

Big River Stream and Riparian Habitat
Restoration
Southeast Missouri Lead Mining District

Final Restoration Plan and Environmental
Assessment

December 2025



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

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2 Introduction

The U.S. Department of the Interior, acting through the U.S. Fish and Wildlife Service (USFWS) and the State of Missouri, acting through the Missouri Department of Natural Resources (MoDNR), in their capacity as natural resource trustees (Trustees) have prepared this Final Restoration Plan and Environmental Assessment (RP/EA) to evaluate and select restoration actions along the Big River in southeastern Missouri. The restoration actions are meant to compensate the public for natural resources injured and ecological services lost due to releases of hazardous substances. These hazardous substances include heavy metals at and from mining associated facilities, such as mines, mills, smelters, and tailings impoundments of the Big River Mine Tailings/St. Joe Minerals Corp., Washington County Lead District, and Southwest Jefferson County Mining Superfund Sites (collectively called “Big River Assessment Area¹” or “Superfund Sites”) within the Old Lead Belt (OLB) of southeast Missouri. Pursuant to applicable laws and regulations, the Trustees have initiated the natural resource damage assessment and restoration (NRDAR) process at different sites throughout the Southeast Missouri Lead Mining District (SEMOLMD) and have recovered damages to restore impacted natural resources and their services. These restoration actions analyzed and selected herein complement planned response actions by the U.S. Environmental Protection Agency (EPA).

For over a century, heavy metals, including, but not limited to, lead and zinc were mined, milled, and smelted in the OLB. Lead mining, milling, and smelting no longer occur in the OLB, though past and ongoing releases of hazardous substances into nearby soils, sediments, and surrounding waters, including the Big River and its tributaries, have led to natural resource injuries. Natural resources, including surface water, sediments, geologic resources, fish, mussels (including species listed pursuant to the Endangered Species Act “ESA”), crayfish, and migratory birds, have been exposed to and adversely affected by hazardous substances released from the mining facilities in the Big River watershed (Allert et al. 2010, Besser et al. 2009, McKee et al. 2010, and Roberts et al. 2023). Big River sediment and floodplain soils are contaminated with lead, zinc, and cadmium for over 100 miles downstream of the first large tailings impoundment (Pavlovsky et al. 2017 and Roberts et al. 2023).

2.1 Purpose, Need, and Background for Restoration

The purpose of the restoration activities selected in this Final RP/EA, is to compensate the public for injured natural resources/services lost due to release(s) of heavy metals in the Big River. Restoration to compensate the public is needed because the injured resources and services they provide will not recover on their own. To date, the response actions implemented by EPA and MoDNR in the OLB have focused on the reduction of threats to human health, including removal and disposal of contaminated yard soils and stabilization of eroding mine waste piles within the Superfund Sites. EPA has conducted Remedial Investigation/Feasibility Studies (RI/FS) to

¹ The Big River Assessment Area, as defined in the Addendum to the Big River Mine Tailings, Southwest Jefferson County, and Washington County Pre-assessment Screen and Determination, includes Bonne Terre, Desloge, Elvins (Rivermines), Federal/St. Joe State Park, Leadwood, National (Flat River), Doe Run, and Hayden Creek Mine Areas, Shaw Branch and Flat River Creek (tributaries to the Meramec), Big River and its floodplain where it runs through St. Francois County (Big River Mine Tailings Superfund Site), Washington County (Washington County Lead District Superfund Site) and Jefferson County (Southwest Jefferson County Mining Superfund Site), and the Meramec River below the confluence of the Big River.

investigate the impacts of heavy metals and the ecological risks they pose in and around the Big River. Along with the RI/FS, EPA is conducting treatability studies to aid in the selection of a remedy for addressing risks from heavy metal contamination in and around the Big River but not developing strategies to restore natural resources and their services. EPA is also proposing Non-Time Critical Removal Actions (NTCRA) in both St. Francois and Jefferson Counties to remove contaminated sediment and stabilize contaminated eroding riverbanks to reduce the threat to human health and the environment. The ongoing nature of response work in the Big River provides a unique opportunity to efficiently integrate natural resource restoration under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) with response actions being conducted by EPA to enhance their ecological outcomes.

The Trustees select the restoration activities described in this Final RP/EA. The Trustees selected restoration activities including reforestation and native vegetation establishment in riparian corridors, wetland enhancement, limited sediment removal, and preservation of lands through fee title or conservation easements. In areas where EPA's response actions are known, such as NTCRA and treatability study locations, the Trustees propose integrating restoration elements with response actions to enhance the ecological uplift at the site and efficiently leverage agency resources to streamline project implementation. Proposed locations for EPA's NTCRA have been provisionally identified in the Draft Engineering Evaluation/Cost Analysis (EE/CA) Reports for the [Big River Mine Tailings Superfund Site](#) (St. Francois County) and [Southwest Jefferson County Mining Superfund Site](#) (Jefferson County).

In addition to EPA's response activities in the Big River watershed, the U.S. Army Corps of Engineers (USACE), in coordination with the Trustees, completed the [St. Louis Riverfront-Meramec River Basin Ecosystem Restoration Feasibility Study with Integrated Environmental Assessment](#) (Meramec FS), which evaluated and recommended plans for habitat restoration projects along the Big and Meramec Rivers. The Meramec FS identifies mining-related sediment and eroding contaminated soil from stream banks as targets for restoration to reduce impacts to freshwater mussels. The greater Meramec River basin and lower Big River represent important strongholds for remaining populations of threatened and endangered freshwater mussels throughout their range. The recommended plan within the Meramec FS focuses on restoration activities to address bank instability, erosion, excessive suspended and bedded sediments, riparian zone loss, altered stream geomorphology, and habitat decline at approximately 40 sites along the Big River to reestablish a more natural, stable river. Partnering with the USACE on these restoration projects potentially provides an opportunity for the Trustees to leverage NRDAR settlement funds (35%) with the USACE (65%) to maximize restoration benefits in the Big River.

Selected restoration projects under consideration in this Final RP/EA are consistent with projects discussed in the Meramec FS and complementary to known response actions. These restoration projects will occur in conjunction with EPA's response actions, and the USACE's Meramec FS restoration projects where applicable and appropriate. Restoration projects may also be independently implemented by the Trustees but will be coordinated with EPA's response actions. Projects contemplated by USACE are in the preliminary planning phase. EPA has developed draft EE/CAs to identify cleanup objectives and analyze the effectiveness, implementability, and cost of various alternatives to satisfy these objectives. EPA released the EE/CAs for public

comment from July 16 – September 17, 2025. Upon completion of the public comment period, EPA will address public comments and will document responses to those comments as part of the Action Memorandum, which is the final decision document authorizing the NTCRA. The exact scope, location, and costs of the projects will be documented in the Action Memorandum. However, the Trustees have utilized the USACE’s Meramec FS in Jefferson County, and USFWS-led reconnaissance of the Big River in St. Francois County, to estimate the scope of selected restoration projects. This has enabled the Trustees to understand the various proposed alternatives to make informed decisions to select an alternative.

This Final RP/EA has been developed in accordance with CERCLA and its implementing regulations and the National Environmental Policy Act (NEPA) to inform the public as to the types and scale of restoration to be undertaken towards compensating for injuries to natural resources and their associated services. The Trustees released the Draft RP/EA for public review and comment for a 30-day period (June 19- July 19, 2025). Comments received from the public during the comment period, and responses to those comments, are provided in the Appendix of this document. Following review and consideration of the public comments, the Trustees have selected Alternative F in this Final RP/EA.

2.2 Relationship to the Southeast Missouri Ozarks Regional Restoration Plan

In 2014, the Trustees produced the [Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment](#) (SEMORRP), which provides a framework for restoration project identification, evaluation, selection, and implementation. In the SEMORRP, the Trustees selected Alternative D as the Preferred Alternative (see Section 3.5, pages 23 and 24 of SEMORRP for a description), where the Trustees will consider a combination of restoration actions and projects to accomplish restoration goals at or near the site(s) of injury.

The goal of this Final RP/EA is to improve or protect water quality, aquatic, riparian, floodplain, and upland habitats, and the species and communities dependent on those natural resources in and around the Big River. This Draft RP/EA incorporates by reference portions of the SEMORRP for expediency and efficiency, as appropriate. The selected activities associated with this Final RP/EA are in alignment with the goals and the Preferred Alternative selected in the SEMORRP.

2.3 Restoration Goals

Based on the nature of natural resource injuries in the Big River, these restoration goals were identified by the Trustees and guided development of this plan:

Goal 1: Enhance or restore adversely affected stream segments and aquatic habitats to enable recovery of associated fish and wildlife, particularly freshwater mussels.

Goal 2: Enhance or restore adversely affected riparian corridor and wetland habitats, particularly those supportive of migratory birds and sensitive species; and

Goal 3: Enhance and protect, through conservation easements and fee title, the conservation value of habitats supportive of species injured by hazardous substances.

2.4 Natural Resource Trustee Authority

Under federal law, the natural resource Trustees are authorized to act on behalf of the public to assess injuries to natural resources and services resulting from the release of hazardous substances into the environment. The NRDAR process allows Trustees to pursue claims against responsible parties for monetary damages based on these injuries to compensate the public. Pursuant to CERCLA, the goal of this process is to plan and implement actions to restore, replace, rehabilitate, and/or acquire the natural resources that were injured or lost as a result of the release of a hazardous substance, or the equivalent resources or their services (42 U.S.C. § 9601, *et seq.*; 43 C.F.R. Part 11). The Trustees for the Big River NRDAR are the State of Missouri, represented by the MoDNR, and the Department of the Interior, represented by the USFWS. See also the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. §§ 300.600, *et seq.*

2.5 National Environmental Policy Act Considerations

NEPA applies to federal agency actions that affect the human environment. NEPA requires that an Environmental Assessment (EA) be prepared to determine whether the proposed restoration actions will have a significant effect on the quality of the human environment. If an impact is considered significant, then an Environmental Impact Statement is prepared. If the impact is considered not significant, then a Finding of No Significant Impact (FONSI) is issued. In accordance with NEPA, this RP/EA summarizes the current environmental setting; described the purpose and need for restoration actions; identifies alternative actions; assesses their applicability and potential impact on the quality of the physical, biological, and cultural environment; and outlines public participation in the decision-making process. Additionally, the USACE's Meramec FS² included an EA which provided NEPA analyses for several alternatives evaluated by this RP/EA. Therefore, this RP/EA tiers off the Meramec FS, where appropriate, for alternatives that overlap.

