FINAL ENVIRONMENTAL ASSESSMENT
WITH
FINDING OF NO SIGNIFICANT IMPACT

Rivers Project Forest Management Pool 26
Mississippi River
Lincoln and St. Charles Counties, Missouri

February 2018

US Army Corps of Engineers ®
St. Louis District

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1. PURPOSE AND NEED OF THE PROPOSED ACTION

1.1 Introduction

The U.S. Army Corps of Engineers (Corps), Mississippi Valley Division, St. Louis District, has prepared this Environmental Assessment (EA) to evaluate the potential impacts associated with the proposed forest management activities within two compartments, located in Mississippi River Pool 26, Lincoln and St. Charles counties, Missouri. The Proposed Actions would be conducted over the next 5-7 years and would include approximately 600 acres in 29 individual forest stands. These actions would be accomplished in accordance with the Rivers Project Master Plan and Upper Mississippi River Systemic Forest Stewardship Plan.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations §1500-1508), as reflected in the USACE Engineering Regulation 200-2-2. Impacts on environmental resources are discussed in detail in this Environmental Assessment and summarized in the Finding of No Significant Impact (FONSI).

1.2 Authorizations

The Corps received Congressional authorization in 1899 through the Rivers and Harbors Act (with modifications in 1927 and 1930) to use a combination of regulating works and dredging for the purpose of securing a 9-foot-deep by 300-footwide navigation channel between St. Louis, Missouri, and Cairo, Illinois (Nine-Foot Navigation Channel Project) on the Mississippi River. To support the Nine-Foot Navigation Channel Project, Congress authorized the construction of 23 locks and dams upstream of St. Louis, Missouri, resulting in a pooled reach upstream of each lock and dam. This required the acquisition of approximately 46,274 acres of private lands within the St. Louis District in the late 1930s and early 1940s. In 1934 the Fish and Wildlife Coordination Act was passed, and 36,276 acres of the original acquisition was made available to the U.S. Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IDNR), and Missouri Department of Conservation (MDC) through Cooperative Agreements for fish and wildlife management in 1954. However, the Corps retained the responsibility for the management of the forest resources.

The Forest Cover Act of 1960 (Public Law 86-717) is a statutory mandate directing the Corps to manage forest resources "to encourage, promote, and assure fully adequate and dependable future resources of readily available timber, through sustained yields programs, reforestation, and accepted conservation practices and to increase the value of such areas for conservation, recreation and other beneficial uses".

The Rivers Project Master Plan (Rivers Project Master Plan, 2015 update) provides further guidance that "forest habitat management will be applied to develop/restore, sustain, protect, and/or improve vegetation conditions for timber, fish, wildlife, soils, recreation, water quality and other beneficial uses".

1.3 Rivers Project Area Location and Description

USACE Rivers Project Office (RPO) lands are located on the Mississippi and Illinois Rivers in east-central Missouri and west-central Illinois. RPO lands are located just north of St Louis, MO, and extend 115 miles up the Mississippi River to just north of Louisiana, MO, and the lower 32 miles of the Illinois River. RPO lands also include the Thompson Bend Riparian Corridor Project located between Mississippi River Miles (RM) 19 through 32. All lands are geographically located within the Upper Mississippi River System (UMRS) (Figure 1). RPO lands are divided into thirteen geographically delineated compartments for management purposes. The Proposed Action Area is located within Compartments 3 and 4. The Compartment descriptions are as follows:

Compartment 3 (Figure 2) is approximately 3,512 acres identified as the Lower Alton Lake Management Area (T 48N R 7E, Sections 17, 18, 19, 20, 21, 22, 26, 27, and 34; T 48N R 6E, Sections 7 and 9; T 6N R 10W, Sections 19 and 31; T 6N R 11W, Sections 13, 14, 23, 24, 25, 26, and 35; and Land Grants USS 1692, USS 1703, USS 1730, USS 1765, USS 1838, and USS 3281). It is comprised of 140 stands located west of Alton, IL, on both sides of the Mississippi River and seven islands within the Mississippi River in Madison and Jersey counties, IL, and St Charles County, MO, between Mississippi RMs 203 to 216. This compartment is further defined into three units: Unit 1 (Missouri Bottoms, 2,301 acres), Unit 2 (Piasa, 761 acres) and Unit 3 (Portage, 450 acres). Unit 1 is composed of the West Alton Conservation Area, Dresser Island Conservation Area, two Corps recreational cottage sites, and the Ameren Missouri Portage Des Sioux Power Plant lease area. Unit 2 includes Piasa Creek, two commercial concession lease areas, three Corps recreational cottage sites, Piasa Island, Eagle's Nest Island, and Mile 210 Management Area. Unit 3 includes Portage Island Group Refuge, Mile 215 Conservation Area, and Slim Island. The entire boundary has a signed and monumented Corps boundary line. There are two major roads Illinois State Highway 100 and Missouri State Highway 94), three county roads and one MDC road that serve as access points. There are five Corps parking areas with boat ramps that allow day use access. Approximately <1% of Compartment 3 is managed for Operations (flood risk management), 5% Ameren Missouri power plant lease (162 acres), 2% Corps recreational cottage program (87 acres), and 2% commercial concession leases (69 acres). The remaining 90% is managed for wildlife and native habitat, most of which is floodplain forest. The composition of the forest communities is overmature cottonwood forest transitioning to maple-ash-elm forest, mature maple-ash-elm forest and scattered remnants of oak-pecan forest communities. There is one reforestation site within this compartment that was planted with oak and pecan.

Compartment 4 (Figure 3) is approximately 3,063 acres identified as Upper Alton Lake Management Area (T 49N R 5E, Sections 33 and 34; T 48N R 5E, Sections 3, 4, 9, 19, and 30; T 48N R 4E, Sections 25, 35, and 36; T 47N R 4E, Sections 2, 3, and 4; T 13S R 1E, Section 6; and Land Grant USS 3288). It is comprised of 144 stands and is located 4 miles north of St Charles, MO, and 15 miles west of Alton, IL, in

Calhoun County, IL, and St Charles County, MO, between Mississippi RMs 218 to 238. This compartment is further defined into three units, Unit 1 (Confluence Islands, 696 acres), Unit 2 (Golden Eagle, 1,413 acres), and Unit 3 (Cuivre Island, 954 acres). Unit 1 is composed of Perry Island, Mason Island, Island 525, Island 526, and one Corps recreational cottage site. Unit 2 includes Dardenne and Bolter Islands Conservation Area and Oriole Island. Unit 3 includes the Cuivre Island Mitigation Area. The entire boundary has a signed and monumented Corps boundary line. There are two county roads and one Corps road that serve as access points. There are two Corps parking areas with boat ramps that allow day use access. Approximately 1% of Compartment 4 is managed as part of the Corps recreational cottage program (21 acres). The remaining 99% is managed for wildlife and native habitat, most of which is floodplain forest. The composition of the forest communities is overmature cottonwood forest transitioning to maple-ash-elm forest, mature maple-ash-elm forest and scattered remnants of oak-pecan forest communities. There are three reforestation sites within this compartment that have been planted with cottonwood, sycamore, oak, and pecan.

Within each aforementioned compartment description, the Proposed Action Area (i.e., island) is further defined as shown in the table below (Table 1). Approximately 19 percent of the total Proposed Action Area would receive treatment under the Forest Management Alternative.

Table 1. Proposed Action Areas and Proposed Action location/acres.

Compartment	Proposed Action Area	Mississippi River Pool	Proposed Action Area Acres	Proposed Action Acres	State
3	Portage Island	26	121	10	MO
3	Slim Island	26	38	38	MO
3	Mile 215 Area	26	298	11	MO
4	Mason Island	26	277	40	MO
4	Bolter Island	26	509	47	MO
4	Dardenne Island	26	821	258	MO
4	Cuivre Island	26	950	179	MO
		Total Acres	**3,014**	**583**	**MO**

1.4 Need for Action

The USACE St. Louis District proposes to improve the forest community within Compartments 3 and 4 through implementation of forest management treatments. The existing forest community has degraded and is now becoming undesirable. Undesirable conditions include (1) poor forest stand structure; (2) low species diversity; and (3) invasive species encroachment.

Poor Forest Stand Structure. There has been a significant change in forest composition and structure since early settlement. Modern forest composition within Rivers Project consists primarily of mature and over-mature stands of eastern cottonwood transitioning to maple-ash-elm forest communities and the

transition of diverse forest communities to homogenous even and uneven age maple-ash-elm forest communities. Factors contributing to the modern forest stand structure include: passive management of the lands acquired in the 1930s (lack of disturbance events); altered hydrology and water levels from lock and dam operation causing a transition to a singular forest community type; lack of natural disturbance events providing suitable conditions for the establishment of early successional forest; and lack of regeneration.

Forest Species Diversity. The oak-hickory forest community type was historically dominant, but due to factors listed above and steamboat era timber harvesting, this forest community is in a state of decline. Oak and other mast producing trees (i.e., pecans) are important food sources for wildlife. The oak forest community is now transitioning to an even-aged maple-ash-elm forest community, which provides less value to wildlife species. Likewise, early successional forest community types are reaching the end of their lifespan and are being replaced mainly by an even-aged maple –ash-elm forest community.

1.5 Invasive Species Encroachment.

Invasive plants have become problematic within the Mississippi River watershed. Species such as, but not limited to, Japanese hops (Humulus japonicas), reed canary grass (Phalaris arundinacea), Johnson grass (Sorghum halepense), and phragmites (Phragmites australis) negatively affect the forest community through competition for light, water, and nutrients. Further, the Corps is required to "Contain and reduce the spread and populations of established invasive species to minimize their harmful impacts." (USACE 2009).

Action is required to restore and enhance early successional (eastern cottonwood, sycamore) and oak-hickory forest communities. There is a need to provide multiple age cohorts at the stand level for early-successional and oak-hickory forest communities in order to ensure long-term sustainability of these critical community types. There is an additional need to improve the number of age cohorts and species diversity within maple-ash-elm forest community types. Without active management, there would be further degradation of forest community diversity, forest species diversity and wildlife species diversity, loss of filtering capabilities, and an increase in invasive species.

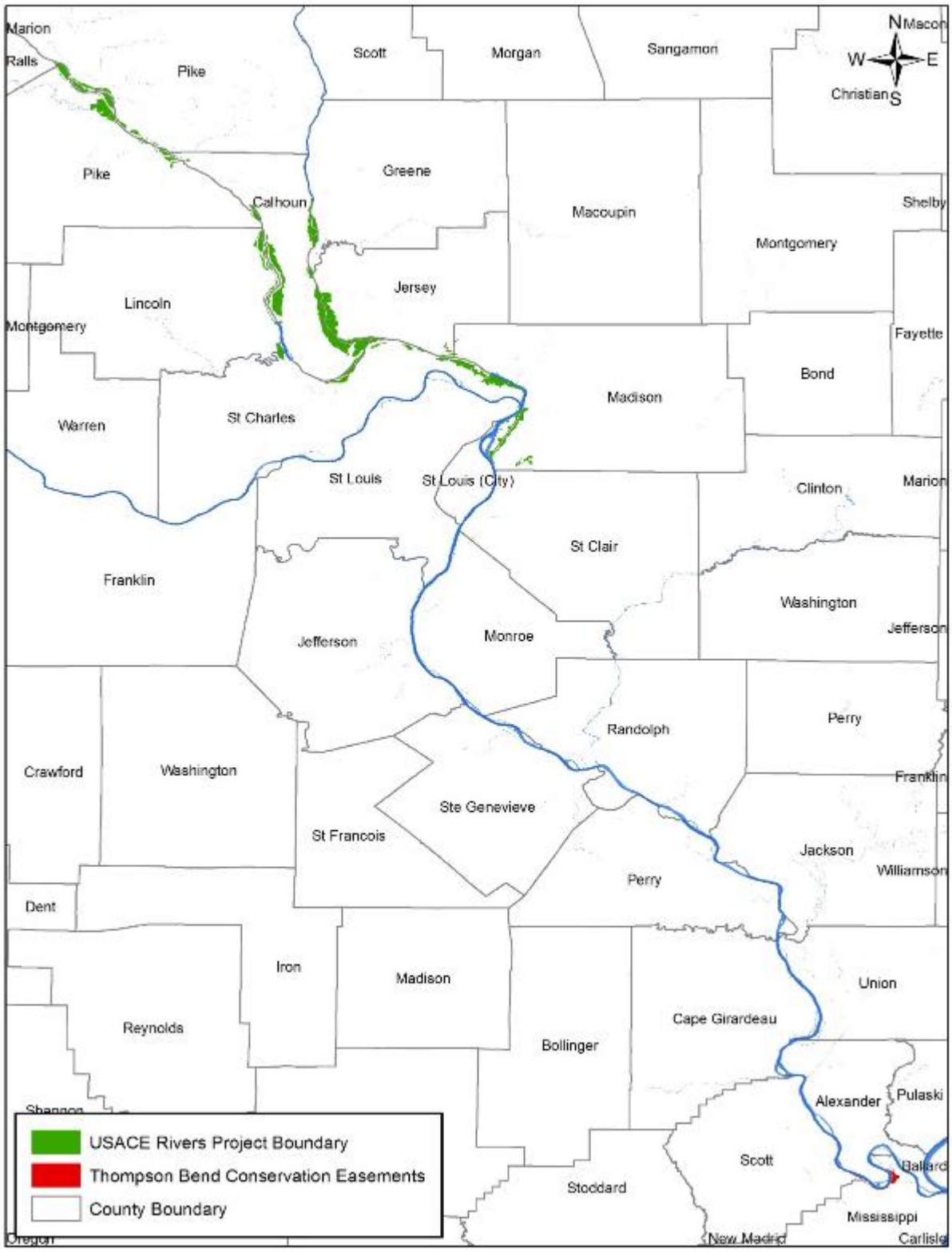

Figure 1. Map showing the location of the Rivers Project Office management areas (shown in green) and Thompson Bend Conservation Easements (shown in red).

