odessa.

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 Upper Mississippi valley—but there was no face-to-face contact between native groups and Europeans. Site 11MC122 may represent a protohistoric winter camp. Archival resources suggest the most likely site occupants were members of one of the Illiniwek tribes or, less likely, the Ioway, Sauk, or Meskwaki (Nolan and Mansberger 1989). This site serves as a good example of variable levels of preservation at a single property—erosion affects the site along the shoreline, but further from the river, the site is protected by between 1.5 and 2.0 m of historic alluvium.

The arrival of Marquette and Joliet to the Upper Mississippi River in 1673 represents the first known European contact with native peoples there. The Mississippi was an important route for many well-documented European explorations; sometimes, the explorer's journals and related maps mentioned specific tribes. None of the earliest explorer-mentioned villages are thought to be within the Project's boundaries.

Very little is known about the four recorded historic American Indian sites on Project lands. The location of Peosta or Kettle Chief's Meskwaki village (13DB9) is known, although site layout is not understood. The other three sites are not field verified. Reported sites include a Sauk or Meskwaki village near the mouth of the Wapsipinicon (13CN36; Benn et al. 1989) and a Sauk village and cemetery on the south side of Bellevue (13JK325; Morrow 2014). Black Hawk's Council House is recorded in the City of Bellevue (13JK326; Western Historical 1879:542–543).

Other historic American Indian sites are mentioned at or near Project lands, but have not been assigned site numbers. In Iowa, these include a Meskwaki village reported about three miles above the mouth of the Turkey River in 1819 (Forsyth 1880:145) and another situated near Princeton in 1805 (Downer 1910:48); a ca. 1819 Sauk or Meskwaki village near LeClaire (Forsyth 1880:144); a battlefield where the Meskwaki fought the Kaskaskia near the mouth of Tete des Morts Creek (Coues 1895:28); and a ca. 1835 Sauk or Meskwaki village at the mouth of the Elk River (Wolfe 1911:49). In Illinois, Zebulon Pike's 1805 expedition mentioned a Sauk village near the mouth of Henderson Creek. Other Indian villages are reported along this stretch of the river, but not in close proximity to Project lands.

Following Meskwaki and Sauk removal from the area by 1832 and Ho-Chunk/Winnebago removal from northeast Iowa's Neutral Ground in 1848, Euro-American settlers arrived, quickly purchasing all available lands and converting much of the moderately sloped prairie and timber into farmland. There are 94 known historic era archeological sites on Project lands, many of which are habitations, along with other site types such as mills (e.g., 47GT94), hydroelectric plants (13JK218), and the townsites of Lafayette and Sinipee, Wisconsin (47GT196, 47GT546). Submerged shipwrecks, navigational markers and related structures may also be present in the Project's managed waters, although none have been designated archeological sites (Custer and Custer 1997).

In addition to archeological resources, there are significant districts, buildings, structures and objects within the Project, including ones related to the lock and dam system, buildings that served administrative functions, cottages on leased lands, and bridges. A small portion of the Rock Island Arsenal District, listed on the NRHP in 1969, is situated on fee titled land. The Clock Tower Building (a.k.a., Storehouse A), on fee title land, is a contributing element to that district. This building became a contributing element of the Rock Island Arsenal Rodman Plan Old Stone Buildings District, designated a National Historic Landmark in 1988 (Slattery 1987).

Also of preeminent importance to the Project and to our nation are resources contributing to the significance of the NRHP Multiple Property listing, "Upper Mississippi River Federal Navigation Projects, 1931–1948," accepted into the National Register system in 2004 (Rathbun 2000). This document recognizes 25 districts with 158 contributing and 409 non-contributing resources between Pools 3–22. Some of the contributing resources include locks, dams, other structures (e.g., a boat harbor, 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).

Other inventoried NRHP-listed, eligible, or potentially eligible architectural properties on or immediately adjacent to fee titled Project lands include one cottage and a pump station in Iowa and four bridges crossing the Mississippi River between Iowa and Illinois.

There is presently no defined Traditional Cultural Properties (TCP) on Project lands, although many tribal groups consider mounds, mound groups, and mortuary features to possess traditional cultural value. No systematic effort has been made to define TCPs in the Project.

