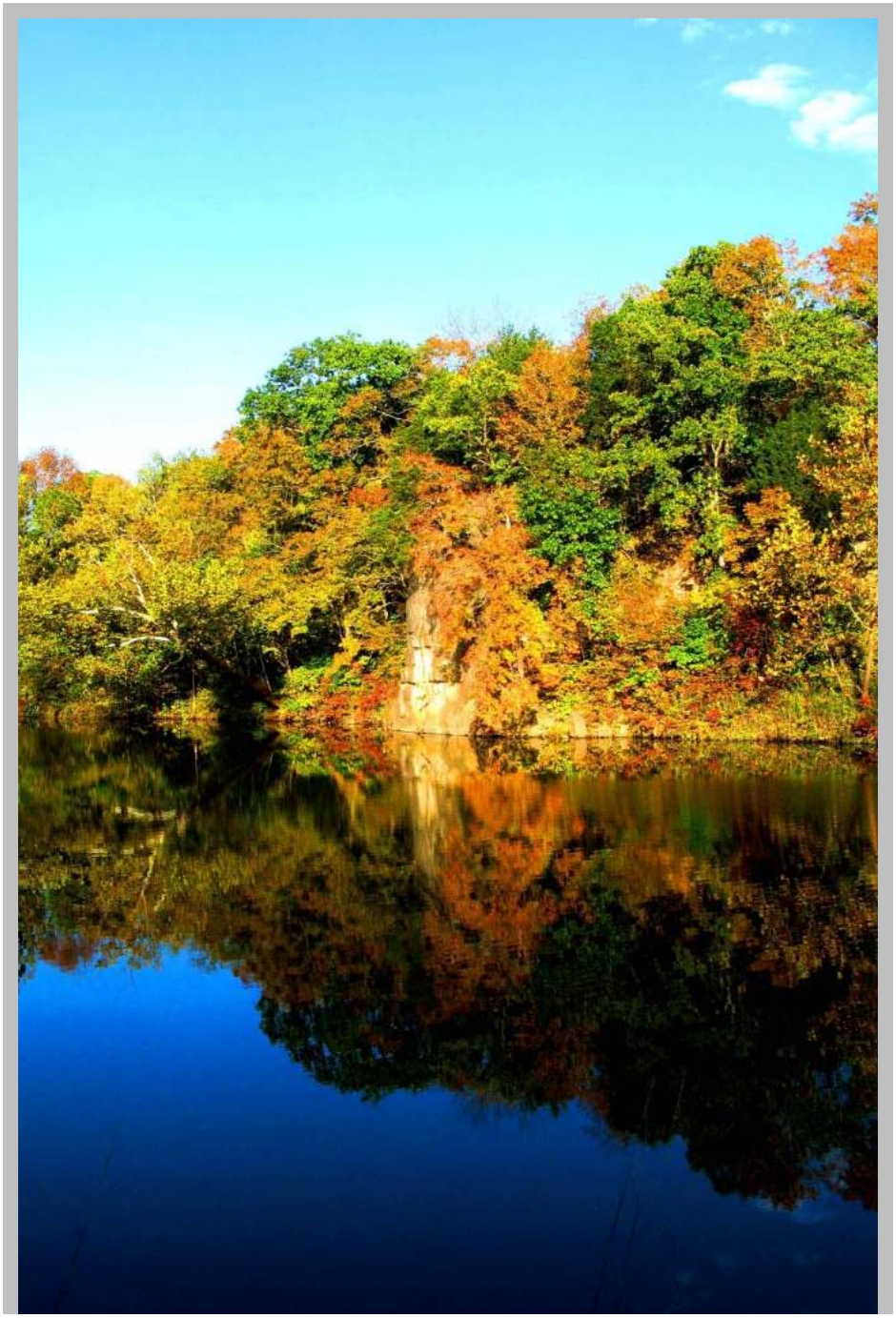
Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment



U.S. FISH & WILDLIFE SERVICE

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

MISSOURI DEPARTMENT OF NATURAL RESOURCES

On the Cover: Bluffs along the Big River of southeast Missouri in the autumn. The Big River displays characteristics typical of many Ozark streams including an abundance of seeps, springs, caves, woodland and forest features that provide unique natural resource services. The southeast Missouri Ozarks are home to more than 200 endemic species. (Photo Credit U.S. Fish & Wildlife Service)

Errata Notice; Final Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment and Finding of No Significant Impact

The "Final Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment and Finding of No Significant Impact" issued June 26, 2014 (79 FR 43066, July 24, 2014), available electronically at http://dnr.mo.gov/env/hwp/sfund/nrda.htm and http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html, needs to be corrected as follows:

Page ii; The Responsible State Agency contact listed for the Missouri Department of Natural Resources should be changed to:
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Page 49; Table 5. Acceptability Criteria for Compensatory Restoration Project Planning should read as follows:

Criteria	Interpretation
Is compliant and consistent with federal and state laws, policies and regulations.	Project must be legal and protect public health, safety, and the environment.
Has demonstrated technical feasibility. If proposed project is submitted in response to an RFP, it must be within the funding limits identified in the RFP	Projects must be feasible within the proposed budget
Addresses impacted natural resources or services targeted for restoration.	Projects must restore, replace or acquire the equivalent of natural resources impacted by the release of hazardous substances in the SEMO.
Project will not be used for response actions, and will not be used to reduce or eliminate NRDAR liability by a Potentially Responsible Party (PRP).	Project addresses the specific concerns and criteria laid out by the Trustees.

<u>Page 59</u>: Section 9.1 Public Participation the following language should replace the second paragraph:

> Public stakeholder meetings will be conducted to fully explain each RFP that is released by the Trustees, and explain each project that a member of the Trustee Council proposes to implement. When the designated time frame for evaluation of proposals submitted in response to an RFP has expired, the Trustees will announce the selection and funding of projects that rank the highest. Project ranking will be based on the Decision Matrix found in Appendix A. Selected restoration projects will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to implementation. The Trustees will continue to select projects until all designated compensatory restoration funds are expended. Funds allocated to primary restoration will be spent as discussed in Section (7).

<u>Appendix B</u>: Evaluation and Selection Process for Compensatory Restoration Projects, Section 1, should read as follows:

> 1. There are two ways that a compensatory restoration project can be proposed:
>
> a. The Trustee Council will publish a notice of a Request for Proposal (RFP) in local newspapers and the Trustee Council websites with at least sixty (60) days for the proposal application process. The Trustee Council will hold at least one public meeting to discuss the particular RFP.
>
> b. An agency member of the Trustee Council will submit to the Trustee Council a restoration proposal based on the goals of the Southeast Missouri Ozarks Regional Restoration Plan.

TRUSTEES: U.S. Department of the Interior
U.S. Fish & Wildlife Service

U.S. Department of Agriculture
U.S. Forest Service

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LIST OF ACRONYMS

AO	AUTHORIZED OFFICIAL
CERCLA	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, & LIABILITY ACT
CFR	CODE OF FEDERAL REGULATIONS
CFLRP	COLLABORATIVE FOREST LANDSCAPE RESTORATION PROJECT
COA	CONSERVATION OPPORTUNITY AREA
CWA	CLEAN WATER ACT
DOI	UNITED STATES DEPARTMENT OF THE INTERIOR
EA	ENVIRONMENTAL ASSESSMENT
EIS	ENVIRONMENTAL IMPACT STATEMENT
EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FONSI	FINDING OF NO SIGNIFICANT IMPACT
FWS	UNITED STATES FISH & WILDLIFE SERVICE
HPO	HISTORIC PRESERVATION OFFICER
LCC	LANDSCAPE CONSERVATION COOPERATIVE
MDC	MISSOURI DEPARTMENT OF CONSERVATION
MDNR	MISSOURI DEPARTMENT OF NATURAL RESOURCES
MTNF	MARK TWAIN NATIONAL FOREST
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
NHPA	NATIONAL HISTORIC PRESERVATION ACT
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NRDAR	NATURAL RESOURCE DAMAGE ASSESSMENT AND RESTORATION
OPA	OIL POLLUTION ACT
RFP	REQUEST FOR PROPOSALS
SEMO	SOUTHEAST MISSOURI OZARKS
SEMOLMD	SOUTHEAST MISSOURI LEAD MINING DISTRICT
SEMORRP	SOUTHEAST MISSOURI OZARKS REGIONAL RESTORATION PLAN
SHPO	STATE HISTORIC PRESERVATION OFFICE
SRIP	STRATEGIC RESTORATION IMPLEMENTATION PLAN
T&E	THREATENED AND ENDANGERED
USDA	UNITED STATES DEPARTMENT OF AGRICULTURE

EXECUTIVE SUMMARY

The Trustees for natural resources in southeast Missouri include the U.S. Fish & Wildlife Service, the U.S. Forest Service, and the Missouri Department of Natural Resources. Pursuant to applicable regulations, the Trustees have initiated natural resource damage assessments at different sites throughout the Southeast Missouri Lead Mining District and have successfully recovered money damages to use to restore impacted natural resources and their services. The Trustees authored this Southeast Missouri Ozarks Regional Restoration Plan (SEMORRP or plan) to describe the restoration objectives and processes for programming existing restoration funds as well as future recoveries of restoration funds derived from the Natural Resource Damage Assessment and Restoration (NRDAR) process.

The purpose of this document is twofold: (1) serve as an Environmental Assessment (EA) and (2) as a Regional Restoration Plan. The EA is designed to consider alternatives which will restore, rehabilitate, replace, and/or acquire the equivalent of natural resources and services potentially injured by the release of hazardous substances into the Southeast Missouri Ozarks (SEMO). Additionally, this plan serves to facilitate public involvement in the restoration plan and to comply with environmental decision-making requirements. Development of the SEMORRP was initiated by the Trustee Council for NRDAR cases occurring in the Southeast Missouri Lead Mining District (SEMOLMD).

The SEMOLMD remains the largest lead (Pb) production area in the U.S., and for parts of its history, the leader world-wide. The SEMOLMD has several geographically and temporally distinct areas of mining. Directly south of St. Louis, MO, mining at the Big River Mine Tailings site dates from the 19th century through the 1970's. The Madison County Mine Site is located 15 to 30 miles south of the Big River Mine Tailings site and is home to some of the oldest mining operations in Missouri, dating to approximately 1740. Approximately 50 miles to the west, mining in the Viburnum Trend began in the 1950's and continues today as the largest producer of Pb in the U.S. One of the legacies of heavy-metal mining is large-scale ecological injury to thousands of acres of terrestrial habitat and hundreds of miles of streams. Large portions of the district are National Priority List (NPL) Superfund Sites due to heavy metal contamination. Other mining sites such as the Viburnum Trend are not covered by NPL designation, but are still covered under this plan.

The SEMORRP is developed to identify a preferred alternative to restore injured natural resources and to establish criteria for selecting projects to implement such restoration alternatives. Under the Trustees' preferred Alternative (D), compensatory restoration projects, or projects occurring away from the site of injury, will be selected and funded by the Trustees via a Request for Proposals (RFP) approach. Each RFP will include such information as the type of natural resources injured and/or services lost; location of the potentially injured natural resources and/or lost services; and the amount of restoration funds available. Selection of successful restoration project proposals will follow the publicly available guidelines discussed in Section (6) of this plan. It is the Trustees' intent to work closely with local stakeholders to develop successful compensatory restoration projects under the preferred alternative.

Primary restoration projects, or those projects serving to directly restore natural resources injured by the release of hazardous substances, will be implemented by the Trustees where feasible and appropriate under Alternative D. It is also the Trustees' intention to work directly with impacted private and public landowners at the sites of natural resource injury to implement site specific and appropriate primary restoration projects utilizing this plan. The Trustee(s) will develop primary restoration project proposals and will jointly evaluate and select proposed primary restoration projects using the Decision Matrix described in Appendix A. Selection of successful primary restoration project proposals will follow the publicly available guidelines discussed in Section (7) of this plan.

In order to provide greater transparency to the public regarding the Trustees' intentions for the disposition of restoration funds, the Trustees have developed a Strategic Restoration Implementation Plan (SRIP). The SRIP identifies the anticipated timeframe and the estimated amounts of restoration funds that will be made available by the Trustees for both compensatory and primary restoration. The SRIP will remain a free standing, bi-annually updated document to facilitate public input, account for changes in site conditions, and reflect the involvement of response agencies. The SRIP is discussed further in Section (8) of this plan.

The preferred Alternative (D) will allow the Trustees both the flexibility to work with the public to identify and select appropriate compensatory and primary restoration projects and the precision to locate and determine restoration projects that adequately compensate the public for the loss of natural resources and services in the SEMO.

SECTION 1 - INTRODUCTION

1.1 General Information

This document is both the Southeast Missouri Ozarks Regional Restoration Plan (SEMORRP) and Environmental Assessment (EA) (40 C.F.R. § 1506.4). The proposed action is to establish and implement the Southeast Missouri Ozarks Regional Restoration Plan. The EA is being developed pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321-4370, and its implementing regulations, 40 C.F.R. Part 1500 and 43 C.F.R. Part 46. The Federal Water Pollution Control Act (CWA, commonly known as the Clean Water Act) [33 U.S.C. §§ 1251-1387] and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, more commonly known as the Federal "Superfund" law) [42 U.S.C. §§ 9601-9675], and its implementing regulations (40 C.F.R. Part 300 and 43 C.F.R. Part 11) authorize states, federally recognized Tribes, and certain federal agencies with authority to manage or control natural resources, to act as "Trustees" on behalf of the public, and to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by hazardous substances releases. Similar to the CWA and CERCLA, the Oil Pollution Act of 1990 (OPA) [33 U.S.C. §§ 2701-2762] and its implementing regulations, 15 C.F.R. Part 990, also authorize Trustees to pursue natural resource damages on behalf of the public for injury to, destruction of, or loss of natural resources, including the costs of assessing the damages. Additionally, Section 644.096 RSMo authorizes the State of Missouri to bring a cause of action against any person violating the provisions of the state's Clean Water Law (CWL), for actual damages to restore any waters of the State to their condition prior to the violation.

The SEMORRP will be jointly administered and used by the Missouri Natural Resource Trustee Council (Trustees) to assist in carrying out their natural resource trust authorities under CERCLA, OPA, and CWA. The Trustees for the SEMORRP include the State of Missouri (represented by the Missouri Department of Natural Resources (MDNR)), the United States Department of Agriculture (represented by the United States Forest Service (Forest Service)) and the United States Department of the Interior (DOI) (represented by the United States Fish and Wildlife Service (Fish & Wildlife Service or FWS)). The Trustees have developed a restoration plan for the entire SEMO region in order to guide the restoration of natural resources injured by the release of hazardous substances. Natural resource damages received, either through negotiated or adjudicated settlements, must be used to restore, replace, rehabilitate, and/or acquire the equivalent of those natural resources injured and natural resource services lost.

The goals of this regional plan are to:

1) Identify the natural resources and services potentially injured by the release of hazardous substances in the Southeast Missouri Ozarks;

2) Develop a request for proposal (RFP) process to evaluate and select compensatory restoration projects to achieve restoration strategies (specific restoration goals identified as part of the RFP process);

3) Identify types and examples of primary restoration projects that will be implemented by the Trustees and/or their contractors;

4) Gain efficiencies in the natural resource damage assessment and restoration (NRDAR) process; provide for consistency and predictability by detailing the NRDAR process, thereby minimizing uncertainty to the public; and,

5) Expedite restoration of potentially injured natural resources and lost services with existing restoration funds.

1.1.1 Natural Resources, Services, Restoration and Damages Defined

Natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any state or local government or Indian tribe, as defined in 40 C.F.R. § 300.5.

Natural resource services may be classified as follows:

- *Ecological services* - the physical, chemical, or biological functions that one natural resource provides for another. Examples include provision of food, protection from predation, and nesting habitat, among others; and

- *Human services* - the human uses of natural resources or functions of natural resources that provide value to the public. Examples include fishing, hunting, nature photography, and education, among others.

In considering both natural resources and services, the Trustees are addressing the physical and biological environment, and the relationship of people with that environment.

Natural resource restoration may be classified as follows:

- *Primary restoration* - any action taken to return an injured natural resource and its services to its baseline condition. Restoration projects that directly restore natural resource injuries caused by the release of hazardous substances are considered primary restoration. An example of primary restoration is the removal of contaminated materials from an ecosystem where they are causing injury to natural resources; and

For purposes of this restoration plan the term “Compensatory Restoration” will be used to refer to the following restoration types:

- *Acquisition of Equivalent Resources or Replacement*: the substitution of an injured resource with one that provides the same or substantially similar services (43 C.F.R. §§ 14(a) and (ii)). An example is the purchase of a property containing high-quality natural resources that is threatened with development or destruction; and

- *Compensatory Restoration*: any action taken to offset the interim losses of natural resources from the date of the event until recovery (USBLM, 2008). An example of compensatory restoration is the removal of undesirable eastern red cedar trees from a glade habitat to compensate for injuries to substantially similar natural resources that occurred elsewhere.

1.2 Scope and Scale of the Southeast Missouri Ozarks Regional Restoration Plan

The SEMORRP is designed to be flexible, allowing existing and future recovered natural resource damages to be used to implement restoration projects consistent with the Preferred Alternative. The SEMORRP and EA are not intended to quantify the extent of restoration needed. Scaling restoration alternatives to ensure that the public is adequately compensated for injured natural resources and lost services will be done on a case by case basis.

As restoration proceeds and the Trustees gain knowledge through monitoring of what projects provide the greatest benefits and ecological value, modifications to the SEMORRP may be made. The Trustees reserve the right to modify the SEMORRP as necessary, including the use of an adaptive management approach as identified in 43 C.F.R. §46.145. Any supplemental document or analysis to the SEMORRP will be provided for public review and comment and finalized before any modifications are implemented.

The geographic scope of the SEMORRP is intentionally broad so that it may address all releases, discharges, spills or other incidents, occurrences, or events (hereinafter referred to as "events") in the Southeast Missouri Ozarks (SEMO), which: 1) affect coexisting or contiguous natural resources under the legally authorized trusteeship and jurisdiction of the Trustees; and 2) give rise to a claim for natural resource damages under the authorities listed below. Therefore, at the time of publication, NRDAR restoration funds have been recovered for some but not all SEMO watersheds. Mere inclusion of a watershed in the SEMORRP does not pre-dispose those watersheds for expenditures of existing NRDAR restoration funds. Priority for expenditures of NRDAR restoration funds will consider proximity to the natural resource injury as described in Sections 6 and 7.

Sites outside of the defined boundary of the SEMORRP may be considered for restoration activities under this plan if the events giving rise to a NRDAR claim are connected by political, jurisdictional, or previously delineated hazardous substances release boundaries (*e.g.* the Herculaneum Smelter Site in northeast Jefferson County is adjacent to the SEMO boundary, and may be included within the SEMORRP at a future time).