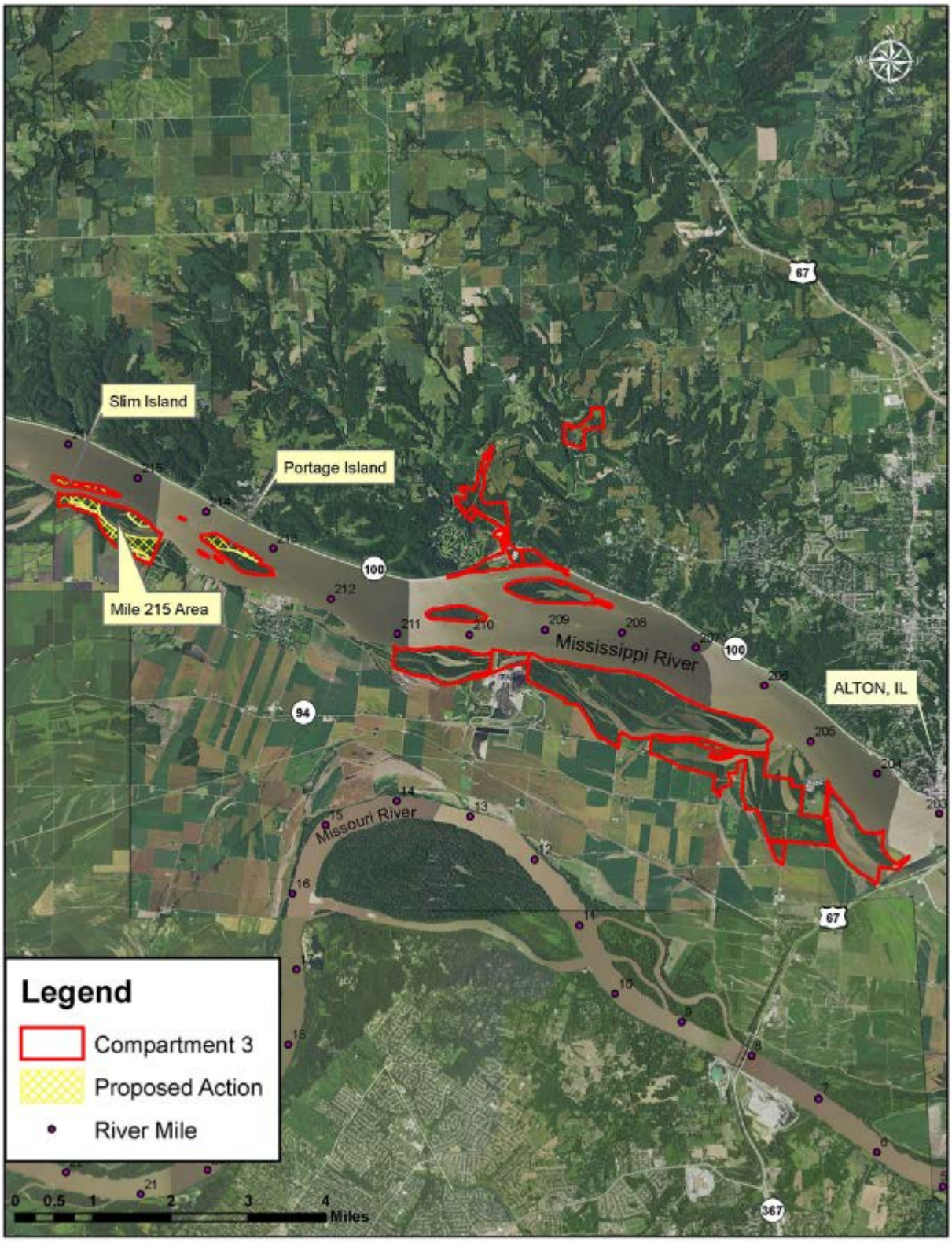

Figure 2. Map showing the location of Proposed Action in relation to Compartment 3 geographic extent. All Proposed Actions are located in Missouri.

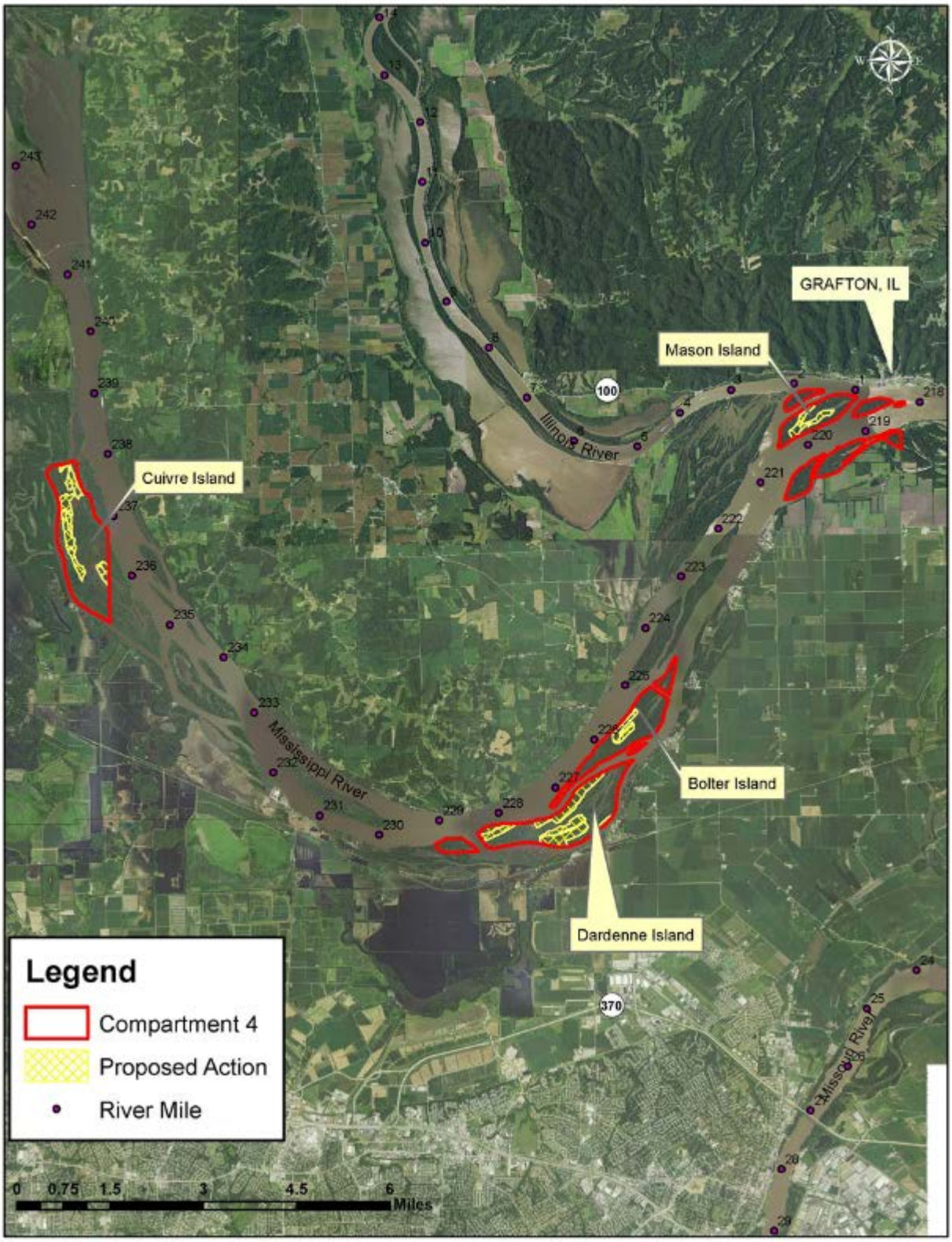

Figure 3. Map showing the location of Proposed Action in relation to Compartment 4 geographic extent. All Proposed Actions are located in Missouri.

1.6 Objectives (The Purpose) of the Rivers Project Forest Management

Federal and state agency natural resource managers, non-governmental organizations, and additional stakeholders recognized the importance of taking a systemic approach to forest management. *The Upper Mississippi River Systemic Forest Stewardship Plan* (Guyon et al., 2012) was developed to provide a guide for the sustainable management of UMRS forests. The goals of this plan include:

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

The purpose of the Rivers Project Forest Management Program is to improve forest species diversity, community diversity and stand structure using vegetation management treatments that:

- Restore natural riparian forests and wetland communities through natural succession, restoration plantings, silvicultural techniques, and succession control.
  - Increase the quantity of early successional forest at several age cohorts
  - Improve the quantity and quality of hardmast forests (i.e., nut-producing trees)
  - Practice uneven-age management in maple-ash-elm forest community types to diversify forest structure
- Sustain healthy forests and wetlands communities through vegetative management to provide high quality habitat for forest wildlife.
- Prescribe forest management techniques which support federal management goals and objectives for wildlife and fish management through Best Management Practices (BMPs).
- Reduce the impacts of invasive species on natural communities.

1.7 Proposed Federal Action

The Rivers Project Forest Management focuses on proposed forest management activities that would improve the forest community and wildlife habitat within the Proposed Action Area.
The federal action of selecting a preferred alternative for potential implementation has been determined by the Corps St. Louis District Engineer. The District Engineer has determined based upon the facts and recommendations contained herein, this EA is adequate to support a FONSI and an Environmental Impact Statement (EIS) will not be needed.

1.8 Scoping and Coordination

The National Environmental Policy Act (NEPA) affords all persons, organizations and government agencies the right to review and comment on proposed major Federal actions that are evaluated by a NEPA document. This is known as the “scoping process.” The scoping process was the initial step in the

preparation of this Environmental Assessment and helped identify (1) the range of actions (project, procedural changes), (2) alternatives (both those to be rigorously explored and evaluated and those that may be eliminated), and (3) the range of environmental resources considered in the evaluation of environmental impacts.

Scoping was conducted during the development of the 2015 Rivers Project Master Plan, which includes land and waters from Cairo, Illinois upstream to the tail waters of Locks and Dam 22 at Saverton, Missouri. Master Plan scoping meetings were held with the public at the National Great Rivers Museum on 22 January 2013 and the Clarksville Visitor Center on 23 January 2013. The final draft review and comment period was held from 24 March 2014 to 25 April 2014 with an Open House held at the National Great Rivers Museum in Alton, Illinois on 16 April 2014.

The Proposed Action also follows the goals and objectives laid out in the *Upper Mississippi River Systemic Forest Stewardship Plan* (Guyon et al., 2012). This plan was made available in draft form for the public to review from June to July 2011, as well as for a multidisciplinary team of agency and non-governmental authors and reviewers from 2005 to its finalization in 2012.

Additional scoping was conducted through coordination with lands managed under the General Plan agreement with Missouri Department of Conservation, Illinois Department of Natural Resources, and US Fish and Wildlife Service. A meeting was held in December 2012 with USFWS, IDNR, and MDC General Plans (GP) and Cooperative Agreement lands managers. The purpose of the meeting was to discuss the current state of the Corps managed lands and what future development may occur by looking at each management area individually. Additional correspondence on the Master Plan update was completed through email updates, in person while on site for other projects visits, and official mailings to each agency.

1.9 Prior Reports

Many studies have analyzed the historic changes in habitat in the Mississippi River Basin from pre-colonization times to present day (Simons, Schumm, & Stevens, 1974; UMRBC, 1982; Theiling, et al., 2000; WEST, 2000; Heitmeyer, 2008).

- The Upper Mississippi River Restoration Program (UMRR) conducted two ecological status and trends analyses of the UMR (USGS, 1999) (Johnson & Hagerty, 2008). The initial Status and Trends Report (USGS, 1999) provided a thorough introduction to the UMRS including extensive descriptions of historical context, watershed geology and land use, floodplain forests, bird populations, water quality, fishes, aquatic vegetation and benthic invertebrates. The 1999 report (USGS, 1999) provided the background information upon which the 2008 report (Johnson & Hagerty, 2008) was written.

- The 2008 Status and Trends Report focused on measuring changes in potential indicators of system health as derived from the Upper Mississippi River Restoration - Long Term Resource Monitoring data. Twenty-four ecosystem indicators were chosen because they relate too many of the primary resource problems or outcomes important to managers. The 24 indicators were grouped into

seven categories: hydrology, sedimentation, water quality, land cover, aquatic vegetation, invertebrates, and fish. Each indicator was evaluated for status across locations, and for trends over time, with estimates of uncertainty, when possible.

- The UMRR Program also conducted a Habitat Needs Assessment for the UMRS (Theiling, et al., 2000). The primary objectives of the Habitat Needs Assessment were the evaluation of existing conditions throughout the UMRS, forecasting future habitat conditions, and quantifying ecologically sustaining and socially desired future habitat conditions.

- Heitmeyer (2008) provided a detailed description of the historic physical and biological conditions specific to the UMRS, changes to those conditions, and restoration and management recommendations.

- The Corps Invasive Species Policy (2009) establishes nationwide invasive species management policy to be applied to all Civil Works projects and programs within the Corps.

- The 2000 Biological Opinion for the Operation and Maintenance of the 9-Foot Navigation Channel on The Upper Mississippi River System considers the systemic impacts of the operation and maintenance of the 9-Foot Channel Navigation Project on the Upper Mississippi River System (UMRS) on listed species as projected 50 years into the future.

2. ALTERNATIVES CONSIDERED

This section both describes the alternatives (potential actions) and compares the alternatives in terms of their environmental differences and their achievement of action objectives (from Section 1.5). The "No Action" Alternative, as required by NEPA, is also analyzed.

Alternative 1 – "No Action" Alternative. The "No Action" alternative assumes that the Proposed Action would not be realized. Under this scenario, the RPO would continue to perform its operation and maintenance responsibilities, but no new federal action regarding forest management in the Proposed Action Areas would be taken in the foreseeable future. The "No Action" alternative would result in a decrease in overall forest health and quality habitat. Failure to allow sunlight to reach the forest floor would prevent desired tree regeneration and decrease diversity of early successional vegetation, which is paramount for overall watershed environmental quality. In addition, the USACE 1999 BA included the following as a Conservation Measure for the Indiana bat. "Forest management efforts within the range of the Indiana bat will be carried out to establish and maintain forest species and size class diversity in order to ensure a long term supply of potential Indiana bat roosting trees. The "No Action" alternative would result in no federal action being taken to correct the overall health of the forest ecosystem.

Alternative 2 – Forest Management Alternative – Tentatively Selected Plan (TSP). This alternative would consist of implementing forest management measures within two compartments of the Rivers Project lands (Table 1). Actions would take place on approximately 583 acres within 29 separate stands. Timber harvests would occur on approximately 248 acres of the total Proposed Action Area (Table 2). All tree cutting activities would take place between 1 October and 31 March of any given year, during the non-

active roost season for Indiana and northern long-eared bat (NLEB). These Proposed Actions would be accomplished in accordance with the Rivers Project Master Plan, Design Memorandum No. 3, Prepared 2001, updated March 2015, and the Upper Mississippi River Systemic Forest Stewardship Plan, August 2012. In addition, an important component of the Proposed Action would be continued compliance with the 2000 Biological Opinion for the Operation and Maintenance of the 9-Foot Navigation Channel on The Upper Mississippi River System. Specifically, Section 2.3.3.3 states that "…forest management efforts within the range of the [Indiana] Bat would be carried out to establish and maintain forest species and size class diversity in order to ensure a long-term supply of potential Indiana Bat roost trees." Wherever the opportunity exists to improve or sustain conditions of the forest and provide benefits to wildlife and fish habitat, watershed protection, public outdoor recreation opportunities, scenic values, and pest control, appropriate management techniques would be applied.

2.1 Development of Forest Management Alternative

Treatment plans were developed by identifying potential forest management measures which may be used to improve the forest community and wildlife habitat within each treatment area in the Proposed Action Area. The following are broad definitions of potential forest management measures:

1) **Enhancement of Indiana Bat Habitat.** Habitat enhancement for the federally endangered Indiana bat would be favored where possible through timber management practices. Thinning activities would increase travel corridors and allow sunlight to reach potential roost trees. All dead trees, split trees, trees that have cavities, and trees with exfoliating bark would be favored for retention. Snags would be created as dictated by habitat type and forest community conditions to provide a specific habitat for Indiana bats. Areas that have known roosts would be delineated and avoided. Enhancement of Indiana bat habitat would occur within all areas of the Proposed Action Area where possible.

