US Army Corps
of Engineers ®
Kansas City District

MISSOURI RIVER RECOVERY PROGRAM

Tadpole Island Side Channel Modification Project

Draft Environmental Assessment
&
Section 404(b)(1)Evaluation

Moniteau County, Missouri

June 2015

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, KANSAS CITY DISTRICT
635 FEDERAL BUILDING
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Missouri River Recovery Program
Tadpole Island Side Channel Modification Project
Moniteau County, Missouri

Project Summary

The U.S. Army Corps of Engineers, Kansas City District (USACE) is proposing to modify the side channel at the Missouri River Recovery Program (MRRP) Tadpole Island project site. Tadpole Island is located along the Missouri River in Moniteau County, Missouri. The side channel was constructed in 2006 to provide aquatic habitat to benefit the federally endangered pallid sturgeon and other native species. When it was constructed, it was anticipated that the side channel would widen to approximately 200 feet wide and about 5 feet deep. However, following several flood events that occurred between the years 2007 and 2011, the side channel became approximately 325 feet wide and roughly 15 feet deep. This threatened to negatively impact the Missouri River navigation channel. In 2012, rock was placed at the entrance of the side channel to restrict water flowing into the side channel in order to maintain adequate flows on the main channel for navigation. However, this reduced the benefits to native species from the side channel by limiting its connectivity with the main channel of the Missouri River.

At this time, USACE is proposing to modify the side channel to improve connectivity between the side channel at Tadpole Island and the mainstem of the Missouri River while maintaining adequate flow to maintain the navigation channel. Removing rock from the entrance of the Tadpole Island side channel would be an important first step to allow the USACE to more easily implement management actions in the future for potential species benefits. It is expected that project construction would begin in late 2015 and could extend over several years depending on availability of funding. This project is authorized under Section 27 601(a) of WRDA86 [Public Law (PL) 99-662], Section 334(a) of WRDA99 (PL 106-53), and Section 5018 of WRDA07 (PL 110-114).

Alternatives

In addition to the No Action Alternative, three other alternative plans were considered that would lengthen the existing side channel to reduce water velocity and allow rock to be removed from the entrance. This project is modifying an existing project in which numerous alternatives were already considered (USACE, 2005).

Alternative 1 – No Action: The No Action Alternative would not result in any changes to the Tadpole Island side channel. The rock that was previously placed at the entrance of the side channel would remain in place to maintain a suitable navigation channel on the Missouri River. However, there would continue to be limited connectivity between the upstream end of the side channel and the mainstem of the Missouri River, limiting access for fish and other aquatic organisms. It would not create future conditions that would be conducive to future management actions to benefit pallid sturgeon.

Alternative 2 – Use of Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative would lengthen Tadpole Island side channel by using paired rock dikes to encourage meandering of the channel and slow water velocities. Approximately six groupings of two to three rock dikes would be placed at alternating locations along the banks of the side channel. The total length of the dikes would not exceed 350 feet in length and approximately 60,000 tons of rock would be used to construct the dikes. The height of the dikes would be about the same height as the water surface elevation during typical navigation flows. A small number of trees may need to be removed in order to anchor the dikes into the bank. In total, less than 0.25 acres of trees would be removed for Alternative 2. It is estimated that the overall length of the side channel would increase approximately 25%, to about 12,000 feet in length. However, the side channel is expected to be dynamic in nature and its length would fluctuate over time. Two new rootless dikes would be constructed and another dike would be extended in length on the mainstem of the Missouri River to prevent shoaling in the navigation channel. The rate at which meanders and point bars would develop in the side channel would be dependent on river flows. After water velocities have been sufficiently reduced in the side channel, the rock at the entrance of the side channel would be removed. Additional modifications to rock structures near the entrance and within the side channel may be undertaken. The project may be constructed in phases over several years depending on the availability of funding.

Alternative 3 – Use of Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative would be similar to Alternative 2 except that it would use single rock dikes to encourage meandering of the channel and slow water velocities instead of paired rock dikes. The purpose of using a single rock dikes would be to minimize the amount of rock used for the project in order to provide for more dynamic geomorphic conditions of the side channel compared to paired rock dikes. The total length of the dikes would not exceed 300 feet in length. Approximately 20,000 tons of rock would be used to construct the dikes. A small number of trees, less than 0.1 acres, may need to be removed in order to anchor the dikes into the bank. Other project features and benefits would be similar to Alternative 2. This includes the construction and modification of dikes in the mainstem of the Missouri River, removing rock from the entrance of the side channel, and other potential modifications to rock structures near the entrance. Although this alternative would be less expensive to construct than Alternative 2 and Alternative 4, it presents a considerable amount of risk. It is uncertain if single rock dikes would be robust enough to encourage the desired meandering. This could lead to the need for added future maintenance when compared to the other alternatives. The project may be constructed in phases over several years depending on the availability of funding.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan would lengthen Tadpole Island side channel in order to slow down water velocities. Approximately 80,000 cubic yards of material would be extracted from the top five to six feet of the outside portions of the meanders. Approximately six rock dikes would be constructed to form the foundation of the inside bends of the side channel meanders. The rock dikes would not exceed 300 feet in length. Approximately, 20,000 tons of rock would be used to construct the dikes. The height of the dikes would be about the same height as the water surface elevation during typical navigation flows. The material excavated from the outside bends would be used to bury the rock dikes and fill the upstream and downstream sides of the rock dikes to speed up the formation of point bar development. A maximum of 5 acres of trees would be removed as a result of the excavation. To the extent possible, trees from the excavated locations would be used to further stabilize the inside bends and diversify habitat. It is estimated that the overall length of the side channel would increase approximately 25%, to about 12,000 feet in length. However, the side channel is expected to be dynamic in nature and its length would fluctuate over time. Two new dikes would be constructed, and another extended in length, on the mainstem of the Missouri River. Because this alternative would result in the need for extensive excavation, it is expected that construction access road(s) would need to be constructed to complete the work. Although the final locations of the road(s) have not been identified at this time, it is estimated that approximately 12 acres of trees would need to be removed for this purpose. Trees would be allowed to naturally regenerate following project construction. Wetland and other environmentally sensitive locations would be avoided to construct the access road(s). After water velocities have been sufficiently reduced in the side channel, the rock at the entrance of the side channel would be removed to improve access for fish and other aquatic organisms. Additional modifications to rock structures near the entrance and within the side channel may be undertaken to improve aquatic organism access and/or sustain navigation. This alternative has the lowest amount of risk and uncertainty associated with its performance when compared to the other alternatives because some of the meanders would be partially constructed. The project may be constructed in phases over several years depending on the availability of funding.

Summary of Environmental Impacts

The Recommended Plan would not result in any significant adverse impacts, either directly, indirectly, or cumulatively to the human environment. Minor impacts would result from the removal of up to 17 acres of trees. The Recommend Plan may affect, but is not likely to adversely affect Indiana bats and northern long-eared bats, federally listed threatened and endangered species. Additionally, it would not be likely to adversely affect pallid sturgeon a federally listed endangered species. Trees would be cleared in the winter months to avoid any take of migratory birds and as a conservation measure for threatened and endangered bats. No wetlands would be directly impacted, although there could be indirect impacts from a more geomorphic dynamic side channel. This would mimic a more natural process. The Recommended Plan would likely have no affect on cultural resources. It would not result in conditions would exceed state water quality standards. Overall, the project would result in beneficial environmental impacts.

Mitigation Measures

The Recommended Plan would not result in any significant adverse impacts to the human environment. To minimize impacts to migratory birds, the clearing approximately 17 acres of mixed shrub and treed habitat would be scheduled during winter, a time of the year when most migratory birds are not present. Also, removing these trees during the winter would serve as a conservation measure to avoid any take of Indian bat and northern long-eared bat, species that are listed as threatened and endangered under the Endangered Species Act. Best management practices would be implemented during project construction. No additional efforts to avoid, minimize, or mitigate for project impacts are proposed.

Public Availability

Beginning on June 15, 2015, Public Notice 2015-1321 is being jointly issued by USACE and Missouri Department of Natural Resources announcing the availability of this draft EA and 404(b)(1) evaluation for a 30-day public comment period. Information concerning the availability of the Public Notice is being e-mailed to entities on the Kansas City District Regulatory Branch distribution list. During the public comment period, the draft documents are available on the Kansas City District Public Notice website at: http://www.nwk.usace.army.mil/Media/PublicNotices/PlanningPublicNotices.aspx. Hard copies are available on request.

Conclusion

After evaluating the anticipated effects of the Recommended Plan for the Tadpole Island Side Channel Modification Project, as described in the Environmental Assessment, I have determined that this plan does not constitute a major federal action that would significantly affect the quality of the human environment; and therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

Date

Andrew D. Sexton
Colonel, Corps of Engineers
District Commander

Missouri River Recovery Program
Tadpole Island Side Channel Modification Project
Draft Environmental Assessment
Moniteau County, Missouri

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Appendices

1.0 Introduction

The U.S. Army Corps of Engineers, Kansas City District (USACE) is proposing to modify the side channel at the Missouri River Recovery Program (MRRP) Tadpole Island project site. Tadpole Island is located along the Missouri River in Moniteau County, Missouri. The side channel was constructed in 2006 to provide aquatic habitat to benefit the federally endangered pallid sturgeon and other native species. When it was constructed, it was anticipated that the side channel would widen to approximately 200 feet wide and about 5 feet deep. However, following several flood events that occurred between the years 2007 and 2011, the side channel became approximately 325 feet wide and roughly 15 feet deep. This threatened to negatively impact the Missouri River navigation channel. In 2012, rock was placed at the entrance of the side channel to restrict water flowing into the side channel in order to maintain adequate flows on the main channel for navigation. However, this reduced the benefits to native species from the side channel by limiting its connectivity with the main channel of the Missouri River. Removing rock from the entrance of the Tadpole Island side channel would be an important first step to allow the USACE to more easily implement management actions in the future for potential species benefits. At this time, USACE is proposing to modify the side channel in order to improve connectivity while at the same time maintain an adequate navigation channel. It is expected that project construction would begin in late 2015 and may extend over several years depending on availability of funding. This project is authorized under Section 27 601(a) of WRDA86 [Public Law (PL) 99-662], Section 334(a) of WRDA99 (PL 106-53), and Section 5018 of WRDA07 (PL 110-114).

The Kansas City District has constructed numerous side channels on the Missouri River as part of compliance with the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System as amended (USFWS, 2000 and 2003). In addition to meeting requirements of the biological opinion, the purchase and restoration of natural features allows USACE to meet mitigation requirements for impacts to fish and wildlife due to the construction, operation, and maintenance of the Missouri River Bank Stabilization and Navigation Project (USACE, 2003). One of the constraints when constructing side channels is that they must not negatively impact any of the congressionally authorized purposes of the Missouri River, which includes the navigation channel.

This environmental assessment (EA) provides the necessary information to fully address the potential environmental impacts of modifying the Tadpole Island side channel. It meets the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S. Code [USC] 4321 et seq.); the President's Council of Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500 – 1508); and the U.S. Army Corps of Engineers ER 200-2-2 (33 CFR 230). This document is also meets the requirements of the National Historic Preservation Act (NHPA), Section 404 of the Clean Water Act (CWA), the Endangered Species Act (ESA) and other laws and regulations listed in Section 10.