2.6 Summary of NRDAR Settlement

The Trustees recovered Natural Resource Damages from ASARCO LLC as a part of bankruptcy proceedings in 2008 to settle certain legal claims concerning injuries to natural resources and their services associated with releases of hazardous substances at and from the Big River Mine Tailings/St. Joe Minerals Corp./Federal Mine Tailings Superfund Site in St. Francois County. Since that settlement, the Trustees have expended restoration funds to restore injured natural resources. Approximately \$22 million remains from the Big River Mine Tailings/St. Joe Minerals Corp./Federal Mine Tailings ASARCO settlement. The Trustees propose to fund the restoration projects described in this Draft RP/EA from remaining settlement funds.

2.7 Public Participation

Public participation and review are an integral part of the restoration planning process and are required under the CERCLA NRDAR regulations (*e.g.*, 43 C.F.R. §11.81(d) (2)). In addition, NEPA requires that federal agencies fully consider the environmental impacts of their proposed decisions and that such information is made available to the public. The Draft RP/EA was available for public comment for 30 calendar days from the date of publication on the Trustees'

² This Draft RP/EA, the SEMORRP and Meramec FS were completed in accordance with NEPA and all controlling Executive Orders.

websites. The Trustees received responses from 13 commenters. Based on these comments, the Trustees' determined that no substantial amendments to the Draft RP/EA were warranted. Public comments and the Trustees' responses to those comments are provided in the Appendix.

3 Summary of Natural Resource Damage Assessment at Superfund Sites

The Trustees initiated the NRDAR process at numerous sites within the SEMOLMD, including the Big River Assessment Area which includes the Big River Mine Tailings Superfund Site and the Big River and its floodplain through the Southwest Jefferson County Mining and Washington County Lead District Superfund Sites. The Trustees completed a Damage Assessment Plan in 2009, summarizing known information on natural resource injuries and describing proposed studies to evaluate past, current, and future impacts to natural resources and the services they provide. In addition, the Damage Assessment Plan outlined how information gathered from the studies would be used to determine the types and scale of restoration needed to address these injuries. The Trustees conducted site-specific studies assessing the exposure of natural resources, such as songbirds, sediments, geologic resources, mussels, crayfish, plant communities, and mammals, to hazardous substances and potential effects resulting from that exposure. Evidence to support injury determination in the Big River and its floodplains includes:

- Exceedances of water quality criteria for aquatic life due to elevated heavy metals in sediment.
- Reductions in mussel density and community richness.
- Reductions in crayfish density.
- Lead concentrations in songbird tissues in levels found to have adverse effects.
- Phytotoxicity and reduced floristic quality.

Please see Section 2.2 of the SEMORRP for more information about the history of lead mining and NRDAR in the SEMOLMD. Summary information about Southeast Missouri Ozarks' physical, biological, and socioeconomic resources are contained in Section 4 of the SEMORRP. Summary information about the Big River, which makes up part of the Meramec River Watershed of the Southeast Missouri Ozarks, including physical resources (geology, topography, soil, surface water, and groundwater), aquatic habitat, and biological resources, including sensitive species, is contained in Appendix D of the SEMORRP (see pages 14 – 17, 22, 25, 26, 27, and 32). These sections of the SEMORRP are incorporated by reference herein.

4 Restoration Alternatives

To compensate the public for injuries to natural resources resulting from releases of metals from facilities in the Big River watershed, the Trustees are required to develop alternatives for the "restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the natural resources and the services those resources provide" (42 C.F.R. §11.82 (a)). The Trustees developed the SEMORRP and identified broad categories of restoration types. As described in Alternative D (Preferred Alternative) of the SEMORRP, the Trustees presented a suite of restoration project types that would be considered for implementation, including riparian corridor and stream bank restoration or enhancement. Except for Alternative A, the No Action Alternative, all restoration alternatives proposed by the Trustees in this Final RP/EA are consistent with the Preferred Alternative in the SEMORRP. The selected restoration actions

discussed in this Final RP/EA fall into categories of wetland and riparian corridor enhancement, surface water quality and aquatic resource improvement; and terrestrial habitat protection and enhancement.

Table 1 Restoration Alternatives

Alternative	Description
A	No Action/Natural Recovery; No projects implemented
B	Riparian Corridor and Land Protection at River Mile 31 and above
C	Rockford Park Dam Modification and Aquatic Organism Passage
D	Bank Stabilization Enhancement, Riparian Corridor Restoration, and Sediment Capture below River Mile 31 in the Big River
E	Off-Site Stream Restoration in the Meramec River
F	Riparian Corridor, In Stream Restoration, and Land Protection in Jefferson and St. Francois Counties (Preferred)

4.1 Restoration Evaluation Criteria

To ensure the appropriateness and acceptability of restoration options addressing ecological losses, the Trustees evaluated each option against restoration evaluation criteria as described in 43 C.F.R. § 11.82(d)(1-10).

1. Technical Feasibility
2. Cost Benefit Comparison
3. Cost Effectiveness
4. Results of Actual/Planned Response Action
5. Avoidance of Further Injury
6. Natural Recovery Period
7. Ability of Resources to Recover without Restoration
8. Public Health and Safety
9. Consistency with relevant Laws, Regulations, and Policies
10. Compliance with applicable Laws, Regulations, and Policies

4.2 Alternative A—No Action Alternative (Natural Recovery)

Under this alternative, the Trustees would rely on natural recovery and take no direct action to restore natural resources or compensate for interim lost natural resource services. This alternative would include the continuance of ongoing monitoring programs, such as those initiated by the MoDNR for benthic macroinvertebrates but would not include activities aimed at reducing contamination, potential exposure to contaminants, or enhancing ecosystem biota or processes.

Under the No Action Alternative, no habitats would be preserved, restored, or enhanced beyond what agencies and organizations are already doing in the area with limited existing resources. Aquatic and riparian habitats would continue to degrade along the Big River and adjacent habitats. Water and sediment quality would continue to be impaired. Migratory birds would continue to be adversely impacted by degradation of resting, foraging, and nesting habitat. Local citizens and visitors recreating in the affected areas would not benefit from improved ecological resources, such as fish populations and wildlife habitat providing wildlife viewing opportunities. Agricultural land would continue to be lost due to stream bank erosion.

4.3 Alternative B—Riparian Corridor and Land Protection at River Mile 31 and above

This alternative focuses on the restoration and protection of wetlands and stream banks along Big River through integration of restoration activities with EPA's response activities upstream of River Mile (RM) 31 (Figure 1). The EPA response actions in Big River are anticipated to include stream bank stabilization and sediment capture at strategic sites to reduce the release and downstream transport of mining related metals in the Big River in Jefferson and St. Francois Counties.

EPA may include green engineering techniques, where practical, for bank stabilization projects. Green engineered bank stabilization techniques use vegetative materials, such as toe wood, to stabilize eroding streambanks and provide additional improvements to aquatic habitat. Since the Big River has lower discharge and stream power in upstream locations, green engineered bank stabilization techniques are more likely to be implementable. These techniques are preferred by the Trustees over more traditional rock revetments and other techniques due to aquatic habitat benefits over and above reducing soil erosion. These techniques can be coordinated and/or implemented in conjunction with EPA under this alternative.

The proposed RM 31 Treatability Study project is located upstream of Morse Mill (Figure 1). The treatability study is planned to include the development of an abandoned gravel pit into a sediment capture basin. Development of a sediment capture basin at this site will, in effect, serve as a downstream control point to significantly reduce loading of contaminated sediment to the lower river. The Trustees anticipate integrating wetland enhancements and riparian corridor plantings following the completion of EPA's off-channel sediment capture.

Specific restoration activities proposed under this alternative include but are not limited to:

- Re-forestation of riparian corridor through the establishment of native grasses, shrubs, and trees appropriate for the area.
- Preservation of project areas through acquisition or establishment of a conservation easement on approximately 250 acres with willing landowners to ensure long-term protection.

- Supplementing bank stabilization with native plantings, root wad revetment or other green engineered techniques that promote aquatic habitat.
- Monitoring and adaptive management of the restoration to ensure ecological integrity of the restoration.

Specific benefits provided by this alternative include:

- Restores native riparian habitat.
- Replaces non-native plants with native plants and trees which will increase wildlife habitat diversity and robustness including important habitat for migratory birds and other species.
- Land protections will ensure the longevity of the project and its benefits.
- Improves water quality by preventing erosion of silt and soil into streams through runoff filtration.
- Reduces land lost due to erosional processes.
- Restored riparian forests will provide further protection of bank stabilization and indirectly support aquatic species and their habitats including non-game and sport fish; and

Coordinated efforts between EPA's response activities and the Trustees proposed restoration activities at the RM 31 Treatability site are anticipated to reduce downstream loading of contaminated sediment and restore and permanently protect habitat for trust species. Reduction of contaminated sediment loading downstream will help protect the most robust freshwater mussel beds remaining in Big River which occur downstream of RM 31. Reducing the movement of contaminated sediment downstream benefits state and federal resources and provides the potential for additional restoration projects downstream due to reduced contaminated sediment migration.

