Natural Resource Restoration in the Southeast Missouri Lead Mining District: Draft Restoration Plan for St. Francois County “Bonehole” Park Expansion and Restoration and Borehole Closure and Restoration Program

February 2020
1. Introduction

This Draft Restoration Plan (RP) has been prepared by the Trustees for the Bonehole County Park and Borehole Closure and Restoration Program (the “Bonehole project” or the “Borehole project” or collectively, the “projects”) to address natural resources injured and ecological services lost due to releases of hazardous substances, including lead, cadmium, and zinc, from historic mining practices at or near these sites in St. Francois County, Missouri. Releases of hazardous substances into nearby air, surface water, groundwater, and soil have resulted in potentially harmful exposure of terrestrial and aquatic biota exposure to contaminants. The Trustees for these natural resources involved in development of this document are 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) (collectively, “Trustees”).

This Draft RP has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) and its implementing
regulations at 43 C.F.R. § 11.93, in addition to the National Environmental Policy Act (NEPA, 42 U.S.C. § 4321 et seq.) (NEPA) to inform the public as to the types and scale of restoration to be undertaken towards compensating for injuries to natural resources. The Trustees are soliciting comments on this draft RP, and will address comments in preparing a final RP wherein the Trustees will identify the selected Restoration Alternative(s).

A. Relationship to the Southeast Missouri Regional Restoration Plan

In 2014, the Trustees produced the Southeast Missouri Ozarks Regional Restoration Plan (SEMORRP), which provides a process framework governing the approach 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 purpose of this draft RP is to address natural resources injured and ecological services lost due to releases of hazardous substances, including lead and other metals, at the site of the Bonehole County Park and from abandoned mining exploration holes (the Borehole project). This plan identifies the Trustees’ proposed actions to restore natural resources, including migratory birds, freshwater mussels, their habitats, and the services those resources provide, that have been injured from releases of hazardous substances. This RP tiers (40 CFR 1502.20, 40 CFR 1508.28, and 43 CFR 46.140) from and incorporates by reference (40 CFR 1502.21 and 43 CFR 46.135) portions of the SEMORRP for expediency and efficiency, as appropriate. Specific sections of the SEMORRP are identified, including a brief summary description of the incorporated material, where incorporation by reference is used below. The proposed activities associated with this RP are in alignment with the goals of the SEMORRP, and compliant with the Preferred Alternative.

B. Natural Resource Trustee Authority

Under federal law, the 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 Natural Resource Damage Assessment and Restoration (NRDAR) process allows Trustees to pursue claims against responsible parties for monetary damages based on these injuries in order to compensate the public. The goal of this process is to plan and implement actions to restore, replace, or rehabilitate the natural resources that were injured or lost as a result of the release of a hazardous substance, or to acquire the equivalent resources or the services they provide. CERCLA, 42 U.S.C. § 9601 et seq.; 43 C.F.R. § 11.

C. Relationship to Remedial Activities

Remedial activities related to the Bonehole Project are presently ongoing and include removal and stabilization of mine waste adjacent to and at the site. Remedial actions in the area will either be completed or will not affect the proposed restoration activities. The goal of the NRDAR process is the restoration of resources to their baseline condition, or what their condition would be absent the release of a hazardous substance.

D. Summary of NRDAR Settlement
The natural resource Trustees recovered monetary damages from the American Smelting and Refining Company (ASARCO, LLC) to settle certain legal claims concerning injuries to natural resources and their services. In accordance with the SEMORRP, the Trustees are funding the restoration of habitat to replace lost natural resources and the services the resources provide. Please see Section 1.5 of the SEMORRP for further information related to the history of NRDAR settlements in the Southeast Missouri Ozarks.

E. Public Participation
Public participation and review is an integral part of the restoration planning process, and is specifically required in the CERCLA NRDAR regulations (e.g., 43 C.F.R. §11.81(d) (2)). This Draft RP will be open for public comment for 30 days from the date of publication. After consideration of public comments, the Trustees will implement the selected alternatives described herein. The Trustees will address public comments and will document responses to those comments as part of the final RP. Interested individuals, organizations, and agencies may submit comments by writing or emailing:

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As restoration progresses, the Trustees may amend the RP if significant changes are made to the types, scope, or impact of the projects. In the event of a significant modification to the RP, the Trustees will provide the public with an opportunity to comment on that particular amendment.