1.1 Project Location

Tadpole Island is located along the Missouri River between river miles 178 and 180 in Moniteau County, Missouri (Figures 1 and 2). The study area is located on approximately 600 acres of the Overton Bottoms MRRP project lands. Overton Bottoms consists of 5,459 acres of land that was purchased by the federal government from willing sellers between the years 1994 and 2010. Overton Bottoms is managed by the USFWS as part of the Big Muddy National Fish and Wildlife Refuge.

Figure 1: Location of Tadpole Island in Moniteau County, Missouri.

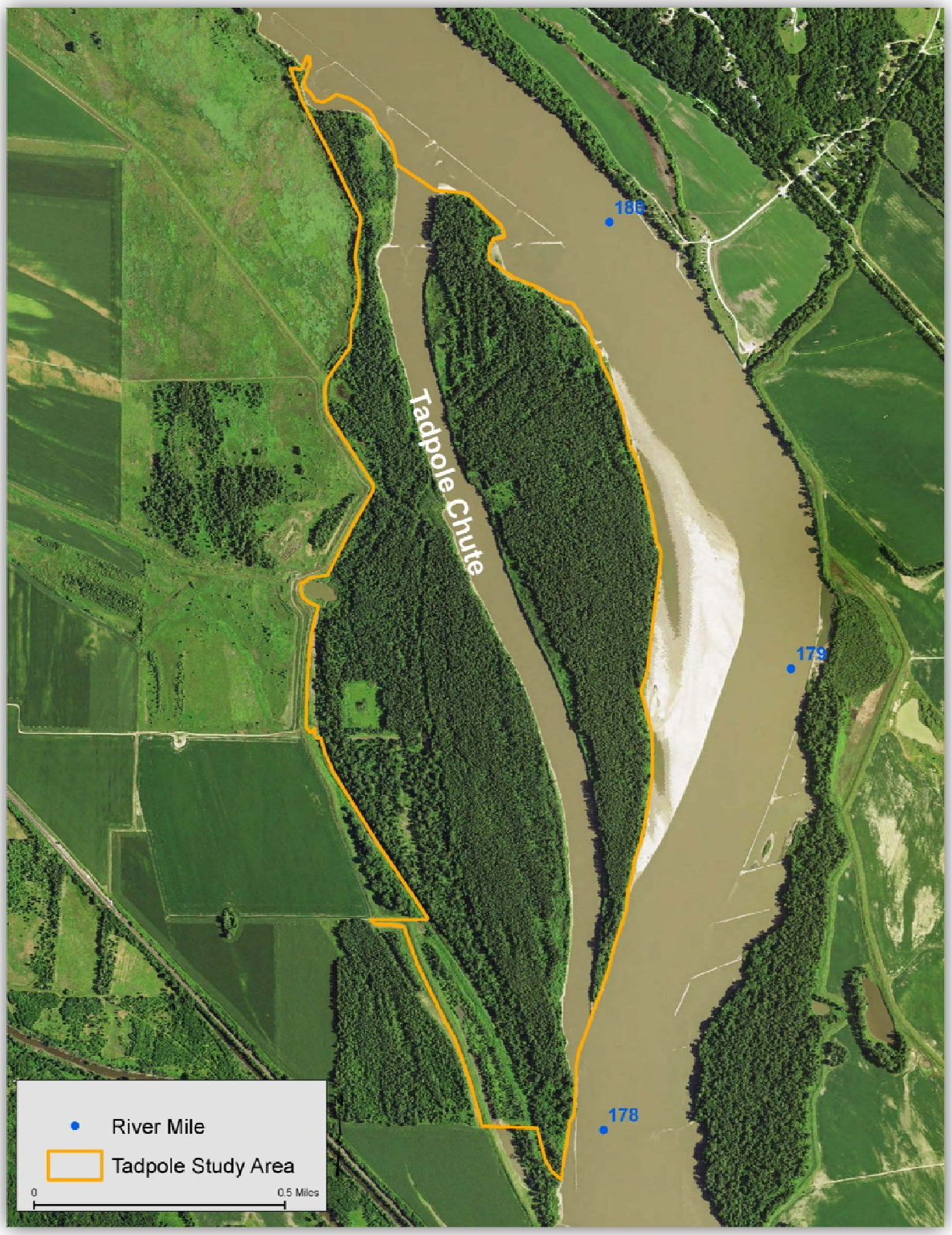

Figure 2: The Tadpole Island side channel is located between Missouri River miles 178 to 180 The 600 acre study area is indicated within the outlined area.

1.2 Purpose and Need

The purpose of this project is to improve connectivity between the side channel at Tadpole Island and the mainstem of the Missouri River while maintaining adequate flow to the navigation channel adjacent to the island. The side channel was constructed in 2006 and is approximately 9,600 feet in length. At the time it was constructed, it was expected that the side channel would widen and meander. Due in part to a series of flood events in the years following project construction, the side channel deepened and widened but did not develop any meandering characteristics. By 2012, approximately 30% of the water flow of the Missouri River was flowing through the side channel. Typically, USACE does not divert more than 10% of the river flow through side channels, although this varies in accordance with site specific conditions. It was noted that shoaling had started to occur in the mainstem navigation channel in 2011 in the vicinity of the downstream end of Tadpole Island. It is believed that this occurred, at least in part, because of the large amount of water that was flowing through the side channel instead of the navigation channel. Consequently, in 2012, rock was placed at the entrance of the side channel to reduce the amount of water that would flow through the channel. Currently, approximately 15% of the mainstem flow currently enters the side channel, primarily from the surface of the river as it overtops rock structures at the entrance of the side channel. While this has reduced the concern about negative impacts to the navigation channel, it is still desirable to reduce the amount of water that flows through the side channel even further. Also, the rock that was placed at the entrance of the side channel in 2012 now limits fish and other aquatic organisms access the side channel from the upstream end. By making improvements to the side channel and removing rock from the entrance, the side channel would function similar to its original designed purpose.

1.3 Agency and Public Coordination

The USFWS and the Missouri Department of Conservation (MDC) provided comments on early iterations of the proposed alternatives. These agencies expressed a desire to limit the amount of rock that would be used to create meanders in the Tadpole Island side channel in order to allow for more dynamic geomorphic processes to occur at the site in the future. They also expressed a desire to use locally available material including soil and large woody debris in order to meet the project objectives. The USFWS indicated that the project area is within the range of pallid sturgeon, Indiana bat, and northern long-eared bat. These species are listed as threatened and endangered under the Endangered Species Act (ESA).

Beginning on June 15, 2015, Public Notice 2015-1321 is being jointly issued by USACE and Missouri Department of Natural Resources announcing the availability of this draft EA and 404(b)(1) evaluation for a 30-day public comment period. Information concerning the availability of the Public Notice is being e-mailed to entities on the Kansas City District Regulatory Branch distribution list. During the public comment period, the draft documents are available on the Kansas City District Public Notice website at: http://www.nwk.usace.army.mil/Media/PublicNotices/PlanningPublicNotices.aspx. Hard copies are available on request. A copy of the Public Notice is included as Appendix A.

2.0 Alternatives

This section describes the alternatives considered in detail for the environmental assessment. In addition to the No Action Alternative, three other alternative plans were considered. These alternatives would lengthen the existing side channel to reduce water velocity in the channel by encouraging it to meander. Reducing water velocity in the side channel would limit the amount of water that would flow through the channel and allow rock to be removed from the entrance. This would improve connectivity between the side channel and the mainstem of the river while at the same time avoid any impacts to navigation. Other modifications, such as constructing a new side channel, were not considered practical. This project is modifying an existing project in which numerous alternatives were already considered (USACE, 2005). Potential impacts of the alternative plans were evaluated in detail in Section 4 before identifying a Recommended Plan.

Alternative 1 – No Action: The No Action Alternative would not result in any changes to the Tadpole Island side channel. The rock that was previously placed at the entrance of the side channel would remain in place to maintain a suitable navigation channel on the Missouri River. However, there would continue to be limited connectivity between the upstream end of the side channel and the mainstem of the Missouri River, limiting access of fish and other aquatic organisms. It would not create future conditions that would be conducive to future management actions to benefit pallid sturgeon.

Alternative 2 – Use of Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative would lengthen Tadpole Island side channel by using paired rock dikes to encourage meandering of the channel and slow water velocities (Figure 3). Approximately six groupings of two to three rock dikes would be placed at alternating locations along the banks of the side channel. Construction would occur in two phases. During the first phase, initial construction of the dikes would occur to initiate channel meandering. During the second phase, several of the rock dikes would be extended to encourage additional meandering if it is necessary to further reduce water velocities. The total length of the dikes would not exceed 350 feet in length and approximately 60,000 tons of rock would be used to construct the dikes. This would include a buried portion of the dike, approximately 25 feet in length, which would be anchored in the bank. A small number of trees may need to be removed in order to anchor the dikes into the bank. In total, less than 0.25 acres of trees would be removed. The height of the dikes would be about the same height as the water surface elevation during typical navigation flows. If sufficient channel meandering would develop following the first phase and water velocities were reduced to an acceptable, then the second phase of the project might not be necessary. It is estimated that the overall length of the side channel would increase approximately 25%, to about 12,000 feet in length. However, the side channel would be expected to be dynamic in nature and its length would fluctuate over time. Two new rootless dikes would be constructed and another dike would be extended in length on the mainstem of the Missouri River as shown in Figure 3. The purpose of these dikes would be to prevent shoaling in order to further maintain the navigation channel. Because this alternative would primarily involve placing rock, it would be expected that most of the work would be accomplished from the river and there would not be any need for construction access road(s) through the project site.

The rate at which meanders would develop would be dependent on river flows. With time, portions of the dike would become covered with sediment and point bars would develop on the inside of the bends. Vegetation would become established in locations where sediment would accrete. This would contribute to more depth and water velocity diversity than currently exists within the side channel, improving the aquatic habitat. It is expected over time that erosion would cause trees along the banks to fall into the side channel, further diversifying the aquatic habitat. While it is uncertain how long it would take the meanders to develop and point bars to form, it is expected that it would be shorter than Alternative 3 but longer than Alternative 4. Less risk and uncertainty is expected with this alternative than Alternative 3 because of number and size of dikes used to encourage meandering.

After water velocities have been sufficiently reduced in the side channel, the rock at the entrance of the side channel would be removed to improve access for fish and other aquatic organisms. In the future, additional modifications to rock structures near the entrance and within the side channel may be undertaken in order to specifically benefit pallid sturgeon. Although it is not known what the modifications to these structures would entail at this time, it is expected that any environmental impacts would be similar to those for this alternative. If, in the future, it is determined that modifications to benefit pallid sturgeon are within the scope of impacts described for this alternative, a memorandum would be prepared documenting such and a new environmental assessment would not need to be prepared. If the potential impacts are outside of the scope described for this alternative, then a new environmental assessment would be prepared.

This alternative would not result in any negative impacts to any adjacent private property, including the Cooper County Levee. If, at any time in the future, private property adjacent to the project were to become threatened by the dynamic nature of the side channel, rock would be used to direct the side channel away from the private property. This alternative would meet the objectives of increasing connectivity between the side channel and the Missouri River to improve access for fish and other aquatic organisms, while maintaining the navigation channel. If this plan were selected for implementation, detailed engineering plans and specifications would be developed that could result in minor modifications to the quantities presented herein. The project may be constructed in phases over several years depending on the availability of funding.