2) **Silvicultural Systems.** Forests would be managed with a goal of sustaining multiple forest communities and forest structure, and would be used as a tool to improve forest habitat. In order to do so, an uneven-aged management protocol would be followed in most management areas. Even-aged management would be used when the goal is to use parent trees for reforestation or adjust the microclimate for more shade intolerant species, such as eastern cottonwood (*Populus deltoids*). Intermediate treatments would be necessary where regeneration of the forest is not a main objective.

    - Even-aged system. Even-aged harvest methods regenerate and maintain a stand in a single age class. There are two primary types of even-aged harvest methods: seed tree and shelterwood.

        - *Seed Tree Method*. This method would involve cutting all trees except for a small number of widely dispersed trees (10-30 BA/acre) which would be retained for seed production and to establish a new age class. The seed tree method can be spaced either uniformly or non-uniformly depending on existing stand structure.

- *Shelterwood Method*. This method would include the cutting of most trees, leaving only those needed to produce sufficient shade to produce a new age class in a moderated microenvironment.

o Uneven-aged System. Uneven-aged methods regenerate and maintain a multi- aged structure by removing some trees in all size classes either singly or in small groups. The three major types are group selection and single tree selection.

- *Group Selection Method*. Group selection harvest systems create small, openings, likely less than one acre, in which trees are removed and new age classes are established. The width of groups is commonly twice the height of the mature trees with smaller openings providing microenvironments suitable for shade tolerant regeneration and larger openings providing conditions suitable for more shade intolerant regeneration.

- *Single Tree Selection Method*. This method involves removing individual trees of all size classes, uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration.

o Intermediate Treatments. Timber Stand Improvement (TSI) is broadly defined as an intermediate treatment. It is further defined as any treatment or tending designed to enhance growth, quality, vigor, and composition of the stand. The following are typical intermediate type treatments that are included within the Forest Management Alternative:

- *Improvement Cut*. These types of cuts are used under the uneven-aged management system to achieve internal stand structure objectives when regeneration is not an objective. Forest harvesting may or may not be applicable depending on the size classes within the stand.

- *Release*. Release is a treatment to free young trees from undesirable competition and can be used to improve the composition, structure, condition, health, and growth of a stand.

- *Thinning*. Thinning is a treatment performed to reduce stand density of trees. It is utilized primarily to increase growth, enhance forest health or reduce potential mortality. Thinning of existing forest resources would be a focus of many of the prescriptions in order to establish early successional and oak-hickory forest communities and support uneven-age management of maple-ash-elm forest communities.

3) **Timber Harvest Process.** Where feasible, timber sales would be utilized as a tool to improve site conditions and salvage removed forest resources (Table 2). In-kind services would be a focus of the timber sales in order to support reforestation efforts and forest management in stands that do not have economic value. Additionally, forest management activities may require the construction of temporary roads and loading sites in order to reduce long skids. Harvest

activities would be completed within a 5-year timeframe, followed by potential burning of slash piles, soil scarification, treatment of invasive species, rehabilitation of temporary roads, and monitoring. The Operations Element would prepare the determination of availability for forest products to be sold on Rivers Project lands. The sale of forest products would be administered by the Real Estate Element, in accordance with ER 405-1-12. Minor sales may be accomplished by the Operations Project Manager on water resources development projects under the general guidance (ER 405-1-12) issued by the Real Estate Element.

i. Determinations of availability would contain as a minimum:

1. A statement of the purpose of the proposed sale.
2. An estimate of the volume of the various products made available and the basis for the estimate.
3. A statement on the accuracy of the estimate to serve as the basis for a lump sum sale (if forest products are intended to be sold on lump sum basis).
4. A listing of voluntary Best Management Practices (BMPs) published by state forestry agencies would be included in the sales contract. Examples of BMPs include seasonal harvesting requirements, riparian protection zones, maximum log lengths, and allowable equipment size.

ii. Provisions for a final joint Operations Element-Real Estate Element compliance inspection before release of the contractor at completion of the contract, as required.

4) **Reforestation.** Reforestation would include planting of trees in open and non-vegetated areas, where timber stand improvements and harvests would be conducted. Generally, the end objective would be the establishment of a diverse forest resource that is adapted to the specific site edaphic and hydrologic conditions and historic forest community. However, other objectives may include the establishment of dense stands of cottonwood and sycamore to reduce bank erosion and increase sediment entrapment. It also may include the establishment of fast growing willow, cottonwood and sycamore in canopy gaps where invasive species (i.e., Japanese hops and reed canarygrass) are a concern and canopy closure is desirable. With reforestation efforts come several years of maintenance to ensure long-term survivorship for the tree planting action. This would include mowing, herbicide application, and supplemental plantings.

5) **Invasive Species Management.** The Corps is mandated by the Federal National Invasive Species Act (1996) and the Corps Invasive Species Policy (2009) to contain and reduce the spread and populations of established invasive species to minimize their harmful impacts. Acceptable control techniques include chemical, mechanical, biological, fire, cultural, and flooding. All of these alternatives would be evaluated prior to the implementation of a control technique. The control technique chosen would be based upon potential ecological impact, susceptibility of targeted species, cultural acceptability, and cost benefit analysis. A Pesticide Use Proposal (PUP) evaluating each control technique and justifying the use of chemical pesticides would be produced prior to the large scale use of a pesticide. Treatment of invasive species would occur within the proposed treatment stands as part of TSI or as needed to ensure tree seedling

survival and recruitment. Monitoring pre- and post-treatment would be conducted to determine the success of the treatment and adaptive management adjustments would be made based upon this analysis.

The specific forest management measures included by treatment type within the Proposed Action Area are shown in Table 2.

Table 2. Proposed treatment type by location.

Location	Compartment	Stand	Total Acres	Treatment Acres	Proposed Action Treatment Type	Timber Harvest
Portage Island	3	1	52	10	Regeneration/Even-age	Yes
Slim Island	3	1	38	38	TSI/Reforestation	No
Mile 215 Area	3	1	16	3	TSI/Reforestation	No
	3	2	32	1	TSI/Reforestation	No
	3	6	17	1	TSI/Reforestation	No
	3	8	29	2	TSI/Reforestation	No
	3	12	81	4	TSI/Reforestation	No
Mason Island	4	7	21	20	Regeneration/Seed Tree	Yes
	4	9	36	20	Regeneration/Seed Tree	Yes
Bolter Island	4	13	31	30	Regeneration/Seed Tree	Yes
	4	15	17	17	Regeneration/Seed Tree	Yes
Dardenne Island	4	7	110	67	Regeneration/Seed Tree	Yes
	4	15	8	8	TSI/Reforestation	No
	4	16	44	44	TSI/Reforestation	No
	4	17	23	23	Regeneration/Seed Tree	Yes
	4	21	35	35	Improvement/Uneven-age	Yes
	4	25	81	81	TSI/Release	No
Cuivre Island	4	2	8	8	TSI/Release/Reforestation	No
	4	15	26	26	TSI/Release/Reforestation	No
	4	16	9	9	TSI/Release	No
	4	26	26	26	Regeneration/Seed Tree	Yes
	4	31	4	4	TSI/Reforestation	No
	4	35	13	13	TSI/Reforestation	No
	4	42	39	39	TSI/Reforestation	No
	4	54	27	27	TSI/Reforestation	No
	4	55	9	9	TSI/Reforestation	No
	4	58	8	8	TSI/Reforestation	No
	4	61	10	10	TSI/Reforestation	No
Proposed Action Total Treatment Acres				**583**		

3. AFFECTED ENVIRONMENT

This section describes existing conditions in the Rivers Project, which are referred to under the NEPA process as the Affected Environment. The resources described in this section are those recognized as

significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

The section is broken into four resource categories: physical resources (air quality, water quality, geology and soils, prime farmland, noise, and HTRW), biological resources, socioeconomic resources, historic and cultural resources, and climate change and greenhouse gas emissions. This section does not address impacts of the Alternatives, but provides a background against which Alternatives can be compared in Section 4, Environmental Consequences.

3.1 Physical Resources

3.1.1 Land Cover/Land Use

The Proposed Action Area encompasses approximately 3,014 land acres in Missouri (Table 3). The majority of the land adjacent to the Proposed Action Area can be generally categorized as rural and agrarian in nature. Isolated areas of highly developed industrialized urban pockets include the Alton, Illinois and St. Louis, Missouri metropolitan areas, located within 50 miles of the Proposed Action Area.

Table 3. Land cover quantities for Proposed Action Areas.

Location	Area Acreage	Open Water	Non Vegetated	Deciduous Forests	Woody Wetlands	Emergent Wetlands	Cultivated Crops
Portage Island	121	10	-	1	110	-	-
Slim Island	38	2	-	-	36	-	-
Mile 215 Area	298	52		15	227	4	
Mason Island	277	22	-	-	255	-	-
Bolter Island	509	18	16	-	473	2	-
Dardenne Island	821	23	-	-	785	13	-
Cuivre Island	950	26	6	12	856	19	31
Total Acreages	**3,014**	**153**	**22**	**28**	**2,742**	**38**	**31**

*(Homer et al., 2015) *Land cover data source used in above table, 2011 National Land Cover Database (NLCD)**

Approximately 90% of total land cover within the Proposed Action Area is classified as Woody Wetlands, or areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water. Within these defined areas the dominant vegetation type is forested.

3.1.2 Air Quality

The Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead. EPA regulates these pollutants by developing human health-based or environmentally-based permissible pollutant concentrations. EPA then publishes the results of air quality monitoring, designating areas as meeting (attainment) or not meeting (nonattainment) the standards or as being maintenance areas. Maintenance areas are those areas that have been re-designated as in attainment from a previous nonattainment status. A maintenance plan establishes measures to control emissions to ensure the air quality standard is maintained in these areas.

All of the nonattainment areas are located in close proximity to the St. Louis Metropolitan area and include St. Charles County, Missouri. St. Charles County, Missouri is designated as nonattainment for two criteria of air pollutants: Particulate Matter 2.5 (1997 Standard) and 8-hour Ozone (2008 Standard). Lincoln County, Missouri is in attainment for all criteria air pollutants (Table 4).

Table 4. Air quality attainment status for counties within the Proposed Action Area (based on 20 June 2017 USEPA data).

County	Pollutant Criteria	Classification*
St. Charles County, MO	Particulate Matter – 2.5 (1997 Standard)	Non-attainment (Moderate)
	8-hour Ozone (2008 Standard)	Non-attainment (Marginal)
Lincoln County, MO	All	In Attainment

*Nonattainment area designations based on Environmental Protection Agency classification system of marginal, moderate, serious, severe 15, severe 17, or extreme. See https://www3.epa.gov/airquality/greenbook/ancl.html#MO for more information.

3.1.3 Water Quality

Consideration of water quality encompasses a wide range of physical, hydrologic, and biological parameters. Watershed influences, including tributary streams, point and non-point pollution sources, flow alteration due to navigation structures, and drought and flood events all influence water quality. Variations in land use practices, cover types, and watershed area would determine the level and type of sediment, nutrient, and contaminant inputs into the Mississippi River and its tributaries. The Mississippi

River has a long history of water quality impairment due to contamination from industrial, residential, municipal, and agricultural sources. Recent changes in wastewater treatment laws and technologies, regulation of point source discharges, and changes in public awareness have contributed to overall improvements in water quality.

Section 303(d) of the Clean Water Act requires states to generate lists of impaired water bodies every two years. Impaired water bodies are those that do not meet state water quality standards for the water bodies' designated uses. Missouri has listed the Mississippi River in the vicinity of the work area as impaired due to the levels of *E. coli* from both nonpoint sources as well as municipal point source discharges (MDNR 2016; https://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm).

Missouri has 2017 fish consumption advisories for all Missouri waterbodies due to mercury contamination for Largemouth Bass >12", Smallmouth Bass >12", Spotted Bass >12", and Walleye >12" (one meal per month for sensitive populations); Flathead Catfish >30" and Blue Catfish >30" (one meal per month for sensitive populations); all other fish (one meal per week for sensitive populations). Additionally, the Mississippi River has 2017 fish consumption advisories for shovelnose sturgeon (all sizes, one meal per month) due to PCB, chlordane, and mercury contamination; sturgeon eggs (do not eat); Flathead catfish >17", and Blue Catfish 17" (1 meal per week); Common Carp >21" (1 meal per week) (MDHSS 2017; https://ogi.oa.mo.gov/DHSS/fishAdvisory/index.html).

3.1.4 Geology & Soils

The Proposed Action Area forest lands lies within the floodplain and islands of the Upper Mississippi River. The floodplain landscape is typical ridge and swale topography created by the river as it migrated across the floodplain. The low ridges in the floodplain are typically composed of sandy or silty material, while the lower swale have surface soils that are typically silty clays. The islands are typically composed of sandy or silty material.

3.1.5 Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland. Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Prime farmland soils may presently be used as cropland, pasture, or forestland or for other purposes. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service. A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. Within the Proposed Action Area, Portage Island, Slim Island, Mile 215 Area, Mason Island, Bolter Island, Dardenne Island, and Cuivre Island are all considered to be Prime farmland if drained (Figure 4). These areas are currently forested.