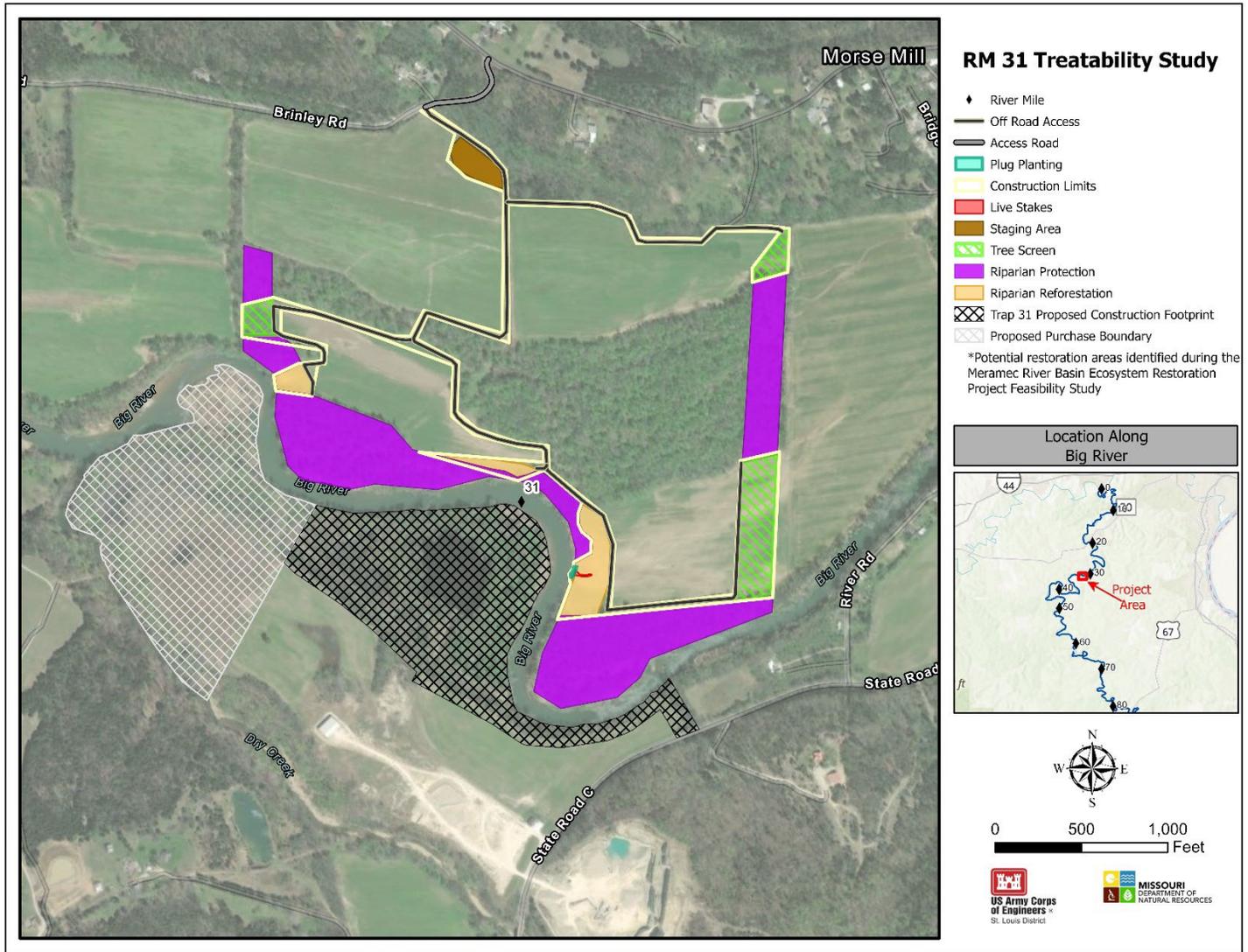


Figure 1. Location of River Mile 31 Treatability Study Site

4.4 Alternative C – Rockford Park Dam Modification and Aquatic Organism Passage

This project alternative proposes a collaborative restoration project between the NRDAR Trustees and the National Fish Passage Program of the USFWS. The alternative will restore the river to a more natural hydraulic state and enhance connection of the aquatic communities through a phased dam modification. The Rockford Park dam (formally known as “Rockford Beach”) is located at approximately RM 10.2 on the Big River, at Rockford County Park, near the city of House Springs, in Jefferson County, Missouri. The Rockford Park dam is the site of a Civil War era mill operation and contains the remnants of the dam used to power the mill. The dam is located upstream of the confluence with Head’s Creek and downstream of the Highway (HWY) W Bridge. The mill dam structure has significantly deteriorated over time and was subject to a temporary stabilization by EPA and USACE in 2016 to prevent dam failure. Over time, the temporary stabilization has adjusted in response to the river, and a permanent modification of the remaining mill dam structure is needed to reduce risks to the environment as well as local recreators.

The lower Big River, downstream of Rockford Park supports some of the river’s last remaining diverse mussel beds including the Federally Endangered Pink Mucket (*Lampsilis abrupta*), Scaleshell (*Leptodea leptodon*) and Spectaclecase (*Cumberlandia monodonta*). Long-term releases of heavy metals have resulted in a significant decrease in mussel densities downstream from historic mining areas where sediment metal concentrations exceed ecological thresholds (Roberts et al. 2023).

Restoration actions under this alternative will provide a permanent modification and stabilization of the remaining mill dam structure to restore the river to a more natural state and further enhance connection of the aquatic communities. It will also reduce the risk of a future dam failure that could cause significant detrimental impacts to natural resources downstream.

Specific restoration activities include but are not limited to:

- Reduction of dam elevation through phased removal or modification
- Grade control establishment to prevent head cutting
- Sediment removal and disposal concurrent with dam modification events
- Stabilization of banks to reduce erosion
- Vegetation establishment to reduce erosion and protect exposed areas
- Best management practices to reduce sedimentation

Specific benefits provided by this alternative include:

- Improve natural hydrology of the Big River at the Rockford Park site and restoration of natural stream processes
- Enhance aquatic community connectivity and improve non-motorized boating recreation
- Reduce need for future maintenance of dam structure
- Increase resilience during future flood events
- Reduce risk of future dam failure

4.5 Alternative D—Bank Stabilization Enhancement, Riparian Corridor Restoration, and Sediment Capture below River Mile 31 in the Big River

This Alternative is substantially similar to Alternative B but implemented in the lower 30 miles of Big River in Jefferson County where lead concentrations decrease, and mussel fauna begin to recover. Alternative D contains all the same components as Alternative B but is not dependent on EPA's response which is not expected to be implemented in an overlapping geography.

The USACE identified restoration projects in the lower 30 miles of the Big River as part of the preferred alternative in the Meramec FS. It's anticipated that activities proposed in this alternative will implement those projects or similar projects in conjunction with the USACE Meramec FS activities. Projects may also be implemented by the Trustees independently if matching funds for the project are not appropriated by congress.

This alternative includes but is not limited to:

- Approximately 350 acres of riparian corridor revegetation.
- Approximately 350 acres of land protection through conservation easements.
- Bed sediment collection through gravel bar excavation or a mechanical bed sediment collector at approximately five locations.
- Off-Channel sediment collectors at potentially two locations.
- Bank stabilization through Longitudinal Peak Stone Toe Protection and live cuttings at approximately 10,000 linear feet of bank; and
- Grade control and bank protection with weirs and other structures at approximately seven locations.

Specific benefits provided by this alternative include:

- Restores native vegetation to the riparian corridor of contaminated streams.
- Improves water quality by preventing erosion of silt and soil into streams through runoff filtration.
- Reduces land lost due to erosion.
- Replaces non-native plants with native plants and trees which will increase wildlife habitat diversity and robustness including important habitat for migratory birds and other trust species.
- Restored riparian corridors will provide protection of stabilized stream banks and indirectly support aquatic species and their habitats including non-game and sport fish; and
- Bank stabilization will help preserve riparian restoration and reduce releases of contaminated soil from eroding banks.

Reducing sediment loading through off-channel capture will further reduce in stream sediment concentrations and allow for mussel and other aquatic fauna population recovery. In addition, Trustee funds will be used to leverage USACE funding, if available, which maximizes benefits and cost effectiveness of restoration.

4.6 Alternative E—Off-Site Stream Restoration on the Meramec River

This alternative would include the stabilization of eroding streambanks on the Meramec River near the mouth of the Big River. A similar alternative (Alternative 4) was evaluated by the

USACE as part of the Meramec FS and included approximately 20 acres of restored riparian areas (Figure 2).

This alternative includes:

- Approximately 20 acres of riparian corridor revegetation.
- Approximately 20 acres of land protection through conservation easements
- Bank stabilization through Longitudinal Peak Stone Toe Protection and live cuttings at approximately 2,000 linear feet of bank

Specific benefits provided by these proposed projects include:

- Restores native habitat and floodplains in the Meramec River benefitting migratory birds and other terrestrial species.
- Improves water quality by reducing erosion of silt and soil into the Meramec River through runoff filtration and watershed protection
- Replaces non-native plants with native plants and trees which will increase wildlife habitat diversity and robustness including important habitat for migratory birds.
- Conserves and protects land through conservation easements.

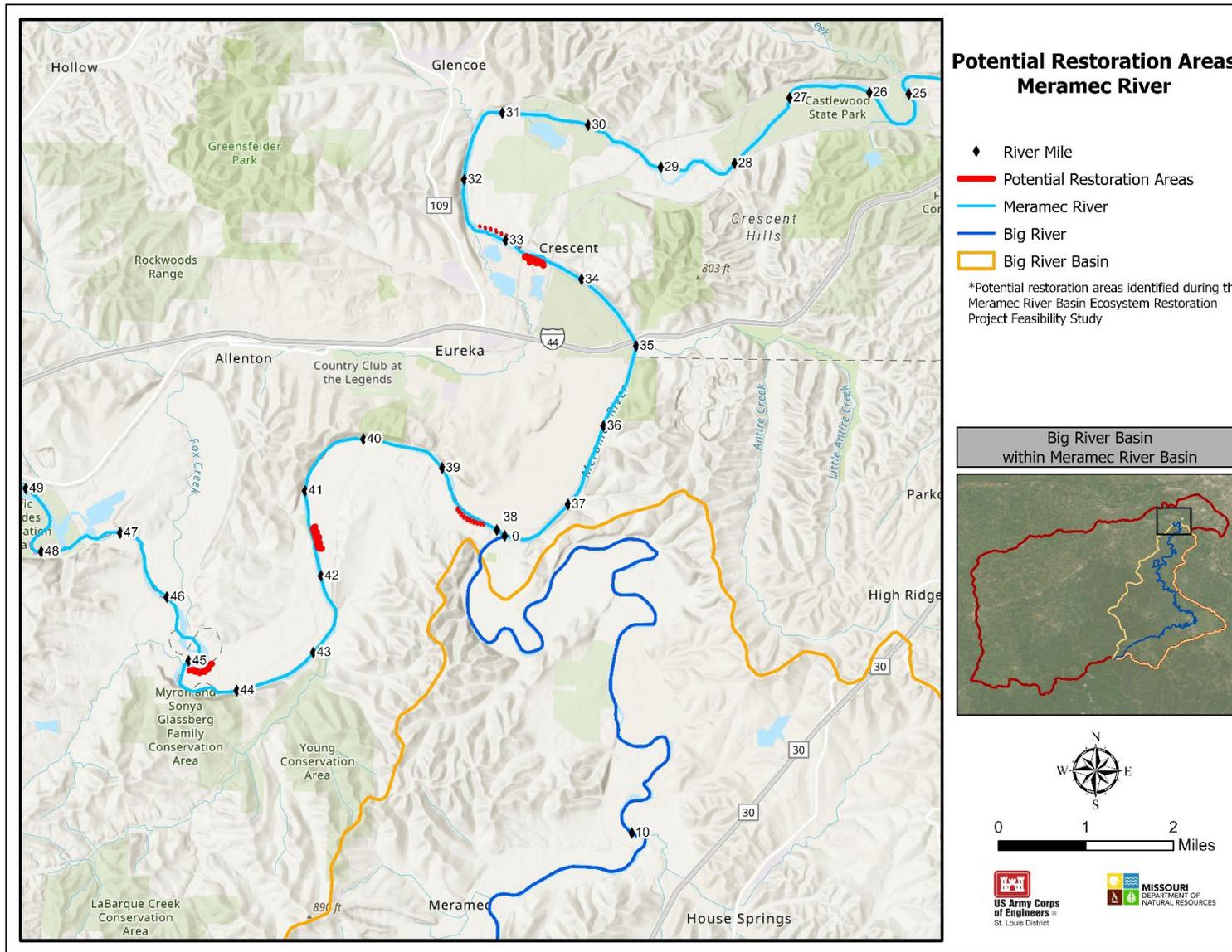


Figure 2. Off-Site Stream Restoration on the Meramec River.