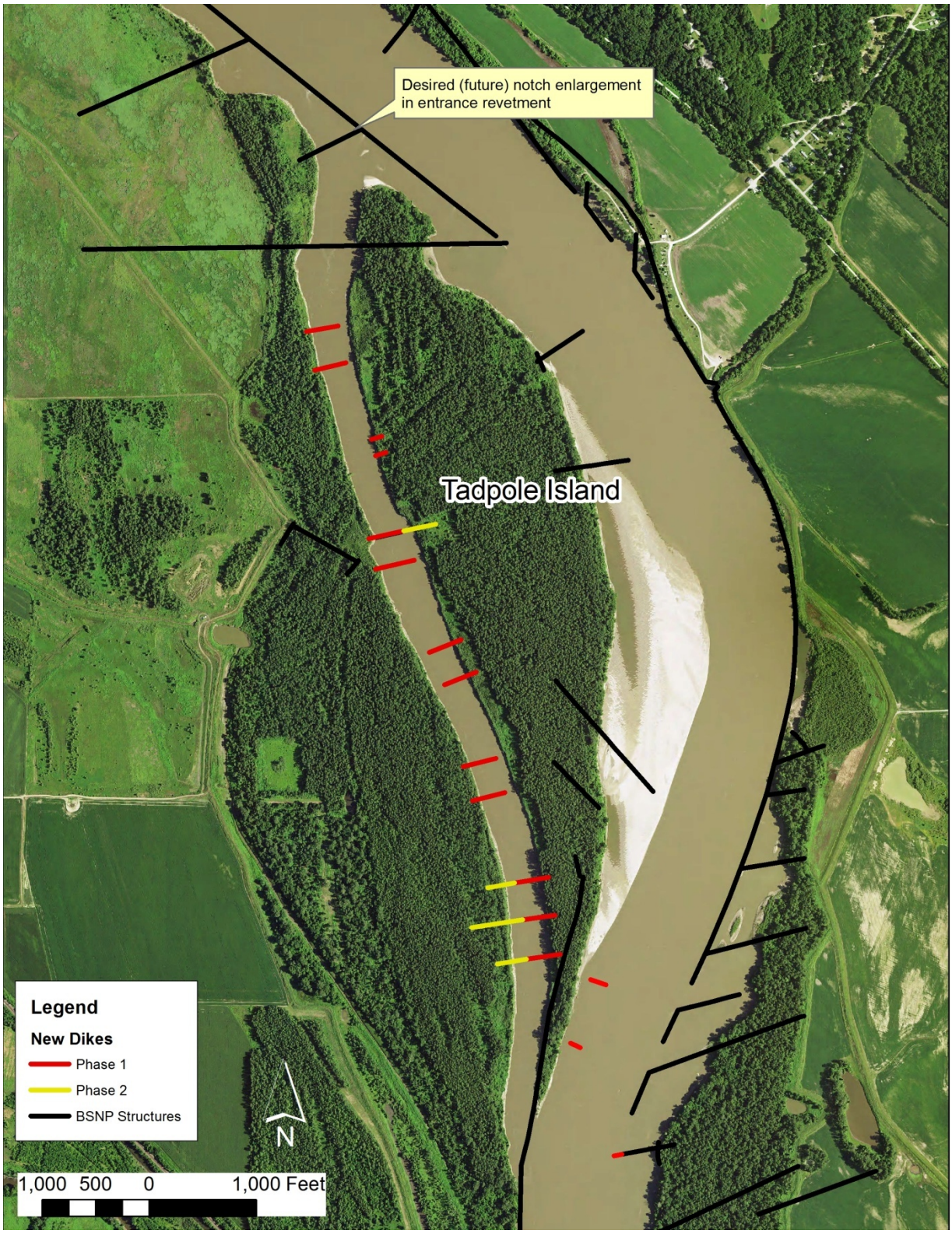

Figure 3: Alternative 2 would increase the length of the side channel using paired rock dikes to increase meandering of the channel and reduce water velocities.

Alternative 3 – Use of Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative would be similar to Alternative 2 except that it would use single rock dikes to encourage meandering of the channel and slow water velocities instead of paired rock dikes (Figure 4). The purpose of using a single rock dikes would be to minimize the amount of rock used for the project in order to provide for more dynamic geomorphic conditions of the side channel compared to paired rock dikes. The total length of the dikes would not exceed 300 feet in length and may be constructed in phases. In total, less than 0.1 acres of trees would be removed in order to anchor the dikes into the bank approximately 25 feet. Approximately 20,000 tons of rock would be used to construct the dikes. Other project features and benefits would be identical to Alternative 2. This includes the construction and modification of dikes in the mainstem of the Missouri River, removing rock from the entrance of the side channel, and potential of future modifications to rock structures near the entrance and within the channel to specifically benefit pallid sturgeon.

The rate at which meanders and point bars would develop in the side channel would be dependent on river flows. It is expected that this alternative would take the longest amount of time to develop meanders and point bars compared to the other alternatives because of the limited amount of material that would be used to encourage meandering. Although this alternative would be less expensive to construct than Alternative 2, it presents a considerable amount of risk. It is uncertain if single rock dikes would be robust enough to encourage the desired meandering. This could lead to the need for added future maintenance when compared to the other alternatives.

As with Alternative 2, this alternative would not result in any negative impacts to any adjacent private property, including the Cooper County Levee. If, at any time in the future, private property adjacent to the project were to become threatened by the dynamic nature of the side channel, rock would be used to direct the side channel away from the private property. It would meet the objectives of increasing connectivity between the side channel and the Missouri River to improve access for fish and other aquatic organisms, while maintaining the navigation channel. If this plan were selected for implementation, detailed engineering plans and specifications would be developed that could result in minor modifications to the quantities presented herein. The project may be constructed in phases over several years depending on the availability of funding.

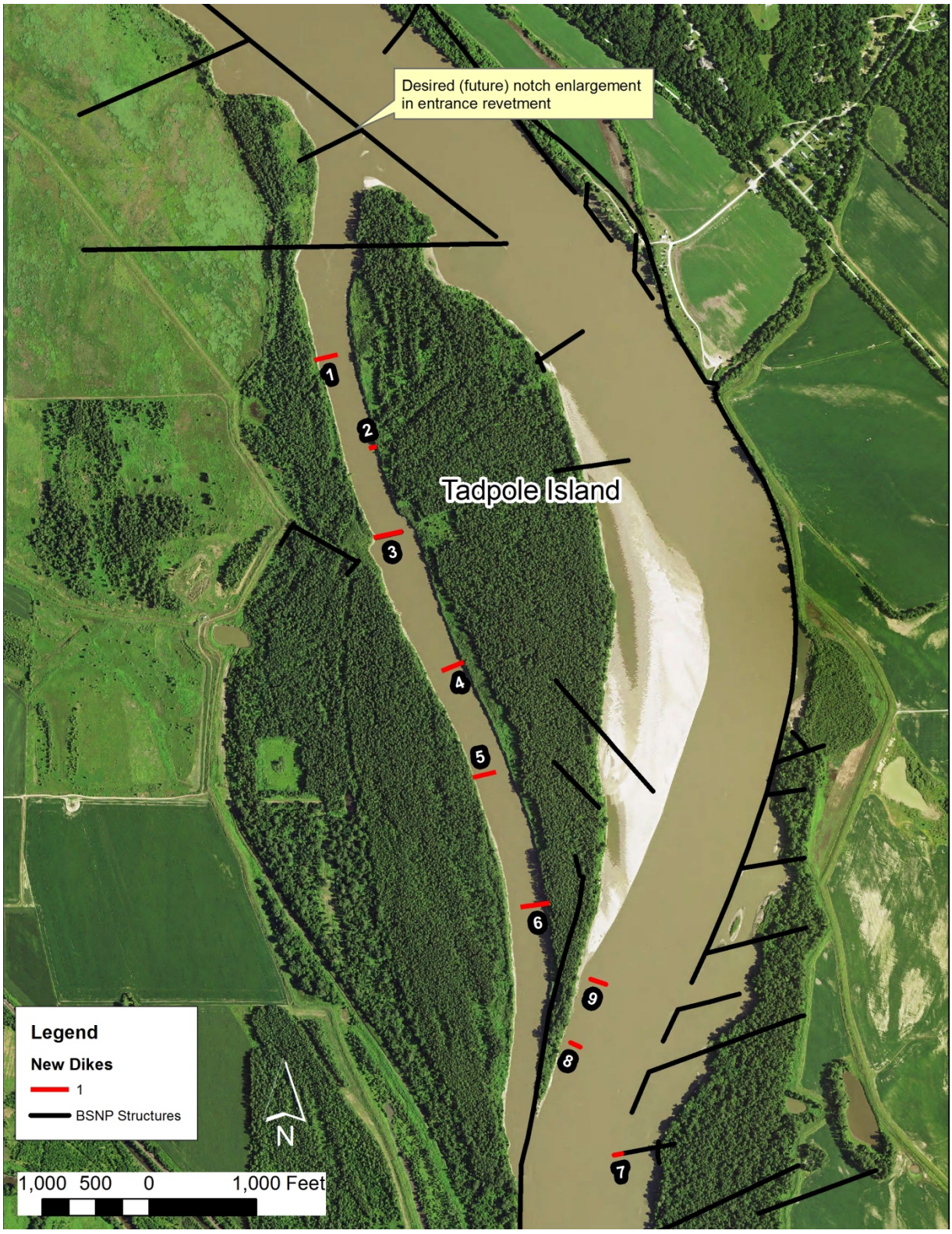

Figure 4: Alternative 3 would increase the length of the side channel using single rock dikes to increase meandering of the channel and reduce water velocities.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): As with the other alternatives, the Recommended Plan would lengthen Tadpole Island side channel in order to slow down water velocities. Approximately six rock dikes would be constructed at alternating locations to form the foundation of the inside bends of the side channel meanders. The rock dikes would not exceed 300 feet in length, including the portion of the dikes that would be buried in the banks. The height of the dikes would be about the same height as the water surface elevation during typical navigation flows. Approximately 80,000 cubic yards of material would be extracted from the top five to six feet of the outside portions of the meanders (Figure 5). The material excavated from the outside bends would be used to bury the rock dikes and fill the upstream and downstream sides of the rock dikes while forming point bars. A maximum of five acres of trees would be removed as a result of the excavation. To the extent possible, trees from the excavated locations would be used to further stabilize the inside bends to further diversify fish and wildlife habitat. It is estimated that the overall length of the side channel would increase approximately 25%, to about 12,000 feet in length. However, the side channel is expected to be dynamic in nature and its length would fluctuate over time. Two new dikes would be constructed, and another extended in length, on the mainstem of the Missouri River as shown in Figure 5. The purpose of these dikes would be to prevent shoaling to further maintain the navigation channel. Approximately 20,000 tons of rock would be used to construct all of the dikes. Because this alternative includes extensive excavation, it is expected that construction access road(s) would be constructed to complete the work. Although the final locations of the road(s) have not been identified at this time, it is estimated that approximately 12 acres of trees would be removed for this purpose. As a conservation measure for threatened and endangered bats and to minimize potential impacts to migratory birds, all tree clearing would between November 1 and March 31. Trees would be allowed to naturally regenerate following project construction. Wetland and other environmentally sensitive locations would be avoided to construct the access road(s). Additional bat habitat surveys would be conducted for the access road(s) once the route(s) is selected to minimize bat habitat impacts. Once the project is completed access road(s) would be seeded with native grasses, milkweed, and forbs to prevent erosion and spread of invasive species.