2. Summary of Injury to Natural Resources
These projects take place in the Big River watershed in the Old Lead Belt (OLB) within the Big River Mine Tailings Superfund Site (BRMT). Past smelting and mineral processing operations caused the release of hazardous substances and left numerous chat and tailings deposits, contaminated with high concentrations of heavy metals in this central part of the county. As a result of the high level of heavy metals concentrations, the BRMT was placed on the National Priorities List (NPL) in 1992, and has been undergoing response actions led by the U.S. Environmental Protection Agency (USEPA) to clean-up the contamination in Operable Unit 1 (OU1), which includes residential and public use areas, and Operable Unit 2 (OU2) which includes the Big River and non-residential areas.
The Bonehole Project site has been identified by USEPA as a source of mine waste contribution to Owl Creek, the Big River floodplain and a potential source for human exposure. There is ongoing Superfund removal activities being conducted by Missouri MoDNR on a portion of the restoration site.

The abandoned boreholes, subject to restoration through this draft RP, consist of abandoned mineral exploration prospecting holes and other subsurface drilling features associated with legacy mining activities in the OLB. The Trustees have identified the abandoned boreholes as a potential pitfall hazard for wildlife and ongoing source of contamination to surrounding aquatic systems. Erosion from the artesian boreholes releases contaminated soil and sediment into the Big River, its tributaries, floodplain, and is a potential source for human exposure.

In 2009, the Trustees settled claims for natural resource damages with ASARCO, LLC for injury to aquatic and terrestrial resources including migratory birds, mussels, crayfish, and their supporting habitats (i.e. river sediment and soil). Recovered restoration funds for St. Francois County and Big River were directly related to ASARCO operations at the BRMT site.

Please see Section 2.2 of the SEMORRP for further information related to the history of lead mining and natural resource injury in the Southeast Missouri Lead Mining District (SEMOLMD). For more information on Trustee initiated Natural Resource Damage Assessments and other studies that have demonstrated injury to natural resources, please see our websites at:

Missouri Department of Natural Resources Southeast Missouri Natural Resource Damage Assessment and Restoration Website

or

U.S. Fish and Wildlife Service Southeast Missouri Natural Resource Damage Assessment and Restoration Website

3. Proposed Restoration Alternatives

The Trustees plan to restore and protect land within the described boundary of the SEMORRP that was injured from the releases of hazardous substances from mining activities. Natural resource restoration activities proposed include the re-introduction of prescribed fire to the landscape, control and removal of invasive species, selective thinning of understory trees to improve migratory bird and other wildlife habitat, and streambank and floodplain forest restoration, among others. Completed restoration areas at the Bonehole Project will be available for public use and enjoyment.

A. Restoration Evaluation Criteria

To ensure the appropriateness and acceptability of restoration options addressing ecological losses, the Trustees evaluated each option against restoration evaluation
criteria. The criteria were developed through discussions with natural resource managers at each of the Trustee agencies and are consistent with the criteria identified in Sections 6.4 and 6.5 of the SEMORRP, incorporated by reference herein.

Below are the criteria used to evaluate the potential restoration projects described in this draft RP as part of the NRDAR process. The criteria reflect the “factors to consider when selecting the alternative to pursue” (NRDAR factors) as described in 43 C.F.R. § 11.82(d)(1-10). The alternatives in this draft RP have been evaluated in light of the following criteria:

- Technical Feasibility (43 CFR 11.82(d)(1);
- Compliance with Laws, Regulations, and Policies (43 CFR 11.82(d)(9-10);
- Consistency with the Trustees Restoration Goals;
- Public Health and Safety (43 CFR 11.82(d)(8);
- Avoidance of Further Injury (43 CFR 11.82(d)(5);
- Time to Provide Benefits (43 CFR 11.82(d)(6-7);
- Duration of Benefits(43 CFR 11.82(d)(6-7);

**B. Alternative 1-No Action Alternative (Natural Recovery)**

As required under CERCLA, the Trustees considered a No Action alternative. Under this alternative, the Trustees would rely on natural recovery and would take no direct action to restore injured natural resources or compensate for interim lost natural resource services. This alternative would include the continuance of ongoing monitoring programs by federal and state agencies but would not include additional activities aimed at compensating the public for lost resources. Acquiring, restoring and preserving the habitat as a natural area for public use would not occur. Under this alternative, no compensation would be provided to the public for interim losses in resource services due to the historic impacts of mining in the area.