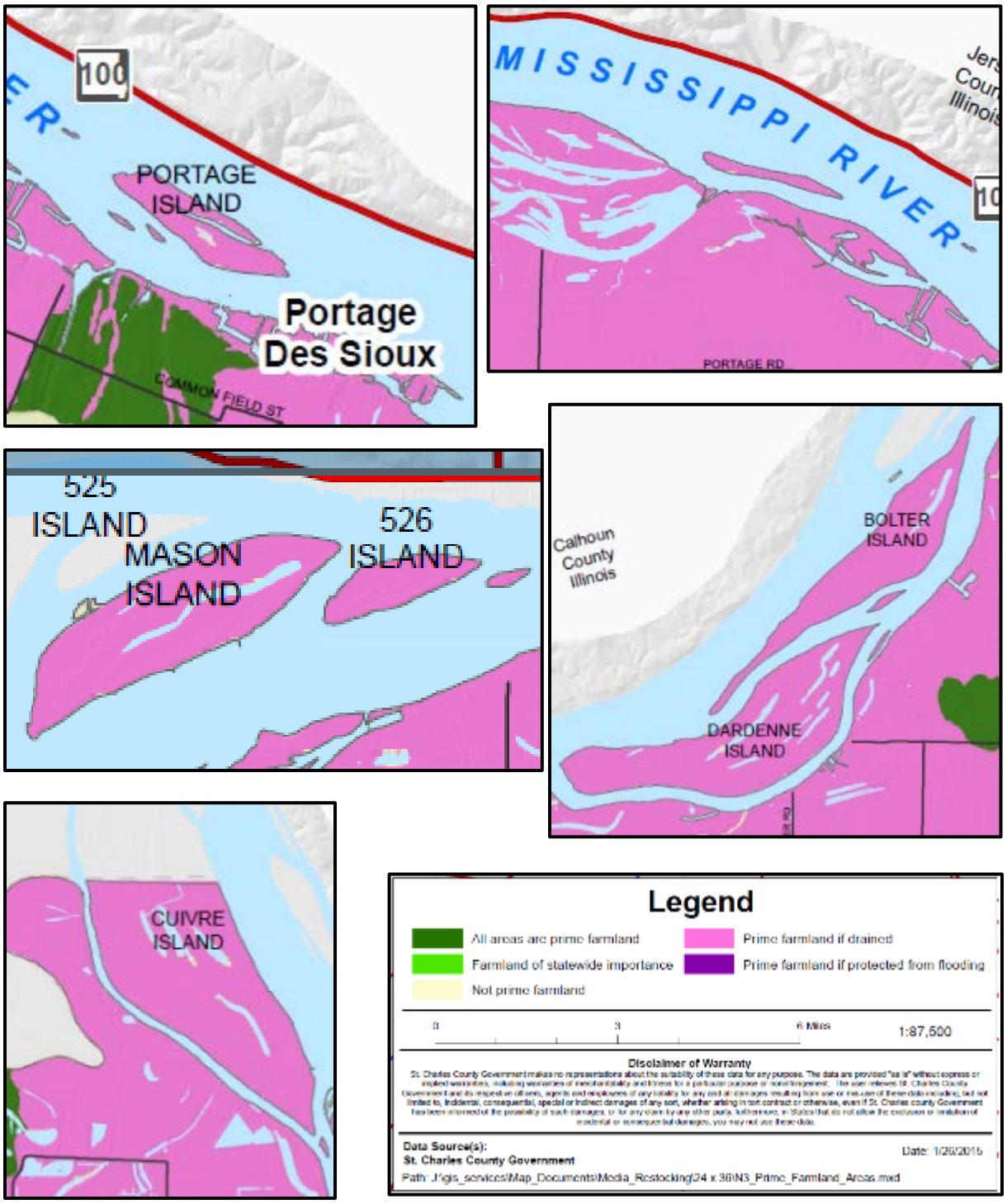

Figure 4. Map showing the location of Proposed Action Areas, all of which are considered to be prime farmland if drained.

3.1.6 Noise

Transportation-related noise, such as that created by navigation traffic, railroads, planes, and small highways, is the main source of noise within the Proposed Action Area. Additional noise can be attributed to gun shots that occur during hunting season. Agricultural and open space areas typically have noise levels in the range of 34-70 decibels (dB; a measure of loudness) depending on their proximity to transportation arteries.

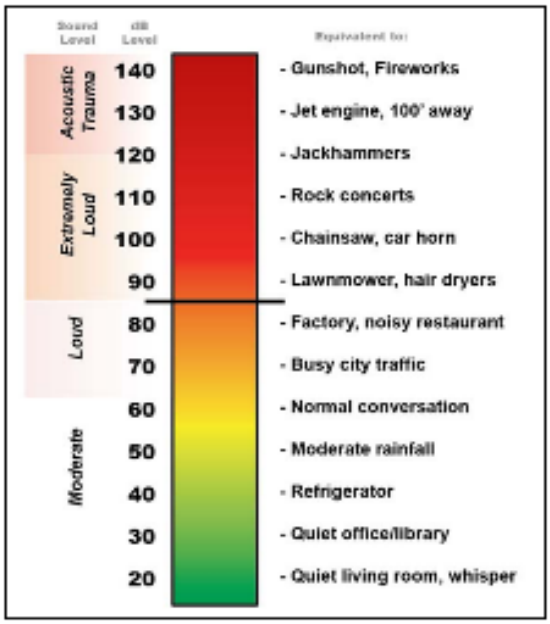

Figure 5. Examples of the sound level and decibel (dB) level of variety of sources.

3.1.7 Hazardous, Toxic, and Radioactive Waste

Corps regulations (ER 1165-2-132 and ER 200-2-3) and District policy require procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, or radioactive waste (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting Environmental Condition of Property (ECP) Assessments. The Corps specifies that these assessments follow the process/standard practices for conducting Phase I Environmental Site Assessments (ESA) published by the American Society for Testing and Materials (ASTM). These assessments are prepared using the following ASTM Standards:

- E1527-13: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment Process
- E1528-06: Standard Practice for Limited Environmental Due Diligence – Transaction Screen Process (interview questionnaires)
- E2247-08: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment Process for Forestland or Rural Property

The purpose of an ECP is to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants (i.e. Recognized Environmental Conditions[1] or RECs) within the scope of the U.S. Environmental Protection Agency's (USEPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products.

All proposed improvements and construction projects are evaluated for potential soil contamination, groundwater quality, surface water quality and issues related to hazardous substance uptake by biota. Site visits are conducted to observe present conditions and check for the presence of chemical spill residue, die-back of vegetation, and prior environmentally hazardous activities. Historical aerial photography of the vicinity and U.S. Geological Survey (USGS) maps are also used to study drainage patterns and topography.

Information is obtained through reviews of records and reports, reviews of environmental databases, site reconnaissance, and interviews of persons knowledgeable of the property history. The readily available electronic records of the U.S. Environmental Protection Agency (USEPA) EnviroMapper and state and local databases are reviewed to identify Superfund sites, toxic releases, or hazardous waste sites within or directly adjacent to the Proposed Action Areas.

3.2 Socioeconomics

3.2.1 Recreation

The majority of Rivers Project Area visitors come from within 100 miles of the Mississippi and Illinois rivers. Rivers Project visitors are a diverse group ranging from anglers, boaters, wildlife viewing, and paddlers that utilize the rivers, residents of riverside communities, hunters who utilize the wildlife management areas, marina customers, recreational cottage owners, and many other user groups. The peak visitation months are January and February.

The Mississippi and Illinois rivers provide major opportunities for water based recreation in the region. Natural vegetation, variable topography, accessibility to water and the proximity of the rivers to a large population are significant features that enhance its attractiveness for recreational purposes. The demand for outdoor recreation is continually increasing.

3.2.2 Aesthetics

Aesthetic resources are represented by those aspects of the natural and human environment that are pleasant or pleasing for people, especially to for viewing purposes. For many people, aesthetic resources include the natural channel of the Mississippi River, undeveloped spaces such as agricultural lands, natural habitats such as forested areas, and some development, such as residential areas. The Rivers Project forested areas are expected to be aesthetically attractive to many people.

[1] Recognized Environmental Conditions are defined by ASTM E1527-13 as "...the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property..."

3.2.3 Demographics and Environmental Justice (EO 12898)

Summary of Entire Region: The Rivers Project jurisdictional lands and waters area extend from Saverton, MO, to Cairo, IL, on the Mississippi River; and from La Grange, IL, to Grafton, IL, on the Illinois River. A total of 2 counties in Missouri are within the Proposed Action Area corridor. The St. Louis Metropolitan Area, with 16 counties, is the population and economic hub of the region and has, by far, the most influence on Rivers Project operations.

Median household income and per capita for the Proposed Action Area show income to be below the statewide averages in Lincoln County, Missouri; whereas St. Charles County and median household income and per capita income are above the Missouri statewide averages (Table 5).

Table 5. Income statistics for the Proposed Action Area counties.

Area	Median Household Income	Per Capita Income
Lincoln County, MO	$53,280	$53,280
St. Charles County, MO	$72,100	$72,100
State of Missouri Averages	$47,764	$47,764

Source: U.S. Census Bureau 2014.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. The most recent minority and low-income data available for this analysis (U.S. Census Bureau 2012) can be found in ***Error! Reference source not found.***.

To further refine the Environmental Justice analysis, Census Block Group information was analyzed to determine the status of minority and low-income populations immediately adjacent to the Proposed Action Area. By utilizing Census Block Group data, minority or low-income populations that may not have been revealed when looking at the broader county-wide information could be analyzed. In addition, comparisons of minority and low-income populations among different parts of the Project Area could more accurately be conducted to ensure that potential disproportionate impacts within the Project Area itself were considered.

Table 6. Socioeconomics information for Proposed Action Area counties.

Socioeconomic Indicator	Lincoln County, MO	St. Charles County, MO
Total Population	52,566	360,485
% White	95.0%	90.7%
% Black	1.9%	4.1%

Socioeconomic Indicator	Lincoln County, MO	St. Charles County, MO
% American Indian/Alaskan Native	0.3%	0.2%
% Asian	0.4%	2.2%
% Native Hawaiian/ Pacific Islander	0.0%	0.0%
% Other	1.0%	3.1%
% Multiple	1.8%	1.8%
% Hispanic	2.0%	2.8%
Average Family Size	2.75	3.11
Total Housing Units	21,011	141,016
% Low Income	15.7%	6.8%

3.3 Climate Change and Greenhouse Gas Emissions

Climate change is a fundamental environmental issue, and is a particularly complex challenge given its global nature and inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Climate change science is evolving, and is only briefly summarized here. In 1970, the level of atmospheric carbon dioxide was estimated at 325 parts per million (ppm) (CEQ 1970). Since 1970, the concentration of atmospheric carbon dioxide has increased at a rate of about 1.6 ppm per year (1970-2012) to approximately 396 ppm in December 2014 (current globally averaged value). Based on the United States Global Change Research Program as well as other scientific records, it is now well established that rising global atmospheric greenhouse gas emission concentrations are significantly affecting the Earth's climate (USACE 2015).

The approach at USACE is to consider the questions in need of climate change information at the geospatial scale where the driving climate models retain the climate change signal. At present, USACE judges that the regional, sub-continental climate signals projected by the driving climate models are coherent and useful at the scale of the 2-digit HUC (Water Resources Region) (Figure 6). Within Water Resources Region 07, the general consensus in the recent literature points toward moderate increases in temperature and precipitation, and streamflow in the Upper Mississippi Region over the past century. In some studies, and some locations, statistically significant trends have been quantified. In other studies and locales within the Upper Mississippi Region, apparent trends are merely observed graphically but not statistically quantified. There has also been some evidence presented of increased frequency in the occurrence of extreme storm events (Villarini et al., 2013). Lastly, a transition point in climate data trends, where rates of increase changed significantly, was identified by multiple authors at approximately 1970 (USACE 2015).

Figure 6. Water Resources Region 07: Upper Mississippi Region Boundary.

There is strong consensus in the literature that air temperatures will increase in the study region, and throughout the country, over the next century. The studies reviewed here generally agree on an increase in mean annual air temperature of approximately 2 to 6 ºC (3.6 to 10.8 ºF) by the latter half of the 21st century in the Upper Mississippi Region. Reasonable consensus is also seen in the literature with respect to projected increases in extreme temperature events, including more frequent, longer, and more intense summer heat waves in the long term future compared to the recent past (USACE 2015).

Projections of precipitation found in a majority of the studies forecast an increase in annual precipitation and in the frequency of large storm events. However, there is some evidence presented that the northern portion of the Upper Mississippi Region will experience a slight decrease in annual precipitation. Additionally, seasonal deviations from the general projection patter have been presented, with some studies indicating a potential for drier summers. Lastly, despite projected precipitation increases, droughts are also projected to increase in the basin as a result of increased temperature and ET rates (USACE 2015).

A clear consensus is lacking in the hydrologic projection literature. Projections generated by coupling GCMs with macro scale hydrologic models in some cases indicate a reduction in future streamflow but in other cases indicate a potential increase in streamflow. Of the limited number of studies reviewed here, more results point toward the latter than the former, particularly during the critical summer months (USACE 2015).

The trends and literary consensus of observed and projected primary variables noted above have been summarized for reference and comparison in the following figure (Figure 7) (USACE 2015).

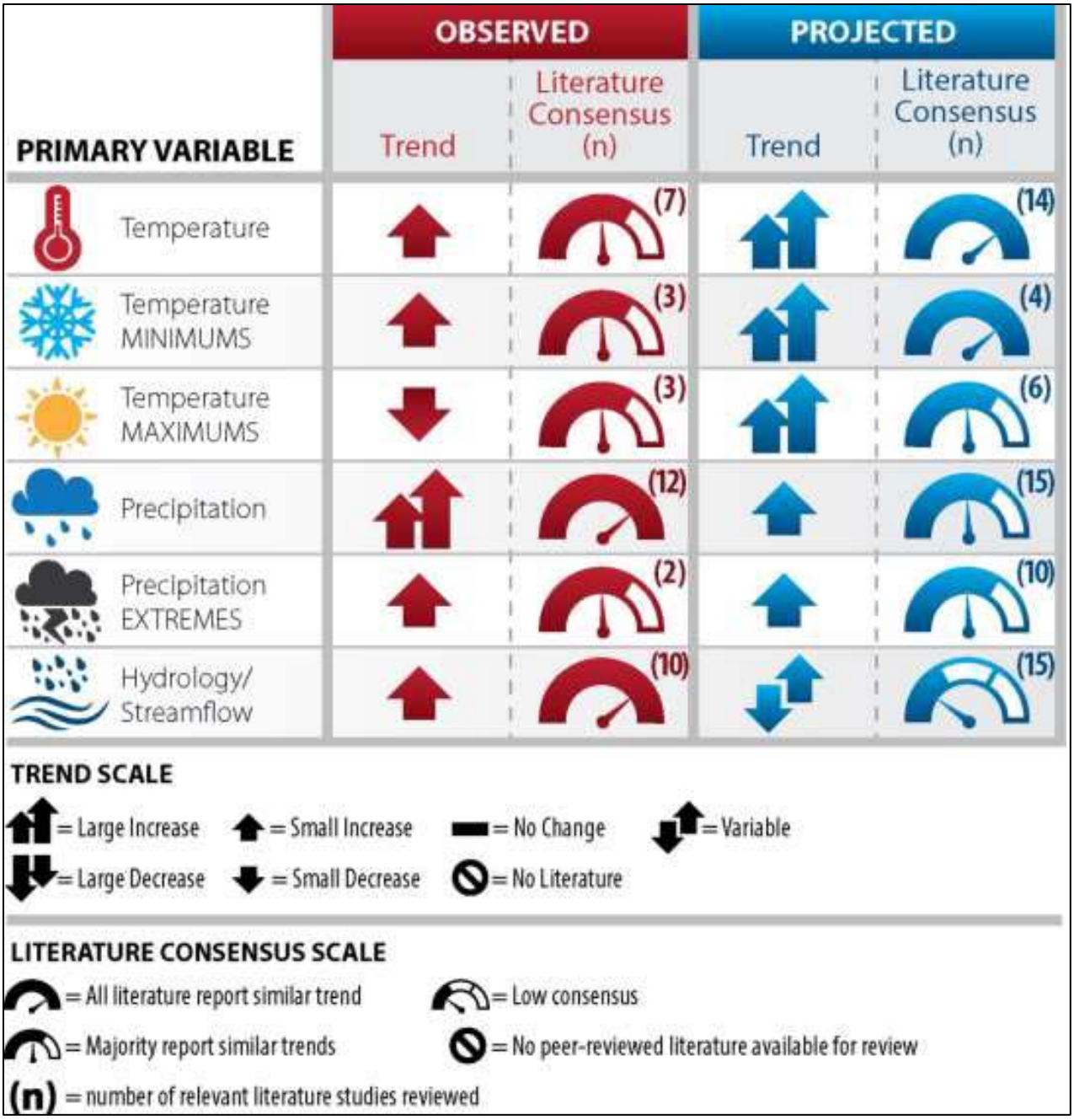

Figure 7. Summary matrix of observed and projected climate trends and literary consensus.