The rate at which meanders would develop would be dependent on river flows. It is expected over time that erosion would cause trees along the banks to fall into the side channel, further diversifying the aquatic habitat. While it is uncertain how long it would take the meanders to develop and point bars to fully mature, it is expected that it would be shorter than Alternative 2 or Alternative 3. Location of dikes, placement of point bar material, and excavation of the outside bends has the lowest amount of risk and uncertainty associated with the alternatives performance and design.

After water velocities have been sufficiently reduced in the side channel, the rock at the entrance of the side channel would be removed to improve access for fish and other aquatic organisms. In the future, additional modifications to rock structures near the entrance and within the side channel may be undertaken in order to specifically benefit pallid sturgeon. Although it is not known what the modifications to these structures would entail at this time, it is expected that any environmental impacts would be similar to those for this alternative. If, in the future, it is determined that modifications to benefit pallid sturgeon are within the scope of impacts described for this alternative, a memorandum would be prepared documenting such and a new

environmental assessment would not need to be prepared. If the potential impacts are outside the scope described for this alternative, then a new environmental assessment would be prepared.

This alternative would not result in any negative impacts to any adjacent private property, including the Cooper County Levee. If, at any time in the future, private property adjacent to the project were to become threatened by the dynamic nature of the side channel, rock would be used to direct the side channel away from the private property. This alternative would meet the objectives of increasing connectivity between the side channel and the Missouri River to improve access for fish and other aquatic organisms, while maintaining the navigation channel. If this plan were selected for implementation, detailed engineering plans and specifications would be developed that could result in minor modifications to the quantities presented herein. The project may be constructed in phases over several years depending on the availability of funding.

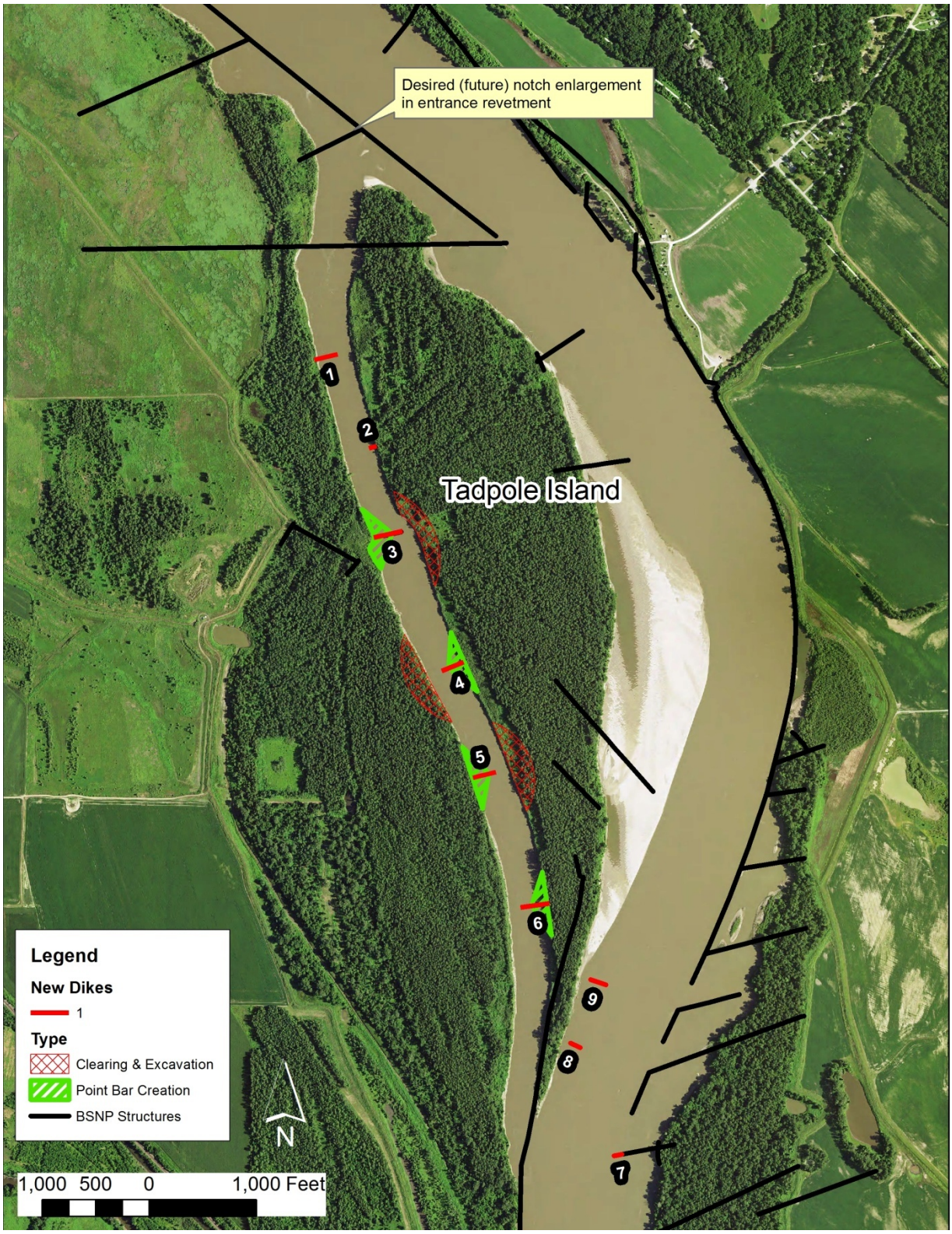

Figure 5: The Recommended Plan would increase the length of the side channel by using a cut and fill technique to reduce water velocities.

3.0 Affected Environment

This section describes the affected environment within and surrounding the project area. It includes resources that have the potential to be affected by the proposed alternatives. Information was obtained from site visits, geographic information systems data, review of maps and aerial photography, agency coordination, and previous reports.

3.1 Water Quality

The USACE maintains an active water quality monitoring program for the Missouri River as part of the MRRP. The goals of the water quality program include: 1) Assess the chemical and biological variables of the mainstem river, tributaries, and created habitats relative to the mitigation, recovery, and restoration of the pallid sturgeon, other native fish species, and aquatic communities, and 2) Develop, establish and maintain a high quality, customer responsive, water quality program within the lower Missouri River basin. The water quality program conducts long-term fixed station ambient monitoring, investigative monitoring, and special studies.

The USACE monitors select side channel construction projects during and after construction to ensure that MRRP projects are within state water quality standards. Current water quality parameters that are measured include total phosphorus, nitrate plus nitrite, ammonia, ortho-phosphorus, dissolved phosphorus, total Kjeldahl nitrogen, total suspended solids, suspended sediment concentration, total dissolved solids, total organic carbon, dissolved organic carbon, turbidity, chlorophyll A, total silica, and dissolved silica. Median concentrations of common water quality constituents are located in Table 1. The Tadpole Island project site is located approximately 47 miles downstream of the Glasgow site and 20 miles upstream of the Marion site. The Missouri River is listed on the Missouri 303(d) list of impaired waters for *Escherichia coli.*

Table 1: Median concentrations of common water quality collected from the Missouri River between the years 2010 and 2014.

	Atchison, River Mile 423		Fort Osage, River Mile 340		Waverly, River Mile 294		Glasgow, River Mile 227		Marion, River Mile 160		Hermann, River Mile 98		Weldon Springs,* River Mile 50	
	Median	**Range**	**Median**	**Range**	**Median**	**Range**	**Median**	**Range**	**Median**	**Range**	**Median**	**Range**	**Median**	**Range**
Total Phosphorus (mg/L)	0.33	0.05-2.4	0.37	0.1-2.3	0.35	0.09-2.1	0.38	0.091-2	0.385	0.11-1.8	0.34	0.11-1.4	0.3	0.12-1.9
Total Orthophosphate (mg/L)	0.087	0.024-0.24	0.12	0.053-0.21	0.115	0.052-0.21	0.1	0.059-0.24	0.099	0.056-0.49	0.087	0.05-0.2	0.09	0.026-0.16
Ammonia (mg/L)	0.056	0.01-0.32	0.09	0.03-0.29	0.068	0.01-.24	0.05	0.02-0.92	0.04	0.03-0.28	0.35	0.02-0.65	0.033	0.02-0.52
Nitrate/Nitrite (mg/L)	1.4	0.1-5.0	1.4	0.21-4.4	1.45	.22-4.7	1.2	0.2-3.8	1.3	0.17-4	0.98	0.12-3	0.9	0.1-2.9
Total Kjehldahl Nitrogen (mg/L)	0.9	0.2-8.4	1.1	0.2-6.7	1	0.25-6.7	1	0.22-6.4	1	0.33-4.6	0.89	0.38-3.6	0.78	0.35-4.2
Total Suspended Solids (mg/L)	128	25-4710	123	22.4-4140	160	28-3070	176	44-2660	203	32-1700	144	31.3-1410	132	23-1520

*Note: Water quality data not collected at Weldon Springs in 2010.

3.2 Wetlands

Prior to being purchased by the federal government, Tadpole Island was used as agricultural cropland. In January 2015, areas that had a potential to be directly disturbed as part of the alternatives were surveyed for wetlands. It was determined that there were approximately 31 acres of forested wetlands directly in or immediately adjacent to the project work area. Using remote sensing information, an additional 5 acres were identified within the study area but outside any proposed project work areas. The total number of wetlands, all forested, within the study area is approximately 36 acres (Figure 6).