Under the No Action alternative, the restoration activities proposed in these projects would not occur and therefore no habitats would be restored and preserved beyond what agencies and organizations are already doing in the vicinity of impacted resources. Terrestrial and aquatic habitats would continue to be degraded. Injuries to migratory birds, freshwater mussels, and other trust resources would continue to occur because of continued contamination, subsequent exposure, toxicological effects, and further degradation of habitat. Local citizens and visitors recreating in the affected areas would not benefit from improved ecological resources.
C. Alternative 2- St. Francois County “Bonehole” Park Expansion and Restoration (Preferred)

i. Project Description

The proposed project is for the restoration and expansion of the St. Francois County Bonehole Park as a means to restore and replace natural resources and their services lost in the OLB. The proposed projects would complement recent cleanup actions at the Owl Creek Dam and entail the expansion of the existing park and the restoration of the areas by re-introducing native vegetation to upland, floodplain, and riparian areas, and invasive species removal. If the projects are approved by the Trustees, they would be funded by monies received from the ASARCO settlement for St. Francois County/Big River in Southeast Missouri (SEMO). The Trustees anticipate that this project would cost approximately $710,000. The Bonehole project will address injuries to natural resources and their services as a result of the releases of lead and zinc in the SEMOLMD.

ii. Affected Environment and Need for Restoration

The existing Bonehole property (38 acres) is county owned and currently serves as a park to local residents. A portion of the proposed project area recently underwent Superfund removal actions to address mine waste. The upland area historically represented the Dolomite Glade/Oak Woodland Land Type Association (LTA, Atlas of Missouri Ecoregions, Nigh and Schroeder 2002). Anthropogenic disturbance has occurred throughout the property which is now representative of a contemporary landscape containing expanses of red cedar and other invasive plant species. The property has however, retained a localized area of dolomite glade habitat, representative of the area’s historic LTA that stretches across the southern portion of the property. These natural glade features are threatened in the eastern Ozarks of Missouri and support unique faunal communities making them important areas to target for conservation and restoration efforts. The openness and shrubby landscape characteristic of glade habitats provide important foraging and breeding opportunities for grassland-shrubland birds. Dolomite glades in nearby Washington County support a diverse bird community including grasshopper sparrows, field sparrows, yellow-breasted chat, brown thrasher, and Bell’s vireo, a bird of continental concern. These glades historically covered a wider spatial extent before the encroachment of cedars and other invasive plant species. Cedar tree thinning, invasive species reduction, and a prescribed burn program will help to restore this important natural feature.

The Bonehole property also contains several important aquatic features. The Big River forms the property boundary to the north and is characterized by perennial flow over deep pools and long riffles. It is lined by gravel bars, high forested banks, and was historically known for having a diverse benthic, mussel and crayfish fauna. Owl Creek forms the current park property boundary to the west and confluences with the Big River at the northwest corner of the county park property. Owl Creek enters the Big River just above an old low water crossing which creates the pool, known locally as the “Bonehole.” An old railroad trestle serves as an impoundment on Owl Creek
near the southwest corner of the property and was constructed primarily of residual mine waste. The MoDNR’s Superfund Section, under a remedial grant from USEPA Region VII recently stabilized the Owl Creek mine waste dam including the removal of waste from the dam site and the adjacent areas on the Bonehole property. The remedy included the excavation of Owl Creek sediments, stabilization of mine waste by removal and capping, and removal of transition soils to meet the remedial action objectives. Removal activities were completed in summer 2019.

The Trustees intend to fund the county’s purchase of additional property to expand the existing Bonehole County Park resulting in the restoration and preservation of a large area of high quality habitat within the Big River watershed in the heart of the OLB. Additional property to be purchased by the county will be in close proximity to the Bonehole County Park and directly impacted or ecologically similar to areas impacted by the releases of hazardous substances and will therefore provide value to similar species and natural communities. The property will also provide enhanced environmental benefit by creating large blocks of restored, high quality habitat. The expanded park will also provide a larger area for the public’s use and enjoyment.