3.4 Biological Resources

3.4.1 Wetlands

Wetlands subject to Section 404 of the Clean Water Act exist throughout the Proposed Action Area. The wetlands were determined by using National Wetland Inventory maps and a local Corps GIS database. No actual wetland delineations were conducted in the field. Table 7 shows the total wetland acreage within the Proposed Action Area. A large percentage of the total wetland areas are considered forested/shrub wetland.

Table 7. Total wetland acreage for Proposed Action Area.

WETLANDS LEVEL ONE INVENTORY							
Location	**Wetland Acreage**	**Forested/ Shrub Wetland**	**%Forested/ Shrub Wetland**	**Emergent Wetland**	**% Emergent Wetland**	**Deepwater Habitat**	**% Deepwater Habitat**
Portage Island	121	94	78%	-	-	27	22%
Slim Island	38	35	92%	-	-	3	8%
Mile 215 Area	296	218	74%	-	-	78	26%
Mason Island	277	254	92%	-	-	23	8%
Bolter Island	497	475	95.5%	1	.5%	21	4%
Dardenne Island	685	618	90%	-	-	67	10%
Cuivre Island	877	826	94%	-	-	51	6%
Total Acreages	**2,791**	**2,520**	**90%**	**1**	**< .01%**	**270**	**10%**

**Wetland data from USFWS-National Wetland Inventory; data last updated in October 2010. **

3.4.2 Forests

There has been a significant change in forest composition and structure since early settlements (Table 8). The land cover at pre-settlement was 46% prairie, 35% forested, and 19% in open water and swamp/marsh (Nelson et al., 1994; Nelson et al., 1997*a*; Nelson et al., 1997*b*; Nelson et al., 1998*a*; Nelson et al., 1998*b*). Forests occurred as a band along the river and on islands. Forests were comprised of oak-hickory (pecan), American elm, hackberry, Eastern cottonwood, ash, and maple. Most of the Corps acquired lands were in lower elevation sites close to the river and islands. These lands and islands naturally supported floodplain forests. The islands and adjacent mainland forests were logged during the mid-1800s to support the early steam boat industry. Harvesting and clearing continued to provide timber products and to support agriculture. Water level management following lock and dam

construction had a significant impact on the forest communities due to increased water levels and altered hydrologic regime. For example, construction of Lock and Dam 26 raised the water levels by approximately 8 feet and decreased annual fluctuation by approximately 12 feet (Figure 8 and 9). This caused mortality for many tree species that were less tolerant of saturated soil conditions. The loss of these tree species caused a shift in forest community composition and distribution. Water level management also disrupted the establishment of early successional forest communities (cottonwood-willow).

Table 8. Species composition of UMRS floodplain forests at Pre-settlement and 1995 (Nelson et al 1994).

Species	GLO 1816-57	1995
Oak species	35%	5%
Hickory species	10%	1%
American elm	14%	13%
Hackberry	9%	2%
Eastern cottonwood	8%	3%
Ash	9%	10%
Maple	5%	45%

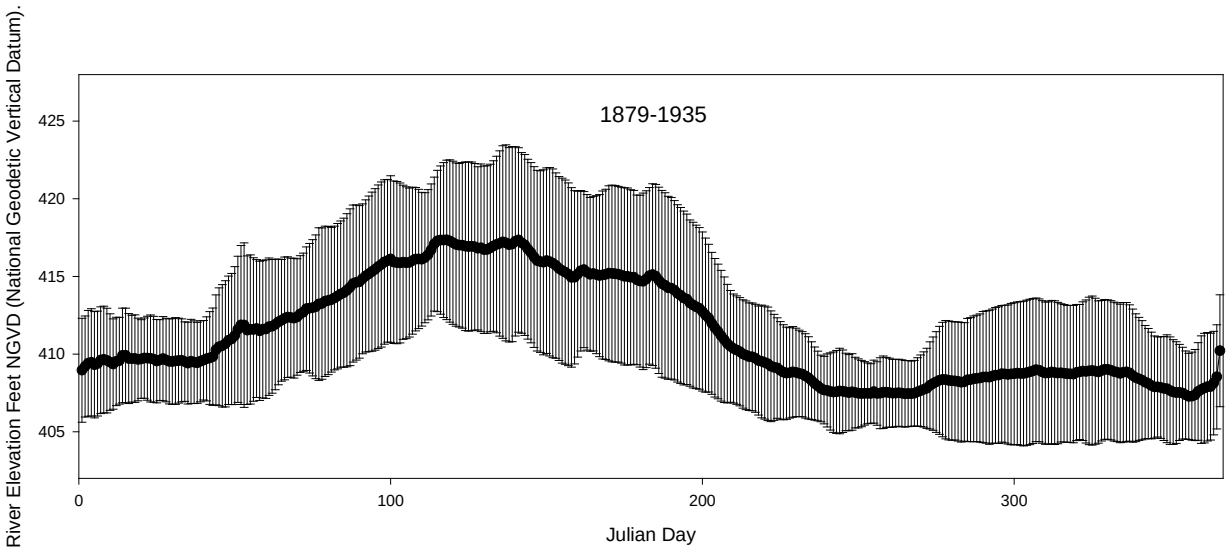

Figure 8. Mean river elevation at Grafton gage, Mississippi River prior to construction of Lock and Dam 26, 1940-2002.

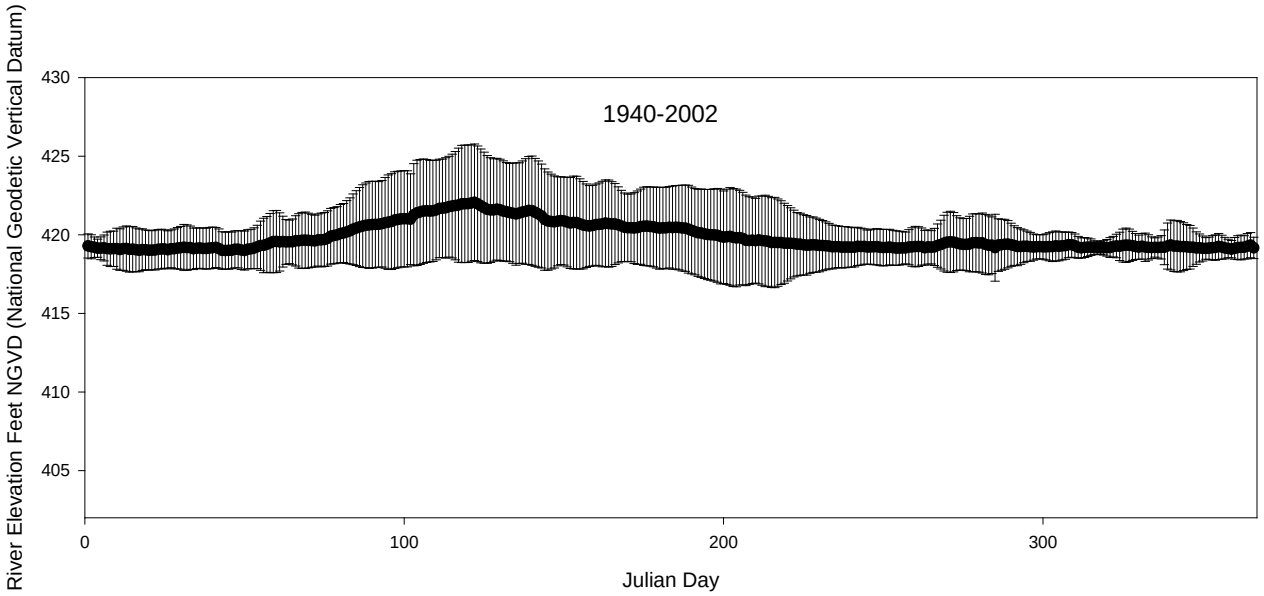

Figure 9. Mean river elevation at the Grafton gage, Mississippi River post-construction of Lock and Dam 26.

Modern forest composition within the Proposed Action Area consists primarily of mature and over-mature stands of eastern cottonwood (early successional) transitioning to maple-ash-elm forest communities (Table 9). The abundance of these community types is directly related to historic management and successional patterns of floodplain forest of the UMRS. Many of the stands at acquisition in the 1930's were in agriculture and the first species to naturally regenerate were early successional species such as eastern cottonwood (*Populus deltoides*) and willow (*Salix* spp.). Today, the early successional species are senescing while the maple-ash-elm community is maturing. This has resulted in a single-canopy structure for forests where the eastern cottonwood trees have already died out. There are scattered remnant oak forest communities throughout the Project Area. The oak forest was historically prominent, but to due to altered hydrology, lack of disturbance events, and lack of regeneration, this forest community is in a state of decline. Oak forest community types are currently transitioning to maple-ash-elm forest communities.

Table 10 presents the average basal area (BA) (ft^2/acre) and density at the broad compartment level. Individual forest stand attributes are shown in Table 12. The BA within individual stands ranges from 26-200 ft^2/acre (Table 11). Tree densities appear to be low as compared to desired conditions. However, this is an average across the entire compartment/stand and does not take into consideration wetland, open water bodies, Operations Management areas, and recreation areas. Lower tree densities represent mature to over-mature forest communities with little natural regeneration occurring. Overall, the forest health, composition, diversity, and habitat capability to support a multitude of wildlife species of concern has declined due to changes in river geomorphology, lack of active forest management, and an increase in invasive species abundance (Urich et al., 2002).

Table 9. Percent species composition by compartment.

Compartment	ACRES	TOP 3 Dominant Forest Species by %		
3	3,512	Silver Maple 36%	Green Ash 17%	E. Cottonwood 11%
4	3,063	Silver Maple 42%	Green Ash 13%	E. Cottonwood 8%

Table 10. Forest summary attributes by compartment.

Compartment	ACRES	Average Basal Area/ Acre	Average Trees /Acre	Average Snag Trees/Acre	Diameter at Breast Height (DBH)*
3	3,512	54.7	67.0	2.9	12.2
4	3,063	92.1	67.1	3.6	15.9

* Quadratic mean diameter breast height

Table 11. Forest summary attributes by stand.

Location	Compartment	Stand	Acres	Average Basal Area/Acre	Average Trees/Acre	Average Snag Trees/Acre	DBH*
Portage Island	3	1	52	134.5	68.3	4.6	18.9
Slim Island	3	1	38	87.7	40.3	5.9	19.9
Mile 215 Area	3	1	16	41.4	38.8	.54	13.9
	3	2	32	103.8	65.5	4.7	17.0
	3	6	17	94.2	38.5	.45	21.1
	3	8	29	53.6	47.8	2.1	14.3
	3	12	81	67.5	82.9	2.2	12.2
Mason Island	4	7	21	183.7	126.5	13.1	16.3
	4	9	36	178.5	144.0	7.7	15.1
Bolter Island	4	13	31	122.1	127.2	2.8	13.2
	4	15	17	168.6	94.4	10.6	18.1
Dardenne Island	4	7	109	120.9	62.8	7.9	18.8
	4	15	8	26.7	84.2	-	7.6

Location	Compartment	Stand	Acres	Average Basal Area/Acre	Average Trees/Acre	Average Snag Trees/Acre	DBH*
	4	16	44	35.9	45.8	2.7	12.0
	4	17	23	200.0	96.6	6.6	19.5
	4	21	34	132.1	85.1	3.5	16.9
	4	25	81	95.8	107.6	2.4	12.8
Cuivre Island	4	2	8	165.0	117.0	8.0	16.1
	4	15	26	45.0	169.0	2.8	7.0
	4	16	9	32.0	166.0	14.7	6.0
	4	26	26	134.4	98.2	2.2	15.8
	4	31	4	60.0	29.1	6.4	19.4
	4	35	13	64.0	89.6	2.7	11.4
	4	42	39	63.1	65.6	.1	13.2
	4	54	27	49.1	98.3	2.5	9.6
	4	55	9	30.0	16.8	-	18.1
	4	58	8	73.0	72.2	-	13.7
	4	61	10	75.0	111.1	2.7	11.1
Forest Stand Averages				**94.2**	**85.3**	**4.8**	**14.6**

*Quadratic mean diameter breast height

3.4.3 Bald Eagle (Haliaeetus leucocephalus)

Although the Bald Eagle was removed from the federal list of threatened and endangered species in 2007, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). The BGEPA prohibits unregulated take of Bald Eagles, including disturbance. The U.S. Fish and Wildlife Service developed the National Bald Eagle Management Guidelines (USFWS 2007) to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to Bald Eagles, particularly where such impacts may constitute disturbance. Bald Eagles nests are known to occur in various locations throughout the Project Area. The National Bald Eagle Management Guidelines would be followed to minimize potential impacts to Bald Eagles in the Proposed Action Area.

3.4.4 Threatened and Endangered Species

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, an official list of species and critical habitat potentially occurring in the vicinity of the proposed project was acquired from the USFWS Information for Planning and Conservation (IPaC) website at (https://ecos.fws.gov/ipac/) on 17 July 2017 (Table 12). Habitat requirements and impacts of the federal action are discussed for each listed species.

Table 12. Federally threatened or endangered species potentially found in vicinity of the Proposed Action Area.

Species	Federal Status	Habitat
Gray bat (*Myotis grisescens*)	Endangered	Caves year-round (winter hibernacula and summer roosting). In the summer gray bats forage along rivers lakes, and creeks, and may roost under bridges.
Indiana bat (*Myotis sodalis)*	Endangered	Caves, mines (winter hibernacula); trees (summer roosting); and small stream corridors with well-developed riparian woods; upland forests (foraging)
Northern long-eared bat (*Myotis septentrionalis*)	Threatened Key to 4(d) Rule	Caves, mines; rivers and reservoirs adjacent to forests
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	Mississippi and Missouri Rivers
Higgins eye mussel (*Lampsilis higginsi*)	Endangered	Large rivers with deep water and moderate currents, and sand & gravel substrate
Decurrent false aster (*Boltonia decurrens*)	Threatened	Disturbed alluvial soils

3.4.5 Fish and Wildlife

The changes in fish and wildlife habitat in the Mississippi River Basin that have occurred over the past 200 years are well documented. Many studies have analyzed the historic changes in habitat in the Mississippi River Basin from pre-colonization times to present day (Simons, Schumm, & Stevens, 1974; (UMRBC, 1982; Theiling, et al., 2000; WEST, 2000; Heitmeyer, 2008). A variety of actions have impacted the makeup of the Mississippi River Basin since colonization including urbanization, agriculture, levee construction, dam construction, and river training structure placement.