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2.10. DEMOGRAPHICS

Drafting

2.11. ECONOMICS

Drafting

2.12. RECREATION FACILITIES, ACTIVITIES, & NEEDS

Drafting

2.13 REAL ESTATE

Acquisition Policy

Project lands were acquired primarily in the 1930's with the authorization and construction of the lock and dam projects. 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 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 as a result of non recreation lease impacts, in accordance with the 2009 Headquarters Non-Recreational Lease Policy or congressionally authorized land exchanges. Navigational servitude, state water laws, and case law also allow for select accreted riparian lands to be included as Project land.

Outgrants on Public Lands

Outgrants of Corps land to agencies, organizations, businesses or individuals have been made for the purpose of providing access to recreation opportunities, marina services, utilities, and assisting riverine related industry or local municipalities.

- **General Plan Lands**

See Chapter 6 for discussion of General Plan lands made available to the FWS and how they are managed by the FWS and state wildlife managing agencies for fish and wildlife management purposes.

- **Public Recreational Leases**

Recreation opportunities in the form of accesses 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. Five of the Project's current twelve marina concessions hold a public park and recreation lease.

- **Commercial Concession Leases**

Commercial concessions on public ground offer marina services for the public. Seven of the Project's current twelve 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 may deem reasonable in the public interest. As a result 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 permitted locations as described in the Shoreline Management Plan (SMP) and shown in maps in appendix ***. More information on Shoreline Management and private exclusive use can be found in Chapter 6 and in the SMP.

- **Commercial Industrial Leases**

The use of these leases range from docking and loading facilities to multipurpose industrial development. These lands have been leased to commercial entities for many years. As such, these lands have been effectively reduced to perpetual private exclusive use and are not available for other uses nor are they available to the general public.

Corps Easements on Private Lands

- **Flowage Easements**

Flowage easements were purchased for improvement of the river for navigational purposes. They provide the Government with the right to occasionally overflow and submerge the property, with no mention made regarding the right of the owner to construct structures. These easements provide the Corps the full, complete and perpetual right, power and privilege to overflow, flood and submerge and also together with full, complete and perpetual right to clear, cut and remove all brush, timber and other natural or artificial obstructions which shall at any time and in any manner interfere with use of said land for navigation purposes. Easements may vary by location and type so the language of individual easements should be directly referenced to identify their specific provisions.

No permit program for structures for monitoring easement compliance will be administered at the Mississippi River 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 Government's right to overflow or submerge easement property for navigational rights at the Mississippi River Project, shall be referred to Real Estate Division for District coordination and resolution.

New Non-Recreational Outgrant Proposals

In executing the US Army Corps of Engineers mission, districts receive numerous and diverse proposals for use of lands and waters at Civil Works water resources projects. The Non-

Recreational Outgrant Policy was developed jointly by the Real Estate and Operations Communities of Practice in 2009 (appendix).

The purpose of this guidance is to establish a consistent, nationwide policy that will be applied to evaluate non-recreational real estate requests for use of civil Works lands and waters.

This guidance is consistent with the Mississippi River Project outgrant management philosophy and shall be implemented for all future outgrant requests on project lands and waters. For more information on the non-recreational outgrant proposal process, please refer to Chapter 6.

2.14. PERTINENT PUBLIC LAWS

Numerous Federal laws and executive orders establish national policy for, and Federal interest in, the protection, restoration, conservation, and management of natural and cultural resources. These Federal statutes include compliance requirements and emphasize protecting environmental quality. Recent water resources authorizations have enhanced opportunities for the Corps involvement in studies and projects to specifically address the restoration of ecological resources and ecosystem management. Specific authorities for new individual studies and projects to restore ecological resources lost or damaged by the project have also been provided in legislation. Examples of legislation that broadly supports Federal involvement in the protection, restoration, conservation, and management natural and cultural resources include:

- The National Environmental Policy Act of 1969, as amended.
- U.S. Fish and Wildlife Coordination Act of 1958
- The Endangered Species Act of 1973, as amended.
- Antiquities Act of 1906
- Historic Preservation Act of 1966.
- Federal Water Project Recreation Act of 1965, as amended.
- Flood Control Act of 1944: Section 4 of the act as last amended.
- Forest Cover Act
- Water Resources Development Acts of 1986, 1988, 1990, 1992, 1996, 1999, 2000, 2007 and Water Resources Reform and Development Act of 2014.