For purposes of *this restoration plan alone*, the SEMO are defined as watersheds of the following rivers as they exist only in the uplands of the Missouri Ozarks: the Big River, the Black River, the Bourbeuse River, the Current River, the Eleven Point River, the Meramec River, and the St. Francis River (Figure 1). An important limitation is that this restoration plan covers only the portions of the above rivers' watersheds as they exist in the Ozark highlands, and not in the alluvial plain of the Mississippi River.

Figure 1 also shows the boundaries of the southeast Missouri Ozarks for purposes of this restoration plan. Section (4) of this document provides further discussion of the physical,

biological, and socioeconomic characteristics of the region. Figure 2 shows the watersheds of Missouri.

1.3 The Southeast Missouri Ozarks Regional Restoration Plan and the Request for Proposal Process

The Trustees have designed a dual process restoration plan that allows them to use the overarching SEMORRP as an umbrella to cover multiple NRDAR settlements. The process in the plan will allow for direct funding of restoration and compensatory actions by the Trustees, with a separate public Request for Proposal process for non-Trustee lead activities as defined below:

1. Natural resource damages are monies recovered from a potentially responsible party (sometimes referred to herein interchangeably as "restoration funds" or "settlement funds").

2. The Trustees develop a Request For Proposal (RFP) which identifies: potentially injured resources, location of the release and where the injury to natural resources occurred or continues to occur, natural resources for which the Trustees have trusteeship, damages amount(s), restoration goals, and potential metrics to measure restoration success. Appendix G provides an example of an RFP for restoration projects;

3. The Trustees will cause the RFPs to be made publicly available. The general public, non-governmental organizations, and/or local, state and federal governments and entities (including the Trustees) may submit restoration proposals meeting the criteria described in the RFP and the SEMORRP. The RFPs will identify the time period in which proposals may be received for consideration by the Trustee Council;

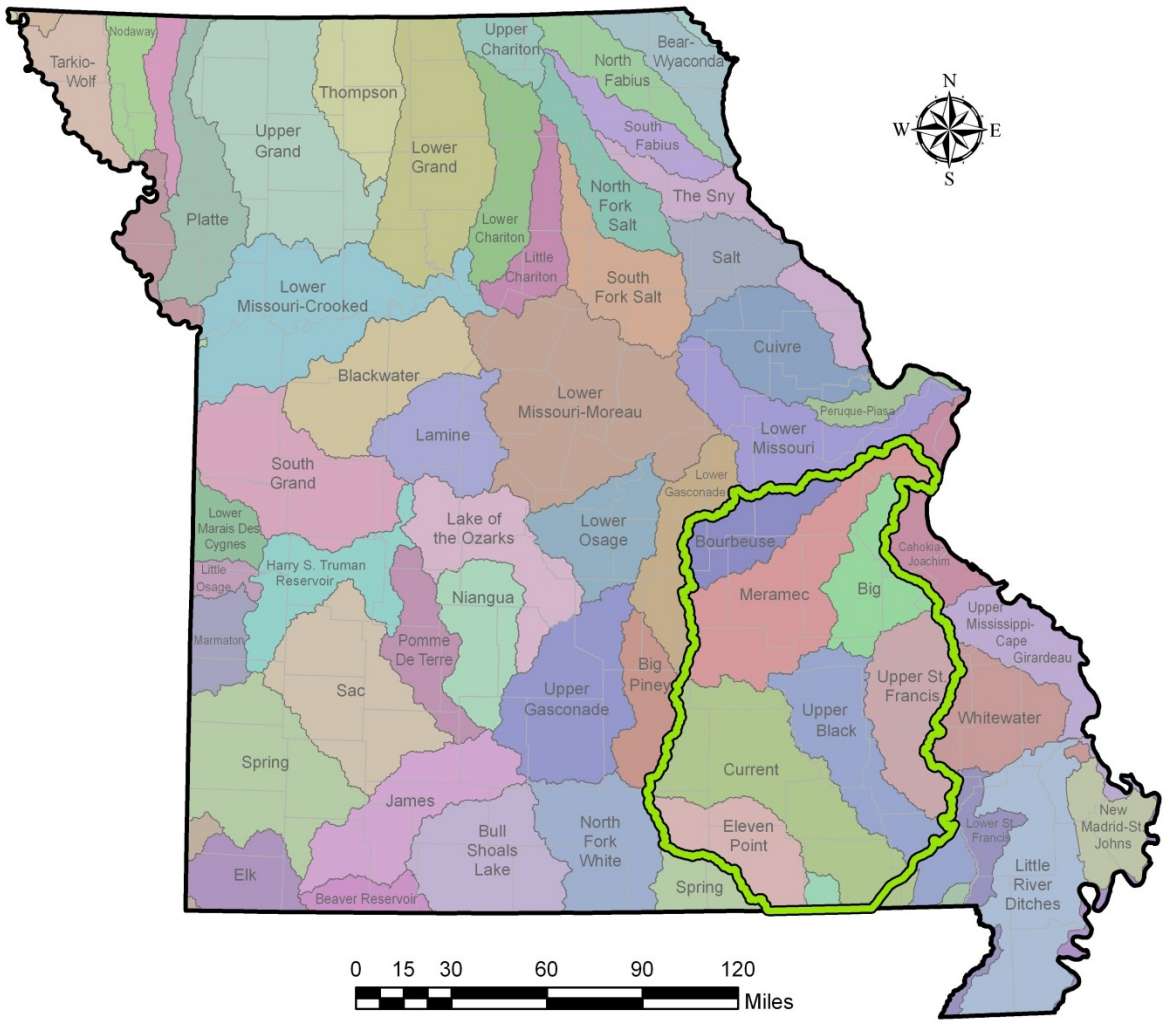
4. The Trustee Council members will evaluate project proposals received from the RFP using the Decision Matrix described in Section (6) of this document and attached as Appendix A. The Trustee Council will follow the project selection process outlined in Appendix B;

5. The Trustees will continue to issue RFPs for desired compensatory restoration goals until injury to natural resources and services lost have been compensated, restoration is completed and the restoration funds allocated to compensatory projects are expended.

Due to the complex nature of implementing primary restoration at the site of injured natural resources, the Preferred Alternative (D) presented in this restoration plan specifies that the Trustees will implement restoration technologies at sites covered under this plan. Additionally, the Trustees may also implement compensatory actions. Further information regarding the process the Trustees will use to evaluate and select restoration projects are found in Section (6) "Compensatory Restoration Project Proposal Process" and Section (7) "Primary Restoration Implementation Process" of this document.

FIGURE 1. SOUTHEAST MISSOURI OZARKS BOUNDARIES

FIGURE 2. WATERSHEDS OF MISSOURI



LEGEND

Southeast Missouri Ozarks Boundary

Missouri County Boundaries

MISSOURI DEPARTMENT OF NATURAL RESOURCES

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 act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

1.4 Authority and Legal Requirements

This SEMORRP was prepared jointly by the Trustees. The Fish & Wildlife Service is acting for DOI as the designated natural resource trustee under Section 107(f) of CERCLA, 42 U.S.C. § 9607(f), Section 311 of the CWA, 33 U.S.C. § 1321, and other applicable laws, including Subpart G of the National Contingency Plan, 40 C.F.R. § 300.600-300.615.

Pursuant to CERCLA, the Governor of the State of Missouri has designated the Director of the Missouri Department of Natural Resources as the Trustee for the State's natural resources. Further, the authorities under which the State of Missouri may act include, but are not limited to, the Missouri Constitution, 1945, Art. IV, Sections 40(a)-47; Chapter 252, RSMo, Department of Conservation – Fish & Game; Chapter 254, RSMo, State Forestry Law; Chapter 644, RSMo, Missouri Clean Water Law; Sections 260.350-260-434, RSMo, Missouri Hazardous Waste Management Law; Sections 260-500 et seq., RSMo, Missouri Hazardous Waste Clean Up Law; and the regulations duly promulgated under the statues set out above.

The Forest Service is acting for USDA as the designated natural resource trustee under Section 107(f) of CERCLA, 42 U.S.C. § 9607(f), Section 311 of the CWA, 33 U.S.C. § 1321, and other applicable laws, including Subpart G of the National Contingency Plan, 40 C.F.R. § 300.600-300.615.

The Trustee Council comprised of the MDNR, the Forest Service, and the Fish & Wildlife Service, will make recommendations to their respective Trustee and Authorized Official (AO), on behalf of the public to assess natural resource injuries and recover damages for injured natural resources and losses of services attributed to releases of hazardous substances. The DOI AO is the official delegated the authority to act on behalf of the Secretary of the DOI to conduct a natural resource damage assessment, restoration planning and implementation. The DOI AO for this plan is the Region 3 Regional Director for the FWS. The USDA AO is the official delegated authority to act on behalf of the Secretary of Agriculture to conduct a natural resource damage assessment, restoration planning and implementation. The USDA AO for this plan is the Region 9 Regional Forester. The state designated Trustee is the Director of the MDNR and is responsible for conducting natural resource damage assessments, restoration planning, and implementation. The federal AOs represent the interests of the DOI and USDA, including all affected Bureaus and Agencies, and the state Trustee represents the interests of the State of Missouri.

Future NRDAR claims may involve other Trustees, e.g., if the claim is for injury on Department of Defense (DOD) lands, the DOD would become an additional federal Trustee. If other Trustees are involved in a NRDAR case, then the SEMORRP will be reviewed by the additional Trustee(s) to determine if it is adequate for future restoration using recoveries of natural resource damages. If the SEMORRP is determined to be insufficient for future needs by the other Trustee(s), then a restoration plan specific to that case will be developed.

Actions undertaken by the Federal Trustees to restore natural resources or services under CERCLA and other federal laws are subject to the NEPA; and the regulations guiding its implementation at 40 C.F.R. Parts 1500 and 43 C.F.R. Part 46. NEPA and its implementing

regulations outline the responsibilities of federal agencies under NEPA. Federal agencies contemplating implementation of a major federal action must produce an environmental impact statement (EIS) if the action is expected to have significant impacts on the quality of the human environment. When it is uncertain whether a contemplated action is likely to have significant impacts, federal agencies prepare an EA to evaluate the need for an EIS. If the EA demonstrates that the proposed action will not have a significant negative impact on the quality of the human environment, the Fish & Wildlife Service will issue a Finding of No Significant Impact (FONSI), which satisfies the requirements of NEPA, and no EIS is required. However, if there is a finding of significant impact to the human environment, then an EIS will be developed. For a proposed restoration plan, if a FONSI determination is made, the Trustees may then issue a final restoration plan describing the potential restoration alternatives. The Regional Director for the U.S. Fish and Wildlife Service Region 3 is the Responsible Official for the NEPA.

In accordance with NEPA and its implementing regulations, the SEMORRP summarizes the current environmental setting, describes the purpose and need for restoration actions, identifies potential 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. This information will be used to make a threshold determination as to whether preparation of an EIS is required prior to selection of the final restoration alternatives.

Other regulations that may guide the Trustees in the implementation of the SEMORRP are found in Appendix C.

1.4.1 Applicability to the Oil Pollution Act

This document was developed to establish and implement restoration to compensate for injuries to natural resources and their services arising from the release of hazardous substances within the SEMO. As previously identified, the CERCLA authorizes states, federally recognized Tribes, and certain federal agencies that have authority to manage or control natural resources, to act as "Trustees" on behalf of the public, and to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by hazardous substance releases. Likewise, the Oil Pollution Act (OPA) authorizes federal and state governments and federally recognized Tribes to make the public whole for injuries to natural resources and their services resulting from an incident involving a discharge or substantial threat of a discharge of oil.

The development of the SEMORRP is a coordinated effort among state and federal natural resource agencies, local governments and entities, and the public. Further, the SEMORRP broadly describes the Trustees' priorities and objectives for restoring all injured natural resources and/or lost services in the SEMO and would be relevant to injured natural resources and/or lost services arising from the release of hazardous substances and/or the discharge of oil. As such, the SEMORRP will meet OPA's use of a regional restoration plan as identified in Subchapter E of the OPA implementing regulations, 15 C.F.R. §990.56 (b) and will expedite restoration implementation when an incident involving a discharge or threat of a discharge of oil occurs. The Trustees intend to refer to this SEMORRP to inform restoration in the event of natural resource injury resulting from the discharge of oil and subsequent recovery of associated damages. In addition, pursuant to the DOI's NEPA regulations, the Responsible Official may

use the NEPA analysis contained in this SEMORRP/EA for future oil spill restoration projects, where and when appropriate 43 C.F.R. § 46.120.

1.4.2 The Natural Resource Damages Assessment and Restoration Process under CERCLA

Pursuant to Executive Order 12580, the responsibility for promulgating NRDAR regulations was delegated to the Department of the Interior. Type A regulations use a computer-based model to assess injuries resulting from chemical and/or oil discharges in coastal and marine environments. Type B assessments are more individualized and take into account more site specific conditions and impacts on the natural resources and services. Both Type A and Type B regulations contain four sequential phases for assessing injuries and determining damages. Generally Type A regulations are not applicable to Missouri. For the purposes of this SEMORRP, the four Type B phases are discussed below.

*Phase 1: Pre-assessment Screen***.** A pre-assessment screen, a prerequisite to conducting a formal natural resource damage assessment, is prepared based on readily available information to determine if additional assessment is warranted and whether there is a reasonable probability of making a successful claim. Five criteria (43 C.F.R. §11.23(e)) must be met and notification provided to the potentially responsible parties prior to moving forward to the next phase.

Phase 2: Assessment Plan. The assessment plan outlines potential studies planned to determine injuries to natural resources and/or services; provides an overview of environmental impacts; and describes the NRDAR process. The assessment plan ensures that any natural resource assessment of potential injuries is conducted in a planned and systematic manner and that the methodologies chosen demonstrate reasonable costs. The draft plan is made available for public review and comment prior to finalization.

Phase 3: Assessment. The purpose of the assessment phase is to collect, compile and analyze data necessary to determine injury (exposure of natural resources to release or discharges); quantify injuries (nature and extent of the injury); and determine damages (monetary value of injured resources plus compensable value of the services lost).

*Phase 4: Post-Assessment***.** During this phase, the Trustees prepare a Report of Assessment documenting all determinations, data, test results and related findings. A reasonable number of restoration alternatives including natural recovery are usually developed. A preferred alternative is selected based on several factors, including, but not limited to, technical feasibility, relationship of costs to benefits, and integration with response actions.

1.5 Summary of NRDAR Settlement History in the Southeast Missouri Ozarks

At the publication of this document the Trustees have achieved several NRDAR settlements. The settlements (Table 1) provide the impetus for the creation of the SEMORRP. It is the Trustees' goal that, once restoration funds are received by the Trustee(s), restoration will begin in as timely a fashion as is possible. However, some circumstances may preclude the initiation of restoration. For example, even if restoration funds are available, starting restoration may be premature if response actions at the site are not complete. Additionally, the Trustees may defer use of some restoration funds until an evaluation of the success and extent of previous restoration

can be completed. Further details regarding individual settlements will be provided in each of the RFPs developed for those settlements and/or other recovered natural resource damages. An example RFP is included as Appendix G.

Table 1. Existing NRDAR Settlements in the Southeast Missouri Ozarks

Settlement	Settlement Date	Available Restoration Funds*
ASARCO: Big River Mine Tailings	12/15/2009	$33,376,090
ASARCO: Madison County	12/15/2009	$1,648,155
ASARCO: West Fork Mine and Mill	12/15/2009	$1,227,292
ASARCO: Sweetwater Mine and Mill	12/15/2009	$2,472,249
ASARCO: Glover Smelter	12/15/2009	$2,454,584
Magmont Joint Venture	02/07/2014	$1,256, 226

* RESTORATION FUNDS AT THE TIME OF PUBLICATION

SECTION 2 - PURPOSE AND NEED FOR RESTORATION

The purpose of this document is twofold: (1) serve as an Environmental Assessment (EA) and (2) as a Regional Restoration Plan. The EA is designed to consider alternatives which will restore, rehabilitate, replace, and/or acquire the equivalent of any natural resources and services potentially injured by the release of hazardous substances into the SEMO, pursuant to applicable state, and federal laws and regulations. Additionally, this plan serves to facilitate public involvement in the restoration plan and to comply with environmental decision-making requirements.

The SEMORRP is developed to identify a preferred alternative or alternatives to restore injured natural resources and to establish criteria for selecting projects to implement such restoration alternatives. The SEMORRP broadly describes the Trustees' priorities and objectives for restoring injured natural resources and lost services in the SEMO. Selected compensatory restoration projects will be funded by the Trustees, Requests for Proposals will be issued for some compensatory restoration projects, while other compensatory restoration projects may be both funded and implemented by the Trustees. Each RFP will include, but is not limited to, such information as the type of natural resources injured and/or services lost; location of the potentially injured natural resources and/or lost services; and the amount of restoration funds available. Primary restoration projects will be implemented by the Trustees and/or their contractors where feasible and appropriate.

Any selected restoration project will be consistent with this SEMORRP, statutory mandates and regulatory procedures, and applicable laws and policies for restoring, replacing, rehabilitating and/or acquiring the equivalent of potentially injured natural resources and lost services.

2.1 Residual Injury After Response Actions

Restoration under the NRDAR process is designed to complement removal and response actions performed by the Environmental Protection Agency (EPA) and/or other agencies that are underway or planned. The extent to which response actions return natural resources and the services they provide to their baseline condition (i.e., the level of services that would have existed but for the release) are considered in the restoration planning process. Generally the response action focuses on risks to human health and the environment posed by hazardous substances contamination. Simultaneous or subsequent restoration activities initiated by the natural resource Trustees address injuries to natural resources and their services resulting from releases of hazardous substances which may be unaddressed by response actions ("residual injury"). Additionally, natural resource Trustees are responsible for assessing and restoring natural resources to compensate the environment and the public for injuries that may have occurred during the response process and may persist into the future.

In addition to primary restoration costs, or the costs associated with directly restoring the injured resource to its baseline condition, damages can also include compensation for the loss of natural resource services pending restoration. The period of injury from the time the injury occurred until baseline recovery is achieved is referred to as "interim loss". The SEMORRP is applicable to restoration for all types of natural resource injuries.