Since the early 1900s, native fish populations in the Mississippi River have declined (Duyvejonck 1996). A major change in fish fauna of the UMR occurred when Common Carp were introduced in the 1880s and by the mid-1900s Common Carp made up of 2/3 of all commercial harvest from the Mississippi and Illinois Rivers (Heitmeyer 2008). More recently, Common Carp have declined, but with increased

populations of Bighead, Silver, and Grass Carp (Heitmeyer 2008; Koel et al. 2002). Pallid sturgeon (*Scaphirhynchus albus*), a federally endangered species, historically occurred from the Gulf of Mexico in the Mississippi River through the Yellowstone River tributary of the Upper Missouri River. A naturally reproducing population exists within the Middle Mississippi River, but it is limited by the lack of braided sandbar habitat and lateral and longitudinal river connectivity with which it evolved (Koch et al. 2009). As backwater and side channel areas decrease in depth and connectivity, native fish community assemblage diversity dramatically decreases (Miranda, 2005).

Waterfowl and waterbird populations in the UMR region historically were large and diverse (Bellrose 1968, 1980), with markets for ducks and geese being common in the late 1800s. Loss of wetlands and land use changes led to market declines. Although most waterfowl species in North America have had an overall increase in populations since the 1950s, species like the northern pintail (*Anas acuta*), Lesser Scaup (*A. affins*), and Greater Scaup (*A. marila*) have seen a population decline (USFWS 2014). Species like these utilize valuable overwintering and migration habitats present in the UMR. Wetland habitat utilized by waterfowl have been in decline in the UMR. Specifically, bottomland hardwood forests along the Mississippi River in this region are famous for their ability to support large winter populations of waterfowl (Tiner 1984). Today, waterfowl numbers are highly concentrated in remnant wetland complexes (Heitmeyer 2008).

Neotropical migrants are bird species that breed in North America but migrate to wintering grounds in Mexico, Central and South America, and the Caribbean Islands. Populations of Neotropical migrants have continued to decline over much of the last century. Much of this decline is due to habitat loss in areas used for wintering, breeding, and during migrations. Floodplain forests serve as some of the most densely populated and diverse avian habitat in North America with high species richness and high abundances (Best 1996, Knutson 1996, Twedt and Portwood 1997). In particular, the Upper Mississippi River serves as a major corridor for Neotropical migrants within the Mississippi Flyway (Grettenberger 1991). It has also been documented that Neotropical species prefer foraging on insectivorous guilds associated hard mast tree species occurring in the Upper Mississippi River (Gabbe 2002). Habitat fragmentation has contributed to declines in abundance of Neotropical migrants within the Upper Mississippi River (Knutson 1996). Specifically, abundance and species richness declines associated with forest community species shifts from a higher composition of hard mast trees to a higher composition of flood tolerant tree species after the 1993 flood have been documented in the Upper Mississippi River (Knutson 1997).

3.5 Historical and Cultural Resources

In Missouri and Illinois, the greatest concentrations of archaeological sites are found in the river corridors which are the most fertile and accessible areas. The Mississippi River Valley and its tributaries constitute an area of great archaeological potential, based on a large number of physiographic and ecological features. Following the adoption of horticulture around 1,600 years ago, the region experienced a significant population increase.

Archaeological surveys conducted along the Mississippi and Illinois Rivers have identified thousands of prehistoric archaeological sites. Evidence of prehistoric cemeteries, burial mounds, temporary camps, farmsteads and village sites are found in significant numbers throughout the Rivers Project Area.

A significant number of prehistoric and historic sites are known to exist in the Upper Mississippi River region, including many archaeological and historic districts on the *National Register of Historic Places*. Major concentrations of archaeological sites have been identified near three types of land features: (1) the confluences of the Mississippi with major tributaries such as the Illinois, Salt, Missouri, Meramec and Kaskaskia rivers; (2) sand ridges and terraces in the Mississippi floodplain; and (3) blufftops and their slopes. All Project development and management plans have to be sensitive to the fragility of these cultural resources and would incorporate measures to protect and conserve them.

In accordance with Section 106 of the National Historic Preservation Act of 1966 and its implementing regulation 36 CFR 800, consultation with the Missouri Historic Preservation Agency for specific locations would occur prior to the implementation of the Proposed Action.

4. ENVIRONMENTAL CONSEQUENCES

The discussion of impacts (environmental consequences) details those resources that could be impacted, directly or indirectly, by the "No-Action" Alternative and the Forest Management Alternative (Tentatively Selected Plan). Direct impacts are those that would take place at the same time and place (40 CFR §1508.8(a)) as the action under consideration. Indirect impacts are those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). The section is organized by resource, in the same order in which they were covered in Chapter 3, Affected Environment.

4.1 Physical Resources

4.1.1 Land Cover/ Land Use

Impacts of the No Action Alternative on Land Cover/ Land Use – With the No Action Alternative, Land Cover/ Land Use is expected to be similar to current conditions within the Proposed Action Areas as well as adjacent lands. However, continued loss of forest due to senescence and invasive species expansion provides the potential for total loss of forest in many areas, as has been seen further up the Mississippi River. Growth of urban areas and associated urban areas near the Proposed Action Area is expected. However, no impacts to Land Cover/ Land use are expected with the No Action Alternative.

Impacts of the Proposed Action on Land Cover/ Land Use – With respect to impacts on Land Cover/ Land Use, implementation of the Proposed Action could result in temporary site specific land cover changes. Changes to current conditions as shown in Table 3 could be seen with decreases to the percent closed canopy forested areas as well as the associated increase to the percent open canopy forested areas where forest management activities are implemented. However, the same land use within the Proposed Action Area would continue. Therefore, no impacts to Land Cover/Land Use is expected with the Proposed Action.

4.1.2 Air Quality

Impacts of the No Action Alternative on Air Quality – Air quality in the vicinity of the work area would be expected to be similar to current conditions. Equipment used for agriculture would generate emissions

on an occasional, ongoing basis from the use of petroleum products adjacent to the Proposed Action Area. Impacts would be minor and local in nature.

Impacts of the Proposed Action on Air Quality – Air quality in the vicinity of the work area would be expected to be similar to current conditions. Equipment used for forest management activities would generate emissions from the use of petroleum products but impacts would be temporary, minor, and local in nature. Adverse effects to air quality resulting from the prescribed burns would be temporary and prior to any activity all required regulatory permits would be obtained including the Clean Air Act, where appropriate. Therefore, only minor short-term impacts to air quality are expected with the Proposed Action.

4.1.3 Water Quality

Impacts of the No Action Alternative on Water Quality – Water quality in the vicinity of the work area would be expected to be similar to current conditions. However, water quality may degrade in the future as the riparian corridor would have a reduced ability to effectively perform filtration processes. Additionally, bank erosion and runoff would be expected to increase with a degraded riparian corridor.

Impacts of the Proposed Action on Water Quality – Water quality in the vicinity of the Proposed Action Area would be expected to be similar to current conditions. Forest management activities are land based, but may cause temporary, minor, and local increases in turbidity and suspended sediment concentrations in the immediate vicinity of the forest management activities during heavy rains. Best Management Practices would be used to limit erosion and runoff.

4.1.4 Geology and Soils

Impacts of the No Action Alternative on Geology and Soils - Without flooding, land use and soils in the area would remain in forest use. With flooding, sedimentation and scour would occur and the risk of losing soils would increase if a channel cutoff forms.

Impacts of Proposed Action on Geology and Soils - The Proposed Action would not cause any overall changes to the geology and soils. Forest management activities may cause temporary soil disturbance in the vicinity of any tree plantings or harvest areas. The impact would be localized and soils would settle quickly.

4.1.5 Prime Farmland

Impacts of the No Action Alternative on Prime Farmland – With the No Action Alternative, impacts to prime farmland within the Proposed Action Area are not anticipated. Currently, the majority of the Proposed Action Area is forested. Conversion of existing agricultural areas to nonagricultural use is not anticipated.

Impacts of the Proposed Action on Prime Farmland – The forest management activities would occur in areas that are currently forested and not being utilized for agriculture. The proposed forest

management activities would not directly or indirectly irreversibly convert prime or unique farmland to nonagricultural use. Impacts to prime farmland are not anticipated.

4.1.6 Noise

Impacts of the No Action Alternative on Noise – Industrial, commercial, and residential development on the floodplain of the Mississippi River is expected to increase over time within the areas adjacent to Corps property. Because of anticipated increases in development, overall noise levels are expected to increase. However, these increases are expected to be related to land use type.

Impacts of the Proposed Action on Noise - Noise receptors consisting of residential areas or single residences are located near some of the areas of proposed forest management activities. Short-term noise impacts would be generated by the use of various types of forestry equipment and machinery. These impacts would be intermittent in nature. In the vicinity of residential areas, these impacts would be alleviated by confining forestry operations to daylight hours when practicable. Overall, impacts would be temporary, minor, and local in nature.

4.1.7 Hazardous, Toxic, and Radioactive Waste

Impacts of the No Action Alternative on HTRW – With the No Action Alternative, impacts to known HTRW within the Upper Mississippi River are not anticipated. Any undocumented HTRW in the floodplain may be affected with future high water events and associated scouring. Without high water events, HTRW in the floodplain would be unlikely to be affected.

Impacts of the Proposed Action on HTRW – Corps regulations (ER-1165-132) and District policy requires procedures be established to facilitate early identification and appropriate consideration of potential HTRW in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resources studies or projects by conducting Phase I Environmental Site Assessment (ESA). The Corps specifies that these assessments follow the process/standard practices for conducting Phase I ESA's published by the American Society for Testing and Materials. A Phase I Environmental Site Assessment would be conducted for the Proposed Action Area as required prior to any land disturbances.

4.2 Socioeconomics

4.2.1 Recreation

Impacts of the No Action Alternative on Recreation – With the No Action Alternative, recreational opportunities within the Proposed Action Area may decline due to the lack of forest species diversity, negatively influencing various sport wildlife species. Public use of the Project Action Area would continue into the future for various recreational opportunities.

Impacts of the Proposed Action on Recreation – The forest management activities would be land based. Locations where state and federal waterfowl management areas occur would be avoided during waterfowl hunting and refuge seasons. Forest recreational activities such as deer and turkey hunting

would be impacted temporarily during the implementation for the forest management activities. However, these impacts would be temporary, minor, and local in nature.

4.2.2 Aesthetics

Impacts of the No Action Alternative on Aesthetics – The emerald ash borer is expected to have an impact on the forest community within the Upper Mississippi River. It is expected that large tree mortality would be associated with emerald ash borer spread throughout the Upper Mississippi River. Areas with infestation would have large numbers of dead or dying green ash trees, which may appear as aesthetically unappealing to many people. Additionally, mature stands of cottonwood have reached biological maturity throughout much of the Proposed Action Area. Large numbers of dead and dying cottonwood trees are expected to be seen in the near future. Therefore, undesirable impacts to aesthetics with the No Action alternative may occur.

Impacts of the Proposed Action on Aesthetics - Aesthetics would be temporarily impacted by the presence of forestry equipment, removal of trees, and the creation of noise, fumes, and dust during the implementation phase. Once the activities have been completed, the Proposed Actions would not likely be considered as aesthetically unpleasant, as the forest community would blend in with the existing surroundings. As a result, impacts to aesthetics would be temporary, minor, and local in nature.

4.2.3 Demographics and Environmental Justice

Impacts of the No Action Alternative on Demographics and Environmental Justice - With the No Action Alternative, the adjacent landowners and agricultural lands would continue to persist into the future. Low income or minority populations are unlikely to be affected.

Impacts of the Proposed Action on Demographics and Environmental Justice – Implementation of the Proposed Action is expected to benefit the local agriculture and agri-business economy. The forest management activities would also provide short-term employment funded by federal money. The Proposed Action would not disproportionately affect low income or minority populations.

4.3 Climate Change and Greenhouse Gas Emissions

Impacts of the No Action Alternative on Climate Change and Greenhouse Gas Emissions - With the No Action Alternative, climate change could potentially impact the Rivers Project Area through increased frequency of high water events related to the expected increase in precipitation. Decreased forest growth and productivity into the future could reduce the extent to which forested areas decrease the amount of greenhouse gas emissions, specifically CO_2.

Impacts of the Proposed Action on Climate Change and Greenhouse Gas Emissions - With respect to impacts on climate change and greenhouse gas emissions, implementation of the Proposed Action would result in some minor greenhouse gas emissions due to equipment used for forest management activities, transporting materials, etc. However, the Proposed Action could potentially decrease the amount of greenhouse gas emissions, specifically CO_2, by restoring a more productive forest community, utilizing more CO_2 for photosynthesis and carbon sequestration.

4.4 Historic and Cultural Resources

Impacts of the No Action Alternative on Historic and Cultural Resources – With the No Action Alternative, impacts to known historic and cultural resources within the Upper Mississippi River are not anticipated. Any undocumented historic and cultural resources in the floodplain may be affected with future high water events and associated scouring. Without high water events, historic and cultural resources in the floodplain would be unlikely to be affected.

Impacts of the Proposed Action on Historic and Cultural Resources - All of the forest management activities work would be land-based; avoiding affects to any submerged cultural resources. On-site cultural resource surveys would be conducted where appropriate, prior to implementation of proposed action, ensuring protection and avoidance measures are in place. If it is determined that a prehistoric or historic resource would be adversely effected by proposed forest management activities, consultation with the appropriate SHPO would be undertaken to determine appropriate measures. Impacts to historical and cultural resources are not anticipated.

4.5 Biological Resources

4.5.1 Wetlands

Impacts of the No Action Alternative on Wetlands – With the No Action Alternative, wetland areas within the Proposed Action Area could change by classification type with forest encroachment. However, impacts to Wetlands with the No Action Alternative are not expected.

Impacts of the Proposed Action on Wetlands – Complete avoidance of all wetlands identified within the Proposed Action Areas is both infeasible and impractical due to the existence of wetlands throughout. Direct impacts to wetlands may occur by operating equipment within wetland boundaries during the proposed forest management activities. Additionally, creation of temporary work pads may be necessary if conditions are wet at the time of construction. If placement of work pads or temporary access roads in wetlands is needed, these actions would be temporary and fill materials would be removed and affected sites restored to pre-action conditions. Silvicultural activities associated with the Proposed Action are exempt under the Clean Water Act, Section 404 (f) (1). Adverse effects to wetlands resulting from the Proposed Action would be temporary in nature. The following applicable BMPs associated with forest road construction and maintenance would be adhered too:

- Roads would be constructed and maintained in accordance with best management practices to assure that flow and circulation patterns and chemical and biological characteristics of waters of the U.S. are not impaired and that the reach of the waters of the U.S. is not reduced, and that any adverse effect on the aquatic environment are minimized.
- Roads shall be held to the minimum feasible number, width, and length consistent with the purpose of silviculture operations and local topographic and climatic conditions.
- Road fill shall be bridged, culverted or designed to prevent the restriction of expected flood flows.

- The fill shall be properly stabilized and maintained during and following construction to prevent erosion.
- Vegetative disturbance shall be kept to a minimum.
- Construction and maintenance of crossing shall not disrupt the migration or other movement of aquatic life.
- All temporary fills shall be removed in their entirety and the area restored to its original elevation.