4.7 Alternative F—Riparian Corridor, In Stream Restoration, and Land Protection in Jefferson and St. Francois Counties (Selected)

This project alternative encompasses all the components of Alternatives B through D and involves the preservation of lands, revegetation of riparian corridor, and bank stabilization in and around the Big River in St. Francois and Jefferson Counties. This alternative allows flexibility to coordinate and implement restoration projects with EPA and the USACE, where applicable, in both Jefferson and St. Francois Counties. Figure 3 shows general project areas based on the USACE's preferred Alternative 5 of the Meramec FS.

Alternative F is a more comprehensive approach to habitat restoration and stream stabilization than the other alternatives individually and provides a greater scope of ecological benefits. Maintaining native vegetation across a larger part of the watershed (e.g., St. Francois and Jefferson Counties) will reduce erosion and contaminated sediment loading basin wide. These comprehensive effects will significantly increase the effectiveness of restoration projects intended to support efforts to restore aquatic life, including freshwater mussels. Larger blocks of protected and revegetated riparian corridor presented in this alternative are more effective at establishing ecosystem function than smaller patchwork restoration proposed by the other alternatives. The total area of restored and preserved forested habitat under this alternative is nearly 650 acres.

This alternative includes but is not limited to:

- Re-forestation of approximately 600 acres of riparian corridor through the establishment of native grasses, shrubs, and trees appropriate for the area.
- Preservation of project areas through acquisition or establishment of a conservation easement on approximately 600 acres with willing landowners to ensure long-term protection.
- Stabilization of approximately 12,000 linear feet of eroding banks on Big River
- Collection of sediment through gravel bar excavation or a mechanical bed sediment collector at approximately five locations.
- Off-Channel sediment collectors at potentially two locations.
- Grade control and bank protection with weirs and other structures at approximately seven locations.
- Phased removal or modification of Rockford Park dam
- Monitoring and adaptive management of the restoration to ensure ecological integrity of the restoration.

Specific benefits provided by these proposed projects include:

- Restores native habitat to 600 acres of Big River riparian corridor and stabilizes approximately 12,000 linear feet of streambanks which will improve water quality by reducing erosion of silt and soil into Big River through runoff filtration.
- Replaces non-native plants with native plants and trees which will increase vegetative diversity and robustness.
- Increases efficiency and success of removal and restoration efforts through coordination with EPA and the USACE.

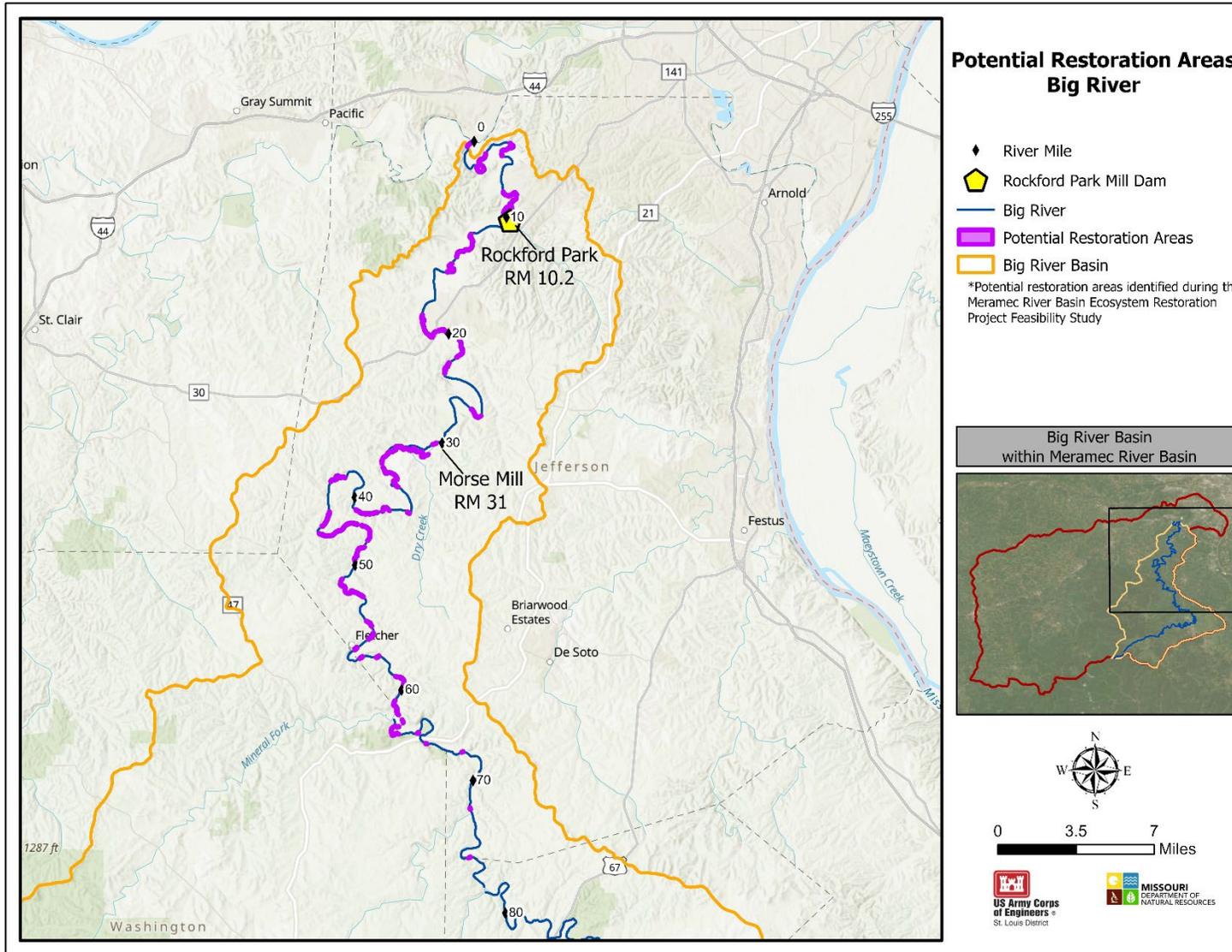


Figure 3. Potential restoration areas in St. Francois and Jefferson Counties

4.8 CERCLA NRDAR Alternatives Evaluation

Restoration Criteria	A: No Action	B: Stream Restoration RM 31 & above	C: Rockford Park Dam Modification	D: Stream Restoration Lower 30 RM	E: Meramec River Restoration	F: Alternatives B-D (Selected)
Technical Feasibility	The No Action alternative is technically feasible.	This alternative uses standard methods for enhancing streambank stabilization using green materials and revegetation of riparian corridors and is technically feasible.	This alternative is technically feasible and likely to result in the desired condition, including improved ecological function of in stream habitats.	Same as Alt B with the addition of sediment capture basins and bioengineered streambank stabilization that have been implemented and have been effective at other sites.	Same as Alt B.	Same as Alt B-D.
Cost Benefits	The No Action alternative has no associated costs or additional resource benefits. It's unlikely injured resources will recover on their own in a reasonable timeframe.	The cost benefit of this alternative is high due to low Trustee expenditures in conjunction with EPA's response actions in comparison to the high benefits.	This alternative leverages aquatic organism passage funding and in-kind agency contributions and results in high ecological benefits.	Similar to Alt B. However, Trustee costs are higher since EPA is not anticipated to have response actions in this area. But if conducted in conjunction with USACE, Trustee restoration, costs are 35% of construction costs with USACE covering 65%.	Trustee costs are relatively low, but with no leveraging opportunity and reduced ecological benefits.	The Selected Alternative provides the most benefits and is anticipated to outweigh implementation cost. Multi-agency collaboration translates to comprehensive restoration and broader scope of benefits.

Restoration Criteria	A: No Action	B: Stream Restoration RM 31 & above	C: Rockford Park Dam Modification	D: Stream Restoration Lower 30 RM	E: Meramec River Restoration	F: Alternatives B-D (Selected)
Cost Effectiveness	The No Action alternative is cost effective.	This alternative is cost effective. Trustee costs are low and will be coordinated with response actions to increase overall project efficiency.	This alternative leverages additional federal funding and in-kind match from partners making it cost effective.	Same conclusions as Alternative B.	This alternative does not anticipate the availability of leveraged funds and is therefore less cost effective than the Selected Alternative.	The Selected Alternative is cost effective as it seeks to leverage several sources of funding and in-kind contributions.
Results of Actual/Planned Response Action	Response actions will marginally improve habitat conditions but will not fully address ecological risks or compensate the public for ecological services lost.	Restoration activities complement planned response actions through conservation easements with landowners or fee title ownership.	Restoration activities under Alternative C are not anticipated to overlap with current or future response actions.	This alternative would be implemented where EPA is not conducting response actions but is coordinated with and dependent on EPA's response actions upstream.	EPA's response action would have no effect on this alternative. This alternative would not interact with the response and as a result would limit EPA's ability to secure access to private property on the Big River and result in less benefit to the resource.	This alternative incorporates Alternatives B and C which closely coordinate restoration with response actions, enabling restoration to occur without conflicting with or duplicating response actions.