### iii. Restoration Methods

The methods used in the proposed projects will consist of restoration practices for upland, floodplain, and riparian corridor revegetation and invasive species reduction. Restoration goals are to address response injuries related to the stabilization and capping of mine waste areas, and removal of transition zone contamination. Management priorities will be to restore glades and woodlands, re-establish native vegetation and control invasive vegetation. Specific projects will include:

a. Establish prescribed burn units;
b. Control invasive non-native plants;
c. Cedar removal;
d. Thinning of understory vegetation to promote old growth forest conditions;
e. Reforestation and rehabilitation of upland, floodplain and riparian corridors through the establishment of native grasses, shrubs and trees appropriate for the area;
f. Address poor quality soils (either emplaced as capping material or remaining following excavations), with the addition of organic amendments to increase growth and survival of vegetation;
g. Monitor bird and vegetation responses to management.

### iv. Project Benefits

This project lies within the restoration boundaries of the SEMORRP and provides conservation and restoration opportunities directly related to the ASARCO injuries from which the proposed restoration project funds are
derived. Specific benefits provided by these projects include:

a. Restores native habitat to the upland, floodplain and riparian zones of areas directly injured from historical releases of metals such as lead, cadmium and zinc from lead mining practices in OLB.

b. Replaces non-native plants with native plants and trees which will increase habitat diversity and robustness for the benefit of upland and riparian biota, including a sizeable glade area.

c. Restoring native plant diversity of upland and riparian habitats will increase suitable habitat for migratory birds of conservation concern and thus increase bird diversity and abundance.

d. Re-forestation of the riparian corridor would provide foraging habitat for the federally endangered Indiana bat (*Myotis sodalis*), which is known to occur in the Big River watershed, including smaller order streams with wooded riparian corridors, and has been identified in St. Francois County. In addition, restored riparian corridor will help stabilize in-stream habitat necessary to support federally endangered mussel species.

e. Restores natural processes by implementing prescribed fire and selective thinning of woody vegetation.

f. The area will be preserved in perpetuity with conservation easements that will provide for continued public use within the county park. On all properties undergoing restoration with funds from this proposal, a conservation easement that complies with section 442.014, RSMo will be recorded. Such easements will require that the property be managed as a natural area in accordance with the goals of the project. The preservation will prohibit the building of structures, roads, and utilities and the planting of non-native plants. The conservation easement will allow for trails and interpretive signage and will provide the Trustees, their contractors and designees access to the property. The easement will be negotiated with the Trustees, St. Francois County, and a non-profit conservation easement holder.

### v. Proposed Budget

<table>
<thead>
<tr>
<th>Costs description</th>
<th>Explanation</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>Land Purchase and Transaction Fees</td>
<td>Land purchase, closing costs, Phase I assessment, etc.</td>
<td>$300,000</td>
</tr>
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</table>
| Conservation Easement                      | Stewardship Contribution Operating Endowment Project Set up | $25,000  
|                                            |                                                       | $5,000   
|                                            |                                                       | $10,000  |
| Baseline, Annual and Final Vegetation Surveys and Reporting | Field work and reporting costs for 10 years | $45,000  |
Site Restoration Activities | Mechanical invasive species removal, tree planting, herbicide application, invasive species control, native plant and seed costs. | $175,000
---|---|---
Long term maintenance (County or subcontractor) | Mowing, Prescribed Burns, Re-planting, Invasive Species Control etc. | $150,000

**Total** | **$710,000**

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**vi. Measures of Success**

An initial vegetation survey will be conducted by a Trustee representative or cooperative partners before the project begins. Inspections will occur on a biannual basis for a ten year period after the initial planting of trees/shrubs. Photographs will be taken at each visit and a yearly progress report will be written to quantify the growth of the planted vegetation. At the end of the ten year timeframe of the project, a final report will be produced, summarizing the amount of growth of the trees/shrubs, any undesirable growth of invasive plant species, general health of the vegetation, and overall success of the plantings. The report will also include a photographic history from the beginning stages of the plantings to the attainment of tree/shrub growth after ten years of intensive re-forestation efforts.
Figure 1: St. Francois County "Bonehole" Park Expansion

Legend
- Yellow: Big River Tailings Pile
- Pink: St. Francois County Property
- Blue: Streams

Base Map: National Agriculture Imagery Program (NAIP)
Orthophotography 2010
Data Source: Missouri Department of Transportation;
USGS National Map Orthophoto