If applicable, USACE will obtain Section 401, 402, and 404 of the Clean Water Act Permits prior to individual construction activities. Most actions should meet existing silviculture exemptions as stated above. With respect to the Proposed Action, wetland areas within the Proposed Action Area would continue to exist. USACE will continue to manage the area as a forested wetland and also monitor for invasive species.

4.5.2 Forest

Impacts of the No Action Alternative on Forest – Under the No Action Alternative, the forest ecosystem would continue to degrade and continue to lose watershed filtering capabilities. Under this alternative some of the consequences would include: 1) persistence of undesirable even-aged stands; 2) increased potential for insect and disease infestation in adjacent woodland; 3) continued undesirable tree species regeneration; 4) increased numbers of diseased and dying timber; 5) loss of economic value of salvageable wood products; 6) continued closed- canopy and non-vegetated forest floor; 7) continued lack of diverse wildlife habitat, especially roosting trees for the Indiana bat and NLEB.

The No Action Alternative would decrease overall forest health and quality habitat. Failure to allow sunlight to the forest floor diminishes the ability for desired tree regeneration and decreases diversity of early succession vegetation, which is extremely important for watershed protection. Open forest floors would allow for increased runoff disallowing a roughness factor that removes impurities, accelerates erosion, minimizes uptake and increases the speed at which water enters tributaries.

Impacts of the Proposed Action Alternative on Forest – The Proposed Action would provide high-quality, sustainable bottomland forest within the Proposed Action Area, including a natural diversity of tree species, ages, canopy heights, and understory vegetation. The forest would better support floodplain ecosystem functions and sustainable habitat for wildlife, especially the Indiana bat by providing available roost trees into the future. Impacts to the forest community of the proposed action would be temporary and conditions would improve over current conditions.

4.5.3 Bald Eagle

Impacts of the No Action Alternative on Bald Eagle – With the No Action Alternative, Bald Eagle habitat within the Proposed Action Area would be expected to persist. Therefore, impacts to Bald Eagle with the No Action Alternative are not expected.

Impacts of the Proposed Action Alternative on Bald Eagle – If any Bald Eagle nest trees were identified within 660' of any Proposed Action, the National Bald Eagle Management Guidelines would be implemented to minimize potential impacts and appropriate coordination with the U.S. Fish and Wildlife Service would be conducted.

4.5.4 Federally Threatened and Endangered Species

In compliance with the Endangered Species Act of 1973 (ESA; 16 USC 1531-1543), the Corps prepared a programmatic (Tier I) Biological Assessment (BA) (USACE 1999) which evaluated the systemic impacts of the Operation and Maintenance (O&M) of the 9-Foot Channel Navigation Project on the Upper Mississippi River System. The BA addressed actual or potential impacts of operation and maintenance of the navigation project on seven federally threatened or endangered species that may occur in the Upper Mississippi River System project area as projected 50 years into the future (USFWS 2000). Additionally, the Mississippi Valley Division prepared a Biological Assessment for the least tern which addressed operation and maintenance activities for the entire range of the species within the Mississippi River Valley. The BAs were not scaled to evaluate impacts of individual, site-specific effects or new construction. It was agreed that site specific impacts and new construction impacts would be handled under separate Tier II BAs. As such, the Rivers Project forest management actions require Tier II ESA Section 7 consultations for specific forest management actions to determine the potential impacts of the work on federally threatened and endangered species at each proposed forest management location.

Accordingly, the District coordinated with the USFWS and at their recommendation, is preparing three site specific Tier II Biological Assessments to determine the potential impacts of the Proposed Action on federally threatened and endangered species. The three BAs will include: Cuivre Island; Dardenne and Bolter Islands; and Mason Island and Mile 215 Area.

Gray Bat - The gray bat (*Myotis grisescens*) occupies a limited geographic range in limestone karst areas of the southeastern United States, including Missouri. With rare exception, the gray bat roosts in caves year-round. In winter, most gray bats hibernate in vertical (pit) caves with cool, stable temperatures below 10 degrees Celsius. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer (0.6 mile) of rivers or reservoirs over which bats feed. The summer caves are warm with dome ceilings that trap body heat. Most gray bats migrate seasonally between hibernating and maternity caves, and both types of caves are located in Missouri. Gray bats are active at night, foraging for insects over water or along shorelines, and they need a corridor of forest riparian cover between roosting caves and foraging areas. They can travel as much as 20 kilometers (12 miles) from their roost caves to forage.

Gray bats are endangered largely because of their habitat of living in large numbers in only a few caves, thus making the species vulnerable to human disturbance and habitat loss or modification. Disturbance of gray bats in their caves during their hibernation can cause them to use their energy reserves and could lead to starvation. Disturbances to their caves during their nursing season (June and July) can frighten females causing them to drop non-volant pups to their death in panic to flee from the intruder. Additionally, many important caves that have been historically used by gray bats have been inundated

by reservoirs. The commercialization of caves, and alterations of the air flow, temperature, humidity, and amount of light can make the cave unsuitable habitat for gray bats and drive bats away.

The fatal bat disease, white-nose syndrome (WNS), has not yet been documented to adversely affect the gray bat. However, because gray bats are cave obligates, and considering how WNS has decimated other cave-dwelling bat species, WNS could be another significant threat to the gray bat.

The gray bat has been documented within Compartment 3 (Table 13). Because gray bats roost in caves year-round, disturbance to above ground roosts is not a concern as it is for Indiana bats. However, disturbance to cave roosts throughout the year should be avoided, especially disturbance to hibernacula in the winter when most forest management work occurs. At this time, no hibernacula or maternity caves have been documented within or adjacent to the Proposed Action Area.

Potential impacts due to the No Action Alternative and Forest Management Alternative on the gray bat are discussed in the site specific Tier II Biological Assessments.

Indiana Bat – The endangered Indiana bat has been noted as occurring in several Illinois and Missouri counties. Indiana bats migrate seasonally between winter hibernacula and summer roosting habitats. Winter hibernacula includes caves and abandoned mines. Females emerge from hibernation in late March or early April to migrate to summer roosts. Females form nursery colonies under the loose bark of trees (dead or alive) and/or in cavities, where each female gives birth to a single young in June or early July. A maternity colony may include from one to 100 individuals. A single colony may utilize a number of roost trees during the summer, typically a primary roost tree and several alternates. Some males remain in the area near the winter hibernacula during the summer months, but others disperse throughout the range of the species and roost individually or in small numbers in the same types of trees as females.

Indiana bat (Myotis sodalis) summer habitat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches DBH (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Trees with less than 5 inches (12.7 cm) DBH that have exfoliating bark, cracks, crevices, and/or hollows may have some potential to be male Indiana bat summer roosting habitat. However, early-successional, even-aged stands of trees less than 5 inches DBH is not typically considered to be suitable roosting habitat. However, early successional habitat with small diameter trees may be used as foraging habitat by Indiana bats.

During the summer, Indiana bats frequent the corridors of small streams with well-developed riparian woods, as well as mature bottomland and upland forests. They forage for insects along stream corridors, within the canopy of floodplain and upland forests, over clearings with early successional vegetation (old

fields), along the borders of croplands, along wooded fence rows, and over farm ponds and in pastures. It has been shown that the foraging range for the bats varies by season, age and sex and ranges up to 81 acres (33 ha).

WNS could be another significant threat to the Indiana bat.

Indiana bats have been documented in previous surveys within the Rivers Project Area (Table 13).

Potential impacts due to the No Action Alternative and Forest Management Alternative on the Indiana bat are discussed in the site specific Tier II Biological Assessments.

Northern Long-Eared Bat - The NLEB (*Myotis septentrionalis*) is a federally threatened bat species. The NLEB is sparsely found across much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. NLEBs spend winter hibernating in large caves and mines. Summer habitat for the NLEB includes a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches DBH that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. The NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. NLEBs typically occupy their summer habitat from mid-May through mid-August each year and the species may arrive or leave some time before or after this period. Forest fragmentation, logging and forest conversion are major threats to the species. One of the primary threats to the NLEB is the fungal disease, white-nose syndrome, which has killed an estimated 5.5 million cave-hibernating bats in the Northeast, Southeast, Midwest and Canada. Suitable NLEB summer habitat exists within the Rivers Project Area. Past surveys within the Compartments 3 have resulted in zero catches of NLEBs (Table 13). Surveys have not been conducted within Compartment 4.

Potential impacts due to the No Action Alternative and Forest Management Alternative on the NLEB are discussed in the site specific Tier II Biological Assessments.

Table 13. Summary of Threatened and Endangered bat species captured during surveys within Compartments 3 in 2012, 2014, and 2016.

Location	Year	Indiana bat (Myotis sodalis)	Northern long-eared bat (Myotis septentrionalis)	Gray bat (Myotis grisescens)
Compartment 3	2012	3 female	-	1 male (*adjacent)
Compartment 3	2014	-	-	-

Location	Year	Indiana bat (Myotis sodalis)	Northern long-eared bat (Myotis septentrionalis)	Gray bat (Myotis grisescens)
Compartment 3	2016	-	-	-

"-"denotes zero catches for that species. *Indicates a bat capture within .5 miles of compartment boundary.

Pallid Sturgeon - The pallid sturgeon is found in the Mississippi River downstream of its confluence with the Missouri River. Pallid sturgeon forage for insects, crustaceans, snails, clams, and fish along the bottom of large rivers (USFWS 2016). These fish are most frequently caught over a sand bottom, which is the predominant bottom substrate within the species' range on the Mississippi River. Tag returns have shown that the species may be using a range of habitats in off-channel areas and tributaries of the Mississippi River. Loss of habitat has occurred due to anthropogenic changes which has ultimately decreased the availability of spawning habitat, reduced larval and juvenile rearing habitat, availability of seasonal refugia, and availability of foraging habitat.

Potential impacts due to the No Action Alternative and Forest Management Alternative on the pallid sturgeon are discussed in the site specific Tier II Biological Assessments.

Higgins Eye Mussel – The Higgins eye is a freshwater mussel of large rivers where it inhabits deep water areas with moderate currents suitable sand and gravel substrate. It historically occurred from St. Louis, MO, upstream to Keokuk, IA, within the Mississippi River and several tributaries along the Missouri and Mississippi rivers. These mussels partially bury themselves into the substrate and feed by filtering in microorganisms such as algae and bacteria from the water. Males release sperm and rely on the current so females can siphon the sperm to fertilize their eggs. After fertilization, the stored developing larvae (glochidia) are expelled back into the current and sometimes attach to the gills of host fish, where they develop further, detach, and settle on the river bottom where they can mature. Known host fish include Sauger, Walleye, Yellow Perch, Largemouth Bass, Smallmouth Bass, and Freshwater Drum. Threats to the Higgins eye include pollution in the form of excess sedimentation, other contaminants, and increased siltation from dredging that can degrade their required water quality and cover suitable substrate; as well as competition with non-native invasive species.

Potential impacts due to the No Action Alternative and Forest Management Alternative on the Higgins eye are discussed in the site specific Tier II Biological Assessments.

Decurrent False Aster– Decurrent false aster (*Boltonia decurrens*) is a perennial plant that exhibits annual and biennial lifecycles. Decurrent false aster is found on moist, sandy, floodplains and prairie wetlands along the Illinois and Mississippi Rivers. It relies on periodic disturbances such as flooding to scour away other plants that compete with it for habitat. The Decurrent false aster is threatened due to excessive silting, intensive agricultural practices, floodplain disconnection which limits flooding disturbances, and herbicides. Past surveys identified populations occurring within Compartment 2a and Compartment 6 in non-forested areas, not within the Proposed Action Area.

Potential impacts due to the No Action Alternative and Forest Management Alternative on the Decurrent false aster are discussed in the site specific Tier II Biological Assessments.

4.6 Summary of Environmental Consequences

The impacts of each Alternative on the human environment are covered in detail in Section 4, Environmental Consequences. Table 14 provides a summary of the impacts of each Alternative by resource category.

Table 14. Summary of impacts of the "No Action" and the "Proposed Action" Alternatives.

	"No Action" Alternative	**"Proposed Action (Forest Management)" Alternative- Tentatively Selected Plan**
Achievement of Project Objectives	Continued degraded forest community with limited species and age diversity with limited ecosystem function	Is expected to improve forest community species and age diversity, which will improve wildlife habitat and ecosystem function
Impacts on River Stages	No impacts anticipated	No impacts anticipated
Impacts on Water Quality	Continued degradation of the forest community would decrease the ability of the riparian corridor to effectively improve water quality and would decrease overall water quality with increased bank erosion and runoff.	Localized, temporary increase in suspended sediment concentrations during forest management activities. Long-term improvement in water quality as degradation of riparian corridor is slowed or reversed.
Impacts on Air Quality	Minor, local, ongoing impacts due to agricultural activities.	Temporary, minor, local impacts due to use of forestry equipment and during slash pile burning.
Impacts to Prime Farmland	No impacts anticipated	No impacts anticipated
Impacts on Fish and Wildlife	Potential ongoing degradation of wildlife habitat	Improved wildlife habitat with increased forest community structural diversity
Impacts on T&E Species	See Tier II Biological Assessments	See Tier II Biological Assessments. Actions are intended to improve habitat for T&E bat species.
Impacts on Historic and Cultural Resources	No impacts anticipated	No impacts anticipated
Impacts on Wetlands	No impacts anticipated	Adherence to BMPs would avoid and minimize temporary impacts.

5. CUMULATIVE IMPACTS

Council on Environmental Quality (CEQ) regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR §1508.7). In order to assist federal agencies in producing better cumulative impact analyses, CEQ developed a handbook, "Considering Cumulative Effects under the National Environmental Policy Act" (CEQ, 1997). Accordingly, the Rivers Project Forest Management Environmental Assessment cumulative impact analysis generally followed the steps laid out by the handbook.

Table 15 describes the past, present, and reasonably foreseeable future actions that might also impact each resource category. The cumulative impact analysis evaluates the same resources that were evaluated in the Environmental Consequences section. In addition, the cumulative impacts for the "No Action" Alternative and Forest Management Alternative are described. The analysis looked beyond the footprint of the Proposed Action Area to include impacts to the resources throughout the Upper Mississippi River.

Past actions have degraded wetland resources within the UMR watershed through floodplain disconnection, floodplain constriction, clearing of forested areas, agricultural practices, increased water input to the system, altered hydrology due to dam construction upstream, and spread of invasive species. Resource managers have projected the continued decline and identified a need for improved management of floodplain forests within the UMR (Theiling *et al.* 2000). Without the Proposed Action, the current floodplain forest communities would continue to persist into the near future with limited species, age, and structural diversity, and a continued lack of a diverse forest community would continue throughout the UMR. No negative cumulative impacts would be expected from the Proposed Action, combined with other present actions by others, and reasonably foreseeable actions. The Forest Management Alternative should have positive long-term benefits to the floodplain forest habitat and community within the Proposed Action Area and would contribute to improving habitat within the entire watershed.