Restoration Criteria	A: No Action	B: Stream Restoration RM 31 & above	C: Rockford Park Dam Modification	D: Stream Restoration Lower 30 RM	E: Meramec River Restoration	F: Alternatives B-D (Selected)
Potential for Additional Injury	The No Action alternative would allow injuries to natural resources to continue into the future and will provide no benefit to offset interim losses.	This alternative will not cause significant injury in the proposed project areas, but has the potential to result in short-term, minor to moderate, adverse impacts in nearby areas. This alternative reduces future injury to natural resources that have been and may continue to be exposed to hazardous substances.	Same analysis as Alternative B. No significant additional injury will occur due to activities within the Alternative.	Same analysis as Alternative B. No significant additional injury will occur due to activities within the Alternative.	No significant additional injury will result from this alternative.	Same analysis as Alternative B. No significant additional injury will occur due to activities within the Selected Alternative.
Natural Recovery Period and Ability of Resources to Recover without Restoration	Under the No Action alternative, natural recovery would be relied upon to improve ecological services, but recovery time is unknown. Given the persistence of heavy metals,	The restoration of wetlands and riparian corridors will provide benefits to injured resources that cannot be achieved through natural recovery alone.	Modification of the Rockford Park dam will provide benefits to natural resources and result in a more natural river hydrology not likely to recover through natural processes.	Same as Alt B. Additionally, sediment capture will support the recovery of mussel fauna in the lower 30 miles of the river.	Riparian areas along the Meramec are unlikely to recover without Trustee action. However natural recovery is more likely than the other alternatives due to the lack of	The Selected Alternative will provide extended natural resource benefits due to the greater scope of restoration. This will result in benefits to

Restoration Criteria	A: No Action	B: Stream Restoration RM 31 & above	C: Rockford Park Dam Modification	D: Stream Restoration Lower 30 RM	E: Meramec River Restoration	F: Alternatives B-D (Selected)
	natural resources are not likely to recover without restoration in a meaningful timeframe.				metal contamination at the location.	migratory birds, increased water quality, recovery of aquatic biota, and benefits to supporting habitats over time.
Public Health and Safety	Potential public health and safety issues or concerns that exist under current and future natural resource management activities would likely remain the same.	Restoration activities and long-term management would not pose elevated risk to workers and any other people accessing restoration areas.	Restoration activities under Alternative C would improve public health and safety at the site. The dam currently serves as a major hazard for public safety.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.

Restoration Criteria	A: No Action	B: Stream Restoration RM 31 & above	C: Rockford Park Dam Modification	D: Stream Restoration Lower 30 RM	E: Meramec River Restoration	F: Alternatives B-D (Selected)
Consistency and Compliance with Laws, Regulations and Policies	The No Action alternative doesn't meet the requirements and goals of the CERCLA NRDAR process to provide restoration that compensates the public for the injury of natural resources and resource services caused by releases of hazardous substances.	Alternative B meets the requirements and goals of the CERCLA NRDAR process. Restoration activities under this Draft RP/EA are subject to requirements of other laws, regulations, and applicable statutes.	Same as Alternative B.	Same as Alternative B.	Same as Alternative B.	The Selected Alternative meets the requirements and goals of the CERCLA NRDAR. Restoration activities under this Final RP/EA are subject to requirements of other laws, regulations, and applicable statutes.

5 Environmental Assessment

Actions undertaken by a federal agency to restore natural resources or services under CERCLA are subject to the NEPA (42 U.S.C. § 4321, *et seq.*) and other federal laws, including but not limited to the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA). NEPA requires an assessment of any federal action that may impact the human environment. The USACE also completed an EA of the projects identified in the Meramec FS. Restoration Alternative B and portions of the Preferred Alternative F are evaluated within the Meramec FS. As identified more fully herein, the Trustees incorporate by reference portions of the Meramec FS EA, as appropriate.

5.1 Affected Environment

This section describes the current physical, biological, socio-economic, and cultural resources of the Big River watershed area that may be affected by selected restoration alternatives. This information will ensure that restoration projects are designed to maximize ecological benefits while minimizing or eliminating project-related adverse environmental consequences.

5.1.1 Big River Watershed

The Big River is the largest tributary to the Meramec River. Summary information about Southeast Missouri Ozarks' physical, biological, and socioeconomic resources are contained in Section 4 of the SEMORRP. Summary information about the Meramec River Watershed of the Southeast Missouri Ozarks, including physical resources (geology, topography, soil, surface water, and groundwater), aquatic habitat, and biological resources, including sensitive species, is contained in Appendix D of the SEMORRP (see pages 14 – 17, 22, 25, 26, 27, and 32). These sections of the SEMORRP are incorporated by reference herein.

There are several areas in Big River affected by one or more environmental stressors. Stressors in the Big River include not only hazardous substances released from hard rock mining, but also effluent from wastewater treatment facilities and other point source discharges and sedimentation and erosion from agricultural and logging practices. When evaluating restoration projects and areas, it is important to identify stressors in order to identify the locations and types of projects to prioritize (e.g., areas by watershed; areas most in need of restoration; areas most at risk; areas where restoration will be most likely to succeed, etc.). The existing stressors are also considered in the evaluation of injury when establishing the baseline conditions of the area.

5.1.2 Demographics

A summary of demographic data is provided in the Meramec FS and is incorporated herein by reference. In general, the proposed project area is rural and agricultural land, with pasture cattle, hay cropping, and timber production. Several towns in St. Francois and Jefferson Counties lie close to the expected project areas including Park Hills, Desloge, Bonne Terre, DeSoto, Cedar Hill, Byrnesville, House Springs, and Byrnes Mill. Additional information on demographics of the areas within which the Trustees selected restoration activities in this Final RP/EA are discussed in SEMORRP section 4.3.2 page 30 and are incorporated by reference herein.

5.1.3 Recreation

Recreational resources are highlighted in Section 4.3.1 and a list of public lands in the SEMO provided in Appendix F of the SEMORRP. These sections of the SEMORRP are incorporated by reference herein.

5.1.4 Cultural and Historic Resources

Selected projects are located in St. Francois and Jefferson Counties, Missouri. Significant historical and cultural resources, including Native American cultural and archeological sites, some of which are protected through Missouri State Parks system are found in the vicinity of the restoration areas.

Prior to the implementation of the selected restoration projects, potential impacts to historic and archaeological resources will be reviewed. Section 106 of the NHPA requires federal agencies to consider the effects of preferred alternatives on historic properties. Historic properties must also be given consideration under NEPA. The National Register of Historic Places is a federally maintained list of districts, sites, buildings, structures, objects, and landscapes significant in American history, prehistory, architecture, archaeology, engineering, and culture. Archaeological sites are places where past peoples left physical evidence of their occupation. Sites may include ruins and foundations of historic-era buildings and structures. Native American cultural resources may include human skeletal remains, funerary items, sacred items, and objects of cultural patrimony. Historic properties can also include traditional cultural properties.

The Trustees will consult with the Missouri State Historic Preservation Office to complete Section 106 review and compliance prior to taking on-the-ground restoration actions.

5.2 Environmental Consequences

In this section, the Trustees analyze the environmental consequences of Alternatives A, B, C, D, E, and F. The Trustees will continue to evaluate environmental impacts as project details are identified, designed and implemented, and determine whether additional analysis under NEPA is warranted. The following definitions will be used to characterize the nature of the various environmental consequences evaluated in this Final RP/EA:

- *Short-term or long-term impacts.* In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.
- *Direct or indirect impacts.* A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action.
- *Negligible, minor, moderate, or major impacts.* These relative terms are used to characterize the magnitude of an impact. Negligible impacts are generally not quantifiable and do not have perceptible impacts on the human environment. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively inconsequential effect. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their

context and due to their intensity (severity), warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

- *Adverse or beneficial impacts.* An adverse impact is one having unfavorable or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.

5.2.1 Environmental Consequences of Alternative A - No Action/Natural Recovery

The No Action/Natural Recovery Alternative in this Draft RP/EA (Alternative A) is similar to the No Action from the SEMORRP (see SEMORRP p. 16, 25, and 26). Environmental consequences of the No Action alternative are described on pages 35 and 36 of the SEMORRP, incorporated by reference herein.

5.2.1.1 Conclusion on Alternative A

The No Action Alternative does not provide the environmental benefits described in the other alternatives. Due to the lack of restored or enhanced aquatic habitat, declines in mussel and benthic fauna and degraded riparian and benthic habitats in the Big River would continue. Therefore, the No Action Alternative is not a selected restoration alternative.

5.2.2 Environmental Consequences of Alternative B - Riparian Corridor and Land Protections at River Mile 31 and above

Environmental consequences associated with implementation of Alternative B have been evaluated at a programmatic level on pages 37 through 40 of the SEMORRP, which discusses among other components of restoration, enhancement or protecting riparian corridor resources. These sections of the SEMORRP are incorporated by reference herein. The analysis of riparian corridor and related stream bank restoration is discussed in the Meramec FS pages 84-97, Section 4.0. That analysis is incorporated by reference herein.

Components of Alternative B may cause minor to moderate, short-term, direct or indirect adverse impacts; however, the long-term benefits listed in Section 3.3 are expected to outweigh any of these adverse impacts. Green engineered bank stabilization would have some temporary short-term consequences mainly focused on harvesting trees to provide toe-wood along the banks. Trees between 6 to 18 inches diameter at breast height would be harvested by knocking the trees over using heavy machinery to keep the root ball in place. Banks would be excavated, and trees buried with the root balls facing into the stream, below the water level. Tree harvesting will have short term negative impacts on the forest by removing mature trees that are habitat to roosting birds and associated wildlife. Soil will be disrupted and/or compacted by heavy machinery used to harvest trees and excavate soil along the banks. However, negative long-term impacts will be negligible since tree harvesting will be done in winter months outside of bird nesting and bat roosting season, and selective harvest of trees can benefit bird habitat. Best management practices like mulching and replanting of vegetation will alleviate short term impacts to soil.

Other restoration actions associated with Alternative B, including tree planting, invasive species control, and erosion reduction, will have negligible to minor short-term, direct and indirect adverse effects on the environment. Minor to moderate long-term benefits across a broad geographic scope are anticipated though, including reduction of invasive species, reduced sediment transport into local waterways, and increases in local native wildlife species. Long-term, moderate beneficial impacts to resources and associated flora and fauna are expected due to the reduced erosion and increased shelter provided by plantings.