2.2 The Southeast Missouri Lead Mining District

The primary impetus behind the creation of the SEMORRP is the availability of restoration funds recovered through the settlements identified in Table 1. The SEMOLMD remains one of the largest lead producing regions of the world. The mining district covers multiple counties located from 40 to 90 miles south and southwest of the City of St. Louis, MO. Mining began in the 1700s in an area now called the Old Lead Belt in parts of St. Francois, Jefferson, Franklin, Madison, Washington, Perry, and St. Genevieve Counties. Mining and ore processing in the Old Lead Belt ceased in the 1970s, but waste from mining operations of the preceding 150 years is still a prevalent feature of the landscape. As a result of the ongoing releases of hazardous substances from the mining, beneficiation, transportation, and smelting activities, numerous sites in the Old Lead Belt have been added to the NPL by the EPA including:

- Annapolis Lead Mine
- Big River Mine Tailings Site
- Furnace Creek, Washington County Lead District
- Madison County Mines Site
- Old Mines, Washington County Lead District
- Potosi, Washington County Lead District
- Richwoods, Washington County Lead District
- Southwest Jefferson County Site

In addition to the NPL sites listed above, there are numerous Superfund Response sites in the SEMOLMD that currently are not listed on the NPL such as the Viburnum Trend, also known as the New Lead Belt. Mining exploration in the Viburnum Trend began in the 1950s, and mining, beneficiation, transportation, and smelting continue presently.

As a result of the extent and level of contamination of natural resources in SEMOLMD from the release of hazardous substances associated with mining, beneficiation, transporting, and smelting of ore, the federal and state natural resource trustees initiated NRDAR activities at numerous sites within SEMOLMD and these are ongoing. Natural Resource Damage Assessments have shown heavy metal contamination affecting thousands of acres of land, dozens of miles of streams, and terrestrial and aquatic life that depend on these habitats.

SECTION 3 - RESTORATION ALTERNATIVES

3.1 Introduction of Alternatives under the National Environmental Policy Act

The following alternatives were developed to evaluate and recommend a preferred alternative to meet restoration goals in the SEMO. Evaluation of alternatives to the proposed action, in this case a process for the restoration of injured natural resources, is a requirement under the NEPA process. Alternatives A, B, C, and D, as presented below, offer a variety of restoration options from which a preferred alternative will be selected at the conclusion of the restoration planning process. For Alternatives B, C, and D, restoration projects will be evaluated and selected using the same criteria as outlined in Sections (6) and (7) of this document. The no action Alternative (A) does not require this same level of implementation. Public review and coordination for Alternatives B, C, and D will be the same as described in Section (8) of this document. Table 2 provides a summary comparison of the Alternatives discussed in this section.

3.1.1 Important Considerations in Developing Restoration Alternatives

The selected alternative will be consistent with statutory mandates and regulatory requirements that specify that recovered damages are used to undertake feasible, safe, and cost-effective projects that address injured natural resources and their services, consider actual and anticipated conditions, have a reasonable likelihood of success, and are consistent with applicable laws, regulations and policies.

The SEMORRP evaluates the alternatives, taking into account a variety of factors including:

- Technical feasibility (*i.e.,* whether it is possible to implement the alternative);
- The relationship of the expected costs of the proposed actions to the expected benefits from the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources;
- The relative cost-effectiveness of different alternatives (*i.e.,* if two alternatives are expected to produce similar benefits, the least costly one is preferred);
- The results of actual or currently planned response actions;
- The potential for collateral injury to the environment if the alternative is implemented;
- The ability of the natural resources to recover with or without each alternative, and the time required for such recovery;
- The natural recovery period determined in § 11.73(a)(1);
- Potential effects on human health and safety;
- Consistency with relevant federal and state policies;
- Compliance with applicable federal and state laws.

43 C.F.R. § 11.82(d)

The selected alternative must restore, rehabilitate, replace and/or acquire the equivalent of those natural resources and their services potentially injured by the releases of hazardous substances within the SEMO boundary. Because the SEMO includes a complex community of invertebrates, fish, wildlife, plants and humans, the Trustees intend to address areas of potential improvement for the ecosystem as a whole in order to restore the lost resources and services**.**

The Responsible Federal Official will select one of the EA alternatives and will determine, based on the facts and recommendations contained within the EA, and public comment, whether this EA is adequate to support a FONSI, or whether an Environmental Impact Statement needs to be prepared. NEPA compliance is a federal requirement and not applicable to NRDARs that only involve the state Trustee.

3.2 Alternative A: No Action

The No Action Alternative, required by NEPA and the NRDAR regulations, 43 C.F.R. § 11.82(c)(2), consists of no change in the current programs pursued outside the NRDAR. It is the basis against which other alternatives can be compared. It is the alternative by which restoration is obtained by natural recovery. If this Alternative is implemented, the Trustees would not initiate specific actions to restore injured natural resources and their services to baseline conditions or compensate the environment and the public for natural resource injuries caused by the releases of hazardous substances into the environment.

Under this Alternative, the state and federal agencies and landowners would continue to manage, conserve and protect the sites within the SEMO as outlined in current programs and regulations and within applicable budget constraints. However, no additional action would be taken to compensate for injuries to natural resources or their services. In addition, the terms of existing Consent Decrees require recovered natural resource damages be spent to restore, replace, rehabilitate and/or acquire the equivalent of potentially injured natural resources and their services and, under this Alternative, the restoration funds would not be expended.

3.3 Alternative B: Primary Restoration of Injured Natural Resources

Primary restoration is any action taken to return an injured natural resource and its services to its baseline condition. Alternative B describes restoration projects that directly restore natural resource injuries caused by the release of hazardous substances through means of primary restoration. This alternative would compensate for injury to natural resources by restoring resources in the immediate area that have been adversely impacted to a condition where they can provide the level of services available prior to the release of hazardous substances. Under this Alternative, sites that cannot feasibly be returned to baseline condition would not be considered for further funding opportunities.

Natural resource-based restoration projects include activities such as upland restoration, wetland, floodplain and riparian corridor restoration, aquatic resource restoration, groundwater or cave/karst restoration, and other projects designed to reduce the exposure of natural resources

under the Trustees' jurisdictions to residual hazardous substances. Alternative B would limit the Trustees to engaging solely in primary restoration of injured natural resources at the site of the release of hazardous substances or where those substances come to be located in the environment. No compensatory restoration projects would occur under this alternative.

Under this alternative, a mix of primary restoration projects would be selected to restore a broad array of natural resource services throughout the area impacted by the release. Selecting a mix of primary restoration projects allows for the recovery of a wide range of injured resources as well as flexibility for cost-effectiveness and feasibility due to different constraints related to the ecology of the area, residual hazardous substance following clean-up or remediation, or ability to find willing participants.

All restoration under this Alternative would only be considered in areas where the landowner is willing and the surrounding land uses indicate that the restoration will remain viable wildlife habitat. The Trustees may conduct primary restoration on existing public land, or may use conservation easements in perpetuity for restored natural resources. The length of the conservation easement may be less than in perpetuity, but the length of time will be determined on a site by site basis. The preservation of restored properties would be obtained through fee title purchase, environmental covenants, or contracts as designated by the Trustees. Land acquired for primary restoration can be conveyed to individual state, tribal, or local government agencies, land trusts, or non-government conservation organizations following specific procedures and standards for each entity. The federal government may also acquire property if it meets the restoration criteria and is contained within existing comprehensive conservation plan, such as the Mark Twain National Forest Plan and/or other property acquisition boundaries. While the primary purpose of the preservation of land is to protect and preserve high quality natural resources, portions of the acquired properties may be made available to the public for natural resource-based recreational activities such as wildlife viewing, hiking, fishing, hunting or educational opportunities.

The main benefit of Alternative B is that it provides the clearest linkage to injury, since the affected resources themselves will be restored. This Alternative also reduces ongoing injury from residual contamination. The next five subsections, 3.3.1 through 3.3.5, present a suite of primary restoration choices that could be selected under this Alternative, though the list is not exhaustive and could include numerous others as approved by the Trustees. The identified resource categories (i.e., upland resources, wetlands) are under the jurisdiction of the Trustees--both as natural resources and as supporting habitat for natural resources under the Trustees' jurisdiction (i.e., migratory birds).

3.3.1 Upland Resource Restoration Projects

The upland settings in the SEMO provide important habitat for migratory birds and other natural resources and may be injured by the release of hazardous substances. Releases of hazardous substances that occur in upland settings may erode, flow, or percolate into other landscapes or geological domains continually being released into the environment and causing ongoing injury.

As a consequence, restoration of injured upland resources becomes a significant component of the SEMORRP. Specific upland restoration projects could include but are not limited to:

- Ecological enhancement of response activities performed by the EPA or other agency
- Re-establishment of native upland vegetation
- Propagation and re-stocking of federally and state-listed Threatened and Endangered (T&E) species
- Utilization of accepted methods for restoration of residual injury not addressed fully by the response action
- Removal of invasive species
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

3.3.2 Wetland, Floodplain, and Riparian Corridor Restoration Projects

Wetlands serve as natural water filters and sequestration sites for many different types of environmental contaminants. As a consequence, hazardous substances may accumulate in wetland environments above thresholds of toxicological concern. Wetland, floodplain, and riparian corridor restoration and reestablishment would help restore resources that may be impaired or destroyed in the SEMO by the release of hazardous substances. Restoration of injured wetlands would provide increased bird nesting opportunities and increased food for a wide variety of fish, birds and other wildlife, as well as increased sediment storage capacity within the watershed. The Trustees envision that wetland, floodplain, and riparian corridor resources reestablishment and enhancement may include active restoration projects such as but not limited to:

- Ecological enhancement of response activities performed by the EPA or other agency
- Removal or stabilization of contaminants from wetlands, floodplains, and riparian corridors where not fully addressed by EPA or other agency
- Restoration of floodplain forests
- Re-establishment of interconnections between surface water and injured wetland, floodplains, and riparian corridors
- Propagation and re-stocking of T&E, game, and non-game wetland species
- Removal of invasive plant species
- Disruption of (or not repairing) agricultural drain systems
- Re-establishment of wetland, floodplain, and riparian corridor plants and other native vegetation
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

Wetland, floodplain, and riparian corridor reestablishment and enhancement projects that will improve water quality and provide habitat for biological resources are preferred. Wetland, floodplain, and riparian corridor restoration would only be considered in areas where the landowner is willing and the surrounding land uses indicate that the restoration will remain viable. The Trustees prefer conservation easements or other contractual agreements in perpetuity

for restored natural resources. The length of the conservation easement may be less than in perpetuity, but the length of time will be determined on a site by site basis.

3.3.3 Surface Water Quality and Aquatic Resource Restoration Projects

The release of hazardous substances, for example from industrial sources or un-reclaimed mine lands, may impair water quality and aquatic resources within the SEMO. To address past and potential future injury, water quality and aquatic resource improvement projects may include many project categories, but are not limited to those listed below:

- Ecological enhancement of response activities performed by the EPA or other agency
- Stabilization of contaminated or eroding stream banks
- Stabilization of soils that represent residual injury in contaminated floodplains
- Restoration of floodplain forests
- Natural stream channel design/restoration of channelized streams
- Restoration of mine drainage seeps or mine waste adjacent to waterways
- Establishment or protection of injured riparian corridors with native species
- Propagation and re-stocking of T&E, game, and non-game aquatic species
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

Surface water quality and aquatic resource restoration projects such as these would provide ecological services similar to those lost due to the release of hazardous substances. Surface water protection and enhancement projects that will improve water quality and provide habitat for biological resources are preferred.

3.3.4 Groundwater Quality and Resource Restoration Projects

The release of hazardous substances can impair groundwater quality as well as karst and cave resources within the SEMO. For example, these resources may be affected by seepage and percolation of contaminants from un-reclaimed and abandoned surface and underground mining, industrial releases of hazardous chemicals from storage pits, releases of hazardous substances due to dumping or accidental spills, as well as other sources. To address past and potential future injury, groundwater quality and karst/cave resource improvement projects may include many of the types of project categories, but are not limited to those listed below:

- Treatment of contaminated groundwater for beneficial use
- Ecological enhancement of response activities performed by the EPA or other agency
- Removal and disposal of contaminated soils and overburden that contribute to injured groundwater
- Closure of voids that allow contamination to enter groundwater directly
- Propagation and re-stocking of T&E species, and other karst dwelling species
- Protection of recharge areas/establishment of groundwater protection zones
- Implementation of source control and water conservation projects
- Riparian restoration along losing streams

- Implementation of water treatment structure projects to intercept and treat groundwater discharge to surface water
- Implementation of permeable pavement and other projects designed to minimize storm water runoff to surface water
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

Groundwater quality and karst/cave habitat restoration projects such as these would provide ecological services potentially similar to those lost due to the release of hazardous substances. Groundwater protection and enhancement projects that will improve groundwater quality for drinking water and provide habitat for biological resources are preferred. Groundwater is a major source of domestic and municipal drinking water in the SEMO and is also utilized for agricultural and industrial purposes. The karstic nature of some of the SEMO aquifers may result in an increased susceptibility to contamination from point and non-point sources. As a result, many opportunities exist to protect or enhance recharge to the aquifer(s).

3.4 Alternative C: Compensatory Restoration

Alternative C allows only for the consideration of Compensatory Restoration. CERCLA authorizes Trustees to replace or acquire natural resources and their services equivalent to those injured by hazardous substance releases, in lieu of or in addition to, direct restoration of the injured resources themselves. Under this Alternative, primary restoration *will not* occur. Natural resource-based restoration projects could occur in the same resource categories described in Alternative B; however, *all* of the restoration activities would take place away from the natural resources injured by the release of hazardous substances. Instead of primary restoration projects, compensatory restoration activities will be used to compensate the environment and the public for the natural resources potentially injured.

Restoration under this Alternative would only be considered in areas where the landowner is willing and the surrounding land uses indicate that the restoration will remain viable. Preservation of restored properties would be obtained through fee title purchase or environmental covenants. The Trustees prefer conservation easements in perpetuity for restored natural resources on private land. The length of the conservation easement may be less than in perpetuity, but the length of time will be determined on a site by site basis.

Land acquired can be conveyed to individual state, tribal, or local government agencies, land trusts, or non-government conservation organizations following specific procedures and standards for each entity. The federal government may also acquire property if it meets the restoration criteria and is contained within existing comprehensive conservation plan and/or other property acquisition boundaries. While the primary purpose of the preservation of land is to protect and preserve high quality natural resources, some or all of the acquired properties may be made available to the public for natural resource based recreational activities such as wildlife viewing, hiking, fishing, hunting or educational opportunities.

Similarly to Alternative B, a mix of natural resource restoration, enhancement, and acquisition projects can be selected to provide a broad array of natural resource services throughout the SEMO area. Selecting a mix of compensatory restoration projects allows for the recovery of a wider range of resources as well as more flexibility for cost-effectiveness and feasibility due to different constraints related to the ecology of the area or ability to find willing participants. Potential benefits of this approach to restoration include creating tracts of continuous high quality habitat or connecting existing habitats. This approach keeps the important linkages between physical, chemical and biological properties of the overall ecosystem.

The next five subsections, 3.4.1 through 3.4.5, present a suite of compensatory restoration choices that could be selected under this Alternative, though the list is not exhaustive and could include numerous others as approved by the Trustees.

3.4.1 Upland Resource Restoration, Enhancement and Creation

The difference between Alternative B and this category of projects is the potential location of the compensatory restoration projects away from areas directly impacted by the release in question. Under this Alternative, upland restoration projects could include:

- Acquisition or protection through conservation easements of high quality glade, grassland, forest, and savannah environments in the SEMO.
- Propagation and re-stocking of T&E, game, and non-game species
- Restoration/rehabilitation of degraded glade, grassland, forest, and savannah environments
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

3.4.2 Wetland, Floodplain, and Riparian Corridor Restoration, Reestablishment or Enhancement Projects

The difference between Alternative B and this category of projects is the potential location of the compensatory restoration projects away from areas directly impacted by the release in question. Under this Alternative, wetland, floodplain, and riparian corridor restoration projects could include:

- Acquisition or protection through conservation easements of native wetland, floodplain, and riparian corridor
- Restoration/rehabilitation of degraded wetland, floodplain, and riparian corridor
- Conversion of non-native wetland, floodplain, and riparian corridor into native species composition
- Acquisition or protection through conservation easements or other contractual mechanisms of high quality seeps, springs, and swamp environments
- Propagation and re-stocking of T&E, game, and non-game species
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

3.4.3 Surface Water Quality and Aquatic Resource Improvement Projects

The difference between Alternative B and Alternative C for this category of projects is the potential location of the compensatory restoration projects away from areas directly impacted by the release in question. Under this Alternative, surface water and aquatic resource restoration projects could include:

- Acquisition or protection through conservation easements or other contractual mechanisms of native riparian corridor/forested floodplain remnants in the SEMO
- Restoration/rehabilitation of degraded riparian corridors
- Stabilization of eroding stream banks
- Natural stream channel design/restoration of channelized streams
- Propagation and re-stocking of T&E, game, and non-game aquatic species
- Acquisition or protection through conservation easements or other contractual mechanisms of high quality seeps, springs, and swamp environments
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

3.4.4 Groundwater Quality and Resource Improvement Projects

The only difference between Alternatives B and C for this category of projects is the potential location of the compensatory restoration projects away from the site of the release of hazardous substances or where they come to reside in the landscape. Under this alternative, groundwater restoration projects could include:

- Acquisition or protection through conservation easements of high quality caves, karst areas, seeps and springs
- Acquisition or protection through conservation easements of cave/karst recharge zones
- Closure of voids that allow contamination to enter groundwater directly
- Establishment of drinking water protection zones
- Restoration/rehabilitation of degraded cave/karst recharge zones
- Installation of cave closure devices
- Propagation and re-stocking of T&E, game, and non-game aquatic species
- Riparian restoration along losing streams
- Implementation of water treatment structure projects to intercept and treat groundwater discharge to surface water
- Implementation of permeable pavement and other projects designed to minimize storm water runoff and increase recharge
- Other projects that serve to reestablish natural characteristics that have been eliminated would be utilized, as appropriate.

3.4.5 Public Education and Enjoyment Projects

This category of projects is intended to promote the improvement in the quality of life for SEMO communities whose use and enjoyment of natural resources may have been lost or diminished as

a result of the release of hazardous substances. Projects could include educational programs that promote hiking and bird watching opportunities, trash clean-ups (stream teams) and education about the importance of water quality to life in the project area. These projects would facilitate protection and conservation of trust resources resulting in enhanced public access to, and thus appreciation of, natural resources.

3.5 Alternative D: Tiered Project Selection Process Evaluating the Feasibility of Primary Restoration or Compensatory Restoration (Preferred Alternative)

Alternative D examines the feasibility of primary restoration at each site and also allows for consideration of other restoration alternatives if a return to baseline level of services is not feasible. CERCLA authorizes Trustees to replace or acquire natural resources capable of providing the baseline level of services equivalent to those injured by hazardous substance releases. Natural resources may also be rehabilitated with actions that increase the ecological integrity or viability of resources and their services. Possible actions and types of restoration to be considered under Alternative D may include both primary and compensatory restoration.