The Rivers Project Area and other floodplain conservation areas provide mid-migration habitat for the Mississippi Flyway, one of the major migratory bird flight corridors in North America. The Mississippi River and floodplain are the center of this flyway. This mid-migration habitat is recognized as significant for Neotropical migrants as well as migratory waterfowl. Past actions within the watershed have deteriorated the physical habitat (both floodplain forest and wetland), which in turn negatively affects the wetland wildlife using that habitat. Present and future actions, including the Proposed Action, are aimed to offset these past negative actions to wetland wildlife caused by habitat loss, fragmentation, and degradation. Without the Proposed Action, the continued deterioration of the physical habitat (floodplain forest) within the Rivers Project Area would have negative impacts on the management of the Rivers Project Area and its contribution to wildlife resources within the UMR watershed. With no improvements to ecosystem function and structure, wetland wildlife use of the Rivers Project Area is expected to decline. No negative cumulative impacts would be expected from the considered action alternative, combined with other present actions by others, and reasonably foreseeable actions. The

Proposed Action aims to restore and improve the floodplain forest community which will provide positive effects to the forest wildlife resources using the Rivers Project Area. The Proposed Action, along with other present and foreseeable future restoration projects, would have a positive impact on the forest wildlife resources within the UMR.

A comprehensive analysis of the cumulative impacts of the Upper Mississippi River Navigation Project on the geomorphic and biological resources of the UMR has been described in WEST (2000) prepared for the Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study (USACE, 2004). These studies provided a cumulative effects analysis of the 9-foot Navigation Project for the entire UMR. WEST (2000) provided a geomorphic assessment of the cumulative effects on geomorphology, sediment transport, and dredging. WEST (2000) provided a biological assessment of the cumulative effects of geomorphic changes, physical habitat changes, impoundment and river regulation, channel training structures, dredging and material placement, the Upper Mississippi River Restoration Program habitat projects, connectivity of UMRS habitats, changes in the UMRS Basin, changes in UMRS floodplain land use and land cover, effects of both point and non-point-source discharges to UMRS, fish entrainment and impingement at electrical generating plants, and exotic and nuisance species. In addition, the UMR-IWW System Navigation Feasibility Study (USACE, 2004) contains a comprehensive description of the environmental impacts of navigation traffic for existing traffic levels and modeled traffic levels for each decade to 2050.

Pursuant to 40 CFR 1502.21 and CEQ Guidelines, the above documents and analyses are incorporated by reference into this analysis for the purpose of reducing the size of this document and not duplicating applicable analyses. 40 CFR § 1502.21 requires that material incorporated by reference must be "reasonably available for inspection". The documents are available for review at: http://www.mvs.usace.army.mil/Missions/Navigation/SEIS/Library.aspx

Table 15. Summary of Cumulative Effects.

Resource	Past Actions	Present Actions	Future Actions	No Action Alternative	Proposed Action-TSP
Floodplain Forest	Loss of floodplain habitat in UMR watershed through floodplain disconnection, floodplain constriction, clearing of forested areas, agricultural practices, increased water input to the system, altered hydrology due to dam construction upstream, and spread of invasive species.	Maintenance of current habitat conditions due to maintenance of 9-foot navigation channel; habitat restoration and land mgmt through USACE, other federal and state agencies as well as private land programs; native species continue to be impacted by exotic species; continued implementation of Biological Opinion Program	Continued maintenance of habitat conditions due to maintenance of 9-foot navigation channel; continued habitat restoration and land mgmt through USACE, other federal and state agencies as well as private land programs; new exotic species likely to be introduced; continued implementation of Biological Opinion Program	Current forest community in the UMR would likely persist into the near future with limited species diversity, and a continued lack of a diverse hard mast forest community, limiting habitat availability for native species.	Improved floodplain forest community over time as well as improved aquatic habitat will likely benefit native species throughout the UMR.
Water Quality	Increasing human populations and industrialization result in increased water quality problems. Establishment of Clean Water Act, NEPA, USEPA, state environmental agencies and associated regulations greatly improve conditions.	Continued population growth and development result in increased potential for water quality impacts. Continued regulation enforcement and societal recognition prevent water quality degradation	Continued regulation enforcement and societal recognition. Continued population growth and development result in increased potential for water quality impacts	Potential increased sedimentation resulting from forest management activities; increased agricultural chemicals entering system through runoff	Localized, temporary increase in suspended sediment concentrations during forest management activities minimized through implementation of BMP's
Air Quality	Increasing human populations and industrialization result in deterioration of air quality. Establishment of Clean Air Act, NEPA, USEPA, air quality standards improve conditions. Attainment status in work area.	Continued population growth and development result in increased potential for air quality impacts. Continued regulation enforcement and societal recognition. Continued attainment status in work area.	Continued population growth and development result in increased potential for air quality impacts. Continued regulation enforcement and societal recognition. Continued attainment status in work area.	Minor and local impacts due to use of agricultural machinery and urban areas in the vicinity	Temporary, minor, local impacts to air quality due to use of forestry equipment

Resource	Past Actions	Present Actions	Future Actions	No Action Alternative	Proposed Action-TSP
Geology, Soils & Prime Farmland	Increasing human populations and industrialization result in loss of prime farmland and increased pressure on marginal lands	Population growth and development result in increased potential for prime farmland impacts.	Population growth and development result in increased potential for prime farmland impacts	No loss of prime farmland within the Proposed Action Area are anticipated.	No direct or indirect conversion of prime or unique farmland to nonagricultural use.
Demo-graphics & Environmental Justice	Rural land with relatively low population densities and relatively high percentage of population living below poverty level. Urbanized areas with relatively high population densities with populations living above and below poverty level.	Continued rural land with low population densities and continued urban land with high population densities	Continued rural land with low population densities and continued urban land with high population densities	Potential for forestry business to be impacted with no action and loss of productive forest system	Potential for forestry business economy to benefit with proposed action
Fish and Wildlife (including threatened and endangered species)	Transformation of river system from natural condition to pooled lock and dam system above Chain of Rocks; loss of floodplain forest community diversity with altered hydrology; in UMR, loss of floodplain habitat due to levees, agriculture, urbanization; USACE, other federal, state, and private habitat restoration and land mgmt programs reverse habitat loss; introduction of exotic species/reduced native species biomass; recognition of T&E species through Endangered Species Act; listing of multiple T&E species in Mississippi River; implementation of District Biological Opinion Program	Maintenance of current habitat conditions due to maintenance of lock and dam system above Chain of Rocks; habitat restoration and land mgmt through USACE, other federal, state, and private programs; native species continue to be impacted by exotic species; continued implementation of Biological Opinion Program	Continued maintenance of habitat conditions due to maintenance of lock and dam system above Chain of Rocks; continued habitat restoration and land mgmt through USACE, other federal, state, and private programs; new exotic species likely to be introduced; continued implementation of Biological Opinion Program;	Fish and wildlife associated with floodplain forest in the vicinity of the work area expected to be similar to current conditions. T&E bat species may be impacted over time from the lack of available roost trees within the floodplain	Avoidance of suitable Indiana bat roost trees during execution of forest management activities; enhancement of Indiana bat habitat overall
Historic and Cultural Resources	Historic and cultural resources subjected to natural processes and manmade actions (e.g., erosion, floodplain development); recognition of importance of historic and cultural resources through National Historic Preservation Act (and others)	Historic and cultural resources continue to be impacted by human activities as well as natural processes; continued societal recognition of importance of historic and cultural resources	Historic and cultural resources continue to be impacted by human activities as well as natural processes; continued societal recognition of importance of historic and cultural resources	Unlikely to affect known and unknown historic and cultural resources	No known historic resources would be affected. Impacts to unknown historic and cultural resources unlikely.

Resource	Past Actions	Present Actions	Future Actions	No Action Alternative	Proposed Action-TSP
Climate Change & Greenhouse Gas Emissions	Increasing human populations and industrialization result in increased greenhouse emissions. Establishment of Clean Air Act, NEPA, USEPA, air quality standards improve conditions	Continued population growth and development result in increased potential for increased greenhouse gas emission impacts. Continued regulation enforcement and societal recognition	Continued population growth and development result in increased potential for increased greenhouse gas emission impacts. Continued regulation enforcement and societal recognition. Increased precipitation and frequency of high water events	Possible decrease in greenhouse gas absorbing capacities as floodplain forest continues to decline	Minor greenhouse gas emissions due to equipment used for forest management activities. Forest community enhancement could potentially decrease future greenhouse gas emissions by increasing the ability to absorb CO_2

6. MITIGATION

Mitigation measures are used to avoid, minimize, or compensate for adverse impacts to environmental resources. The Rivers Project Forest Management Pool 26 work has avoided and minimized adverse impacts throughout the alternative development process. All permits necessary for completion of the work would be obtained prior to implementation. No adverse impacts have been identified that would require compensatory mitigation.

7. RELATIONSHIP TO OTHER ENVIRONMENTAL LAWS AND REGULATIONS

Table 16. Federal policy compliance status.

Federal Laws[1]	Compliance Status
Abandoned Shipwreck Act of 1987, as amended, 43 USC § 2101, et seq.	**Full**
American Indian Religious Freedom Act, as amended, 42 USC § 1996	**Full**
Archaeological and Historic Preservation Act, as amended, 54 USC § 312501, et seq.	**Full**
Bald and Golden Eagle Protection Act, as amended, 16 USC § 668, et seq.	**Full**
Clean Air Act, as amended, 42 USC § 7401, et seq.	**Full**
Clean Water Act, as amended, 33 USC § 1251, et seq.	**Partial[2]**
Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 USC § 9601, et seq.	**Full**
Endangered Species Act, as amended, 16 USC § 1531, et seq.	**Full**
Farmland Protection Policy Act, as amended, 7 USC § 4201, et seq.	**Full**
Federal Water Project Recreation Act, as amended, 16 USC §460l-12, et seq. and 16 USC § 662	**Full**
Fish and Wildlife Coordination Act, as amended, 16 USC § 661, et seq.	**Full**
Flood Control Act of 1944, as amended, 16 USC § 460d, et seq. and 33 USC § 701, et seq.	**Full**
Food Security Act of 1985, as amended, 16 USC § 3801, et seq.	**Full**
Land and Water Conservation Fund Act of 1965, as amended, 16 USC § 460l-4, et seq.	**Full**
Migratory Bird Treaty Act of 1918, as amended, 16 USC § 703, et seq.	**Full**
National Environmental Policy Act, as amended, 42 USC § 4321, et seq.	**Full**
National Historic Preservation Act, as amended, 54 USC § 300101, et seq.	**Partial[3]**
National Trails System Act, as amended, 16 USC § 1241, et seq.	**Full**
Noise Control Act of 1972, as amended, 42 USC § 4901, et seq.	**Full**

Resource Conservation and Recovery Act, as amended, 42 USC § 6901, et seq.	**Full**
Rivers and Harbors Appropriation Act of 1899, as amended, 33 USC § 401, et seq.	**Partial[2]**
Wilderness Act, as amended, 16 USC § 1131, et seq.	**Full**
Executive Orders	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, EO 12898, February 11, 1994, as amended	**Full**
Floodplain Management, EO 11988, May 24, 1977, as amended	**Full**
Invasive Species, EO 13112, February 3, 1999, as amended	**Full**
Protection and Enhancement of Environmental Quality, EO 11991, May 24, 1977	**Full**
Protection and Enhancement of the Cultural Environment, EO 11593, May 13, 1971	**Full**
Protection of Wetlands, EO 11990, May 24, 1977, as amended	**Full**
Recreational Fisheries, EO 12962, June 7, 1995, as amended	**Full**
Responsibilities of Federal Agencies to Protect Migratory Birds, EO 13186, January 10, 2001	**Full**

[1] Also included for compliance are all regulations associated with the referenced laws. All guidance associated with the referenced laws were considered. Further, all applicable Corps of Engineers laws, regulations, policies, and guidance have been complied with but not listed fully here.

[2] Required permits would be obtained prior to project implementation.

[3] Full compliance will be attained after all required archaeological investigations, reports, and coordination have been completed.

This list of Executive Orders is not exhaustive and other Executive Orders not listed may be applicable.

8. LIST OF PREPARERS

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Experience: 10 years private sector; 16 years Environmental Branch, USACE
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Role: Section 404/401 permit review

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FINDING OF NO SIGNIFICANT IMPACT

Rivers Project Forest Management
Mississippi River Pool 26
Lincoln and St. Charles Counties, Missouri

1. In accordance with the National Environmental Policy Act, I have reviewed and evaluated the documents concerning the Rivers Project Forest Management Activities, located in Mississippi River Pool 26, Lincoln and St. Charles counties, Missouri. The Proposed Action involves implementing forest management measures on approximately 583 acres of Corps lands. Measures would include timber stand improvement via reforestation and/or release; regeneration; timber harvests; and invasive species management.

2. As part of this evaluation, I have considered:

    a. Existing Resources and Future without Project with Alternative 1 – No Action;

    b. Impacts to existing resources with Alternative 2 - Forest Management (Tentatively Selected Plan).

3. The possible consequences of these alternatives have been studied for physical, environmental, cultural, and social and economic effects. Significant factors evaluated as part of my review include:

    a. The Tentatively Selected Plan would substantially improve the forest resources on Corps lands. This would be accomplished through various forest harvest techniques, reforestation, and invasive species control.

    b. The Tentatively Selected Plan would not adversely impact the physical environment (e.g., land use/land cover, air quality, water quality, geology and soils, prime farmland, noise, greenhouse gases, or climate change).

    c. No hazardous and toxic waste issues are expected as a result of the Tentatively Selected Plan.

    d. The Tentatively Selected Plan would not adversely impact the socioeconomic environment (e.g., recreation, aesthetics, or demographics).

    e. No disproportionately high and adverse human health or environmental impacts on minority populations or low-income populations would occur (environmental justice) as a result of the Tentatively Selected Plan.

    f. No significant impacts are anticipated to biological resources, including wetlands, forests, or fish and wildlife resources as a result of the Tentatively Selected Plan.

g. The Tentatively Selected Plan would have no effect upon significant known historic properties or archaeological resources.

h. No adverse impacts to federally threatened or endangered species are anticipated. Conversely, the Tentatively Selected Plan would enhance Indiana bat habitat.

i. Per the Tentatively Selected Plan, all tree cutting activities would take place between 1 October and 31 March of any given year, during the non-active roost season for Indiana and northern long-eared bat. Any alteration to the tree clearing restriction dates of 1 April through 30 September will require further coordination with USFWS and USACE.

j. Phase 1 Environmental Site Assessments (ESAs) would be conducted prior to any land disturbance resulting from the Tentatively Selected Plan in coordination with USACE EC-EQ.

k. No significant cumulative impacts are anticipated resulting from the Tentatively Selected Plan.

4. Based on the evaluation and disclosure of impacts contained within the Environmental Assessment, I find no significant impacts to the human environment are likely to occur as a result of the Tentatively Selected Plan. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with the proposed Rivers Project Forest Management Project.

MAR 18 2018

Date

Bryan K. Sizemore
Colonel, U.S. Army
District Commander