Land preservation through easements will ensure long-term viability of these projects. Alternative B would also allow the Trustees to implement monitoring and long-term stewardship activities to ensure existing natural resource services and aesthetic values are conserved and are available into the future.

5.2.2.1 Conclusion on Alternative B

The Trustees found Alternative B to meet the purpose and need for restoration and all the Restoration Evaluation Criteria. The alternative aligns with the selected project and the Trustees' restoration goal of improving stream condition and supporting native aquatic communities. The Trustees have found Alternative B to have negligible to moderate short-term adverse impacts to the human environment, with the majority of anticipated effects being beneficial and long-term. For these reasons, Alternative B, taken together with the other alternatives described herein, is a component of the Selected Alternative (Alternative F).

5.2.3 Environmental Consequences of Alternative C – Rockford Park Dam Modification and Aquatic Organism Passage

Environmental consequences associated with implementation of Alternative C have been evaluated at a programmatic level on pages 36 through 40 of the SEMORRP³, which discusses among other components restoration, enhancement, or protecting aquatic resources. These sections of the SEMORRP are incorporated by reference herein.

Modification to the existing dam structure at Rockford Park would result in minor to moderate short-term, direct disruptions to habitat due to the movement of sediments and soils as a result of phased dam removal, associated dredging and trenching, instream placement of materials for grade control and to improve aquatic organism passage, grading activities, and other related actions. These impacts are expected to be localized and limited to the project area through the use of best management practices. Further, project implementation would appropriately adhere to all federal, state, and local laws, regulations, and policies. The use of heavy machinery or other equipment would likely increase noise and diesel emissions in the surrounding area during construction. However, these disturbances would be temporary and minor. In addition, fish and wildlife may be disturbed by the increase in turbidity and noise but could avoid the area during construction and are likely to resume normal patterns of movement shortly after implementation is complete. Though these construction-related impacts would be adverse, they are anticipated to be minor to moderate, and short-term in nature. Long-term beneficial impacts to aquatic

³ This Final RP/EA, the SEMORRP and Meramec FS were completed in accordance with NEPA and all controlling Executive Orders.

resources would occur due to increased aquatic connectivity and beneficial impacts would span a large geographic area downstream.

5.2.3.1 Conclusion on Alternative C

The Trustees found Alternative C to meet the purpose and need identified for restoration or the Restoration Evaluation Criteria. The Trustees anticipate Alternative C to have primarily beneficial direct and indirect long-term impacts in the form of improved land management activities and stream conditions which will enhance fish and wildlife communities and recreation opportunities. For these reasons, Alternative C, taken together with the other alternatives described herein, is a component of the Selected Alternative (Alternative F).

5.2.4 Environmental Consequences of Alternative D - Bank Stabilization Enhancement, Riparian Corridor Restoration, and Sediment Capture below River Mile 31 in the Big River

Environmental consequences associated with implementation of Alternative D have been evaluated at a programmatic level on pages 37 through 40 of the SEMORRP, which discusses among other components restoration, enhancement, or protecting riparian and floodplain resources. These sections of the SEMORRP are incorporated by reference herein.

Alternative D could have some short-term negative effects. Soil compaction during the operation through use of heavy equipment will occur. However, best management practices will reduce the short-term negative impacts to soils, water quality, and wildlife. The analysis of floodplain and related stream bank restoration is also discussed in the Meramec FS at pages 84-97, section 4.0. That analysis is incorporated by reference herein.

Unlike other alternatives, Alternative D also involves work in stream utilizing sediment capture mechanisms and stream barbs. Construction of these in stream structures could have short-term water quality effects through temporary mobilization of fine sediments. However, the structures are designed to capture sediment, so the positive effects will outweigh the short-term impacts.

Alternative D will result in new or improved habitat in riparian corridors and in stream. Land preservation through easements will ensure long-term viability of these projects. Alternative D would also allow the Trustees to implement monitoring and long-term stewardship activities to ensure existing natural resource services and aesthetic values are conserved and are available into the future.

5.2.4.1 Conclusion on Alternative D

The Trustees found Alternative D to meet the purpose and need for restoration and the Restoration Evaluation Criteria, including alignment of the selected project and the Trustees' restoration goal to preserve and/or enhance conservation value of upland or aquatic habitats supportive of injured natural resources. The Trustees anticipate Alternative D to have primarily beneficial direct and indirect long-term impacts in the form of improved land management activities enhancing fish and wildlife populations and recreation opportunities. For these reasons, Alternative D, taken together with the other alternatives, is a component of the Selected Alternative (Alternative F).

5.2.5 Environmental Consequences of Alternative E - Off-Site Stream Restoration on the Meramec River

Similar to Alternative D, environmental consequences associated with implementation of Alternative E have been evaluated at a programmatic level on pages 37 through 40 of the SEMORRP. These sections of the SEMORRP are incorporated by reference herein. The analysis of floodplain and related stream bank restoration is also discussed in the Meramec FS at pages 84-97, section 4.0. That analysis is incorporated by reference herein. The short-term impacts from Alternative E are expected to be less than Alternatives B through D. However, the long-term benefits of Alternative E are not as great as alternatives implemented in the Big River. Alternative E does not reduce injury to terrestrial and aquatic organisms through reduced exposure to lead contamination.

5.2.5.1 Conclusion on Alternative E

Alternative E does not meet the purpose and need for restoration or the Restoration Evaluation Criteria. The goal of restoring adversely affected stream segments and aquatic habitats to enable recovery of associated fish and wildlife is not effectively met by this alternative. Improvements to habitats in the Meramec River will be made by this alternative, but the Meramec River does not suffer injuries from releases of hazardous substances that are the target of this RP/EA. Additionally, Alternative E has no potential to leverage additional funding from EPA or the USACE. The reduced short-term impacts from Alternative E, does not compensate for the lesser long-term benefits of Alternative E.

5.2.6 Environmental Consequences of Alternative F - Riparian Corridor, In Stream Restoration, and Land Protection in Jefferson and St. Francois Counties (Selected)

The Trustees have selected a combination of three alternatives (B, C, and D) as the Selected Alternative, which includes riparian corridor restoration, re-vegetation, sediment capture, and property protection. Specifically, the Selected Alternative includes a variety of activities that provide the most benefits to the public by restoring and compensating for natural resources and associated services in aquatic and riparian habitats. Stream restoration will involve riparian corridor plantings, as well as sediment capture in the lower 30 miles of the Big River. This activity will benefit mussels, crayfish, other aquatic invertebrates, and fish that are negatively affected by the erosion of heavy metal contaminated sediments into the stream. Conservation easements will ensure long-term protection of an estimated 650 acres of restored terrestrial habitat. Collectively these activities combine to form the selected Alternative, which will provide improved terrestrial habitat and improved stream habitat for the public benefit. The combination of the various alternatives into the Selected Alternative will provide more benefits than the sum of the parts. Protecting large sections of the upland watershed and riparian area will help ensure lowland restoration remains intact and retains its effectiveness in preventing erosion. Improving stream access through habitat corridors will have greater benefit to upland wildlife through access to water. A diversity of habitats is also considered ecologically beneficial. This range of restoration alternatives is consistent with the Preferred Alternative selected within the SEMORRP. This alternative affects the largest geographical area among the alternatives. While the potential for negative short-term impacts from implementing this alternative is greater than the other alternatives, the long-term benefits are higher than the other alternatives.

5.2.6.1 Conclusion on Alternative F

The Trustees found Alternative F to best meet the purpose and need for restoration and all the Restoration Evaluation Criteria, including alignment of the selected project and the Trustees' restoration goal to preserve and/or enhance conservation value of upland or aquatic habitats supportive of injured natural resources. The Trustees anticipate Alternative F to have primarily beneficial direct and indirect long-term impacts in the form of improved land management activities enhancing fish and wildlife populations and recreation opportunities.

6 Implementation, Oversight, Monitoring, and Adaptive Management

All components of the Selected Alternative will include construction and implementation oversight by the Trustees. This could include contractor oversight, working with landowners to ensure their questions and concerns are addressed, and working with partner agencies such as the USACE and EPA. In addition, the Trustees may seek outside expertise on various components of the restoration that will improve overall habitat outcomes. Most revegetation restoration efforts involve periodic management to ensure the desired assemblage of native vegetation is sustained. Such management is based, in part, on adapting to the initial restoration and rehabilitation efforts as well as mowing, burning, additional mechanical tree thinning, or herbicide application to control invasive species. Monitoring of all projects will be conducted by a Trustee representative or cooperative partners. Inspections will occur on an annual basis after the completion of the outlined restoration activity and for a period of time that will be designated in the contractual agreement with the implementing group/agency. In addition to vegetation monitoring, bird and pollinator community measurements may be taken, as well as water and soil quality metrics. Monitoring will inform whether adaptive management activities are necessary. Examples of adaptive management could include changing a vegetation mix to better compete with invasive species, discontinuing a planned burning regime in the upland due to bird response, etc.

7 Agencies, Organizations, and Parties Consulted for Information

U.S. Fish and Wildlife Service
Columbia Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, MO 65203

Missouri Department of Natural Resources
Environmental Remediation Program
P.O. Box 176
Jefferson City, MO 65102-0176

U.S. Army Corps of Engineers
1222 Spruce St.
St. Louis Missouri 63103-2833

U.S. Environmental Protection Agency
Region 7
11201 Renner Blvd

Lenexa, KS 66219

Ozark Land Trust
P.O. Box 1512
Columbia, MO 65205

Missouri Department of Conservation
St. Louis Regional Office
2360 Hwy D
St. Charles, MO 63304

The Nature Conservancy
Missouri Chapter
P.O. Box 440400
St. Louis, MO 63144

Land Learning Foundation
704 W. Jackson St., P.O. Box 55
Keytesville, MO 65261

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Roberts, A.D., John Besser, Josh Hundley David E. Mosby, Amanda Rosenberger, Kristen L. Bouska, Bryan Simmons, Stephen E. McMurray, Scott Faiman, and Leslie Lueckenhoff. 2023. An assessment of the relation between metal contaminated sediment and freshwater mussel populations in the Big River, Missouri. *Science of the Total Environment*. 876 (2023) 162743

U.S. Army Corps of Engineers St. Louis Riverfront - Meramec River Basin Ecosystem Restoration Feasibility Study with Integrated Environmental Assessment. November. 2019.
[Meramec River Basin Ecosystem Restoration Feasibility Study with Integrated Environmental Assessment](#)

U.S. Department of Agriculture Natural Resource Conservation Service Environmental Quality Incentives Program State of Missouri Cost List, July 2019.