This Alternative includes all the categories of potential projects outlined in Alternative B and Alternative C. Alternative D is different from Alternatives B and C in that it allows the Trustees to use a combination of primary and compensatory restoration activities and projects to accomplish restoration goals at or near the site. Consequently, Alternative D allows for the restoration, rehabilitation, replacement, and/or acquisition of equivalent resources within the SEMO. Like Alternative B, primary restoration is preferred but a combination of any or all categories of restoration may be considered and determinations of the appropriate type will be site-dependent. In cases where primary (on-site) restoration is not feasible, compensatory restoration will allow flexibility for adequate compensation of the public for the resources.

Both primary and compensatory restoration projects will be evaluated and selected using a matrix of factors ("Decision Matrix") including criteria to give appropriate weight to the factors used to rank the projects. The Decision Matrix is included in Appendix A. The Decision Matrix will be used to evaluate all compensatory restoration projects regardless of whether they are implemented directly by the Trustees. The Trustees will solicit compensatory restoration project proposals from non-profit organizations, local, state and federal agencies, and the general public using the RFP approach. Please see the Appendix G for an exemplar RFP. The exemplar RFP serves as a model for future RFPs. Additional details regarding the RFP process can be seen in Section (6) of this document.

Due to the inherent complexity of implementing primary restoration projects at a site potentially contaminated with hazardous substances, the Trustees will retain responsibility to implement all appropriate primary restoration projects under this Alternative. Further details regarding the primary restoration process can be seen in Section (7) of this document.

The next five subsections, 3.5.1 through 3.5.5, present a suite of choices that could be selected under this Alternative, though the list is by no means exhaustive and could include others as approved by the Trustees.

3.5.1 Upland Resource Restoration, Enhancement and Creation

Under this resource category of restoration projects, Alternative D allows the Trustees to select potential restoration projects discussed in both Alternatives B and C that serve to most efficiently return the site to pre-release conditions and/or compensate the public for the loss of upland natural resource services if primary restoration is not indicated. Alternative D restoration projects will be evaluated and selected using the guidelines established in Sections (6), (7), and the Decision Matrix.

3.5.2 Wetland, Floodplain, and Riparian Corridor Restoration, Reestablishment or Enhancement Projects

Under this category of restoration projects, Alternative D allows the Trustees to select potential restoration projects discussed in both Alternatives B and C that serve to most efficiently return the site to pre-release conditions and/or compensate the public for the loss of wetland, floodplain, and riparian corridor natural resource services. Alternative D restoration projects will be evaluated and selected using the guidelines established in Sections (6), (7), and the Decision Matrix.

3.5.3 Surface Water Quality and Aquatic Resource Improvement Projects

Under this category of restoration projects, Alternative D allows the Trustees to select potential restoration projects discussed in both Alternatives B and C that serve to most efficiently return the site to pre-release conditions and/or compensate the public for the loss of surface water and aquatic resource services. Alternative D restoration projects will be evaluated and selected using the established in Sections (6), (7), and the Decision Matrix.

3.5.4 Groundwater Quality and Resource Improvement Projects

Under this category of restoration projects, Alternative D allows the Trustees to select potential restoration projects discussed in both Alternatives B and C that serve to most efficiently return the site to pre-release conditions and/or compensate the public for the loss of groundwater resources. Alternative D restoration projects will be evaluated and selected using the established in Sections (6), (7), and the Decision Matrix.

3.5.5 Public Education and Enjoyment Projects

Under this category of restoration projects, Alternative D allows the Trustees to select potential restoration projects discussed in Alternative C that serve to educate and/or compensate the public for the loss of any natural resources or natural resource. Alternative D restoration projects will be evaluated and selected using the guidelines established in Sections (6), (7), and the Decision Matrix. As with all selected restoration projects, public education and enjoyment projects must be directly related to the resources that were lost or injured by the release of hazardous substances.

Table 2. Comparison of Alternatives A, B, C, and D

Actions	**Alternative A** (No Action)	**Alternative B** Primary Restoration Projects	**Alternative C** Compensatory Restoration Projects	**Alternative D** Primary Restoration and Compensatory Restoration Projects (Preferred)
Restore injured upland resources	No	Yes	No, compensatory restoration allowed at off-site locations, acquisition of equivalent resources possible.	Yes
Preserve existing high-quality upland resources	No	No	Yes	Yes
Restore injured wetland, floodplain, and riparian corridor and associated resources	No	Yes	No, compensatory restoration allowed at off-site locations, acquisition of equivalent resources possible.	Yes
Preserve existing high-quality wetland, floodplain, and riparian corridor resources	No	No	Yes	Yes
Restore injured surface water systems and aquatic resources	No	Yes	No, compensatory restoration allowed at off-site locations, acquisition of equivalent resources possible.	Yes

Table 2 Continued				
Actions	**Alternative A** (No Action)	**Alternative B** Primary Restoration Projects	**Alternative C** Compensatory Restoration Projects	**Alternative D** Primary Restoration and Compensatory Restoration Projects (Preferred)
Preserve existing high-quality surface water systems and aquatic resources	No	No	Yes	Yes
Restore injured groundwater, cave, and karst systems	No	Yes	No, compensatory restoration allowed at off-site locations, acquisition of equivalent resources possible.	Yes
Preserve existing high-quality groundwater, cave, and karst systems	No	No	Yes	Yes
Improve outdoor recreational opportunities/enhance public awareness	No	Yes	Yes	Yes

SECTION 4 - AFFECTED RESOURCES

The purpose of this section is to briefly describe the physical, biological, and socioeconomic resources that are potentially affected by the implementation of the SEMORRP and the selected Alternative discussed in Sections (3) and (5). More detailed descriptions of the affected resources are provided in Appendix D.

The SEMO are part of a distinctive biogeographic region termed the Ozark Highlands that includes most of southern Missouri, much of northern Arkansas and small parts of neighboring states. For purposes of the SEMORRP, the SEMO are defined by the following seven watersheds: the Big River, the Black River, the Bourbeuse River, the Current River (includes the Jacks Fork River), the Eleven Point River, the Meramec River, and the upper portion of the St. Francis River (Figure 1). Differences in landform, lithology, soils, and vegetation produce a grouping of sixteen ecological subsections collectively known as the Ozarks as defined by Nigh and Schroeder's 2002 Atlas of Missouri Ecoregions. Seven of these 16 Ozark ecological subsections are also within in the SEMO (Figure 2). The following ecological subsections are located in the SEMO: Central Plateau (CP), Meramec River Hills (MRH), St. Francois Knobs and Basins (SKB), Current River Hills (CRH), Black River Ozark Border (BRO), and Inner Ozark Border (IOB).

4.1 Physical Resources

4.1.1 Geology

The SEMO is part of the Ozark Highlands, a low structural dome of horizontally bedded strata which have been subjected to ongoing erosion for over 250 million years into a heavily dissected plateau (Nigh and Schroder, 2002). This incredibly long period of uninterrupted erosion, combined with the central location of the SEMO in North America has created a region of unique ecosystems.

Overall, the SEMO contains a diverse representation of various geologic formations ranging in age from Pennsylvanian to Precambrian which includes the Cambrian age cherty dolomites and sandstones, Ordovician cherty dolomites and the Precambrian igneous rock. The dolomites are soluble and create impressive local karst, including some very large springs, extensive caverns and numerous dry valleys (Nigh and Schroder, 2002).

4.1.2 Surface Water

The streams of the SEMO are an outstanding and internationally recognized natural resource. Streams in the SEMO are typically clear with chert gravel and cobble, and limestone or dolomite boulders and bedrock. Streams in the SEMO generally occupy narrow, entrenched valleys and often lose water to underground karst features. Accordingly, other streams receive water from springs and seeps (Nigh and Schroder, 2002). Substantial portions of many of the rivers in the SEMO are protected within state and federal parks and forests.

4.1.3 Groundwater

Groundwater in the SEMO is comprised of two primary aquifers, the Ozark aquifer and the St. Francois aquifer. The Ozark aquifer is the most economically and ecologically significant

aquifer of the area. Conversely, only a minor portion of the St. Francois aquifer is found at the surface near the northeast boundary and subtending the Ozark aquifer elsewhere.

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing more than 1,000 gallons per minute (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

The St. Francois aquifer subtends the Ozark aquifer and is 300-400 feet thick in south-central Missouri. Water is withdrawn from the aquifer principally in the St. Francois Mountains, where the aquifer crops out or is close to the surface (Miller and Appel, 1997). The aquifer is at the surface at that location due to uplift and subsequent erosion. Where water is withdrawn, it is considered "suitable for most uses," and has typical yields of 60 to 150 gallons per minute (Miller and Vandyke, 1997).

4.2 Biological Resources

4.2.1 Terrestrial and Aquatic Habitats

Before settlement, the Ozarks were mainly timbered with oak and oak-pine forests and woodlands (Nigh and Schroeder, 2002). Open oak and pine woodlands with bluestem grass occupied higher, gentler ground and steep exposed slopes (Nigh and Schroeder, 2002). Closed forest of oak, shortleaf pine, and mixed deciduous species were best developed on the roughest, most dissected lands (Nigh and Schroeder, 2002). Glades, fens, and sinkhole ponds added to the diversity (Nigh and Schroeder, 2002). Bottoms were mainly forested with mixed hardwood and riverfront sycamore-cottonwood types (Nigh and Schroeder, 2002).

At present, the SEMO are still mainly timbered, except for cleared bottomlands and some ridges (Nigh and Schroeder, 2002). The forests and woodlands have been altered by past management practices and have become much more dense, shortleaf pine is less abundant, and much of the forest is dominated by oak of nearly even age (Nigh and Schroeder, 2002). Remnants of the lowland forest that once covered the region occur in small, managed tracts and in most locations without levees to protect them from flooding (Nigh and Schroeder, 2002).

Rare natural communities in this region include dolomite cliff communities, caves, springs, fens, and sinkhole ponds (Nigh and Schroeder, 2002). Most glade/woodland complexes have been overgrown with cedar, except in the St. Francois Mountains, where numerous high quality igneous glades still exist (Nigh and Schroeder, 2002).

4.2.2 Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) represent areas with unique species and habitats that are prioritized for conservation. The Missouri Department of Conservation (MDC) has identified numerous COAs in the SEMO, including the LaBarque Creek Watershed, Middle Meramec, St. Francois Knobs, Current River Hills, and Eleven Point River Hills areas (Conservation Commission of Missouri, 2009) (Figure 4).

4.2.3 Federally- and State-listed Species

The SEMO is home to more rare and endangered species than any other region in Missouri (Nigh and Schroeder, 2002). Thirty-four species in the SEMO are state or federally-listed, or are candidates for listing, including 19 species with federal status and 15 species with state status (Table 3). The list of species provided in Table 3 was compiled from county-specific information available online from the MDC Heritage Program (MDC, 2012a) and the FWS (USFWS, 2012a); this list is current for the year 2013.

4.2.4 Missouri Species of Concern

In addition to the "listed" species, the Missouri Department of Conservation maintains a database of rare plants and animals – the "Missouri Species of Concern" (MDC, 2012b). Plants and animals are given a numeric rank (S1 through S5) based upon number of occurrences within Missouri. The number of species of concern within the numeric rank of S1 through S2 that occupy the SEMO totals 337 species (Appendix E) (MDC, 2012b).

4.2.5 Extirpated Species

Extirpated species are species that previously existed in Missouri, but are no longer found in Missouri (MDC, 2011c). The extirpation of a species is of concern because all species have a unique role or "niche" that they fulfill in an ecosystem. Some extirpated species are being reintroduced into Missouri. Examples of reintroduction plans currently underway in Missouri include plans for the American burying beetle, bison, and elk.

4.2.6 Migratory Bird Species

The SEMO is located within the Mississippi Flyway, one of the major migration routes in the United States. More than 350 species of migratory birds utilize the SEMO as a migratory pathway, according to the MDC's Fish and Wildlife Information System (MDC, 2009b). Additionally, the SEMO are host to more than 115 nesting species of migratory birds, and significant portions of the populations of Whip-poor-Wills (*Caprimulgus vociferous*), Kentucky Warblers, (*Oporornis formosus*), and Summer Tanagers (*Piranga rubra*) (Poole and Gills, 1998).

4.3 Socioeconomic Resources

4.3.1 Recreational Resources

Fish and wildlife in the SEMO provide hunting and fishing opportunities for people living in or near the region, and result in significant annual revenue for the area. Fishing and hunting expenditures in Missouri totaled nearly $2.2 billion in 2006, according to the most recent *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (USFWS et al., 2006).

The SEMO contains over 1.2 million acres of public lands (Figure 3) (Nigh and Schroeder, 2002). The public lands in the SEMO provide recreational opportunities such as hunting,

fishing, swimming, boating, bird watching, camping, and hiking (Nigh and Schroeder, 2002). A listing of the public lands in the SEMO is provided in Appendix F.

4.3.2 Demographics, Economics and Land Use

Demographics

Early occupants of the SEMO include the Osage and western migrating groups, such as the Shawnee, Delaware, and Cherokee Indians (Nigh and Schroeder, 2002). Most early settlement was by Creoles of French Canadian ancestry, Americans from Kentucky, Tennessee, and other parts of Appalachia, and Caribbean African slaves. Mining attracted immigrants from Europe (Nigh and Schroeder, 2002).

The best agricultural lands were taken well before the Civil War, but growth in the mining industries after the war kept the population growing into the twentieth century (Nigh and Schroeder, 2002). Rural populations have declined except in the recreation industry along the major streams (Nigh and Schroeder, 2002).

Economics and Land Use

Surface lead mining began around 1720 and disturbed many acres of land and repeated timber cutting for fuel caused many tracts to become denuded of timber by the early nineteenth century (Nigh and Schroeder, 2002). The early settlers also mined the bat guano (potassium nitrate) in caves to make gunpowder (Nigh and Schroeder, 2002). Early agriculture involved open range grazing of cattle and hogs in the hills and small patches of croplands in the bottoms (Nigh and Schroeder, 2002). The timber industry is still predominant in the area (Nigh and Schroeder, 2002). Deep subterranean lead mining began shortly after the Civil War and continues today in the Viburnum Trend Lead Mining District (Nigh and Schroeder, 2002).

Today, agriculture is predominantly based on pastured cattle and hay cropping (Nigh and Schroeder, 2002). Lead, and other metals mining continue as major activities, and recreation and tourism have grown around streams, caves, and springs (Nigh and Schroeder, 2002). Timber is still cut for pallets, barrel staves, flooring and charcoal (Nigh and Schroeder, 2002). At the time of publication, the areas of fastest growth are in commercial and services sectors along the I-44 corridor and the Potosi, Bonne Terre, and Farmington areas (Nigh and Schroeder, 2002).

Table 3. Threatened, Endangered, and Candidate Species in the Southeast Missouri Ozarks

Common Name	Scientific Name	State Status	Federal Status
Birds			
American bittern	*Botaurus lentiginosus*	Endangered	
Northern harrier	*Circus cyaneus*	Endangered	
Peregrine falcon	*Falco peregrinus*	Endangered	
Swainson's warbler	*Limnothlypis swainsonii*	Endangered	
Bachman's sparrow	*Peucaea aestivalis*	Endangered	
Mammals			
Gray bat	*Myotis grisescens*	Endangered	Endangered
Indiana bat	*Myotis sodalis*	Endangered	Endangered
Plains spotted skunk	*Spilogale putorius interrupta*	Endangered	
Mollusks			
Spectaclecase	*Cumberlandia monodonata*		Endangered
Elephant-ear	*Elliptio crassidens*	Endangered	
Curtis' pearlymussel	*Epioblasma florentina curtisii*	Endangered	Endangered
Snuffbox	*Epioblasma triquetra*	Endangered	Endangered
Ebonyshell	*Fusconaia ebena*	Endangered	
Pink mucket	*Lampsilis abrupta*	Endangered	Endangered
Scaleshell	*Leptodea leptodon*	Endangered	Endangered
Sheepnose	*Plethobasus cyphyus*	Endangered	Endangered
Rabbitsfoot	*Quadrula c. cylindrica*		Candidate
Winged mapleleaf	*Quadrula fragosa*	Endangered	Endangered
Fish			
Lake sturgeon	*Acipenser fulvenscens*	Endangered	
Crystal darter	*Crystallaria asprella*	Endangered	
Swamp darter	*Etheostoma fusiforme*	Endangered	
Goldstripe darter	*Etheostoma parvipinne*	Endangered	

Table 3 Continued			
Common Name	Scientific Name	State Status	Federal Status
Sabine shiner	*Notropis sabine*	Endangered	
Mountain madtom	*Noturus eleutherus*	Endangered	
Longnose darter	*Percina nasuta*	Endangered	
Pallid sturgeon	*Scaphirhynchus albus*	Endangered	Endangered
Insects			
Hine's emerald dragonfly	*Somatochlora hineana*	Endangered	Endangered
Amphibians			
Eastern hellbender	*Cryptobranchus alleganiensis alleganiensis*	Endangered	
Ozark hellbender	*Cryptobranchus alleganiensis bishopi*	Endangered	Endangered
Plants			
Mead's milkweed	*Asclepias meadii*	Endangered	Threatened
Decurrent false aster	*Boltonia decurrens*	Endangered	Threatened
Virginia sneezeweed	*Helenium virginicum*	Endangered	Threatened
Pondberry	*Lindera melissifolia*	Endangered	Endangered
Eastern prairie fringed orchid	*Platanthera leucophaea*	Endangered	Threatened
Running buffalo clover	*Trifolium stoloniferum*	Endangered	Endangered