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The user of this map assumes all risks of using this data or related materials.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
D. Alternative 3 –St. Francois County “Bonehole” Park Terrestrial Restoration

This alternative involves the restoration, and conservation of existing property owned by St. Francois County, but does not include expanding the existing park. The primary goal of this alternative is to restore and protect the natural resources at the existing Bonehole County Park, including native plants and animals and preserve and protect natural resource services provided by native habitats, including but not limited to habitat for migratory birds, and native wildlife. This project will consist of upland, floodplain, glade and riparian corridor restoration and will restore these areas to their natural condition. The Trustees plan to reintroduce native vegetation to the area, control invasive species, introduce prescribed fire, selectively thin understory trees and remove cedar. Reestablishing these types of habitats will help to replace migratory bird habitat that was injured as a result of the releases of heavy metals.

Under this alternative, only the area currently owned by St. Francois County would undergo restoration efforts and would not include the expansion of the existing county park.

E. Alternative 4- St. Francois County Borehole Closure and Restoration Program (Preferred)

i. Project Description

The proposed project is for the implementation of a program of restoration through the Soil and Water Conservation Program (SWCP) of the MoDNR. Funds identified for this project will go towards the closure and restoration of prospecting borehole sites in St. Francois County, therefore, the St. Francois County Soil and Water Conservation District (SWCD) will assume a leadership role in the identification and implementation of specific project sites. A borehole is identified generally as a 3-4” steel pipe protruding from the ground or an open borehole near the known mining sites (Figures 1-5 below). Often boreholes will produce artesian flow of water during periods of high precipitation, making their identification easy.

The proposed project entails the solicitation and identification of current un-capped and un-restored boreholes located on public and private lands in St. Francois County. Using State of Missouri Well Installation Board approved methodology, the boreholes will be excavated, permanently plugged, and their locations noted with Global Positioning Systems (GPS), and potentially with permanent monuments. Sites will be re-vegetated in accordance with land use and landowner wishes using native vegetation. Removal of invasive species and replacement with native species may be implemented if necessary. Projects that qualify for cost share through existing state programs will receive the appropriate allocation with a portion of remaining costs supplemented by funds identified in this proposal. If the program of restoration is approved by the Trustees, it will be funded by monies received from the ASARCO settlement for St. Francois County/Big River in Southeast Missouri (SEMO).
The Trustees anticipate that this project would cost approximately $300,000. The Borehole project will address injuries to natural resources and their services as a result of the releases of lead and zinc in the SEMOLMD.

ii. **Affected Environment and Need for Restoration**

A borehole is an opening in the ground or a straight pipe installed into the ground by mineral prospecting crews following drilling in their search for mineral resources of the OLB. In addition to the apparent safety hazards created by a preponderance of metal pipes protruding from the ground, many of the pipes terminate in the abandoned mine workings below ground. Therefore, abandoned boreholes represent an avenue or conduit for contaminants to enter the groundwater system. Boreholes open at the ground surface are also an attractive nuisance to a variety of wildlife. As mentioned above, during periods of high precipitation, many of the boreholes produce substantial flow to the surface, denuding the area of protective vegetative cover and eroding contaminated soil and sediment into the surrounding surface water.

It is currently unknown how many unclosed boreholes remain in St. Francois County. In the past, the Special Area Land Treatment (SALT) Program funded by the MoDNR through the St. Francois County SWCD closed approximately 3,000 boreholes. However, dozens if not hundreds of prominent boreholes remain in close proximity to the mines and the Big River. Many flowing boreholes terminate directly in the floodplain, riparian corridor, and channel of the Big River itself (Figures 1-5). Heavy water flows from some of the remaining boreholes are eroding contaminated floodplain and riverbank soils and contributing metals into the Big River. As a consequence, a host of environmental problems occur including increased sedimentation, loss of vegetative cover, additions of metals to the Big River (Figure 1), and subsequent injury to aquatic and terrestrial habitat and biota. The Big River was historically characterized by perennial flow over deep pools and long riffles. It is lined by gravel bars, high forested banks, and was historically known for having a diverse benthic, mussel and crayfish fauna. However, long term contributions of contaminated soil and sediment to Big River from historic mining practices, have had significant negative impacts on aquatic biological resources, including fish, aquatic plants, and benthic invertebrates (e.g. freshwater mussels and crayfish).