9 Appendix – Response to Comments

This appendix summarizes comments that were received on the Draft Big River RP/EA and provides responses to the comments on behalf of the NRDAR Trustees. The Trustees appreciate the time and effort expended by the commenters on the proposed projects.

Comment 1: *The commenter expressed support for the removal of the Rockford Park Dam, citing personal experiences with river recreation and concerns over safety risks associated with current site conditions.*

Response: The comment expresses support for the modification and stabilization of the dam as proposed in Alternative C and incorporated within the Selected Alternative (Alternative F). The modification of the dam will help to improve the natural hydrology of the Big River at Rockford Park and restore natural stream processes at the site. It will also reduce risks associated with future dam failures that could significantly impact natural resources downstream. The project will help enhance the connection of aquatic communities and restore more natural flow regimes which will support improved opportunities for non-motorized boating recreational activities.

Comment 2: *The commenter expressed support for Alternative C, specifically advocating for the removal or modification of the dam at Rockford Park due to its safety risks. The comment highlighted multiple fatalities attributed to the dam’s hazardous hydraulic conditions and emphasized the site’s popularity for recreational use. The commenter noted that removing or altering the dam would have an immediate and significant life-saving impact. Additionally, the commenter indicated intent to raise public awareness by sharing information about the planning process through local social media channels to encourage broader support for Alternative C.*

Response: The safety concerns raised regarding the dam at Rockford Park are well-founded and a key consideration in the development and implementation of restoration under the Selected Alternative F. The Trustees recognize Rockford Park as a high-priority location due to the convergence of aging infrastructure and high levels of public recreation.

Modification and stabilization of Rockford Park Dam will advance critical ecological objectives while also helping to address current safety hazards in the river. Modification would help restore natural hydrologic processes, improve longitudinal connectivity for aquatic species, and enhance habitat conditions for native fish and other organisms. Dam modification would support the long-term function of the Big River ecosystem.

Comment 3: *The commenter expressed support for actions to mitigate the dangers associated with the dam at Rockford Park and stabilize riverbanks along the Big River. Following participation in the public meeting and review of the proposed alternatives, the commenter indicated a preference for Alternative C, which calls for modification and stabilization of the Rockford Park Dam. The commenter further noted that in their capacity as part of the Jefferson County Council, they believe the full Council would support Alternative C.*

Response: The support expressed by the commenter for Alternative C and stream bank stabilization is appreciated. Local government leadership plays a key role in identifying community priorities and advancing ecological restoration projects to benefit the Big River.

Alternative C proposes the modification and stabilization of the Rockford Park Dam, which will help to improve natural stream processes, including improved hydrologic connectivity and enhancing aquatic habitat. These ecological improvements are central to the Restoration Plan's identified goals for the Big River.

The Selected Alternative F incorporates key elements supported by the commenter, including dam modification and streambank stabilization at priority locations. It provides a comprehensive approach to ecological restoration with considerations of site conditions, stakeholder input, and implementation feasibility.

The Trustees value the input of local elected officials and appreciate the interest in supporting restoration actions along the Big River. Engagement from county leadership enhances the alignment of restoration priorities with local needs.

Comment 4: *A commenter expressed appreciation for ongoing efforts to address issues along the Big River in Jefferson County and provided historical context regarding previous public engagement. The commenter recalled concerns and distrust from private landowners related to river improvement projects on private property. They expressed support for prioritizing projects on publicly owned lands—specifically noting Rockford Park, Cedar Hill Park, and River Bend Park—as areas of concern due to the presence of aging mill dams and documented safety hazards, including drowning incidents. The commenter recommended that Alternative C be designated as a primary project. They also emphasized that any work on private lands should be voluntary to avoid controversy.*

Response: The recommendation to elevate Alternative C as a primary project aligns with the goals of improving natural stream processes at the site.

The historical context and concerns regarding public engagement and private property rights are appreciated and have been considered in the planning process. The Environmental Assessment acknowledges the importance of building and maintaining trust with landowners and stakeholders when considering river improvement activities, particularly where private lands are involved. Consistent with this, any future efforts involving private property would be strictly voluntary and conducted in partnership with willing landowners.

The Selected Alternative (Alternative F) incorporates modification and stabilization of the Rockford Park Dam, which will advance the restoration of more natural hydrology within the Big River. This includes improving longitudinal connectivity, reestablishing more natural flow conditions, and supporting aquatic habitat function.

Comment 5: *The commenter, a long-term resident of House Springs, provided detailed observations regarding the Rockford Park dam and surrounding river conditions. According to the commenter, historical changes to the dam, have caused sediment buildup to the point that water no longer flows through it, resulting in increased current velocity and hazardous hydraulic*

conditions. The comment highlighted frequent drowning incidents involving uninformed or intoxicated visitors, despite warning signage, and noted the repeated risks taken by first responders. The commenter strongly supports the complete removal of the dam and closure of Rockford Park to prevent further tragedies and protect public safety.

Response: The concerns shared by this long-standing community member and support of restoration components proposed under Alternative C and incorporated into the Selected Alternative F are appreciated. The detailed historical insights help reinforce the documented safety risks associated with the Rockford Park dam. The commenter's recommendation for removal of the dam aligns with restoration goals of improving the natural hydrology of the Big River and enhancing aquatic community functions.

While the potential for closure or modification of public access at Rockford Park is outside the scope of this Restoration Plan, the Trustees are committed to ongoing engagement with the local community to ensure future restoration actions prioritize ecological benefits consistent with community interest and need.

Comment 6: *A commenter expressed support for Alternative A (No Action), citing a long history of frustration with federal and state agencies. The commenter shared personal experiences regarding delayed or denied assistance related to sediment management, bank erosion, and lead contamination on their property. Concerns were raised regarding lack of follow-through by agencies, conflicting guidance, and inadequate funding to support private landowners. The commenter also voiced distrust in the collaborative nature of the project and emphasized the need for voluntary participation, expressing their intent to prohibit access to their private land for future work unless direct, effective assistance is provided.*

Response: The concerns expressed regarding past agency interactions, sediment management, and private property rights are fully acknowledged and appreciated. While these issues fall outside the direct scope of the CERCLA NRDAR process, they underscore the importance of transparency, coordination, and voluntary participation as the project moves forward.

The Final Restoration Plan/Environmental Assessment (RP/EA) outlines voluntary restoration actions focused on improving stream and riparian habitat within the Big River watershed. As stated in the RP/EA, any restoration activities conducted on private property would require full landowner consent and active participation. No restoration work will be conducted on private land without the landowner's explicit approval. The planning process recognizes the importance of private property rights and ensuring that restoration actions are both collaborative and locally appropriate.

Regarding concerns about coordination with federal agencies, the EPA is one of several stakeholders involved in ongoing environmental efforts within the Big River watershed, particularly related to legacy lead contamination through the Superfund program. However, the current restoration planning process is separate from EPA enforcement or regulatory actions. The Preferred Alternative (Alternative F) includes habitat restoration measures designed to complement, not duplicate, existing EPA-led remedial efforts and does not impose new regulatory requirements on landowners.

The commenter's experiences, including sediment deposition, land use restrictions, and past engagement with agency representatives, reflect challenges that have occurred across the watershed. These concerns reinforce the need for clear communication with impacted landowners. While not all these concerns can be directly addressed within the scope of this NRDAR process, they are important context for interagency coordination moving forward.

Comment 7: *A commenter expressed interest in the proposed modifications to the Rockford Park Dam and provided background as a whitewater kayaker and member of the Missouri Whitewater Association. The commenter noted past recreational use of the area near the dam for skill development and acknowledged ongoing safety concerns related to hazardous conditions, unauthorized swimming, and bluff jumping. They also suggested that the site could serve as a future whitewater park, referencing similar projects in other states and offered to connect project leads with a designer experienced in developing such facilities.*

Response: The Trustees appreciate the perspective of the whitewater recreation community and recognize the long-standing interest in Rockford Park as a potential site for enhanced recreational use. While decisions regarding park development or recreation-specific infrastructure would fall under the jurisdiction of local or county parks departments, the information provided may help inform any future recreational planning or partnerships related to the site.

Comment 8: *A commenter expressed support for Alternative F, noting its comprehensive scope and potential to improve safety at Rockford Park. The commenter recognized the importance of dam removal (Alternative C) and supported keeping Rockford Park open to the public. They also inquired about the potential to preserve the remnants of the historic mill as part of the project. Additional questions were raised about whether Alternatives E and F could be implemented concurrently and what would happen to restoration activities in the Meramec River corridor if Alternative E is not selected.*

Response: The Trustees appreciate the commenter's engagement on the Draft Restoration Plan and Environmental Assessment (RP/EA), as well as support for the Preferred Alternative F. As described in the RP/EA, Alternative F incorporates key components of Alternatives B, C, and D to provide a comprehensive approach to stream and riparian habitat restoration.

Regarding the historic Rockford mill, coordination with appropriate historical and cultural resource agencies will be conducted during project implementation to determine if any preservation measures are warranted. The site's historical significance is recognized, and any remaining structures or features will be assessed in accordance with applicable laws and guidelines, such as Section 106 of the National Historic Preservation Act.

Regarding Alternatives E and F, each alternative represents a distinct approach evaluated under NEPA and CERCLA planning requirements. Alternative E focuses specifically on habitat enhancements along the Meramec River and is not included within the scope of Alternative F. This means at this time, restoration on the Meramec River will not occur under this RP/EA. However, selection of the Preferred Alternative does not preclude future work along the

Meramec River, but those activities would need to be considered under separate planning and funding efforts.

Comment 9: *A representative from the City of Byrnes Mill expressed interest in addressing local issues, including a partially failed dam within a city park that poses a public safety hazard. The representative noted that the city enacted a “no swimming” ordinance following a drowning incident in 2022 but acknowledged the challenges with enforcement. Additionally, concern was expressed regarding a section of streambank failure within the park. The city expressed interest in potential restoration at the dam and bank stabilization efforts in coordination with the proposed work at Rockford Park.*

Response: The Trustees appreciate the City of Byrnes Mill’s interest in the Big River Stream and Riparian Habitat Restoration Project and acknowledges concerns raised regarding dam safety and streambank erosion in your community.