FIGURE 3. SELECT PROTECTED LANDS IN THE SOUTHEAST MISSOURI OZARKS

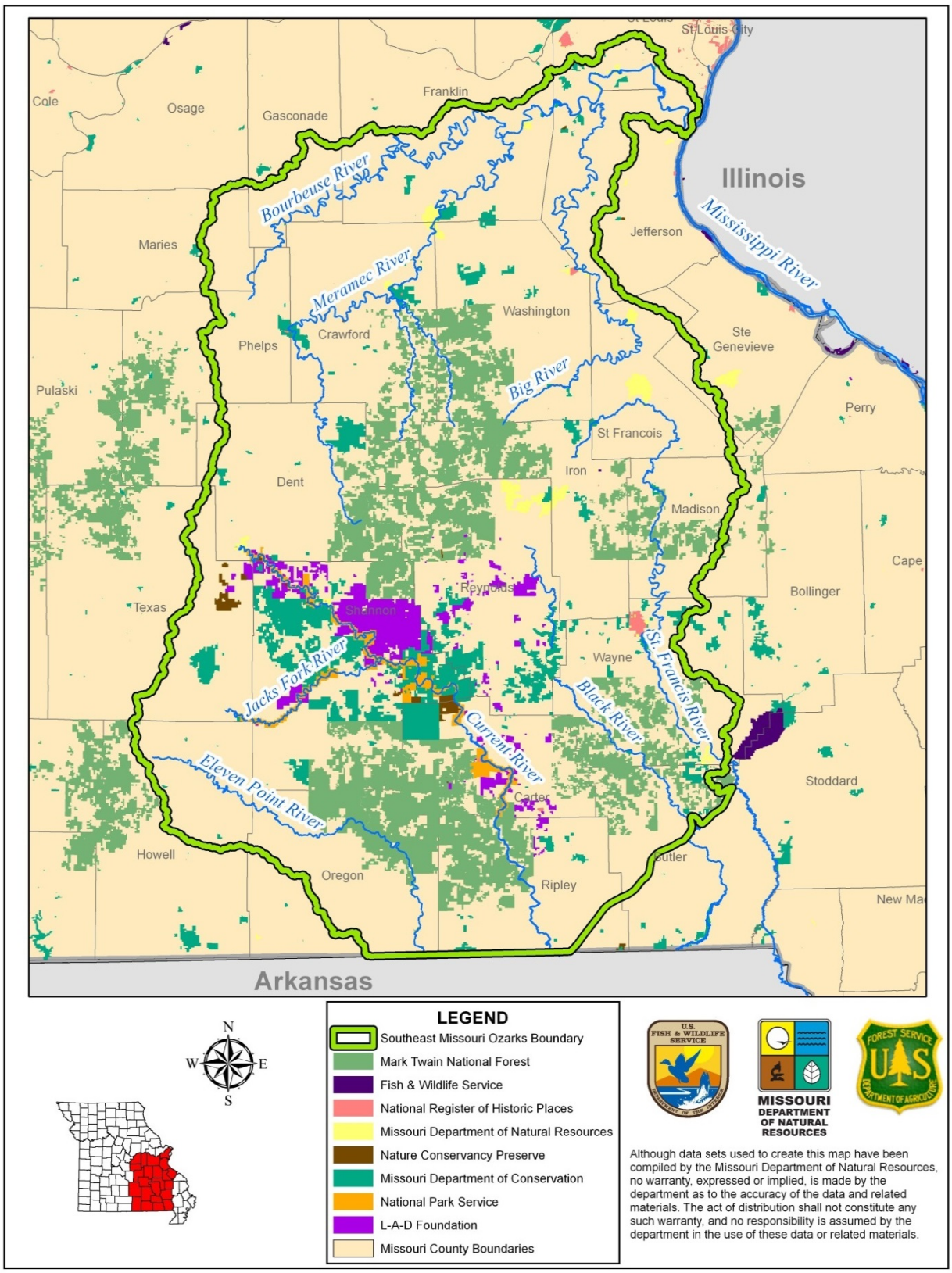
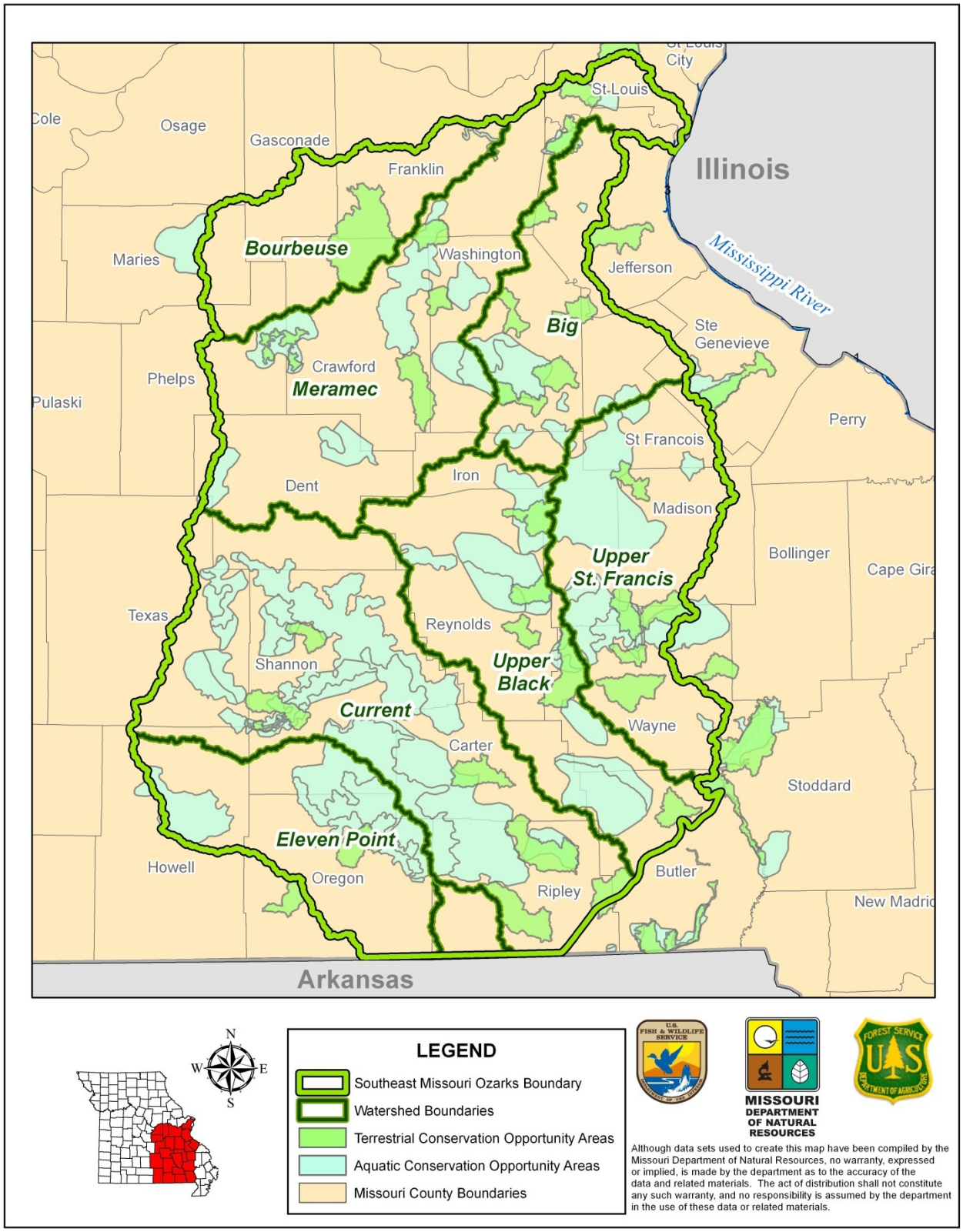


FIGURE 4. CONSERVATION OPPORTUNITY AREAS IN THE SOUTHEAST MISSOURI OZARKS



SECTION 5 - ENVIRONMENTAL CONSEQUENCES

The purpose of this section is to evaluate and explain the potential environmental impacts of the selection of a particular Alternative. The four alternatives reviewed in this document are discussed here to reveal their differences and to provide insight into the selection of the Trustees' Preferred Alternative.

5.1 Alternative A: No Action

5.1.1 Habitat Impacts

Under this Alternative, no natural resources would be restored, enhanced, or acquired beyond what is currently being done within mandates, policies and budgets. The public would not be compensated for injuries to natural resources from the release of hazardous substances into the environment because no restoration linked to the injuries would occur.

5.1.2 Biological Impacts

Natural resources harmed by the release of hazardous substances into the environment would not be restored, rehabilitated, replaced or the equivalent acquired. Local populations of fish and wildlife species, including migratory birds, throughout the SEMO that rely on streams and associated upland, wetland, floodplain, and riparian corridor, surface water, and ground water habitats would not increase sufficiently to compensate for past losses. Ongoing residual injury would occur.

5.1.3 Listed, Proposed, and Candidate Species

Negative impacts to listed species would not be reduced under this alternative.

5.1.4 Cultural Resources

No cultural resources would be altered from their current condition.

5.1.5 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 Federal Register 7629 (1994)), directs federal agencies to incorporate environmental justice in their decision making process. Federal agencies are directed to identify and address as appropriate, any disproportionately high and adverse environmental effects of their programs, policies and activities on minority or low-income populations.

Under the No Action Alternative (A), wildlife viewing and environmental education opportunities would not improve through enhancement projects. Thus, the local environment would remain impacted while natural recovery occurs. While affluent individuals can afford to

travel and pay for non-impacted outdoor experiences located elsewhere, low-income individuals are less capable of doing so.

5.1.6 Socioeconomic Impacts

This alternative would not result in any positive direct or indirect impacts on the local economy. This alternative would not result in additional lands that could provide increased recreational opportunities and related economic development in the area.

5.1.7 Cumulative Impacts

If this alternative were implemented, the cumulative impacts would be adverse to the environment. Injuries to the environment likely would persist for some time into the future and would not be compensated for. The exclusive reliance on existing programs, regulations and policies do not necessarily provide for long-term restoration and preservation of high quality upland, wetland, floodplain, and riparian corridor, aquatic, and groundwater resources or additional services to compensate for injuries suffered.

5.2 Elements Common to Alternatives B, C, and/or D

5.2.1 Habitat Impacts

Restoring, enhancing, or protecting upland, wetland, floodplain, and riparian corridor, aquatic, and groundwater resources negatively impacted by hazardous substances improves the ecological functions of the SEMO that are essential for many species. In addition, resource restoration and preservation may also improve public use and enjoyment of these resources. Benefits of upland, wetland, floodplain, and riparian corridor, aquatic, and groundwater resource improvements or enhancement would include improved water quality, restored habitat for fish and wildlife species, and increased ecological productivity. Improving the quality of vegetation and habitat for fish and wildlife would provide similar ecological functions as those potentially injured by hazardous substances.

Under Alternatives B, C, and D there would be minimal short-term impacts to habitat due to the manipulation of soil and sediments to complete upland, wetland, floodplain, and riparian corridor, and aquatic habitat restoration or enhancement projects.

5.2.2 Biological Impacts

Alternatives B, C, and D would benefit a wide suite of species found in the SEMO. Improvements to the habitats of species are expected to result in commensurate increases in the abundance and diversity of species that utilize the newly restored, created, or protected habitats. There would be minimal negative impacts to biological resources from human disturbance in relation to use of preserved areas and natural resource-based public use projects. The public use projects would also protect and potentially minimize human disturbance to fish and wildlife by controlling human impacts on those resources.

5.2.3 Listed, Proposed, and Candidate Species

State- and federally-listed or endangered species would receive further aid in the recovery of the species if Alternative B, C, or D were implemented. Protective measures would be taken during implementation of any projects to prevent any impact to these sensitive species. Adherence to the restrictions proscribed in the protective measures will provide for no adverse effects on the listed species. For federally-listed species, consultation under the Endangered Species Act will be conducted as described in Section 9.4 of this report.

5.2.3.1 Birds

The State endangered Swainson's warbler and the State endangered Bachman's sparrow may use uplands restored or acquired under Alternative B, C, or D.

5.2.3.2 Mammals

The gray bat and Indiana bat may benefit from caves and karst systems restored, protected, or acquired under alternatives B, C, or D. The State endangered plains spotted skunk may benefit from the preservation of small glades and rocky outcroppings, and also the maintenance and development of edges and brush piles restored under Alternatives B, C, and D.

5.2.3.3 Aquatic organisms

State and federally-listed mussel species like the Pink mucket, the Rabbitsfoot, the Snuffbox, the Spectaclecase, and other mussel species require clean waterways and specific fish host species for their young. Mussel abundance and diversity may return or increase in surrounding waterways as aquatic stream habitat is restored, water quality is improved, and (as needed) mussels and their host species are propagated and reintroduced in the SEMO waterways. The Ozark hellbender may also benefit from restoration or acquisition projects under Alternative B, C, or D.

State- and federally-listed fish species like the crystal darter and the Niangua darter may benefit from aquatic habitat restoration or acquisition projects in Alternative B, C, or D.

5.2.3.4 Insects

The state- and federally-listed Hine's emerald dragonfly may benefit from wetland, floodplain, and riparian corridor restoration and acquisition projects under Alternative B, C, or D.

5.2.3.5 Plants

State- and federally-listed plant species like the running buffalo clover, Virginia sneezeweed, eastern prairie fringed orchid, and Mead's milkweed may benefit from upland restoration and acquisition projects under Alternative B, C, or D.

5.2.4 Cultural Resources

Projects covered under this EA such as planting riparian buffers, stabilizing stream banks, acquiring tracts of native forest, restoring abandoned mine lands, and development for public uses on acquired lands have the potential to affect properties meeting the criteria for the National Register of Historic Places and other cultural resources. Specific areas for upland and wetland, floodplain, and riparian corridor restoration and land acquisition have not been determined. When project areas are determined during preparation of a RFP, and prior to making final decisions about these projects, the Field Supervisor at the Columbia, Missouri Ecological Field Office of the Fish and Wildlife Service, will initiate consultation with the Missouri State Historic Preservation Officer (SHPO) and, with the assistance of the FWS Regional HPO, will complete the Section 106 process. 36 C.F.R. Part 800. If the project occurs on the Mark Twain National Forest, then the Forest Supervisor will initiate the consultation and the Mark Twain National Forest Heritage Staff will oversee the Section 106 compliance.

5.2.5 Environmental Justice

Upland, wetland, floodplain, and riparian corridor, aquatic, and cave/karst preservation would involve transactions with willing landowners. Any impact to the local population, such as displacing fishermen from a particular section of stream, would be temporary and localized, with the goal of improved resources in the future. While the primary purpose of the restoration of this land is to restore natural resources, portions of acquired properties may be used by the public for natural resource based recreational/educational activities such as wildlife viewing. Aquatic habitat improvement would also enhance recreational opportunities in and around the SEMO.

5.2.6 Socioeconomic Impacts

Protection of forests, wetland, floodplain, and riparian corridor, riparian buffers, and caves would provide wildlife viewing, fishing and hunting, and help create positive economic impacts on the local economy. Aquatic habitat improvements or enhancements would provide more opportunities for public enjoyment of natural resources. Acquisition procedures of land or purchase of conservation easements would involve transactions with willing land owners who would be paid fair market value.

5.2.7 Elements Common to All Impacts

Ongoing sources of contaminant release to the ecosystem, such as pollution associated with development would continue to affect the SEMO where restoration projects would be implemented under Alternatives B, C, and D. These additional sources of impact may also inhibit the ability of the natural resources to fully recover or may negatively impact restoration projects undertaken by the Trustees.

5.3 Alternative B: Primary Restoration of Injured Natural Resources

5.3.1 Cumulative Impacts

Alternative B would limit the Trustees solely to primary restoration of natural resources at the site of the release of hazardous substances or where those substances come to be located in the environment. No compensatory restoration projects would occur under this alternative. Selection of Alternative B would compel the Trustees to spend restoration funds only at the site of release, without regard to other mitigating factors such as the local environment, prospects for restoration success, and long-term project viability due to external pressures. As a result, the Trustees may be compelled to spend large sums of money to directly restore resources that have limited value due to the surrounding environment (*e.g.* restored woodland surrounded by urban development).

Cumulative impacts from the primary restoration implemented under Alternative B would still positively affect the region as a whole. Primary restoration is the Trustees' stated preference for all potentially injured natural resources. However, the cumulative effect of primary restoration projects from Alternative B is expected to be less than cumulative benefits of the comprehensive restoration options offered by Alternative D. Due to the limitation of the ability of the Trustees to only consider primary restoration, Alternative B is less desirable than Alternative D. To begin restoring the resources of the SEMO that have been injured by the release of hazardous substances and achieving maximum benefit from restoration projects implemented, the Trustees need to have the flexibility to request and implement projects that best suit the needs, local conditions, and local communities affected by the injured natural resources while still meeting our legal requirements.

5.4 Alternative C: Compensatory Restoration

5.4.1 Cumulative Impacts

Alternative C would limit the Trustees solely to compensatory restoration projects. No primary restoration of injured natural resources to their baseline condition would occur under this Alternative. Selection of Alternative C would compel the Trustees to spend restoration funds solely off-site from the injured natural resources. Consequently, the Trustees would be without the ability to directly restore injured natural resources, even in situations where primary restoration is feasible, cost-effective, and desired by the local community.
Under Alternative C ongoing adverse effects from residual injury to natural resources would not be diminished, as primary restoration would not occur and the source of injury would not be eliminated.

Nonetheless, cumulative impacts from the compensatory restoration implemented under Alternative C will still positively affect the SEMO. Alternative C will provide for opportunities to add to and connect the currently protected resources over a larger geographic area than Alternative B. Consequently, Alternative C may also establish larger tracts of contiguous high quality habitat that would benefit many fish and wildlife species in the area.

However, the overall effect of restoration projects under Alternative C is expected to be less than the cumulative benefits of the comprehensive restoration alternatives offered by Alternative D. Due to these limiting factors, Alternative C is less desirable than Alternative D. To achieve maximum benefit from those restoration projects implemented, the Trustees need to have the

flexibility to request and implement projects that best suit the environmental needs, local conditions, and local communities affected by the injured natural resources while still meeting our legal requirements.

5.5 Alternative D: Tiered Project Selection Process Evaluating the Feasibility of Primary Restoration or Compensatory Restoration. (Preferred Alternative)

5.5.1 Cumulative Impacts

As the synthesis of restoration projects presented in both Alternatives B and C, Alternative D would contribute most to the efforts of the Trustees to restore natural resources in the SEMO. With the ability to selectively decide between primary restoration, off-site restoration/resource enhancement, or acquisition of equivalent resources, the Trustees can plan for and seek projects that will best restore natural resources to their baseline level of services or acquire the equivalent of such resource services. As a result, large tracts of injured natural resources can be considered for restoration, and where on-site restoration is impracticable, or less appropriate, suitable off-site restoration projects can be considered and implemented. The Trustees would use the project selection criteria as outlined in Sections (6) and (7) of this document to judiciously select the most appropriate restoration projects.

The inclusion of more diverse projects under Alternative D allows for greater input and impact by local communities, organizations, and agencies. Accordingly, Alternative D provides for increased cooperation between the Trustees and the abovementioned entities towards the completion of conservation, natural resource enhancement, and restoration goals. Because of the ability to consider a greater diversity of projects, Alternative D may result in the establishment of larger tracts of continuous high quality habitat that would benefit species in the SEMO area than possible under either Alternatives B or C.

Cumulative impacts from the primary restoration and compensatory restoration projects implemented under Alternative D would result in the greatest positive impact for the SEMO as a whole. The overall effect of restoration projects under Alternative D is expected to be significantly greater than cumulative benefits offered by Alternative B or Alternative C.