For a more comprehensive list of pertinent public laws with descriptions, see Appendix ___.

Items below will be moved to an Appendix

Public Law (PL) 59-209, Antiquities Act of 1906: The first Federal law established to protect what are now known as "cultural resources" on public lands. It provides a permit procedure for investigating "antiquities" and consists of two parts: An act for the Preservation of American Antiquities, and Uniform Rules and Regulations.

The Migratory Bird Act of 1918 (16 USC 703-712) as amended: The original 1918 statute implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Soviet Union (now Russia).

PL74-292, Historic Sites Act of 1935: Declares it to be a national policy to preserve for (in contrast to protecting from) the public, historic (including prehistoric) sites, buildings, and objects of national significance. This act provides both authorization and a directive for the Secretary of the Interior, through the National Park Service, to assume a position of national leadership in the area of protecting, recovering, and interpreting national archeological historic resources. It also establishes an "Advisory Board on National Parks; Historic Sites, Buildings, and Monuments, a committee of eleven experts appointed by the Secretary to recommend policies to the Department of the Interior".

PL74-409, The River and Harbor Act of 1935: approved 30 August 1935, determined that non-navigable types of dams would be used for the Nine-Foot Channel Navigation Project. Non-navigable dams are those which will not pass vessels without the use of locks. It also identified the improvements that were to be made on the Illinois River, which included dredging and the construction of modern locks and dams at Peoria and La Grange and the removal of the earlier navigation structures at La Grange and Kampsville. The construction of Lock and Dam 26 on the Mississippi at Alton, IL made the Illinois River navigable from its mouth to Illinois river mile 80.

PL78-534, Flood Control Act of 1944: Section 4 of the act as last amended in 1962 by Section 207 of PL87-874 authorizes the Corps to construct, maintain, and operate public parks and recreational facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to Federal, State or local governmental agencies.

PL79-526, The Flood Control Act of 1946: Approved 24 July 1946. Section 4 (60 Stat. 641) amended PL 78-534 to include authority to grant leases of lands in reservoir areas and licensing of lands to federal, state and local government agencies when in the public interest.

PL 83-780, The Flood Control Act of 1954: Section 209 amended the Flood Control Act of 1944. It authorized the Secretary to grant leases to federal, state or local government agencies without monetary considerations for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreation purposes when in the public interest (68 Stat 1256).

PL87-874, The Flood Control Act of 1962: Section 207 amended Section 4 of the Flood Control Act of 1944, permitting recreational developments at non-reservoir projects (76 Stat. 1195).

PL85-500, River and Harbor Act of 1958: This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

PL85-624, Fish and Wildlife Coordination Act 1958: This act as amended in 1965 sets down the general policy that fish and wildlife conservation shall receive equal consideration with other project purposes and be coordinated with other features of water resource development programs. Opportunities for improving fish and wildlife resources and adverse effects on these resources shall be examined along with other purposes which might be served by water resources development.

PL86-523, The Archaeological and Historic Preservation Act: Also called the Reservoir Salvage Act (16 USC 469 et seq.) was approved 27 June 1960 as amended, provided for the preservation of historical and archaeological data which might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any federal construction projects.

PL86-717, Forest Conservation: This act provides for the protection of forest cover for reservoir areas under this jurisdiction of the Secretary of the Army and the Chief of Engineers.

PL87-874, Rivers and Harbors Act of 1962: This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

PL88-578, Land and Water Conservation Fund Act of 1965: This act established a fund from which Congress can make –appropriations for outdoor recreation. Section 2(2) makes entrance and user fees at reservoirs possible by deleting the words "without charge" from Section 4 of the 1944 Flood Control Act as amended.

PL89-72, Federal Water Project Recreation Act of 1965: This act requires that not less than one-half the separable costs of developing recreational facilities and all operation and maintenance costs at Federal reservoir projects shall be borne by a non-Federal public body. An OCE/OMB implementation policy made these provisions applicable to projects completed prior to 1965.