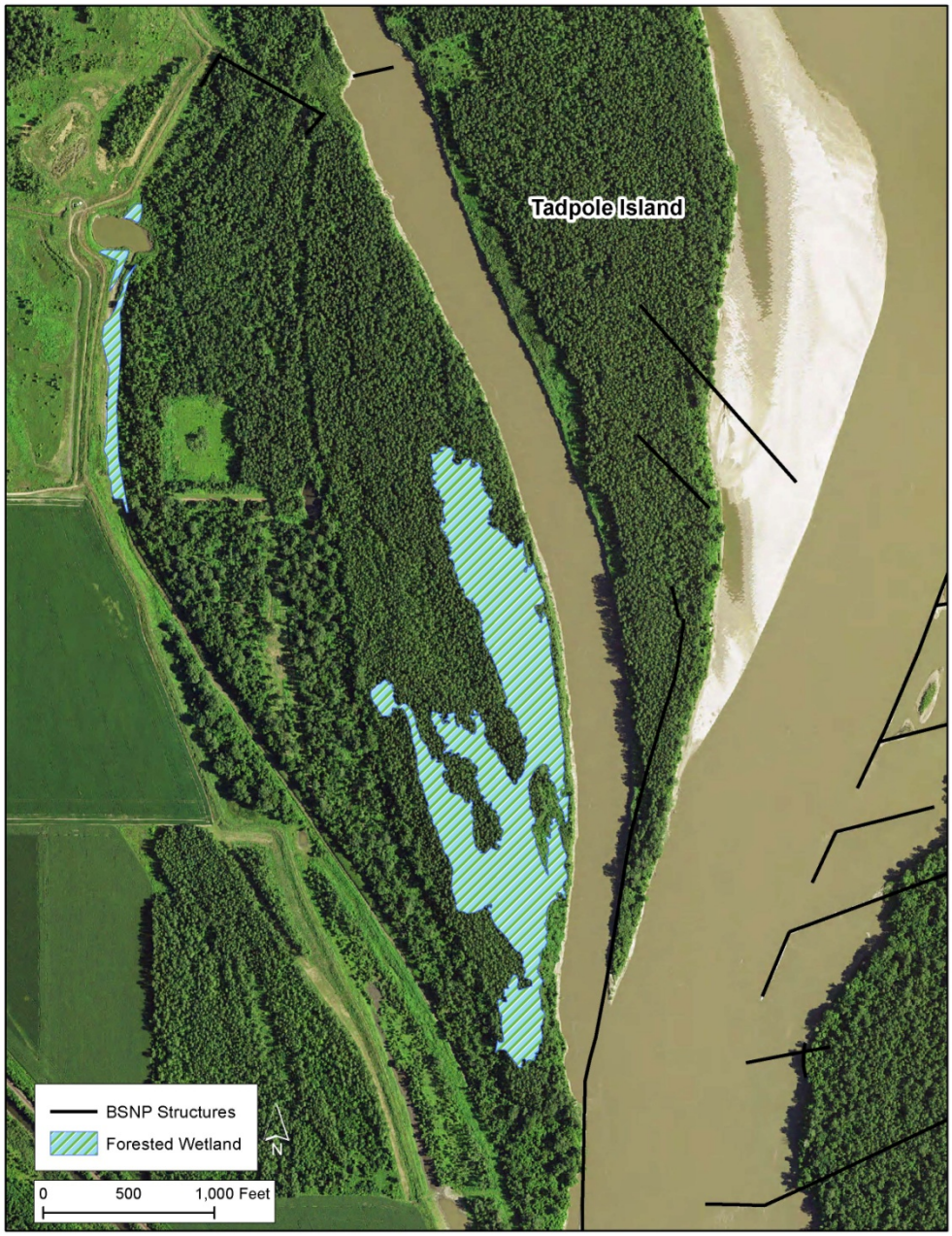

Figure 6: Wetlands within the study area.

3.3 Geomorphology

The banks of the side channel are nearly vertical and range from approximately 15 to 20 feet high during typical flow conditions. Remnant soil stockpiles from construction of the side channels can be found along some portions of the banks and range from three to eight feet high. The remainder of the property is generally flat. The right bank of the Missouri River along Tadpole Island is also nearly vertical and approximately 20 feet high. The land that composes the site was formed from alluvium that has accreted since construction of the Missouri River Bank Stabilization and Navigation Project (BSNP).

3.4 Terrestrial Habitat

Prior to 1994 when the property was purchased by the federal government, most of project site was used as agricultural cropland. Little woody vegetation was present in the area except for a narrow band of trees, one to two trees deep, adjacent to the Missouri River. Following 1994, willow and cottonwood trees began colonizing the project site. When the side channel was constructed in 2006, these trees were already well established. During a January 2015 site visit, trees located along the side channel ranged in size from small saplings to approximately 16 inches in diameter. Cottonwood trees averaging seven to twelve inches in diameter were the dominate species. Hackberry and willow were also identified within the study area. Some open areas exist near the banks of the side channel and consist of one-half to three inch diameter willows mixed with grasses and giant ragweed. Table 2 shows the amount of various habitat types within the approximately 600- acre study area.

Table 2: Habitat types within the approximately 600-acre study area.

Habitat Type	**Approximate Number of Existing Acres**
Side Channel	51
Forested Wetland	36
Grassland	28
Scrubland	18
Deciduous Forest	445
Lake, Pond, Scour Hole	6
Agricultural Land	7
Barren	11

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3.5 Fish and Wildlife

Fish and wildlife species present within the study area are typical of those described in the Final Supplemental Environmental Impact Statement for the Missouri River Fish and Wildlife Mitigation Project (USACE, 2003), available online at http://moriverrecovery.usace.army.mil/mrrp/f?p=136:183:0::NO::SITE_ID,PIS_ID:,#seis . Section 3.3.3 Wildlife and Section 3.3.4 Fisheries of this report are herby incorporated by

reference. Most fish and wildlife populations in the area have increased since the site was purchased by the federal government for the purpose of developing fish and wildlife habitat.

3.6 Threatened and Endangered Species

Federally listed threatened or endangered species that are known to occur in Moniteau County, Missouri include Indiana bat, northern long-eared bat, least tern, piping plover, rufa red knot, pallid sturgeon, Topeka shiner, and running buffalo clover. The USFWS provided information regarding three of these species that have the potential to occur in the study area. These species are listed in Table 2. Additionally, a cave located roughly 5 miles from the study area is known to provide hibernacula for three federally threatened and endangered bats, the Indiana bat, the northern long-eared bat, and the gray bat.

Table 2: Threatened and endangered species with the potential to occur within the project area.

Common Name	Scientific Name	Status
Indiana Bat	*Myotis sodalis*	Federally Endangered
Northern Long-Eared Bat	*Myotis septentrionalis*	Federally Threatened
Gray Bat	*Myotis grisescens*	Federally Endangered
Pallid Sturgeon	*Scaphirhyncus albus*	Federally Endangered

The Indiana bat is an endangered species that has experienced serious population declines due to habitat loss and human disturbance. Indiana bats hibernate in caves during winter and roosts in trees with loose bark in the spring and summer. The loss of wetland and riparian habitat along the Missouri River has contributed to the loss of foraging and roosting habitat for this species. A field survey using USFWS 2014 updated Range-Wide Indiana Bat Summer Survey Guidelines was conducted on January 28, 2015 to determine if any suitable habitat for Indiana bat was within the project areas described in Section 2. These guidelines are available online at http://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2014IBatSummerSurveyGuidelines13Jan2014.pdf . Results from the field survey indicated that there is little to no preferred habitat for the Indiana bat (Appendix B). Although most of the trees within the project areas are the species and sizes preferred by Indiana bats, they do not have any exfoliating bark because they are relatively young. There were several tree snags, but the majority were located close to the ground and/or did not contain any exfoliating bark. On average the preferred canopy density is poor and has little to no mid or understory. See Appendix B for the field survey forms.

The northern long-eared bat has recently been listed as a threatened species under the Endangered Species Act. Northern long-eared bats have been experiencing rapidly declining populations due to white nose syndrome, a fungal pathogen. During winter this species of bat is known to hibernate in caves and abandoned mines. Summer habitat is not well defined, but it is believed that roosting habitat includes dead or live trees and snags with cavities, peeling or exfoliating bark, split tree trunk and/or branches. Foraging habitat includes upland and lowland woodlots and tree lined corridors. Occasionally, they may roost in structures like barns and sheds. The USFWS recommended using guidance and habitat survey protocols for Indiana bat until specific information is developed for northern long-eared bat. Based on this guidance and

the field habitat assessment, the project area contains little to no suitable roosting habitat for the northern long-eared bat.

Gray bats live in caves year-round. They feed on flying insects present along rivers and lakes. It is expected that gray bats may use the study area for foraging.

The pallid sturgeon generally occurs in the main channel of the large, turbid, free flowing Missouri River, in the lower segments of some major tributaries. Modification of the natural Missouri River hydrograph, habitat loss, fish migration blockage, pollution, hybridization, and over harvesting are likely responsible for pallid sturgeon decline (USFWS 1993).

3.7 Invasive Species

Invasive species have the potential to displace native plants and animals. In accordance with Executive Order 13122, federal agencies may not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species. Invasive aquatic species that are a concern and which have the potential to be introduced into new water bodies as a result of contaminated construction equipment include zebra mussels, quagga mussels, New Zealand mudsnails, purple loosestrife, and Eurasian watermilfoil, among others. Common invasive fish species on the lower Missouri River include common carp, goldfish, grass carp, silver carp, bighead carp, and western mosquitofish. Invasive terrestrial species often flourish on land that has recently been disturbed. They may also be transported to new locations on construction equipment. Examples of invasive terrestrial species of concern would be Johnsongrass, reed canary grass, sericea lespedeza, brome grass, Canada thistle, Japanese honeysuckle, and Japanese hops, among others. It is important to note that the project is located along the Missouri River. Transport of invasive species by the river is common. Furthermore, natural erosion and deposition of material along the river can result in conditions that are susceptible to becoming established with invasive plants.

3.8 Cultural Resources

Cultural resources are defined as any area of past human activity, occupation, or use, identifiable through inventory, historical documentation, or oral evidence. Cultural resources include, but are not limited to, archeological sites, buildings or structures, cemeteries, and traditional cultural properties. Background research of the project areas were conducted to determine if any previously recorded cultural resources were present within or near them. This research included a review of the National Register of Historic Places (NRHP), the Missouri Department of Natural Resources Archaeological Viewer (on-line), and pertinent cultural resource reports and shipwreck location maps on file at the Kansas City District.
The Tadpole Island cultural resources review found no previously recorded cultural sites in the project area and that the entire site is recently accreted land with little potential for unrecorded buried archeological sites.

3.9 Navigation

The Missouri River from Sioux City, Iowa to its confluence with the Mississippi River just upstream of St. Louis, Missouri, a distance of 735 miles, is maintained and operated by the USACE under the authority and in accordance with requirements of the Missouri River BSNP. USACE is directed by Congress to maintain a 9-foot deep by 300-foot wide navigation channel along this portion of the river. In addition, Missouri River flows are managed in part, for commercial navigation on the Missouri River. Navigation on the Missouri River is limited to the normal ice-free season, with a full-length flow support season of 8 months (USACE, 2001). At Sioux City, the full-length support season extends from March 23 to November 22 and at St. Louis the full-length support season extends from April 1 to December 1 (USACE, 2001).

Following numerous flood events, the side channel became wider and deeper than was desirable and 30% of the mainstem flow entered the chute. This threatened to negatively impact the Missouri River navigation channel. In 2012, rock was placed at the entrance of the side channel to restrict water flow. Approximately 15% of the mainstem flow currently enters the side channel, primarily from the surface of the river as it overtops rock structures at the entrance of the side channel.

4.0 Environmental Consequences

This section presents the evaluation of direct and indirect impacts of the alternatives on the human environment. The significance of an action depends on both context and intensity. Context is related to any short or long-term impacts in a specific location. Intensity is related to the severity of the impact, either beneficial or adverse. Refer to 40 CFR Section 1508.27 for a detailed description of context and intensity.

4.1 Water Quality

Alternative 1 – No Action: The No Action alternative would not result in any changes to the existing water quality of the Missouri River.