5.6 Summary of Environmental Effects for Each Alternative (Table 4)

Table 4. Comparison of the Effects of Alternative A, B, C, & D,

Attributes	Alternative A (No Action)	Alternative B Primary Restoration	Alternative C Compensatory Restoration	Alternative D Primary Restoration, and Compensatory Restoration
Uplands	Continued net loss of resources	Increase of upland resources associated with the restoration of injured sites	Uplands away from the site are restored and/or protected, additional protection from degradation or development. On-site injured resources remain unaddressed	Injured uplands are directly restored where appropriate; uplands are preserved, enhanced, or protected when primary restoration is not indicated
Wetland, floodplain, and riparian corridor	Expected continued net loss of resources	Increase of wetland, floodplain, and riparian corridor resources associated with the restoration of injured sites	Wetland, floodplain, and riparian corridor away from the site are restored and/or protected, additional protection from degradation or development. On-site injured resources remain unaddressed	Injured wetland, floodplain, and riparian corridor are directly restored where appropriate; wetland, floodplain, and riparian corridor are preserved, enhanced, or protected when primary restoration is not indicated
Aquatic resources	Continued degradation and loss of resources	Increase of aquatic resources associated with the restoration of injured sites	Aquatic resources away from the site are restored and/or protected, additional protection from degradation or development. On-site injured resources remain unaddressed	Injured aquatic resources are directly restored where appropriate; aquatic resources are preserved, enhanced, or protected when primary restoration is not indicated
Surface waters	Remain degraded due to land use issues and historic pollution in sediments	Increase of surface water quality associated with the restoration of injured sites	Surface water quality away from the site is restored and/or protected, additional protection from degradation or development. On-site injured resources remain unaddressed	Injured surface waters are directly restored where appropriate; surface waters are preserved, enhanced, or protected when primary restoration is not indicated
Ground water, cave and karst resources	Continued degradation and loss of resources	Increase of ground water quality associated with the restoration of injured sites	Groundwater resources away from the site are restored and/or protected, additional protection from degradation or development. On-site injured resources remain unaddressed	Injured ground water/cave/karst resources are directly restored where appropriate; ground water/cave/karst resources are preserved, enhanced, or protected when primary restoration is not indicated
Biological resources	Continued injury	Increase in abundance with restoration of injured sites	Increase in abundance in locations other than the site of injury.	Biological resources increase in abundance at the site of injury where primary restoration is implemented and at off-site locations when compensatory restoration is indicated
Listed threatened or endangered species	Negative impacts would continue	Potential recovery of species in the area of primary restoration	Protection of species through acquisition of existing resources. On-site injured resources remain unaddressed.	Potential recovery of listed species at the site of primary and compensatory restoration. Protection of species through acquisition of existing resources

Table 4 Continued				
Attributes	**Alternative A (No Action)**	**Alternative B Primary Restoration**	**Alternative C Compensatory Restoration**	**Alternative D Primary Restoration and Compensatory Restoration**
Cultural resources	No change in current condition.	Adverse impacts are possible	Adverse impacts are possible	Adverse impacts are possible
Environmental justice issues	Degraded resources impacting communities are not restored.	Degraded resources impacting communities are directly restored	Degraded resources impacting communities are not restored. Persons distant from the site more directly benefit from restoration	Degraded resources impacting communities are restored or the public is compensated for their loss with appropriate off-site restoration projects
Socioeconomic issues	Local economy would remain the same due to continued injury without restoration.	Local economy could potentially increase due to funds spent on primary restoration	Increase likelihood of restoration benefiting regional economy due to greater geographic region	Local economy likely to benefit from the restoration of injured sites, funds expended on restoration, and enhanced wildlife, fishing, hiking, viewing, etc. opportunities.
Recreational use, environmental education and resource enjoyment	No enhancement or increase in recreational opportunities or environmental education.	Potential enhancement of wildlife viewing and fishing opportunities at the site only.	Allows for enhancement of wildlife viewing and fishing opportunities as well as enhancement of understanding of the ecosystem in areas similar to the injured resources.	Allows for enhancement of wildlife/bird viewing and fishing opportunities as well as enhancement of understanding of the ecosystem both at the site and at off-site areas designed to compensate the public.
Cumulative impacts	Potential decrease in abundance of biological resources, continued loss of upland and wetland, floodplain, and riparian corridor resources, continued degradation of groundwater.	Increased abundance of biological resources and greater diversity in the aquatic and terrestrial biotic communities; some ecosystem functions restored.	Increased abundance of terrestrial and aquatic communities only at locations other than the site of release. Natural resources at the site of injury remain injured.	Increased abundance of biological resources and greater diversity of aquatic and terrestrial biotic communities; ecosystem functions are able to be restored. Local communities have more opportunities for increased natural resources and enjoyment.

SECTION 6 – COMPENSATORY RESTORATION REQUEST FOR PROPOSAL PROCESS

6.1 Compensatory Restoration

Compensatory restoration is one of two options for restoration which the Trustees may exercise to compensate the public for loss of natural resources and the services they provide. As discussed in Section 1 of this restoration plan the term "Compensatory Restoration" will be used to refer to the following restorations types:

- Acquisition of Equivalent Resources or Replacement: the substitution of an injured resource with one that provides the same or substantially similar services. 43 C.F.R. §§ 14(a) and (ii). An example of AER is the purchase of a property containing high-quality natural resources that is threatened with development or destruction; and

- Compensatory Restoration: any action taken to offset the interim losses of natural resources from the date of the event until recovery (USBLM, 2008). An example of compensatory restoration is the removal of undesirable eastern red cedar trees from a glade habitat to compensate for injuries to substantially similar natural resources that occurred elsewhere.

Compensatory restoration is distinguished from primary restoration (discussed in Section (7)) in that it enhances resources or services different from those injured, with the difference being either the type of services restored or the location where services are restored.

By law, the Trustees are responsible to the public to use recovered restoration funds solely for the restoration of natural resources injured by the release of hazardous substances, and/or pollutants. The Trustees must ensure that there is a connection between the injury and the restoration project implemented. The Trustees are accountable to the public for how the restoration funds are expended and must comply with requirements under NEPA and CERCLA. There is no intent by the Trustees to delegate these responsibilities to other parties or organizations.

6.2 The Request for Proposal Process

Compensatory Restoration projects will be evaluated and selected through a Request for Proposal or RFP process. In order to maximize the ecological benefit of the recoveries, it is the intent of the Trustees to utilize this RFP process to assist in the identification of compensatory restoration projects for implementation. Issuance of an RFP by the Trustees will be triggered by a number of factors, including but not limited to the availability of restoration funds, staff time and availability, input from stakeholders, the schedule of CERCLA response actions at a particular site, and the nature of the resource injury. Issuance of an RFP will be announced by multiple media sources and a public meeting near the targeted geographical priority area discussed in the RFP. The Trustees will work with stakeholders and amongst themselves to identify projects which meet the restoration criteria and goals contained within this SEMORRP. The Trustee Council will evaluate and make the final recommendations on the selection of

projects. Each individual restoration project that is selected under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to its implementation. The exemplar RFP contained in Appendix G serves as a model for future RFPs. It contains the restoration project RFP format and guidance for proposal submission.

Potential stakeholders include, but are not limited to, private landowners, municipalities, county and local governments, state and federal agencies, private and public entities, and private and public nonprofit organizations interested in implementing restoration projects to restore injured natural resources and their services. Restoration project proposals prepared by local agencies or groups are more likely to be supported by the community overall because they will better reflect local interests and priorities. Overall effectiveness of the SEMORRP will increase through leveraging public and private contributions (dollars and services) and coordination with other area enhancement projects. Note that the Trustees can submit projects through the RFP process. These project submittals will be evaluated objectively using the same criteria as non-trustee submittals. If the RFP process does not result in any proposals that adequately meet the goals laid out in the RFP, the Trustees reserve the right to re-issue the RFP at a later date.

Restoration projects should not duplicate or substitute for traditional funding sources or program responsibilities; they should be in addition to existing responsibilities. Basic principles such as fish and wildlife biology, landscape ecology, botany, wetland, floodplain, and riparian corridor ecology, and hydrology are important concepts to utilize in the development of quality restoration projects that restore both habitat structure and function and comply with the goals of the SEMORRP. Maximizing resources and leveraging monies for restoration projects is strongly encouraged. The Trustees may condition proposal funding offers on land management requirements such as sustainable forestry.

6.2.1 Communication with the Trustees

The Trustees will use their websites for a multitude of purposes, including, but not limited to: the announcement of public meetings, announcement of scheduled releases of RFPs, publication of dates for project proposal submission, publication of RFPs, announcement of selected restoration projects, and general communication of restoration efforts in the SEMO. Requests for Proposals will also be advertised on http://www.grants.gov. Project submission details and requirements will be included in each individual RFP that the Trustees release. The SEMO NRDAR website is located at http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html. The MDNR's NRDAR website is located at http://www.dnr.mo.gov/env/hwp/sfund/nrda.htm. Hard copies of all materials on the websites will also be available in the FWS' office in Columbia, Missouri, and the MDNR's office in Jefferson City, Missouri.

The Trustees reserve the right to initiate or return communications in any form to project proposal submitters to request clarifications in their proposal documents. The Trustees will notify each submitter separately regarding their selection or failure to be selected for funding under a specific RFP. The public will be notified of selected restoration project proposals via the Trustees' respective NRDAR websites and via local repositories.

6.3 Compensatory Restoration Project Proposal Evaluation Criteria

Sections 6.3.1 through 6.5 below provide detailed information regarding the criteria for compensatory restoration project proposals. The scoring criteria or Decision Matrix which the Trustees will use to score individual restoration project proposals is included as Appendix A. Appendix B details the full process which the Trustee Council will use to screen and select successful restoration project proposals.

6.3.1. Benefit Scope

Wherever possible, natural resource functions that are self-sustaining and essential to maintain the resource will be restored or enhanced and protected. Projects that provide long-term benefits that begin immediately after project implementation are preferred, assuming that any operation and maintenance activities required for long-term success will be conducted. Projects that provide a broad scope of measurable benefits to a wide area or wildlife resource will be given priority. Those that are focused on a limited set of benefits to a limited area or wildlife resource are less preferred. Restoration projects should not have disproportionate high costs or low benefits to a small area. Projects that benefit more than one injured natural resource will also be given priority. Projects that use reliable, tested methods are preferred to those that rely on untested methods. Natural resource-based restoration projects with a high ratio of expected benefits to expected cost will be preferred. This aspect may be assessed relative to other proposed projects that benefit the same resource. Projects promoting species native to the SEMO will be preferred.

6.3.2 Quantifiable Benefit

Restoration projects with quantifiable benefits and easily discernible success endpoints are a higher priority than projects that do not include these measures. Restoration project proposals shall include performance measures to determine whether the restoration actions are effective in providing the public with similar services and values to those lost due to the release of hazardous substances into the environment. A timeline outlining the implementation and establishment of the restoration project will be used by the Trustees to determine completion and success of the project. The overall success of the Trustees' restoration plan will depend upon the success of each restoration project.

6.3.3 Potential Impact

Priority will be given to restoration projects that avoid or minimize negative impacts to natural resources or environmental degradation. Temporary degradation which is necessary for project success will not preclude the selection of a restoration project. Mitigation measures, if necessary, should be identified in the proposal. The Trustees will require that all appropriate permits are obtained and regulations followed. All projects selected for implementation will comply with applicable and relevant laws, policies and regulations.

6.3.4 Voluntary Land Acquisition/Easements

Protection of resources through acquisition of land or conservation easements will only be from willing sellers or participants. Landowners will be under no obligation to sell or provide a conservation easement for the purposes of implementing a restoration project. Neighbors adjacent to land purchased for preservation under this restoration plan will retain all of their current rights to their lands. The Trustees are required to pay fair market value for land purchased. Fair market value will be determined through established appraisal procedures.

6.3.5 Geographic Area

All potential compensatory restoration projects will be evaluated for their proximity to the injury. Priority will be given to projects that seek to restore or compensate the public for injury in the geographic area identified by the Trustees. All restoration projects that are authorized under this plan will seek to restore or replace natural resources within a defined geographic area as indicated in the RFP, unless the Trustees determine that all other options are exhausted.

Geographical priorities will be influenced by the following factors:

1) proximity to the impacted natural resources and/or lost services; and
2) quality of restoration opportunities (areas with substantial ecological opportunities are preferred).

6.3.6 Climate Change

The climate of the Earth is changing with the potential to cause changes in ecosystems and mass species extinctions. The FWS is committed to examining every activity it performs for its implications for climate change (USFWS, 2009). Consequently, the restoration project proposals will also be evaluated in the context of climate change—both its implications for and its adaptability to climate change. In particular, restoration project proposals should address how the proposed project incorporates one or more of the four basic climate change adaptation approaches or strategies identified by the FWS: Resistance, Resilience, Response, and Realignment. (www.wildlifeadaptationstrategy.gov/). Further information about the FWS' perspective and plan for Climate Change can be found at: http://www.fws.gov/home/climatechange/index.html.

Generally, restoration projects that serve to restore degraded environments, re-establish native vegetation, and improve the habitat of native species also serve to increase the sequestration of carbon in the biosphere and the soil. Projects that specifically seek to address natural resources injured as a result of the release of hazardous substances while mitigating the effects of climate change are preferred. Projects that solely focus on climate change *are not* the focus of the SEMORRP and will not be funded under this process.

6.3.7 Landscape Conservation Cooperatives

By leveraging resources and strategically targeting science to inform conservation decisions and actions, Landscape Conservation Cooperatives (LCCs) are a network of partnerships working in unison to ensure the sustainability of America's land, water, wildlife and cultural resources. LCCs are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. LCC partners include federal agencies, states, tribes, non-governmental organizations, universities and others. LCCs enable resource management agencies and organizations to collaborate in an integrated fashion within and across landscapes. General information regarding LCCs is available at: http://www.fws.gov/science/shc/lcc.html.

The SEMO falls within the Interior Highlands section of the Gulf Coastal Plains and Ozarks LCC. The Trustees plan to utilize the expertise of the Gulf Coastal Plains and Ozarks LCC and coordinate their activities to the greatest and most environmentally beneficial degree possible.

6.3.8 Strategic Habitat Conservation

Strategic Habitat Conservation is a structured, science-driven approach for making efficient, transparent decisions about where and how to expend FWS resources for species, or groups of species, that are limited by the amount or quality of habitat. It is an adaptive management framework integrating planning, design, delivery and evaluation. The purpose of the Strategic Habitat Conservation framework is to ensure that the FWS uses the best process to make decisions about local conservation actions to achieve broad-scale objectives as efficiently as possible. Further information regarding Strategic Habitat Conservation is available at: http://training.fws.gov/EC/resources/shc/shc.htm.

A fundamental principle of Strategic Habitat Conservation is that every site has a unique management potential for every trust species. Consequently, this SEMORRP will evaluate projects for both selection and eventual success under the context of Strategic Habitat Conservation.

6.3.9 Missouri Conservation Opportunity Areas, Parks, and Other Public Lands

The Missouri Department of Conservation's framework of COAs identifies the best places where partners can combine technology, expertise and resources for all wildlife conservation. Focused efforts in these COAs will ensure that Missourians continue to enjoy a rich and diverse natural heritage. Further information regarding COAs is available at: http://mdc.mo.gov/landwater-care/priority-focus-areas/conservation-opportunity-areas. The MDC has several COAs in the SEMO, including the LaBarque Creek, Middle Meramec, St. Francois Knobs, Current River Hills, and Eleven Point Hills COAs (Figure 4) (Conservation Commission of Missouri, 2009).

Restoration projects that serve to enlarge, buffer, connect, or restore existing protected natural resources in the SEMO will be given preference under the SEMORRP. Compensatory restoration projects funded under this plan do not have to specifically occur within or adjacent to a designated COA, park, or other public property; however, restoration projects that meet other

criteria and also occur within above described areas will receive additional points according to the Trustees' Decision Matrix, as outlined in Appendix A.

6.3.10 The U.S. Forest Service's Mark Twain National Forest Plan

The Mark Twain National Forest (MTNF) has developed and published an in-depth, descriptive analysis of current forest conditions as well as desired goals and objectives for future management activities on the entire Forest. It can be found on the Mark Twain National Forest website: http://www.fs.usda.gov/detail/mtnf/landmanagement/?cid=fsm8_045643. Where NRDAR restoration objectives and priorities align with MTNF management priorities, the Trustees will give preference to restoration projects implemented on the MTNF that serve to fulfill both sets of priorities, provided that the same or substantially similar natural resources or the services they provide injured by the release of hazardous substances are being restored. However, NRDAR restoration funds will not be used to replace or supplant normal funding sources for the MTNF. Compensatory restoration projects implemented on the MTNF should only be in addition to normal management activities.

6.3.11 The U.S. Forest Service's Collaborative Forest Landscape Restoration Program

The Forest Service's Collaborative Forest Landscape Restoration Program (CFLRP) is an innovative and pioneering program designed to prioritize the restoration of critical forest landscapes. The CFLRP is being implemented on a national scale and presents a unique opportunity to potentially complement NRDAR restoration in the MTNF. The goals of the CFLRP are further defined below:

The purpose of the CFLRP is to encourage the collaborative, science-based ecosystem restoration of priority forest landscapes. The Collaborative Forest Landscape Restoration Program expands collaborative landscape partnerships to:

- encourage ecological, economic, and social sustainability;
- leverage local resources with national and private resources;
- facilitate the reduction of wildfire management costs, through re-establishing natural fire regimes and reducing the risk of uncharacteristic wildfire;
- demonstrate the degree to which various ecological restoration techniques achieve ecological and watershed health objectives; and,
- encourage utilization of forest restoration by-products to offset treatment costs, to benefit local rural economies, and improve forest health.

(http://www.fs.fed.us/restoration/CFLRP/index.shtml/index.shtml)

The MTNF has successfully applied for funds under the CFLRP and will begin to implement their "Missouri Pine-Oak Woodland Restoration Project" using prescribed fire and mechanical treatments in priority areas of the Current River and the Black River Watersheds in Shannon, Carter, Wayne, Butler, Ripley, and Oregon counties. To the extent that the Trustees' Compensatory Restoration priorities align with the restoration priorities described in the MTNF's Pine-Oak Woodland Restoration Project, the Trustees will prioritize restoration projects that serve to fulfill both sets of priorities. Aligning the SEMORRP with existing restoration and

management plans allows the Trustees to leverage the previous planning efforts that have taken place in the SEMO, while still keeping a focus on restoring natural resources and services that were injured by the release of hazardous substance

6.3.12 Tribal Cultural Resources

The restoration of specific areas or resources with appreciable cultural value to Native American tribes is important to the Trustees. Although no federally recognized tribes currently reside in Missouri, several federally recognized tribes consider portions of the Forest to be important ancestral homeland areas. Mark Twain National Forest currently consults with 28 federally recognized tribes.

6.4 Compensatory Restoration Project Proposal Acceptability Criteria

Proposed compensatory restoration projects must meet the Acceptability Criteria (Table 5) to be considered further in the project selection process. These criteria were developed by the Trustee Council to aid in eliminating those projects that are inconsistent with the requirements of the NRDAR regulations. In essence, the Acceptability Criteria stipulate that a restoration project must comply with all applicable laws and regulations, address resources or services connected to those injured only by the release of hazardous substances and be technically feasible to implement. Proposed projects will be evaluated on a pass/fail system in relation to each criterion. If a proposed project passes each criterion, it will be evaluated further under the Restoration Ranking Criteria. If a proposed project fails any of the Acceptability Criteria, it will no longer be considered.