PL89-90, Water Resources Planning Act (1965): This act established the Water Resources Council and gives it the responsibility to encourage the development, conservation, and use of the Nation's water and related land resources on a coordinated and comprehensive basis.

PL89-665, Historic Preservation Act of 1966: This act provides for: (1) an expanded National Register of significant sites and objects; (2) matching grants to states undertaking historic and archeological resource inventories; and (3) a program of grants-in aid to the National Trust for Historic Preservation; and (4) the establishment of an Advisory Council on Historic Preservation. Section 106 requires that the President's Advisory Council on Historic Preservation have an opportunity to comment on any undertaking which adversely affects properties listed, nominated, or considered important enough to be included on the National Register of Historic Places.

PL91-190, National Environmental Policy Act of 1969 (NEPA): NEPA declared it a national policy to encourage productive and enjoyable harmony between man and his environment, and for other purposes. Specifically, it declared a "continuing policy of the Federal Government... to use all practicable means and measures...to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations and public law of the United States shall be interpreted and administered in accordance with the policies of the Act.

PL91-611, River and Harbor and Flood Control Act of 1970: Section 234 provides that persons designated by the Chief of Engineers shall have authority to issue a citation for violations of regulations and rules of the Secretary of the Army, published in the Code of Federal Regulations.

PL92-500, Federal Water Pollution Control Act Amendments of 1972: The Federal Water Pollution Control Act of 1948 (PL 845, 80th Congress), as amended in 1956, 1961, 1965 and 1970 (PL 91- 224),

established the basic tenet of uniform State standards for water quality. PL92-500 strongly affirms the Federal interest in this area. “The objective of this act is to restore and maintain the chemical, physical and biological integrity of the Nation’s waters.”

PL92-516, Federal Environmental Pesticide Control Act of 1972: This act completely revises the Federal Insecticide, Fungicide and Rodenticide Act. It provides for complete regulation of pesticides to include regulation, restrictions on use, actions within a single State, and strengthened enforcement.

PL93-81, Collection of Fees for Use of Certain Outdoor Recreation Facilities: This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended to require each Federal agency to collect special recreation use fees for the use of sites, facilities, equipment, or services furnished at Federal expense.

PL93-205 The Endangered Species Act of 1973: requires that Federal agencies will, in consultation with the U.S. Fish and Wildlife Service, further conservation of endangered and threatened species and ensure that their actions are not likely to jeopardize such species or destroy or modify their critical habitat.

PL93-251, Water Resources Development Act of 1974: Section 107 of this law establishes a broad Federal policy which makes it possible to participate with local governmental entities in the costs of sewage treatment plant installations.

PL93-291, Archeological Conservation Act of 1974: The Secretary of the Interior shall coordinate all Federal survey and recovery activities authorized under this expansion of the 1960 act. The Federal Construction agency may transfer up to 1 percent of project funds to the Secretary with such transferred funds considered non-reimbursable project costs.

PL93-303, Recreation Use Fees: This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended, to establish less restricted criteria under which Federal agencies may charge fees for the use of campgrounds developed and operated at Federal areas under their control.

PL93-523, Safe Drinking Water Act: The act assures that water supply systems serving the public meet minimum national standards for protection of public health. The act (1) authorizes the Environmental Protection Agency to establish Federal standards for protection from all harmful contaminants, which standards would be applicable to all public water systems, and (2) establishes a joint Federal-State system for assuring compliance with these standards and for protecting underground sources of drinking water.

PL94-422, Amendment of the Land and Water Conservation Fund Act of 1965: Expands the role of the Advisory Council. Title 2 - Section 102a amends Section 106 of the Historical Preservation Act of 1966 to say that the Council can comment on activities which will have an adverse effect on sites either included in or eligible for inclusion in the National Register of Historic Places.

Executive Order 11593, 13 May 1971, Protection and Enhancement of the Cultural Environment required Federal agencies to administer cultural properties under their control and direct their policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical, architectural, or archeological significance were preserved, restored, and maintained.