Alternative 2 – Use of Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 should not result in any significant impacts to water quality. Approximately 60,000 tons of rock rip rap, obtained from a commercial source, would be used to construct the rock structures. The rock would only contain minimal fines and would be free of any harmful contaminants. Minor, incidental discharges of accreted soil may occur during project construction. This would be minimal compared to the amount of material that enters the Missouri River by natural processes. It would also be minimal compared to the amount of material that entered the river during construction of the original project in 2006, 800,000 cubic yards, which did not result in any significant impacts to water quality. It has been documented by Gosch *et al.* (2013) that construction of side channel projects on the Missouri River have not resulted in any significant impacts to water quality or exceeded state water quality criteria. Best management practices to reduce discharges of pollutants in storm water runoff from construction areas would be utilized. The construction contractor may be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Missouri

Department of Natural Resources (MDNR). Based on these facts, it has been determined that this alternative would not result in any significant impacts to water quality of the Missouri River. If this alternative were selected for implementation, a Clean Water Act Section 404 authorization and a Clean Water Act Section 401 water quality certification would be obtained prior to project construction.

Alternative 3 – Use of Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative should not result in any significant impacts to water quality for the same reasons described for Alternative 2. Approximately 20,000 tons of rock rip rap would be used to construct the rock structures. Best management practices to reduce discharges of pollutants in storm water runoff from construction areas would be utilized. The construction contractor may be required to obtain a NPDES permit from MDNR. Based on these facts, it has been determined that this alternative would not result in any significant impacts to water quality of the Missouri River. If this alternative were selected for implementation, a Clean Water Act Section 404 authorization and a Clean Water Act Section 401 water quality certification would be obtained prior to project construction.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan should not cause an exceedence of federal or State of Missouri water quality standards. Approximately 20,000 tons of rock rip rap, obtained from a commercial source, would be used to construct the foundation of the inside bends of the side channel. The rock would only contain minimal fines and would be free of any harmful contaminants. Approximately 80,000 cubic yards of soil would be placed on top and next to the rock foundations. This is a minimal amount of material compared to the amount of material that enters the Missouri River by natural processes on an annual basis. It would also be minimal compared to the amount of material that entered the river during construction of the original project in 2006, 800,000 cubic yards, which did not result in any significant impacts to water quality. It has been documented by Gosch *et al.* (2013) that construction of side channel projects on the Missouri River have not resulted in any significant impacts to water quality or exceeded state water quality criteria. Best management practices to reduce discharges of pollutants in storm water runoff from construction areas would be utilized. The construction contractor would be required to obtain a NNPDES permit from the MDNR. All conditions of the NPDES permit and any conditions of a Clean Water Act Section 401 water quality certification would be followed. Based on these facts, it has been determined that this alternative would not result in any significant impacts to water quality of the Missouri River. A draft Clean Water Act Section 404(b)(1) Evaluation for the Recommended Plan is included in Appendix C. The Corps' preliminary determination, pending completion of the public interest review, is that the Recommended Plan would be in full compliance with the Section 404(b)(1) Guidelines. At this time, a Section 401 water quality certification is being requested from MDNR.

4.2 Wetlands

Alternative 1 – No Action: This alternative would have no direct or indirect impacts to wetlands.

Alternative 2 – Use of Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would not result in any direct impacts to wetlands. No direct fill or construction work would occur in any wetlands. Indirect impacts to wetlands could occur as a result of creating a more dynamic side channel. This would occur if the alignment of the side channel migrated to locations with existing wetlands. New wetlands would likely develop as part of the dynamic geomorphic processes that would occur as the channel migrates.

Alternative 3 – Use of Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 would not result in any direct impacts to wetlands. No direct fill or construction work would occur in any wetlands. Indirect impacts to wetlands may occur as a result of creating a more dynamic side channel. This would occur if the alignment of the side channel migrated to locations with existing wetlands. However, new wetlands would likely develop as part of the channel migration process.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): Alternative 4 would not result in any direct impacts to wetlands. When this alternative was initially developed, it included excavation in a location that was later identified as forested wetland. After the forested wetland area was identified, the alternative was modified to avoid direct impacts to this location. Indirect impacts to wetlands may occur as a result of creating a more dynamic side channel. This would occur if the alignment of the side channel migrated to locations with existing wetlands. However, new wetlands would likely develop as part of the channel migration process.

4.3 Geomorphology

Alternative 1 – No Action: The No-Action alternative is not expected to result in any significant impacts to geomorphology of the study area. There could be minor changes to the slope of the banks of the side channel as they continue to stabilize following placement of rock at the entrance of the side channel in 2012.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would result in long term beneficial impacts to the geomorphology of the study area by creating meanders in the side channel that would benefit fish and wildlife. This would mimic a more natural process.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: This alternative would result in long term beneficial impacts to the geomorphology of the study area by creating meanders in the side channel that would benefit fish and wildlife. This would mimic a more natural process.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan would result in long term beneficial impacts to the topography of the study area by creating meanders in the side channel that would benefit fish and wildlife. This would mimic a more natural process.

4.4 Terrestrial Habitat

Alternative 1 – No Action: Alternative 1 would not result in any direct or indirect impacts to the terrestrial habitat within the study area. Natural vegetative succession would continue within the study area.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would result in minor direct impacts to the terrestrial habitat. Up to 0.25 acres of land adjacent to the bank would be disturbed in order to anchor the dikes approximately 25 feet into the bank. These locations were previously disturbed when the original side channel was constructed in 2006. Some of the locations where the dikes would be anchored have small trees that have grown since that time. This alternative would result in minor indirect impacts to the terrestrial habitat within the study area as the side channel would migrate and meander through portions of the study area. Areas adjacent to the side channel that were not disturbed as part of the construction of the side channel in 2006 are dominated by cottonwood trees that are approximately 20 years old. Some of these trees would erode into the side channel, enhancing the aquatic habitat. New terrestrial habitat would also develop as the side channel would meander. This dynamic geomorphic process is desirable and would improve the overall benefits of the project for fish and wildlife.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 would result in minor direct impacts to the terrestrial habitat. Up to 0.1 acres of land adjacent to the bank would be disturbed in order to anchor the dikes approximately 25 feet into the bank. These locations were previously disturbed when the original side channel was constructed in 2006. Some of the locations where the dikes would be anchored have small trees that have grown since that time. This alternative would result in minor indirect impacts to the terrestrial habitat within the study area as the side channel would migrate and meander through portions of the study area. Areas adjacent to the side channel that were not disturbed as part of the construction of the side channel in 2006 are dominated by cottonwood trees that are approximately 20 years old. Some of these trees would erode into the side channel, enhancing the aquatic habitat. New terrestrial habitat would also develop as the side channel would meander. This dynamic geomorphic process is desirable and would improve the overall benefits of the project for fish and wildlife.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): Alternative 4 would result in direct impacts to the terrestrial habitat. As much as 17 acres of trees would be removed during project construction. These impacts would result from excavating the outside bends of the side channel to a depth of approximately 5 to 6 feet which would require up to five acres of trees being cleared. Most of the trees consist of cottonwood trees that are less than 20 years old. Access road(s) would also be constructed to access the side channel for project construction. It is estimated that up to an additional 12 acres of similar forest may be cleared for this purpose. These would also be minor indirect impacts to the terrestrial habitat within the study area as the side channel would migrate and meander through portions of the study area. Areas adjacent to the side channel are dominated by cottonwood trees that are approximately 20 years old. Some of these trees would erode into the side channel, enhancing the aquatic habitat. New terrestrial habitat would also develop as the

side channel would meander. This dynamic geomorphic process is desirable and would improve the overall benefits of the project for fish and wildlife. Because over 400 acres of trees would remain within the study area, similar habitat is in other nearby locations, and natural regrowth of the access road(s) would occur these impacts described for the Recommended Plan are considered relatively short-term and minor.

4.5 Fish and Wildlife

Alternative 1 – No Action: Alternative 1 would not result in any direct or indirect impacts to the fish and wildlife on site. It would not meet the objective of the project to increase aquatic connectivity between the mainstem of the Missouri River and the side channel.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would not result in any long-term negative impacts to fish and wildlife. However, there would be short-term construction related impacts associated with noise and physical disturbance at locations where rock would be placed in the water. It is likely that individual organisms would temporarily move to other nearby locations with similar habitat types. Long-term, this alternative would benefit aquatic species by allowing rock to be removed from the entrance of the side channel. Furthermore, a more dynamic geomorphic process within the side channel is expected to benefit both fish and wildlife by creating more diverse habitat features.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 would not result in any long-term negative impacts to fish and wildlife. However, there would be short-term construction related impacts associated with noise and physical disturbance at locations where rock would be placed in the water. It is likely that individual organisms would temporarily move to other nearby locations with similar habitat types. Long-term, this alternative would benefit aquatic species by allowing rock to be removed from the entrance of the side channel. Compared to Alternative 2 and the Recommended Plan, this alternative would take the greatest amount of time to develop dynamic meandering characteristic that would benefit fish and wildlife. A more dynamic geomorphic process within the side channel is expected to benefit both fish and wildlife by creating more diverse habitat features.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan would have similar impacts to fish and wildlife as described for Alternative 2 and Alternative 3. Alternative 4 would not result in any long-term negative impacts to fish and wildlife. However, there would be short-term construction related impacts associated with noise and physical disturbance at locations where rock would be placed in the water and the terrestrial habitat would be disturbed. Minor impacts would be associated to the construction of the access road(s), but these would be temporary because the road(s) would not be permanent and would be allowed to re-grow naturally. It is likely that individual organisms would temporarily move to other nearby locations with similar habitat types. Long-term, this alternative would benefit aquatic species in the shortest amount of time by allowing rock to be removed from the entrance of the side channel sooner than would be expected for the other alternatives. This is because some of the meanders of the side channel would be partially

constructed. Additionally, placing large woody debris around the inside of the bends of the side channel would enhance habitat diversity for both fish and wildlife. The Recommended Plan would also result in a more dynamic geomorphic process within the side channel than currently exists. This dynamic process is expected to benefit both fish and wildlife by creating more diverse habitat features.