Table 5. Acceptability Criteria for Compensatory Restoration Project Planning

Criteria	Interpretation
Is compliant and consistent with federal and state laws, policies and regulations.	Project must be legal and protect public health, safety, and the environment.
Has demonstrated technical feasibility, and is within the funding limits identified in the RFP.	Projects must be feasible within the proposed budget.
Addresses impacted natural resources or services targeted for restoration within the RFP.	Projects must restore, rehabilitate, replace or acquire the equivalent of natural resources impacted by the release of hazardous substances in the SEMO.
Project will not be used for response actions, and will not be used to reduce or eliminate NRDAR liability by a Potentially Responsible Party (PRP).	Project addresses the specific concerns and criteria laid out by the Trustees.

6.5 Compensatory Restoration Project Proposal Ranking Criteria

The Trustees developed criteria to evaluate and rank potential compensatory restoration projects. These criteria (Table 6) reflect the Trustee requirements and priorities for NRDAR restoration as outlined in Section (6) and the Preferred Alternative. The purpose of the project ranking criteria is to provide a means of ranking potential restoration projects against each other by considering the objectives and requirements of the NRDAR restoration planning process. Proposed projects will then be rated by priority within each criterion. Projects with the highest ranking will undergo final review and selection for implementation by the Trustees. Only proposals meeting Acceptability Criteria (Section 6.4, Table 5) will be considered.

These evaluation criteria relate to whether the project meets the goals and objectives of the Trustees for restoration of the SEMO relating to project location, injury caused by release of the hazardous substance, restoration goals, project implementation, feasibility, cost-effectiveness, project types, timing, and duration of benefits provided by the project.

Table 6. Compensatory Restoration Project Ranking Criteria

Criteria	Interpretation
Project occurs in an identified priority geographic area.	Projects closer to the site of injury to natural resources are preferred to projects further from the site of release of hazardous substances.
Project occurs within or adjacent to a park, national forest, natural area, conservation area, or conservation opportunity area within the geographic area identified.	Preference is given to the expansion and buffering of existing protected areas as well as those areas identified in existing landscape scale conservation planning efforts.
Restores or replaces injured, lost, or depressed ecological services.	Priorities include woodlands, glades, savannahs, wetland, floodplain, and riparian corridor, aquatic resources, groundwater, state and federal rare, threatened or endangered species, and native species.
Project fits within one or more of the restoration project categories identified as appropriate for restoring injured resources.	Projects addressing the identified restoration goals in the RFP will receive the highest priority for funding.
Benefits federal- and state-listed species, or Missouri Species of Concern.	Preference is given to projects that directly and indirectly benefit federal and state listed species and Missouri species of concern.
Restores lost human uses (e.g., drinking water, recreational opportunities).	Projects that serve to restore lost human uses while simultaneously restoring natural resources and the services they provide will be given preference.

Table 6 Continued	
Restores or enhances native diversity and abundance.	Projects which enhance the diversity and abundance of native Missouri flora and fauna will be preferentially funded over those projects which do not.
Creates greater connectivity between existing natural areas.	Connectivity between existing natural areas is important for the maintenance of healthy gene flow. Consequently, the Trustees will give preference to projects that enhance or create connectivity.
Ecosystem improvements are self-sustaining.	Projects which do not require continual maintenance and investment of resources will be prioritized over projects that require continued operations and maintenance.
Provides specific benefits or enhancements not provided by other restoration or ongoing management projects.	Restoration project proposals which serve to fund projects not directly sponsored through traditional governmental or other funding methods will be prioritized.
Complements planned response actions. Does not provide benefits already provided by response actions.	To the extent practicable, restoration projects should seek to complement known response actions if they exist at the specified sites. This requirement will not be listed for sites where response actions are not conducted.
Provides the greatest scope of ecological, cultural, and economic benefits to the largest area or resource.	To the degree that a bigger project results in greater good, bigger projects are better. Projects that benefit more than one injured resource or service will be given priority. Projects that avoid or minimize additional impacts to natural resources or environmental degradation will be given priority.
Time required to return resources to baseline condition is minimized.	Proposal identifies expected timeline to return to baseline.
Minimal adverse impact to natural resources will occur from the proposed actions over the long term.	Proposed project does not pose the risk of adverse environmental effects or the project proposal explicitly identifies steps which will be taken to mitigate the risk of adverse environmental impacts.
Is cost effective, including planning, implementation, and long-term operation, maintenance, and monitoring.	A project with a high ratio of expected benefits to expected costs is preferred. This may be assessed relative to other projects that benefit the same resource.
Additional funds (matching or scaled) are provided by proposal source (submitter) or to be pooled with other funding sources.	Proposals with other sources of funding, including in-kind services, will be given priority over project proposals that do not include other sources of project funding.

Table 6 Continued	
Project involves partnerships between multiple entities.	Proposals received from a partnership of groups, agencies, landowners, or other consortia will be given priority by the Trustees.
Project involves a monitoring component.	Projects will be evaluated in terms of whether the benefits can be quantified and the success of the project determined. A restoration monitoring plan is included. Projects can be scaled to provide restoration of appropriate magnitude. Small projects that provide only minimal benefit relative to injured resources or larger projects that cannot be appropriately reduced in scope are less favored.
Project identifies performance measures for successful restoration.	Project identifies timeline for restoration success and specific quantitative or qualitative performance measures that can be used to identify the progress and completion of the project.
If goals of restoration are not being achieved, the project identifies the next steps to achieve restoration success.	Preference will be given to project proposals which explicitly identify mitigating steps which the submitter will take given scenarios where restoration success is not achieved within the timeframe, scope, or location described in the proposal.
Uses methods that are known to be technically practicable or has research to support the feasibility of the project.	Projects will be evaluated for their likelihood of success given the proposed methods. Factors that will be considered include whether the proposed technique is appropriate to the project, whether it has been used before, and whether it has been successful. Projects incorporating wholly experimental methods, research, or unproven technologies will be given lower priority.

6.6 Additional National Environmental Policy Act (NEPA) Considerations for Compensatory Restoration

In the course of the development of restoration proposals for specific sites that fall within the SEMO, it has come to the attention of the Federal Trustees that additional NEPA analyses may be required for certain compensatory restoration projects. Each individual restoration project that is selected under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis prior to its implementation.

SECTION 7- PRIMARY RESTORATION IMPLEMENTATION PROCESS

7.1 Primary Restoration Considerations

The Trustees have decided to include the ability to directly control the implementation of primary restoration at the sites where injury to natural resources has been determined by assessment studies. Primary restoration is defined as:

- Any action taken to return an injured natural resource and its services to its baseline condition. Restoration projects that directly restore natural resource injuries caused by the release of hazardous substances are considered primary restoration. An example of primary restoration is the removal of contaminated materials from an ecosystem where they are causing injury to natural resources.

By law, the Trustees are responsible to the public to use recovered restoration funds solely for the restoration of natural resources injured by the release of hazardous substances, and/or pollutants. The Trustees must ensure that there is a biological connection between the injury and the restoration project implemented. The Trustees are accountable to the public for how the funds are expended and must comply with requirements under NEPA and CERCLA. There is no intent by the Trustees to delegate these responsibilities to other parties or organizations.

Implementation of primary restoration at the site of natural resource injury may involve the following complications and complexities:

- Health and Safety Hazards
- Complex site ownership histories and permissions
- Lengthy permitting processes
- Limited suite of available sites for primary restoration
- The presence of residual contamination in remediated habitat that presents an attractive nuisance to wildlife unless properly restored
- Advanced technical issues not present at “normal” resource restoration projects
- Other considerations which may impair restoration success

Due to the likely presence of these confounding conditions at primary restoration sites, the Trustees determined that implementation of primary restoration projects on sites where hazardous substances have been released does not conform with an RFP process. Consequently, for the implementation of primary restoration at sites covered by this plan, the Trustees will not use an RFP process akin to the process described in Section (6) of this plan for compensatory restoration. Instead, the Trustees will implement primary restoration according to the details laid out below and in accordance with Section (8) of this plan.

In order to provide greater transparency to the public regarding the Trustees’ intentions for the disposition of funds discussed in Section (1.5), the Trustees have developed a Strategic Restoration Implementation Plan (SRIP). The SRIP identifies the anticipated timeframe and the estimated amounts of restoration funds that will be issued by the Trustees. The SRIP is discussed further in Section (8) of this plan.

7.2 Primary Restoration Project Proposals, Evaluation, and Implementation

Sections 7.2.1 through 7.2.5 provide detailed information regarding primary restoration proposals which the Trustees will generate as well as the criteria which the Trustees will use to select and implement primary restoration projects consistent with the findings of the Trustees injury determination studies.

7.2.1 Primary Restoration Project Proposals

The first step in the implementation of primary restoration projects is the generation of a primary restoration proposal from one or more of the Trustees. Proposals for primary restoration will be crafted to reflect the known suite of information regarding the NRDAR site where the Trustees' have made a successful claim. Proposals will contain information which is substantially similar to the information requested in the "Restoration Project Information Sheet" of Appendix G of this plan. At a minimum, Primary Restoration Project Proposals will include the following information:

1. <u>Project cost and budget estimate</u>

The Trustee(s) proposing a primary restoration project will provide an approximate budget estimate for the funding requested in descriptive summary categories such as personnel, surveying, easements, contractual services, materials etc. The Trustees will also include information pertaining to any types of cost sharing, such as other funding sources or in-kind services that will add the value of the proposal.

2. <u>Timeline</u>

The Trustee(s) will outline the estimated time and steps or phases needed to complete the primary restoration project including an estimated completion date as well as long term monitoring and maintenance requirements of the project.

3. <u>Description of parcels, streams, or other areas currently being considered</u>

The Trustee(s) will provide details on all potential land currently being considered for primary restoration. Details will include parcel size and location on a map, approximate size of restoration acreage (if different), general description of pre-restoration conditions of the land (wetland or upland, vegetation cover type, etc.), connectivity with nearby greenspaces, and any special conditions that may exist on the property (utilities, easements, etc).

4. <u>Description of primary restoration technologies and techniques to be implemented</u>

The Trustee(s) proposing a primary restoration project will discuss the technologies and techniques they are planning to implement at the restoration site. The discussion will include the scientific basis for the restoration technology, partners used in the development and implementation of the project, as well as the mechanisms and processes used to implement the restoration.

5. Benefit Scope

Primary restoration project proposals will describe the immediate and long term benefits of the restoration of the injured resource. Projects that provide long-term benefits that begin immediately after project implementation will be preferentially selected, assuming that any operation and maintenance activities required for long-term success will be conducted. Projects that provide a broad scope of measurable benefits to a wide area or wildlife resource will be given priority. Restoration projects should not have disproportionate high costs or low benefits to a small area. Projects that benefit more than one injured natural resource will also be given priority. Primary restoration projects with a high ratio of expected benefits to expected cost will be preferred. Except under extraordinary conditions, projects utilizing species native to the SEMO will be required.

6. Quantifiable Benefit

The Trustee(s) will also discuss how the return of ecological services provided by the restored resources will be quantified. Restoration projects with quantifiable benefits and easily discernible success endpoints are a higher priority than projects that do not include these measures. Primary restoration projects proposed by the Trustees will include performance measures to determine whether the restoration actions are effective in providing the public with similar services and values to those lost due to the release of hazardous substances into the environment.

7. Potential Impact

Discussion of the potential impacts to the environment will be included in the primary restoration project proposals. Priority will be given to restoration projects that avoid or minimize negative impacts to natural resources or environmental degradation. Temporary degradation which is necessary for project success will not preclude the selection of a restoration project. The Trustees will ensure that all appropriate permits are obtained and regulations followed. All projects selected for implementation will comply with applicable and relevant laws, policies and regulations.

8. Voluntary Participation in Primary Restoration and Easements

Landowners will be under no obligation to sell or provide a conservation easement for the purposes of implementing a primary restoration project. The Trustees will only implement primary restoration projects on the lands of willing owners without exception.

9. Climate Change

The climate of the Earth is changing with the potential to cause changes in ecosystems and mass species extinctions. The FWS is committed to examining every activity it performs for its implications for climate change (USFWS, 2009). Consequently, all primary restoration projects will be evaluated in the context of climate change—both its implications for and its adaptability to climate change. Further information about the

FWS' perspective and plan for Climate Change can be found at: http://www.fws.gov/home/climatechange/index.html.

Generally, restoration projects that serve to restore degraded environments, re-establish native vegetation, and improve the habitat of native species also serve to increase the sequestration of carbon in the biosphere and the soils. Projects that specifically seek to address natural resources injured as a result of the release of hazardous substances while mitigating the effects of climate change are preferred. Projects that solely focus on climate change *are not* the focus of the SEMORRP and will not be funded under this process.

7.2.2 Primary Restoration Project Proposals Selection and Evaluation

Akin to compensatory restoration project selection and evaluation, the Trustees will use the Decision Matrix (Appendix A) to evaluate primary restoration proposals for suitability for implementation. Full details regarding the acceptability and ranking criteria in the decision matrix are discussed in Section (6) of this plan. The Trustee Council will jointly review and select primary restoration proposals to implement.

7.2.3 Public Participation and Primary Restoration

Prior to the implementation of any selected primary restoration project the Trustees will advertise and conduct a public meeting to discuss, answer questions, and solicit public comment on the selected primary restoration project. The Trustees will accept comments in writing and via e-mail for a period of at least 30 days. The Trustees will respond in writing to all received comments prior to the implementation of any primary restoration projects.

7.2.4 Primary Restoration Project Implementation

Though the Trustees will not use an RFP process to solicit primary restoration projects under the SEMORRP, the Trustees will utilize a similar process of advertising and requesting bids for professional services or goods necessary to complete selected primary restoration projects in accordance with applicable federal and state laws. In instances where the Trustees utilize a request for bids, a substantially detailed bid document will be prepared and shared throughout the geographic priority area for restoration via local media sources, the Trustees' websites, http://www.grants.gov, and other means in compliance with state and federal contracting laws.

Through a variety of forums and public listening sessions in the SEMO area, the Trustees have repeatedly heard from private landowners that they prefer to directly influence and assist in the implementation of primary restoration projects on their own property. The Trustees or their designees will make every effort to work directly with private landowners and public land managers to implement the most appropriate types of primary restoration at the site of injury to natural resources and the services they provide. Additionally, the Trustees will make a concerted effort to include incentives within their requests for bid documents that encourage respondents to utilize local contractors, materials, and labor as compliant with state and federal contracting laws.

Successful respondents to a request for bids will enter into a contractual agreement with one of the Trustees. Additional contracting requirements may be applicable for successful respondents. For example, professional services or certain construction activities may require proof of Errors and Omissions Insurance and securing of a Payment and Performance Bond. Successful applicants will be notified of contracting and cooperative agreement needs upon selection of proposals. Final approval of a project will occur at the completion of any necessary contracts or formalization of cooperative agreements.

7.2.5 Communication with the Trustees

Similarly to compensatory restoration, the Trustees will use their websites for a multitude of purposes regarding primary restoration, including, but not limited to: the announcement of public meetings, issuing requests for bids for aspects of the primary restoration process, announcement of primary restoration project schedules, and general communication of restoration efforts in the SEMO. The SEMO NRDAR website is located at http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html. The MDNR's NRDAR website is located at http://www.dnr.mo.gov/env/hwp/sfund/nrda.htm. Hard copies of all materials on the websites will also be available in the FWS' office in Columbia, Missouri and the MDNR's office in Jefferson City, Missouri at the following addresses:

U.S. Fish & Wildlife Service
Ecological Services Office
Attn: John Weber
101 Park DeVille Dr. Suite A
Columbia, MO 65203

Missouri Department of Natural Resources
Hazardous Waste Program
Attn: Eric Gramlich
P.O. Box 176
Jefferson City, MO 65102-0176

The public will be notified of selected restoration projects via the Trustees respective NRDAR websites and via local outreach.

7.3 Additional National Environmental Policy Act (NEPA) Considerations for Primary Restoration

In the course of the development of primary restoration proposals for specific sites that fall within the SEMO, it has come to the attention of the Federal Trustees that additional NEPA analyses may be required for certain restoration projects (*e.g.* in stream restoration of contaminated sediments in the Big River). Each individual restoration project that is selected under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to its implementation.

SECTION 8 – DRAFT STRATEGIC RESTORATION IMPLEMENTATION PLAN

The Trustees have developed a stand-alone Draft Strategic Restoration Implementation Plan (SRIP) to accompany this restoration plan. The SRIP was designed to provide greater transparency regarding the Trustees' intentions, plans, and timeframes for restoration in the SEMO. The SRIP covers both compensatory and primary restoration in the SEMO and includes the following categories of information:

- Estimated amount of money to be released
- Estimated year of release
- Type of restoration (Primary or Compensatory) contemplated
- Natural Resource or Service Target (e.g., Riparian Corridor, Upland Migratory Bird Habitat, etc.)
- Geographic priority for restoration

The SRIP is designed as a stand-alone document in order to facilitate biannual updates to the information contained therein. Additionally, other entities such as the U.S. Environmental Protection Agency are formulating response plans at a number of Superfund sites within the geographic scope of this plan that may strongly affect the Trustees' strategic vision for restoration implementation. Consequently, the SRIP will remain a fluid document, independent of this restoration plan and be updated on a biannual basis in order to provide the public with a greater degree of access to important restoration information.

The SRIP will be located at: http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html and at:
http://www.dnr.mo.gov/env/hwp/sfund/nrda.htm

SECTION 9—CONSULTATION AND COORDINATION WITH THE PUBLIC AND OTHERS

9.1 Public Participation

Public review of the SEMORRP/EA is an integral component of the restoration planning and NEPA process. Throughout the public comment period, the Trustees accepted comments on the SEMORRP/EA. To insure that the public had ample opportunity to provide comments on the SEMORRP/EA, the Trustees accepted comments on the draft plan for 75 days and held public meetings during that period to facilitate understanding of the draft plan. Next, the Trustees responded to comments and incorporated changes to the draft document. Notification of comment period and public meetings was made available on the Trustees' respective websites, local newspapers, and the Federal Register, among other sources.

Once the final SEMORRP has been published, the Trustee Council will publish RFPs for compensatory restoration under the SEMORRP and will begin to accept and review proposals for restoration projects. Public stakeholder meetings will be conducted to fully explain each RFP that is released by the Trustees. When the designated time frame for evaluation of proposals has expired, the Trustees will announce the selection and funding of projects that rank the highest. Project ranking will be based on the Decision Matrix found in Appendix A. Each individual restoration project that is selected under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to its implementation. The Trustees will continue to issue RFPs until all designated compensatory restoration funds are expended. Funds allocated to primary restoration will be spent as discussed in Section (7).