The dam and stream bank failure referenced at Byrnes Mill is outside the scope of the current restoration activities anticipated specifically at Rockford Park; however, they are consistent with components of the restoration goals of the Preferred Alternative F. The bank failure described within the city park highlights an ongoing challenge throughout the Big River watershed. The Trustees would be interested in learning more about the potential needs at the site to determine what restoration activities under the Selected Alternative F may be appropriate at the site.

Comment 10: *The commenter, a former Jefferson County Councilman, expressed a clear preference for Alternative C in the RP/EA, noting that this alternative contributes to remediation efforts and addresses what he considers to be a “dangerous area” of the Big River, referring to the dam at Rockford Park. The commenter expressed appreciation for the opportunity to submit his view and thanked the agencies for considering their input.*

Response: The Trustees appreciate the commenter’s engagement in efforts to restore the Big River, particularly as a former Jefferson County Councilman with experience serving the local community. The RP/EA provides a comprehensive approach to ecological restoration with considerations of site conditions, stakeholder input, and implementation feasibility. Support for Alternative C—which proposes modification and stabilization of the Rockford Park Dam to improve natural hydrology of the Big River at the Rockford Park site and restoration of natural stream processes, is incorporated as part of the Selected Alternative F.

Comment 11: *The commenter expressed support for the Draft RP/EA and the proposed use of NRDAR settlement funds to advance restoration projects along the Big River. Specifically, the commenter:*

- *Fully supports Alternative C, the Rockford Park Dam Modification and Aquatic Organism Passage Project, describing it as essential for Jefferson County due to the safety risks associated with the dam and the value of the river.*
- *Also supports Alternatives B and D (riparian corridor and land protection upstream of river mile 31, and bank stabilization downstream of mile 31) and views them as*

appropriate and beneficial uses of Settlement funds for the health of the Big River, property owners, and the broader ecosystem.

The commenter raised concerns—echoing those voiced at public meetings—regarding potential “mission creep” if restoration agreements with private landowners are not clearly limited in scope. The primary concern is that signing such agreements could unintentionally permit expanded access by other federal agencies, such as the EPA, beyond what is outlined in the project scope. While expressing trust in the intentions of the U.S. Fish and Wildlife Service, Missouri DNR, and the U.S. Army Corps of Engineers, the commenter urged that:

- *Restoration agreements should explicitly define access limitations.*
- *Contracts should contain prominent language recommending that landowners have documents reviewed by legal counsel.*
- *These safeguards are necessary to build trust and ensure maximum voluntary participation.*

The commenter expressed hope that the project would move forward successfully, with strong local cooperation and meaningful ecological outcomes.

Response:

The endorsement of Alternative C (Rockford Park Dam Modification and Aquatic Organism Passage Project) is appreciated. This project will result in ecological benefits to the aquatic communities by restoring natural stream processes at the site. The Trustees agree that advancing this project would represent a meaningful and effective investment of settlement funds in Jefferson County.

The additional support for the riparian protection and bank stabilization projects upstream and downstream of river mile 31 is also appreciated. These efforts aim to enhance water quality, reduce erosion, and protect streambank habitat, all while working cooperatively with landowners and local stakeholders.

The Trustees acknowledge and understand concerns expressed about potential “mission creep” and unintended federal access on private properties. As stated in the RP/EA and emphasized during public engagement, any restoration activity on private land will be strictly voluntary and conducted only in partnership with willing landowners and access to the land will be limited to the parties named within the agreements.

Comment 12: *State Senator Mary Elizabeth Coleman (District 22) expressed support for Alternative C—the Rockford Park Dam Modification and Aquatic Organism Passage Project—as an effective approach to addressing a longstanding public safety hazard while also enhancing habitat connectivity and ecological function along the Big River. She indicated that the project represents an appropriate and beneficial use of settlement funds that will serve both people and wildlife.*

Senator Coleman recommended prioritizing restoration actions on public lands, particularly those already owned by Jefferson County, to maximize public benefit and reduce administrative complexities.

In addition, she raised concerns shared by constituents during public meetings regarding restoration work on private property. She stressed the importance of ensuring that such efforts remain strictly voluntary, with clear communication about the limited scope of access and activities. She recommended that any restoration agreements with private landowners:

- *Use plain language to describe the terms of access and work to be performed*
- *Include a strong recommendation that landowners consult legal counsel before signing.*

These steps, she noted, would help build trust and encourage participation from private landowners.

Response: The Trustees appreciate Senator Coleman’s comments on the Draft RP/EA. Support for Alternative C—which focuses on dam modification and stabilization at Rockford Park—is noted and valued, particularly given the site’s importance for public safety and ecological restoration within Jefferson County.

As the Senator observed, Rockford Park is a high-use public recreation area with a well-documented history of safety risks associated with the existing dam. Alternative C addresses these hazards while also restoring more natural stream conditions and improving connectivity for aquatic organisms, contributing to the ecological recovery of the Big River system. The Trustees agree that such projects represent a responsible and effective use of settlement funds in a manner that benefits both local communities and natural resources.

The recommendation to prioritize work on publicly owned lands, including county parks, aligns with the Trustees’ strategic goals. Projects on public lands typically offer greater opportunities for community engagement, long-term stewardship, and public benefit, while also simplifying coordination and access logistics.

The Trustees also recognize and fully support the principle that all restoration efforts on private lands must remain voluntary. The concerns raised regarding privacy, access, and potential future implications are important, and the Trustees are committed to addressing them with transparency and care. As part of any future implementation involving private properties:

- Participation will be entirely voluntary and conducted in close partnership with willing landowners
- Clear, plain language will be used to outline the specific scope of access and restoration activities

These measures are intended to ensure clarity, protect private property rights, and promote trust between landowners and restoration partners.

Comment 13: *The commenter, The Doe Run Company, expressed conditional support for the integration of restoration activities along the Big River but raised significant legal, procedural,*

and factual concerns regarding the Draft Restoration Plan and Environmental Assessment (RP/EA).

Key concerns include:

- The RP/EA is premature and relies on incomplete or draft plans from the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE), with no finalized remedial or restoration plans available for meaningful integration.*
- The RP/EA inaccurately references existing documents such as EPA’s Draft EE/CAs and the USACE Meramec Feasibility Study without sufficient detail or finalized site-specific plans, undermining compliance with CERCLA, NEPA, and related regulations.*
- The RP/EA lacks a transparent basis for selecting project locations or activities, particularly in St. Francois County, where the Trustees cite non-specific reconnaissance rather than formal, public plans.*
- The commenter disputes the Trustees’ interpretation of the ASARCO settlement funds, arguing that funds must be used only for natural resource damages “at or in connection with” the Desloge or Federal Sites in St. Francois County, not downstream areas.*
- The Doe Run Company incorporated its previous legal objections by reference and emphasized that use of ASARCO funds outside the specified settlement scope remains an unresolved issue.*
- Despite these concerns, The Doe Run Company expressed support for coordinated restoration efforts and indicated willingness to collaborate with Trustees on future efforts.*

Response: The Trustees acknowledge and appreciate The Doe Run Company’s support of the Trustees’ collaborative approach to Big River restoration efforts through the integration of remedial and watershed restoration activities. The input provided reflects the Trustees’ long-standing engagement with The Doe Run Company and contributes to the public record for this restoration effort.

- The commenter related concerns regarding the use of information from remedial and planning efforts by the EPA and USACE. The Trustees have worked closely with EPA and USACE through their respective processes, to identify opportunities to coordinate and align restoration planning efforts with ongoing and anticipated remedial and watershed restoration efforts. Proposed project location information identified in both the final USACE Meramec River Basin Feasibility Study and EPA’s Draft Engineering Evaluation/Cost Analyses (EE/CAs) has been used to inform restoration planning and the restoration activities that are included as part of the Selected Alternative F. Elements of these related efforts are in progress and will continue to evolve. Implementation of restoration projects under the RP/EA are dependent on landowner participation and are strictly voluntary. Therefore, the Trustees will remain flexible and responsive to new information, including finalized remedial decisions and site access considerations.

- Regarding the use of ASARCO settlement funds, the Trustees maintain that proposed restoration actions are consistent with the terms of the settlement and are designed to compensate for documented natural resource injuries caused by mining-related hazardous substances releases. The suggestion that the ASARCO settlement mandates recovered funds be spent only “at or in connection with” the Desloge or Federal Sites proper is incorrect. That settlement defines each of those two Sites to also include “any location at which hazardous substances from [those properties] have come to be located.” At a minimum, the ASARCO settlement provides that funds may be spent at any location at which hazardous substances from the Desloge or Federal Sites have come to be located (see published information on the disposition of contamination in Big River: *Lead speciation, bioaccessibility and source attribution in Missouri’s Big River watershed* (Noerpel, et al, 2021)). Furthermore, the phrase “. . . in connection with” does not impose a geographic limitation on where the Trustees may spend settlement funds. Rather, it speaks to the Trustees’ statutory and regulatory authority and obligation to ensure that there is a connection between the resources to be restored, replaced, or acquired and those that were injured by releases of hazardous substances from the site in question. Thus, even if the proposed areas of the Big River at which the Selected Alternative will be implemented had not been contaminated by releases of hazardous substances from the Desloge or Federal Sites, the Trustees could nonetheless act within those areas to “restore, replace, or acquire the equivalent of” resources in other areas of the Big River that were injured as a result of such releases. The Trustees’ Selected Alternative F anticipates implementation of restoration activities throughout the entirety of the Big River throughout St. Francois and Jefferson County. In sum, Doe Run’s claim that the RP/EA activities cannot be paid for with funds secured in the ASARCO bankruptcy, In re: ASARCO LLC, et. al., Debtors, Case No. 05-2207 (S.D. Tex.), through the Settlement Agreement Regarding the Southeast Missouri Sites, Dkt. No, 7070-2, remains meritless and is contradicted by the plain language of that agreement. By way of further response, the Trustees incorporate by reference the United States’ correspondence and pleadings in the Asarco bankruptcy related to this dispute, including ECF Nos. 17037 and 17023.
- With respect to public process and regulatory compliance under CERCLA and NEPA, the Trustees have followed applicable procedures for public review and comment. The RP/EA provides a programmatic framework for restoration, with site-specific actions to be further refined as project implementation proceeds. Where appropriate, additional environmental review will be conducted to ensure full compliance with federal and state requirements.
- The Trustees appreciate The Doe Run Company’s support for the goals of coordinated restoration.