4.6 Threatened and Endangered Species

Alternative 1 – No Action: Alternative 1 would not adversely affect any threatened or endangered species.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would only result in the clearing of a minimal amount of trees, less than 0.25 acres, to anchor the rock structures into the existing bank. These trees are immediately adjacent to the bank and became established following the construction of the original side channel in 2006. As a conservation measure, trees would be cleared between November 1 and March 31, a time of the year when these species are not expected to be present. Because of this, and the fact that they do not have any exfoliating bark that would provide roosting habitat for Indiana bat or northern long-eared bat, this alternative is not likely to adversely affect either of these species. This alternative would have no affect on gray bats. The nearest known roosting habitat for gray bats is roughly five miles away from the project area. It would not adversely impact the overall populations of insects that any threatened and endangered bats use for forage. Furthermore, this alternative is not likely to adversely affect pallid sturgeon. Pallid sturgeon have the ability to move out of any areas that would be temporarily disturbed during project construction. Also, there is no known spawning of pallid sturgeon within the areas that would be disturbed during project construction. Long-term, this alternative may provide beneficial effects to pallid sturgeon by providing greater connectivity between the mainstem of the Missouri River and the Tadpole Island side channel.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 would only result in the clearing of a minimal amount of trees, less than 0.1 acres, to anchor the rock structures into the existing bank. These trees are immediately adjacent to the bank and became established following the construction of the original side channel in 2006. As a conservation measure, trees would be cleared between November 1 and March 31, a time of the year when these species are not expected to be present. Because of this, and the fact that they do not have any exfoliating bark that would provide roosting habitat for Indiana bat or northern long-eared bat, this alternative is not likely to adversely affect either of these species. This alternative would have no affect on gray bats. The nearest known roosting habitat for gray bats is roughly five miles away from the project area. It would not adversely impact the overall populations of insects that any threatened and endangered bats use for forage. Furthermore, this alternative is not likely to adversely affect pallid sturgeon. Pallid sturgeon have the ability to move out of any areas that would be temporarily disturbed during project construction. Also, there is no known spawning of pallid sturgeon within the areas that would be disturbed during project construction. Long-term, this alternative may provide beneficial effects to pallid sturgeon by providing greater connectivity between the mainstem of the Missouri River and the Tadpole Island side channel.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan would result in the clearing of up to 17 acres of trees. This would result from clearing up to 12 acres of trees for construction access road(s) and clearing 5 acres from the outside bends of the side channel meanders. USACE has determined that the Recommended Plan may affect, but is not likely to adversely affect, federally listed Indian bat and northern long-eared bat. As a conservation measure, trees would be cleared between November 1 and March 31, a time of the year when these species are not expected to be present. The USFWS concurred with this determination in an email dated 27 April 2015 (Appendix D). This alternative would have no affect on gray bats. The nearest known roosting habitat for gray bats is roughly five miles away from the project area. It would not adversely impact the overall populations of insects that any threatened and endangered bats use for forage. Additional bat habitat surveys would be conducted for the access road(s) once the route(s) is selected to minimize bat habitat impacts. In the event that access road(s) would result in additional environmental impacts, to include these bat species, further coordination with USFWS would occur. After being evaluated, any environmental impacts would be minimized and avoided. It is not likely or anticipated that construction of the access road(s) would result in significant impacts to any threatened or endangered species. Much of the forest at the project locations is similar throughout. Furthermore, this alternative is not likely to adversely affect pallid sturgeon. Pallid sturgeon have the ability to move out of any areas that would be temporarily disturbed during project construction. Also, there is no known spawning of pallid sturgeon within the areas that would be disturbed during project construction. Long-term, this alternative may provide beneficial effects to pallid sturgeon by providing greater connectivity between the mainstem of the Missouri River and the Tadpole Island side channel.

4.7 Invasive Species

Alternative 1 – No Action: The No Action alternative is not expected to result in new invasive species being transferred to or from the study area.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 is not expected to transfer any invasive species to or from the project site. The construction contractor would be required to wash their equipment prior to entering and leaving the construction site to avoid the spread of both terrestrial and aquatic invasive species by their equipment. Disturbed areas would be susceptible to the establishment of invasive plant species. However, planting native grasses, milkweed, and forbs in all disturbed areas would prevent erosion and reduce invasive plant infestation. Long-term, these areas would naturally regenerate to floodplain forest.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 is not expected to transfer any invasive species to or from the project site. The construction contractor would be required to wash their equipment prior to entering and leaving the construction site to avoid the spread of both terrestrial and aquatic invasive species by their equipment. Disturbed areas would be susceptible to the establishment of invasive plant species. However, planting native grasses, milkweed, and forbs

in all disturbed areas would prevent erosion and reduce invasive plant infestation. Long-term, these areas would naturally regenerate to floodplain forest.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): Alternative 4 is not expected to transfer any invasive species to or from the project site. The construction contractor would be required to wash their equipment prior to entering and leaving the construction site to avoid the spread of both terrestrial and aquatic invasive species by their equipment. The Recommended Plan would differ from Alternatives 2 and 3 in that it would involve more land disturbance. Disturbed areas would be susceptible to the establishment of invasive plant species. However, planting native grasses, milkweed, and forbs along all disturbed access road(s) would prevent erosion and reduce invasive plant infestation. Long-term, these areas would naturally regenerate to floodplain forest.

4.8 Cultural Resources

Alternative 1 – No Action: The No Action alternative would have no affect on historic properties.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 would be expected to have no affect on any cultural resources. Cultural resource investigations took place prior to the side channels construction and no cultural resources were indicated or found during construction. Furthermore, the project is located on accreted lands formed from construction of the BSNP and is not likely to contain any cultural resources. The Missouri State Historic Preservation Officer concurred with USACE determination that there would be no historic properties affected in a letter dated February 11, 2015 (Appendix E). If cultural materials were encountered during project activities, all construction would be halted and the State Historic Preservation Officer would be notified as soon as possible in order to determine the appropriate course of action.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 3 would be expected to have no affect on any cultural resources. Cultural resource investigations took place prior to the side channels construction and no cultural resources were indicated or found during construction. Furthermore, the project is located on accreted lands formed from construction of the BSNP and is not likely to contain any cultural resources. The Missouri State Historic Preservation Officer concurred with USACE determination that there would be no historic properties affected in a letter dated February 11, 2015 (Appendix E). If cultural materials were encountered during project activities, all construction would be halted and the State Historic Preservation Officer would be notified as soon as possible in order to determine the appropriate course of action.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): The Recommended Plan would be expected to have no affect on any cultural resources. Cultural resource investigations took place prior to the side channels construction and no cultural resources were indicated or found during construction. Furthermore, the project is located on accreted lands formed from construction of the BSNP and is not likely to contain any cultural resources. The Missouri State Historic Preservation Officer

concurred with USACE determination that there would be no historic properties affected in a letter dated February 11, 2015 (Appendix E). If cultural materials were encountered during project activities, all construction would be halted and the State Historic Preservation Officer would be notified as soon as possible in order to determine the appropriate course of action.

4.9 Navigation

Alternative 1 – No Action: Alternative 1 would not result in any additional modifications the side channel in order to maintain a suitable navigation channel. Rock that was placed at the entrance of the side channel in 2012 would remain in place. Approximately 15% of normal navigation flows would continue to pass through the side channel, more than is desired, potentially resulting in future impacts to the navigation channel.

Alternative 2 – Use Paired Rock Structures to Encourage Side Channel Meandering and Point Bar Development: Alternative 2 is not expected to result any adverse impacts to navigation on the Missouri River. Adding meanders to the side channel is expected to reduce water velocities to such a degree that rock at the entrance of the side channel could be removed without adversely impacting navigation. Approximately 10% of flow from the Missouri River would flow through the side channel during normal navigation conditions. In addition, two new rootless dikes and the addition of a sill to an existing dike will also help prevent shoaling in the navigation channel. The USACE is required to maintain navigation as one of the congressionally authorized purposes of the Missouri River. If, in the unlikely event this alternative would impact navigation, corrective actions would be taken.

Alternative 3 – Use Single Rock Structures to Encourage Side Channel Meandering and Point Bar Development: For the same reasons discussed for Alternative 2, Alternative 3 is not expected to result any adverse impacts to navigation on the Missouri River. Adding meanders to the side channel is expected to reduce water velocities to such a degree that rock at the entrance of the side channel could be removed without adversely impacting navigation. Approximately 10% of flow from the Missouri River would flow through the side channel during normal navigation conditions. In addition, two new rootless dikes and the addition of a sill to an existing dike will also help prevent shoaling in the navigation channel. The USACE is required to maintain navigation as one of the congressionally authorized purposes of the Missouri River. If, in the unlikely event this alternative would impact navigation, corrective actions would be taken.

Alternative 4 – Use Cut and Fill Technique to Develop Side Channel Meandering (Recommended Plan): Similar to Alternatives 2 and 3, the Recommended Plan is not expected to result any adverse impacts to navigation on the Missouri River. Adding meanders to the side channel is expected to reduce water velocities to such a degree that rock at the entrance of the side channel could be removed without adversely impacting navigation. Approximately 10% of flow from the Missouri River would flow through the side channel during normal navigation conditions. In addition, two new rootless dikes and the addition of a sill to an existing dike will also help prevent shoaling in the navigation channel. The USACE is required to maintain navigation as one of the congressionally authorized purposes of the Missouri River. If, in the unlikely event this alternative would impact navigation, corrective actions would be taken.

4.10 Cumulative Impacts

The Council on Environmental Quality (CEQ) Regulations defines 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" (CEQ, 1997). The cumulative impacts addressed in this document consist of the impacts of multiple actions that result in similar effects on the natural resources. The geographical areas of consideration are actions located within/along the lower Missouri River.

Past Actions: Past actions that have significantly impacted the Missouri River include the Mainstem Reservoir System, the Bank Stabilization and Navigation Project, and land use changes. Impacts from these activities are documented in the Missouri River Fish and Wildlife Mitigation Iowa, Nebraska, Kansas, and Missouri Final Feasibility Report and Final Environmental Impact Statement (USACE, 1981) and the Missouri River Bank Stabilization Fish and Wildlife Mitigation Project Supplemental Environmental Impact Statement (USACE, 2003) and are being incorporated by reference.

Present and Future Actions: Cumulative effects of the Missouri River Bank Stabilization Fish and Wildlife Mitigation Project, of which the project is a part of, were discussed in the Supplemental Environmental Impact Statement prepared in 2003 and are being incorporated by reference (USACE 2003). The Supplemental Environmental Impact Statement is available online at http://moriverrecovery.usace.army.mil/mrrp/f?p=136:183.

Since the Supplemental Environmental Impact Statement was prepared in 2003, additional projects and studies that have the potential to result in cumulative impacts with the Recommended Plan have been undertaken. These other projects or studies include the Missouri River Commercial Dredging Final Environmental Impact Statement and Record of Decision, the Missouri River Recovery Management Plan and Environmental Impact Statement, and the Missouri River Bed Degradation Integrated Feasibility Study and Environmental Impact Statement.

The Missouri River Commercial Dredging Final Environmental Impact Statement and Record of Decision for Authorization of Commercial Sand and Gravel Dredging on the Lower Missouri River were prepared in 2011 as part of an evaluation for a Clean Water Act Section 404 permit application by commercial sand and gravel mining entities to profitably obtain aggregate from the bed of the Missouri River to supply the region's construction and manufacturing needs (USACE, 2011a and 2011b). The Record of Decision limited the amount of aggregate that could be mined from the Missouri River and initiated an adaptive management approach in order to limit degradation, or down cutting, of the river bed and lowering of water surface elevations. As described in these documents, there was information that suggested commercial sand and gravel mining is a contributing cause to the degradation of the river bed in some locations, resulting in impacts to infrastructure. Additional information is available at http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/MissouriRiverCommercialDredging.aspx.

The Missouri River Recovery Management Plan and Environmental Impact Statement is an ongoing effort to evaluate the effectiveness of current habitat development and recommend any needed modifications to more effectively create habitat and avoid jeopardy to pallid sturgeon, least terns and piping plovers. It is being led by USACE and USFWS. Additional information is available online at http://moriverrecovery.usace.army.mil/mrrp/f?p=136:70:0::NO.