PL 95-217, Clean Water Act of 1977, as amended. This Act amends the Federal Water Pollution Control Act of 1970 and extends the appropriations authorization. The Clean Water Act is a

comprehensive Federal water pollution control program that has as its primary goal the reduction and control of the discharge of pollutants into the nation's navigable waters. The Clean Water Act of 1977 has been amended by the Water Quality Act of 1987, Public Law 100-4.

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

PL 95-341, American Indian Religious Freedom Act of 1978. The Act protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

95-632, Endangered Species Act Amendments of 1978. This law amends the Endangered Species Act Amendments of 1973. Section 7 directs agencies to conduct a biological assessment to identify threatened or endangered species that may be present in the area of any proposed project. This assessment is conducted as part of a Federal agency's compliance with the requirements of Section 102 of NEPA.

PL 96-95, Archeological Resources Protection Act of 1979. This Act protects archeological resources and sites that are on public and tribal lands, and fosters increased cooperation and exchange of information between governmental authorities, the professional archeological community, and private individuals. It also establishes requirements for issuance of permits by the Federal land managers to excavate or remove any archeological resource located on public or Indian lands.

PL98-63, Supplemental Appropriations Act of 1983: The act authorized the Corps of Engineer Volunteer Program. The United States Army Chief of Engineers may accept the services of volunteers and provide for their incidental expenses to carry out any activity of the Army Corps of Engineers except policy making or law or regulatory enforcement.

PL97-98, The Farmland Protection Policy Act: The Act was approved 22 December 1981, minimized the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

PL99-662, The Water Resources Development Act of 1986: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL100-298, The Abandoned Shipwreck Act: 28 April 1988 asserts U.S. Government title to three categories of abandoned shipwrecks: those embedded in a state's submerged lands; those embedded in coralline formations protected by a state on its submerged lands, and those located on a state's lands that are included or determined eligible for inclusion in the National Register of Historic Places. The law then transfers title for a majority of those shipwrecks to the respective states, and provides that states develop policies for management of the wrecks so as to protect natural resources, permit reasonable public access, and allow for recovery of shipwrecks consistent with the protection of historical values and environmental integrity of wrecks and sites.

PL 101-601 The Native American Graves Protection and Repatriation Act (NAGPRA): 16 November 1990, provides a process for museums and Federal agencies to return certain Native American cultural items -- human remains, funerary objects, sacred objects, or objects of cultural patrimony -- to lineal descendants, and culturally affiliated Indian tribes and Native Hawaiian organizations. NAGPRA

includes provisions for unclaimed and culturally unidentifiable Native American cultural items, intentional and inadvertent discovery of Native American cultural items on Federal and tribal lands, and penalties for noncompliance and illegal trafficking.

PL101-640, Water Resource Development Act of 1990: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL101-676, Water Resource Development Act of 1988: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL102-580, Water Resource Development Act of 1992: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL104-303, Water Resource Development Act of 1996: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

Executive Order 13007, 24 May 1996. This Executive Order directs Federal land-managing agencies to accommodate Native Americans' use of sacred sites for religious purposes and to avoid adversely affecting the physical integrity of sacred sites.

PL106-53, Water Resource Development Act of 1999: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL 106-147, Neo-tropical Migratory Bird Conservation Act: 20 July 2000, promotes the conservation of habitat for neo-tropical migratory birds.

PL106-541, Water Resource Development Act of 2000: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, 10 January 2001, directs Federal agencies, pursuant to its Memorandum of Understanding with the US Fish and Wildlife Service, to support the conservation intent of migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the greatest extent practicable, adverse impacts on migratory bird resources.

PL109-58, Energy Policy Act of 2005: Directed the Secretaries of Agriculture, Commerce, Defense Energy and Interior to identify corridors for oil, gas, and hydrogen pipelines and electrical transmission and distribution facilities on Federal lands and to schedule prompt action to identify, designate, and incorporate the corridors into the applicable land use plans.

PL110-114, Water Resource Development Act of 2007: Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

PL113-121, The Water Resources Reform and Development Act of 2014: This act authorizes the U.S. Army Corps of Engineers to carry out missions to develop, maintain, and support the nations vital ports and waterways infrastructure needs and support effective and targeted flood protection and restoration needs.

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