Closure of boreholes will reduce wildlife pitfall hazards, vegetation loss, sedimentation, and the contribution of metals into the river system, therefore lessening further exposure of aquatic and terrestrial biota to hazardous substances and will contribute to the overall restoration of the Big River system.
The purpose of this restoration proposal is to create a program of restoration which will be implemented on a case by case basis with individual landowners. The Trustees propose to create a suite of restoration options available to landowners who have boreholes located on their property. Prioritization of willing landowners with boreholes on their property will proceed in accordance with the following regimen:

a. **First Priority**: Landowners with flowing boreholes located in or adjacent to the Big River and its tributaries.

b. **Second Priority**: Landowners with boreholes located in or adjacent to the Big River and its tributaries.

c. **Third Priority**: Landowners with flowing boreholes not located in or adjacent to the Big River and its tributaries.

d. **Fourth Priority**: Landowners with boreholes not located adjacent to the Big River and its tributaries.

e. 
**Figure 2.** An example of a flowing borehole located in the channel of the Big River. This would be a first priority for the Trustees.

**Figure 3.** An example of a non-flowing borehole located near the channel of the Big River. This would be a second priority for the Trustees.
iii. Restoration Methods

Specific practices for restoration will vary with each private landowner and the unique environmental setting of each borehole to be closed. Generally, each borehole site will undergo some incarnation of the following process:
a. Borehole Closure

Identification of boreholes for restoration will rely heavily on willing landowner participation. News of the program is expected to be distributed by the St. Francois County SWCD. District representatives will discuss the borehole restoration program and applicable state cost share practices, contracting, associated costs and potential matching fund requirements with the landowner as well as desired site conditions post-closure. Borehole closures will follow the guidelines associated with the state N351- Well Decommissioning Program, and will meet standards and specifications within Natural Resource Conservation Service (NRCS) commission policy. Specific procedures for closure of non-flowing boreholes are being developed by the Missouri Geological Survey (MGS). Generally speaking, Boreholes will be cleared of impediments or debris and closed with a combination of cement grout and bentonite pellets.

Specific procedures for closing boreholes with artesian pressure will be developed in accordance with MGS. Alternatively, landowners may desire to continue to use the water flowing from artesian. In this scenario, the Trustees and the SWCD staff will work with individual landowners to create a specific beneficial restoration design for the area including potential wetland creation or alternative water sources for livestock. In these scenarios, every opportunity will be taken to minimize or eliminate erosive flows and reduce the exposure of wildlife and humans to metals contamination. In these instances, water samples will be collected and analyzed at the MoDNR state lab to ensure that water quality standards for metals are not exceeded. Preservation of water flow is not a priority of the Trustees, but will not automatically disqualify projects from consideration.

Typically, approved SWCD cost share practices provide the landowner reimbursement for a percentage (or in some cases a set amount) of the total cost of the practice, with the remaining costs covered by the landowner as matching funds. For restoration projects outlined as part of the St. Francois County Borehole Closure and Restoration Program, the Trustees plan to cover 100% of the matching fund requirements for borehole closures and post closure restoration, and up to 95% of the matching fund requirements for projects where artesian boreholes are converted to other beneficial uses.

b. Registration

Missouri requires the plugging of abandoned wells to be registered. This is accomplished by plugging the wells according to the rules set out in 10 CSR 23-3.110 and by filling out a registration record and submitting it to the MGS, with the proper fee. Currently, the registration fee has been eliminated to encourage the proper plugging of abandoned wells. Once the registration record has been submitted, it will be reviewed by the MGS. Upon successful review, a registration number will be sent to the property owner which documents that the well has been plugged according to the minimum standards.
c. Post-closure Restoration

The post-closure site restoration methods used in the proposed project will consist of a variety of conservation practices appropriate for the location of the borehole including upland, floodplain, and riparian corridor revegetation and invasive species control techniques. Restoration goals are to address injuries related to the input of metals and erosion caused by existing boreholes, and restore surrounding vegetative communities to their climax conditions. Management priorities will be to restore riparian corridor and floodplain forests, re-establish native vegetation where needed and control invasive vegetation. Specific borehole restoration projects may include:

- Control invasive non-native plants;
- Reforestation and rehabilitation of upland, floodplain and riparian corridors through the establishment of native grasses, shrubs and trees appropriate for the area;
- Establishment of alternative water sources for cattle, or wetlands;
- Monitor vegetation responses to management.