The Missouri River Bed Degradation Integrated Feasibility Study and Environmental Impact Statement is another ongoing study within the Lower Missouri River. The purpose of the study is to develop a complete, effective, efficient, and acceptable plan to avoid additional economic impacts to federal, state, and local infrastructure resulting from the degradation of the Missouri River. The geographic scope of the study extends along the Missouri River from approximately Waverly to St. Joseph Missouri. Additional information about the study is available online at http://www.marc.org/Environment/Water-Resources/Missouri-Riverbed-Degradation/About

In addition to the three projects or studies mentioned, it is also expected that USACE may undertake other similar projects to the Tadpole Island Project Modifications described in this document in the future. The purpose of these projects would be to refine the function of side channels that have already been constructed as new information about the needs of pallid sturgeon and other aquatic species are gained. However, at this time, the extent of such projects is not known. The extent of constructing new side channel projects is also unknown at this time. More certainty will exist at such time the Missouri River Recovery Management Plan and Environmental Impact Statement is finished. This is expected to be in 2016. Other activities that have the potential to contribute to cumulative impacts are discussed as applicable for individual resource categories.

Cumulative Impact Assessment: The Recommended Plan would not be expected to have any significant cumulative economic, recreation, or flood control impacts as discussed in the Supplemental Environmental Impact Statement. Other cumulative impacts, not specifically addressed in the Supplemental Environmental Impact Statement or discussed with only limited detail, that may have the potential to result in cumulative impacts in combination with the Recommended Plan include water quality, wetlands, geomorphology, terrestrial habitat, fish and wildlife, threatened and endangered species, invasive species, and navigation.

Water Quality: In the past, there have been public concerns that sediment contributions to the Missouri River from MRRP projects may adversely impact water quality and also contribute to hypoxia in the Gulf of Mexico. However, a study by the National Research Council concluded that given the "relatively small volumes of sediment loadings" from MRRP projects on the Missouri River, "it is not appropriate to relate changes in the areal extent of the hypoxic zone to sediment and nutrient loadings" to these projects (NRC, 2011). Also, there have been long-term declines in suspended sediment loads on the lower Missouri River (Blevins, 2006). Additional analysis by Heimann et al. (2014) indicate that from 1993-2012 the total phosphorous loads from side channel construction only accounted for 1.9% of Missouri River and 0.5% of Mississippi River total phosphorus loads. Nitrate, the constituent most closely related to gulf hypoxia, was 0.01% or less of the Missouri and Mississippi River nitrate loads in the Gulf. The authors also

estimated that sediment volumes from side channels, during 1993-2012, accounted for 3.1% and 1.5% of total suspended sediment loads from the Missouri and Mississippi Rivers respectively.

The Missouri River Commercial Dredging Final Environmental Impact Statement considered MRRP projects, such as the Recommended Plan, when evaluating cumulative impacts. It was stated in the Environmental Impact Statement that "there appears to be little potential for cumulative impacts on nutrient loading and little likelihood of effects on waters meeting water quality standards" as a result of commercial sand and gravel mining (USACE, 2011). Furthermore, it is not anticipated that actions that may result from the Management Plan or the Bed Degradation study would contribute to significant adverse cumulative impacts to water quality. These studies will also include an evaluation of any cumulative impacts.

Wetlands: It is not expected that any indirect impacts to wetlands that would result from the Recommended Plan would contribute to significant adverse cumulative impacts to this resource in combination with other past or future actions previously described. The process by which wetlands could be indirectly impacted would more closely mimic the dynamic conditions that existed prior to large scale modifications to the Missouri River. New wetlands may also develop as a result of this process. It is anticipated that any actions implemented as a result of the Management Plan or the Bed Degradation study would also avoid negative impacts to wetlands. Assuming that the adaptive management approach that is described in the Record of Decision for Authorization of Commercial Sand and Gravel Dredging on the Lower Missouri River are effective, it is not expected that this activity would negatively impact wetlands adjacent to the Missouri River. These studies will also include an evaluation of any cumulative impacts.

Geomorphology: Numerous factors impact the geomorphology, including sediment transport, of the Missouri River. Sediment transport of the Missouri River has been impacted by the Missouri River Mainstem Reservoir System and Bank Stabilization and Navigation Project. It has also been impacted by commercial sand and gravel mining from the river bed, and land use changes. Overall, there has been a reduction in the amount of sediment that is transported by the river, negatively affecting the ecology of the river (USACE 2003). The historically high concentration of sediment in the Missouri River was necessary for habitat development for native species (NRC, 2011). High sediment concentrations were also important to the evolution of native species (NRC 2011). Sediment from the Missouri River was also transported down the Mississippi River and is important to sustaining coastal wetlands in Louisiana (NRC 2011).

Following the construction of the Bank Stabilization and Navigation Project, large amounts of sediment was trapped behind the dikes and revetments, converting portions of the previous river channel into accreted land. This was particularly evident between the early 1930s and the mid 1960s. It has been estimated that approximately 45 million tons of sediment per year were trapped by the BSNP and levees along the Missouri River between 1910 and 1981 (NRC, 2011). Sediment that enters the Missouri River from MRRP projects typically consists of material from these accreted lands. Without modifications to the Missouri River, these materials would have been transported through the system by natural geomorphic processes as the river would flood, rework, remove, and deposit these materials in a dynamic fashion. Any sediment that enters the Missouri River from MRRP projects does not constitute a net addition to the system.

The effects of sediment removal by commercial sand and gravel mining operations from the Missouri River to the geomorphology of the river were evaluated in The Missouri River Commercial Dredging Final Environmental Impact Statement (USACE, 2011). It is discussed in the Environmental Impact Statement that degradation of the Missouri River is a problem in some locations and that commercial sand and gravel mining operations could result in additive impacts to river bed degradation. However, cumulative impacts would likely be less overall bed degradation in areas located near MRRP projects. For reasons discussed, the Recommended Plan is not expected to result in any cumulative impacts to the geomorphology or sediment transport characteristics of the lower Missouri River.

Terrestrial Habitat: The Recommended Plan is not expected to result in any significant adverse cumulative impacts when considered with other past, present, and future actions on the Missouri River. The Recommended Plan would result in the clearing of up to 17 acres of trees. Within the study area, over 400 acres of trees have already become established as a result of managing the area to benefit fish and wildlife populations. Additional acres of trees are expected to become established within other lands that have been purchased for the MRRP, resulting in a net benefit to the terrestrial habitat. It is not anticipated that actions that may result from the Management Plan or the Bed Degradation study would contribute to significant adverse cumulative impacts to the terrestrial habitat. These studies will also include an evaluation of any cumulative impacts.

Fish and Wildlife: Since the 2003 Supplemental Impact Statement was prepared, there have been large scale improvements to fish and wildlife habitat along the Lower Missouri River. It is expected that these projects have resulted in increases to fish and wildlife populations, and increases species diversity. In addition to MRRP, other large scale efforts to improve fish and wildlife habitat include the Big Muddy National Fish and Wildlife Refuge operated by USFWS, the Wetland Reserve Program operated by the Natural Resources Conservation Service, public and private land management programs of the Missouri Department of Conservation, habitat restoration and preservation activities of the MDNR, and other efforts undertaken by individuals on private lands to benefits fish and wildlife resources. The Recommended Plan will provide a benefit to fish and wildlife resources by improving connectivity between the Missouri River and the Tadpole Island side channel, and also creating a side channel that has more geomorphic dynamics. It is not expected that the Recommended Plan would result in any adverse cumulative impacts when considered with other past, present, and future projects.

Threatened and Endangered Species: The Recommended Plan may affect, but not likely to adversely affect Indiana and northern long-eared bats. It is also not likely to adversely affect pallid sturgeon. It may provide beneficial effects to pallid sturgeon. It is not expected to result in any cumulative impacts when considered with other present and future actions described elsewhere in this section.

Invasive Species: The Recommended Plan would not result in the spread of any invasive species. Therefore, it would not result in any cumulative impacts when considered with other past, present, and future actions described elsewhere in this section.

Navigation: The Recommended Plan would not result in any cumulative adverse impacts to the Missouri River navigation channel. The Recommended Plan benefits maintenance of the congressionally authorized navigation channel. Other potential projects are not anticipated to negatively impact the navigation channel either, unless specifically authorized by law.

For reasons discussed in this section, the Recommended Plan would result in any adverse cumulative impacts to the human environment.

5.0 Compliance with Environmental Quality Statutes

Compliance with environmental laws is listed in Table 3.

Table 3: Compliance with environmental quality statutes.

Federal Policy	**Compliance**
Archeological Resources Protection Act, 16 U.S.C. 470, et seq.	Full Compliance
Clean Air Act, as amended, 42 U.S. C. 7401-7671g, et seq.	Full Compliance
Clean Water Act (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.	Full Compliance
Coastal Zone Management Act, 16 U.S.C. 1451, et seq.	Not Applicable
Endangered Species Act, 16 U.S.C. 1531, et seq.	Full Compliance
Environmental Justice (Executive Order 12898)	Full Compliance
Estuary Protection Act, 16 U.S.C. 1221, et seq.	Not Applicable
Farmland Protection Policy Act, 7 U.S.C. 4201, et. seq.	Full Compliance
Federal Water Project Recreation Act, 16 U.S.C. 4601-12, et seq.	Full Compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 661, et seq.	Full Compliance
Floodplain Management (Executive Order 11988)	Full Compliance
Invasive Species (Executive Order 13122)	Full Compliance
Land and Water Conservation Fund Act, 16 U.S.C. 4601-4, et seq.	Not Applicable
Marine Protection Research and Sanctuary Act, 33 U.S.C. 1401, et seq.	Not Applicable
Migratory Bird Treaty Act, as amended, 16 U.S.C. 703-712	Full Compliance
National Environmental Policy Act, 42 U.S.C. 4321, et seq.	Full Compliance
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et seq.	Full Compliance
Protection & Enhancement of the Cultural Environment (Executive Order 11593)	Full Compliance
Protection of Wetlands (Executive Order 11990)	Full Compliance
Rivers and Harbors Act, 33 U.S.C. 403, et seq.	Full Compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq.	Full Compliance
Wild and Scenic River Act, 16 U.S.C. 1271, et seq.	Not Applicable

NOTES: a. Full compliance. Having met all requirements of the statute for the current stage of planning (either preauthorization or post authorization).
b. Partial compliance. Not having met some of the requirements that normally are met in the current stage of planning.
c. Noncompliance. Violation of a requirement of the statute.
d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

6.0 Conclusion

Following an evaluation of environmental consequences, Alternative 4 has been identified as the Recommended Plan. This alternative best meets the purpose and need of the project. It would improve connectivity between the side channel at Tadpole Island and the mainstem of the Missouri River while maintaining adequate flow to maintain the Missouri River navigation channel adjacent to the island. It would also allow the USACE to more easily implement future modifications to the channel to benefit pallid sturgeon.

The Recommended Plan would not result in any significant adverse impacts, either directly, indirectly, or cumulatively to the human environment. Minor impacts would result from the removal of up to 17 acres of trees. The Recommend Plan may affect, but is not likely to adversely affect Indiana bats and northern long-eared bats, which are federally listed threatened and endangered species. Additionally, it would not be likely to adversely affect pallid sturgeon a federally listed endangered species. Trees would be cleared in the winter months to avoid any take of migratory birds and as a conservation measure for threatened and endangered bats. No wetlands would be directly impacted, although there could be indirect impacts from a more geomorphic dynamic side channel. This would mimic a more natural process. The Recommended Plan would likely have no affect on cultural resources. It would not result in conditions would exceed state water quality standards. Overall, the project would result in beneficial environmental impacts.

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