iv. Project Benefits

The proposed program of restoration and the projects that flow from it all lie within the restoration boundaries of the SEMORRP and provide conservation and restoration opportunities directly related to the ASARCO injuries, from which the proposed restoration project funds are derived. The restoration projects will:

a. Reduce or eliminate erosion of contaminated floodplain and riverbank soils into the Big River;
b. Reduce exposure of aquatic and terrestrial biota to contaminated soils and sediments;
c. Reduce attractive nuisances to terrestrial wildlife;
d. Restore native habitat to the upland, floodplain and riparian zones of areas directly injured from historical and ongoing releases of metals such as lead, cadmium and zinc from lead mining practices in OLB;
e. Replace non-native plants with native plants and trees which will increase habitat diversity and robustness for the benefit of upland and riparian biota;
f. Re-forestation of the riparian corridor would provide foraging habitat for the federal endangered Indiana bat (*Myotis sodalis*), which is known to occur in the Big River watershed, including smaller order streams with wooded riparian corridors, and has been identified in St. Francois County;

v. Proposed Budget

<table>
<thead>
<tr>
<th>Costs description</th>
<th>Explanation</th>
<th>Amount</th>
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</table>

18
<table>
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<tr>
<th>Borehole Closure</th>
<th>Individual closure costs are estimated to range from $1,000-5,000 per borehole depending upon whether the well is flowing or not</th>
<th>$200,000</th>
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<tr>
<td>Restoration Program</td>
<td>Individual restoration projects will be site specific and designed with landowner objectives in mind.</td>
<td>$100,000</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$300,000</strong></td>
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**vi. Measures of Success**

An initial site survey will be conducted by the SWCD employees or cooperative partners before the borehole closure project begins. Inspection of the post-closure restoration areas will occur on an annual basis for a ten-year period after the initial planting of trees/shrubs. The SWCP will provide biannual reports to the Trustees outlining the details and associated costs of projects that have been completed or with landowner agreements in place. At the end of the ten-year timeframe of the project, a final report will be produced, summarizing the number of boreholes closed and the acreage of terrestrial habitat restored. Estimates of soil erosion precluded through restoration will be included in the report.

**F. Alternative 5- St. Francois County non-flowing Borehole Closure and Restoration Program**

This alternative involves the permanent closure and restoration of non-flowing boreholes adjacent to the Big River in St. Francois County. The primary goal of this alternative is to restore and protect the natural resources in and around the Big River and its tributaries, including native plants and animals and protect natural resource services provided by native habitats. This project will consist of the identification, closure and restoration of un-capped, non-flowing boreholes on public and private lands in St. Francois County. Boreholes will be permanently plugged and re-vegetated in accordance with land use and landowner wishes using native vegetation.

Under this alternative, only boreholes that do not produce artesian flows would be eligible for closure and restoration. Flowing boreholes would continue to erode contaminated soil and sediments, and aquatic habitats would continue to be degraded. Injuries to terrestrial and aquatic fauna, including trust resources would continue to occur because of continued contamination, subsequent exposure, toxicological effects, and further degradation of habitat.

**4. Environmental Compliance**

In accordance with CERCLA NRDAR regulations (43 C.F.R. § 11.93), the Trustees’ primary goal in this section is to evaluate restoration alternatives that compensate the
public for natural resource injuries and associated losses resulting from release of hazardous substances within the SEMOLMD. Actions undertaken by a federal trustee to restore natural resources or services under CERCLA are subject to the NEPA (42 U.S.C. § 4321 et seq.) and other federal laws. NEPA requires an assessment of any federal action that may impact the human environment. NEPA applies to restoration actions undertaken by federal natural resource trustees, and the Trustee will complete its NEPA analysis before finalizing the Draft RP. At this time, the Trustees are evaluating this plan pursuant to a categorical exclusion which will be documented in the Final Restoration Plan, in which the Trustees will select restoration projects to implement. To the extent additional analysis is warranted and as appropriate, the public will have the opportunity to comment. A completed NEPA Compliance Checklist(s) will be included with the Final Restoration Plan.

5. 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

Missouri Department of Natural Resources
Soil and Water Conservation Program
P.O. Box 176
Jefferson City, MO 65102

St. Francois County Commission
1 West Liberty Street
Annex Building
Suite 301
Farmington, MO 63640