Prior to the implementation of any selected primary restoration project the Trustees will advertise and conduct a public meeting to discuss, answer questions, and solicit public comment on the selected primary restoration project alternatives. The Trustees will accept comments in writing and via e-mail for a period of at least 30 days. The Trustees will respond in writing to all received comments prior to the implementation of any primary restoration projects.

9.2 Public Meetings, Presentations, and Scoping for Restoration

As part of restoration scoping for the SEMORRP, the Trustees have conducted extensive outreach to local communities covered by the current plan. A partial list is included below.

9/23/2010	Jefferson County Public Meeting, Hillsboro Civic Center
4/25/2011	Washington County Public Meeting, Washington County Health Department
4/26/2011	Jefferson County Public Meeting, Hillsboro Civic Center
4/27/2011	St. Francois County Public Meeting, Mineral Area College
5/24/2011	Jefferson County Public Meeting, Hillsboro Civic Center
6/21/2011	Washington County Public Meeting, Washington County Library in Potosi
6/28/2011	Jefferson County Public Meeting, Hillsboro Civic Center
6/30/2011	St. Francois County Public Meeting, Mineral Area College
7/26/2011	Jefferson County Public Meeting, Hillsboro Civic Center
7/28/2011	St. Francois County Public Meeting, Mineral Area College

8/2/2011	Washington County Public Meeting, Washington County Courthouse
8/23/2011	Jefferson County Public Meeting, Hillsboro Civic Center
8/25/2011	St. Francois County Public Meeting, Mineral Area College
11/1/2011	Jefferson County Public Meeting, Hillsboro Civic Center
11/2/2011	Washington County Public Meeting, Washington County Courthouse
11/3/2011	St. Francois County Public Meeting, Mineral Area College
12/6/2011	Jefferson County Public Meeting, Hillsboro Civic Center
12/8/2011	St. Francois County Public Meeting, Mineral Area College
5/29/2012	Jefferson County Public Meeting, Hillsboro Civic Center
5/31/2012	St. Francois County Public Meeting, Mineral Area College
6/7/2012	Washington County Public Meeting, Industrial Development Authority Office
10/8/2013	Jefferson County Public Meeting, Hillsboro Civic Center
10/10/2013	St. Francois County Public Meeting, Mineral Area College
10/15/2013	Washington County Public Meeting, Washington County Library in Potosi
10/17/2013	Iron/Reynolds County Public Meeting, Viburnum City Hall
10/29/2013	Jefferson County Public Meeting, Hillsboro Civic Center

9.3 National Historic Preservation Act Compliance

The FWS' Region 3 Regional Director will provide the SHPOs with this restoration plan and environmental assessment as part of the public review and comment process, drawing their attention to the recommended procedure for implementing Section 106 of the National Historic Preservation Act (NHPA) as described in 36 C.F.R. Part 800.

Cultural resources are those parts of the physical environment, natural and built, that have cultural value to some socio-cultural groups and human social institutions. Cultural resources include historic sites, archeological sites and associated artifacts, sacred sites, traditional cultural properties, cultural items (human remains, funerary objects, sacred objects, and objects of cultural patrimony), and buildings and structures. Most cultural resource concerns can be identified through the Section 106 process of the NHPA. To reduce paperwork, avoid duplication, and expedite decision making, the Section 106 process as defined in 36 C.F.R. Part 800 will be followed for purposes of the environmental assessment.

Absent objections from HPOs or from other interested persons, the NHPA is recognized as having legal standing (39 C.F.R. § 800.2(c)(3), (4), and (5)) in land acquisition projects, projects involving ground disturbance, and projects impacting buildings and structures 50 years and older, the FWS' representative on the Trustee Council will:

1) consult with the appropriate HPO for each specific project (undertaking) for the purpose of identifying cultural resources in the area of potential effect and obtain from the HPOs a determination of no historic properties or no effect on historic properties as outlined in Section 106 of the NHPA, and

2) provide the Regional HPO with sufficient documentation to determine if the Section 106 process has been completed prior to project implementation.

If the project occurs on the Mark Twain National Forest, then the Forest Supervisor and Mark Twain National Forest Heritage Staff will oversee the Section 106 compliance.

9.4 Endangered Species Act Compliance

One of the Fish & Wildlife Service's primary goals is to protect and benefit Threatened and Endangered Species. Consequently, after projects have been evaluated and deemed successful through the SEMORRP's RFP process, the FWS' case manager for projects in the SEMO will provide the FWS' Ecological Services Field Office with completed Intra-Service Section 7 consultation forms pursuant to Section 7 of the Endangered Species Act of 1973, as amended, 16 U.S.C. §§ 1531-1599, and its implementing regulations, 50 C.F.R. Part 402. Each project funded under this restoration plan will be evaluated for its potential effects to federally threatened, endangered and candidate species prior to the award of any restoration funds. Projects deemed to have an adverse effect on listed or candidate species or their critical habitats will not be funded under this plan.

9.5 Administrative Record

An administrative record pertaining to the implementation of this plan will be maintained at the U.S. Fish and Wildlife Service, Columbia, Missouri Ecological Services Field Office and at Missouri Department of Natural Resources in Jefferson City, Missouri. All pertinent documents relating to the restoration will be cataloged and an index will be available at http://www.fws.gov/midwest/nrda/index.html . The documents will be available to the public during normal office hours at:

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

Missouri Department of Natural Resources
Hazardous Waste Program
1738 East Elm Street
Jefferson City, MO 65102-0176

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SECTION 12 – REFERENCES CITED

Conservation Commission of Missouri (CCM). 2012. "Comprehensive Wildlife Strategy: Conservation Opportunity Areas". Internet. Retrieved from <http://mdc.mo.gov/nathis/cws/coa/> on 1 November 2012.

Conservation Commission of Missouri. "Elk restoration in Missouri." 2010. Missouri Department of Conservation. 25pp.

Cornell Lab of Ornithology (CLO). 2011. "Birds in Forested Landscapes: Swainson's Warbler". Internet. Retrieved from <http://birds.cornell.edu/bfl/speciesaccts/swawar.html> on 9 November 2011.

Illinois Natural History Survey (INHS). 2011. "*Quadrula cylindrica* Rabbitsfoot". Internet. Retrieved from <http://www.inhs.illinois.edu/animals_plants/mollusk/musselmanual/page32_3.html> on 19 September 2011.

Imes, J.L. 1990. Major geohydrologic units in and adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma – Ozark Aquifer: U.S. Geological Survey Hydrologic Investigations Atlas HA-711-E. 3 sheets.

Miller, J.A., and C.L. Appel, 1997. Ground water atlas of the United States: Kansas, Missouri, and Nebraska HA 730-D U.S. Geological Survey.

Miller, D E., and J.E. Vandike. 1997. Missouri State Water Plan Series Volume II, Groundwater Resources of Missouri. Missouri Department of Natural Resources' Division of Geology and Land Survey, Water Resources Report No. 46. 210 p.

Missouri Audubon Society (MAS). 2011**.** **"**Annotated Checklist of Missouri Birds". The Audubon Society of Missouri, July 2010. <http://mobirds.org/listing/listoflists.aspx>

Missouri Department of Conservation (MDC). 1997. "Big River: Inventory and Assessment for Big River Watershed." 1997, July 31. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/big-river> on 21 September 2012.

MDC. 1998. "Meramec River: Executive Summary." 1998, November. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/meramec-river> on 21 September 2012.

MDC. 1999. "Bourbeuse River: Executive Summary." 1999, December. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/bourbeuse-river> on 21 September 2012.

MDC. 2001. "Jacks Fork River: Executive Summary." 2001, April. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/jacks-fork-river> on 25 October 2012.

MDC. 2001. "Eleven Point River: Executive Summary." 2001, March. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/eleven-point-river> on 21 September 2012.

MDC. 2001. "St. Francis River: Executive Summary." 2001, July. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/st-francis-river> on 21 September 2012.

MDC. 2003. "Current River: Inventory and Assessment for Current River Watershed." 2003, January. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/current-river> on 21 September 2012.

MDC. 2004. "Black River: Inventory and Assessment." 2004, February. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/black-river> on 21 September 2012.

MDC. 2010. "Elk History and Restoration". 17 August 2010. Internet. Retrieved from <http://mdc.mo.gov/conmag/2010/09/elk-history-and-restoration> on 27 July 2011.

MDC. 2011 a. "Heritage Program". Internet. Retrieved from <http://mdc.mo.gov/landwater-care/heritage-program> on 3 July 2011.

MDC. 2011 b. "Detailed Report – Northern Harrier". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400122> on 19 September 2011.

MDC. 2011 c. "Detailed Report – Peregrine Falcon". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400063> on 19 September 2011.

MDC. 2011d. "Detailed Report – Swainson's Warbler". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400340> on 9 November 2011.

MDC. 2011e. "Detailed Report – Bachman's Sparrow". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400252> on 19 September 2011.

MDC. 2011f. "Endangered Species in the Field Guide – Gray Bat". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/gray-bat> on 22 July 2011.

MDC. 2011g. "Endangered Species in the Field Guide – Indiana Bat". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/indiana-bat> on 22 July 2011.

MDC. 2011h. "Endangered Species in the Field Guide – Eastern Spotted Skunk". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/eastern-spotted-skunk> on 4 November 2011.

MDC. 2011i. "Endangered Species in the Field Guide – Elephantear". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/elephantear-elephants-ear> on 3 August 2011.

MDC. 2011j. "Endangered Species in the Field Guide – Snuffbox". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/snuffbox> on 3 August 2011.

MDC. 2011k. "Endangered Species in the Field Guide – Ebonyshell". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/ebonyshell> on 2 August 2011.

MDC. 2011l. "Detailed Report – Crystal Darter". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0100051> on 10 September 2011.

MDC. 2011m. "Best Management Practices – Crystal Darter". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9545_6485.pdf> on 13 September 2011.

MDC. 2011n. "Detailed Report – Longnose Darter". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0100061> on 13 September 2011.

MDC. 2011o. "Best Management Practices – Longnose Darter". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9548_6488.pdf> on 13 September 2011.

MDC. 2011p. "Endangered Species in the Field Guide – Hellbender". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/hellbender> on 23 August 2011.

MDC. 2011q. "Endangered Species in the Field Guide – Mead's Milkweed". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/meads-milkweed> on 3 August 2011.

MDC. 2011r. "Detailed Report – Mead's Milkweed". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=2001400> on 3 August 2011.

MDC. 2011s. "Detailed Report – Virginia Sneezeweed". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=2003311> on 3 August 2011.

MDC. 2011t. "Endangered Species in the Fieldguide – Running Buffalo Clover". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/running-buffalo-clover> on 3 August 2011.

MDC. 2011u. "Bison". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/bison> on 27 July 2011.

MDC. 2012a. "Best Management Practices for Curtis Pearlymussel". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9565_6505.pdf> on 31 October 2012.

MDC. 2012b. "XPlor Field Guide: Lake Sturgeon". Internet. Retrieved from <http://xplor.mdc.mo.gov/discover-nature/field-guide/lake-sturgeon> on 30 January 2012.

MDC. 2012c. "Field Guide: Swamp Darter". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/swamp-darter> on 2 November 2012.

MDC. 2012e. "Field Guide: Goldstripe Darter". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/goldstripe-darter> on 2 November 2012.

MDC. 2012g. "Field Guide: Sabine Shiner". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/sabine-shiner> on 2 November 2012.

MDC. 2012h. "Field Guide: Mountain Madtom". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/mountain-madtom> on 2 November 2012.

MDC. 2012j. "XPlor Field Guide: Pallid Sturgeon". Internet. Retrieved from <http://xplor.mdc.mo.gov/discover-nature/field-guide/pallid-sturgeon> on 30 January 2012.

MDC. 2012l. "XPlor Field Guide: Decurrent False Aster". Internet. Retrieved from http://xplor.mdc.mo.gov/discover-nature/field-guide/decurrent-false-aster> on 31 October 2012.

MDC. 2012m. "Missouri Species and Communities of Conservation Concern Checklist - January 2012". Missouri Department of Conservation, Jefferson City. 51pp.

Missouri Department of Resources (MDNR)-Water Resources Center. 2012a. "Salem Plateau Groundwater Province". Internet. Retrieved from <http://www.dnr.mo.gov/env/wrc/groundwater/education/provinces/salemplatprovince.htm> on 26 October 2012.

Nigh, T.A. and W.A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City. 212 pp.

Oklahoma Department of Wildlife Conservation (OKDWC). 2011. "Endangered species – Longnose Darter". Internet. Retrieved from <http://wildlifedepartment.com/wildlifemgmt/endangered/darter.htm> on 13 September 2011.

Poole, A. and F. Gills, eds. 1998, The Birds of North America. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D. C.

The Nature Conservancy (TNC). 2011. "The bison are back!" Internet. Retrieved from <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/missouri/the-bison-are-coming.xml> on 27 July 2011.

USBLM, 2008. Natural Resource Damage Assessment and Restoration Handbook. Internet. Retrieved from http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.38115.File.dat/H-1703-3.pdf on 31 October 2012.

USFWS. 2005. Mead's Milkweed Fact Sheet. June 2005. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS. 2006, March. Hine's Emerald Dragonfly Fact Sheet. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS, 2009, September. Rising to the Challenge: Draft Strategic Plan for Responding to Accelerating Climate Change. Internet. Retrieved from http:// http://www.fws.gov/home/climatechange/pdf/CCStrategicPlan.pdf

USFWS. 2009, November. Winged Mapleleaf Fact Sheet. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS. 2011a. Spectaclecase Fact Sheet. January 2011. USFWS Endangered Species Division, Fort Snelling, Minnesota. 2 pp.

USFWS. 2011b. "Ozark Hellbender Fact Sheet". October 2011. USFWS Endangered Species Division, Fort Snelling, Minnesota. 2 pp.

USFWS- Raleigh Ecological Services Field Office. 2011c. "Pondberry (*Lindera melissifolia*)". 2011, August. Internet. Retrieved from http://www.fws.gov/raleigh/species/es_pondberry.html> on 31 October 2012.

USFWS. 2012a. "Missouri Federally-Listed Threatened, Endangered and Candidate Species County Distribution". Internet. Retrieved from <http://www.fws.gov/midwest/endangered/lists/missouri-spp.html> on 26 October 2012.

USFWS. 2012b. "Curtis' Pearlymussel". Internet. Retrieved from <http://www.fws.gov/ecos/ajax/docs/life_histories/F00J.html> on 31 October 2012.

USFWS. 2012c. "Species Profile: Decurrent False Aster (*Boltonia decurrens*)". Internet. Retrieved from <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q26A> on 31 October 2012.

USFWS. 2013. Natural Resource Damage Assessment: Southeast Missouri Lead Mining District. http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html .

USFWS, U. S. Department of Commerce and U. S. Census Bureau. 2006. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. 91pp.

Wisconsin Department of Natural Resources (WIDNR). 2011. "Endangered Resources Program Species Information: Crystal Darter". Internet. Retrieved from http://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=AFCQC01010> on 13 September 2011.

SOUTHEAST MISSOURI OZARKS REGIONAL RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

APPENDICES

APPENDIX A	DECISION MATRIX FOR SCORING OF RESTORATION PROPOSALS
APPENDIX B	EVALUATION AND SELECTION PROCESS FOR COMPENSATORY RESTORATION PROJECTS
APPENDIX C	LIST OF OTHER RELEVANT STATUTES, REGULATIONS, OR GUIDANCE
APPENDIX D	DETAILED EXPLANATION OF AFFECTED RESOURCES IN THE SOUTHEAST MISSOURI OZARKS
APPENDIX E	2012 MISSOURI SPECIES OF CONSERVATION CONCERN IN THE SOUTHEAST MISSOURI OZARKS
APPENDIX F	LIST OF PUBLIC LANDS IN THE SOUTHEAST MISSOURI OZARKS
APPENDIX G	EXEMPLAR REQUEST FOR PROPOSALS
APPENDIX H	TRUSTEES' RESPONSE TO COMMENTS RECEIVED ON THE DRAFT SOUTHEAST MISSOURI OZARKS REGIONAL RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

Appendix A:
Decision Matrix For Scoring of Restoration Proposals

PROPOSAL TITLE:

ACCEPTABILITY CRITERIA: Projects Must Pass These Four Criteria for Further Consideration:		
Is compliant and consistent with federal and state laws, policies and regulations.	Yes or No	
Demonstrates technical feasibility.	Yes or No	
Addresses injured natural resources or services targeted for restoration within the Request for Proposal or Natural Resource Damage Assessment and Restoration (NRDAR) process.	Yes or No	
Project will not be used for response actions, and will not be used to reduce or eliminate NRDAR liability by a Potentially Responsible Party (PRP).	Yes or No	

PROJECT RANKING CRITERIA: Scored Criteria	**Scoring:**	**Points Assigned:**
1. <u>Location of project (20 points possible):</u>		
a) Project occurs in an identified priority geographic area. When applicable, score according to the tiered geographic priorities identified in the RFP. *0 = outside of the Southeast Missouri Ozarks, 5 = within the Tier 1 area nearest the injured resource, etc.*	(Score 0-5) x 3	
b) Project occurs within or adjacent to a park, national forest, natural area, or conservation area within the geographic area identified. *0 = project is not near a protected area, 5 = project is within or completely surrounded by a protected area.*	(Score 0-5)	
2. <u>Preferred resources and services, identified in the RFP (50 points possible):</u>		
a) Restores or replaces lost (or depressed) ecological services and/or resources. *0 = minimally restores or replaces lost ecological services, 5 = substantially restores and replaces lost ecological services for the injured natural resources.*	(Score 0-5) x 2	
b) Project fits within one or more of the restoration project categories identified as appropriate for restoring the injured resources. When appropriate, score according to the prioritization of projects identified in the RFP. *0 = outside of the restoration categories identified in the RFP, 5 = proposed restoration falls within the top priority restoration category.*	(Score 0-5)	

c) Benefits federal- and state-listed species, or Missouri Species of Concern. *0 = does not benefit any listed species, 5 = directly benefits listed species.*	(Score 0-5) x 2
d) Restores lost human uses (e.g., drinking water, recreational opportunities). *0 = does not restore or replace lost human uses, 5 = fully restores or replaces a lost human uses.*	(Score 0-5)
e) Restores or enhances native diversity and abundance. *0 = does not restore or enhance native species, 5 = increases both the abundance and diversity of native species.*	(Score 0-5) x 2
f) Creates greater connectivity between existing natural areas. *0 = project fails to connect protected natural areas, 5 = project connects two previously separate protected areas.*	(Score 0-5)
g) Ecosystem improvements are self-sustaining. *0 = ecosystem improvements are not self-sustaining, 5 = ecosystem improvements require no human inputs after implementation.*	(Score 0-5)

3. Scope of Benefits (20 points possible):	
a) Provides specific benefits or enhancements not provided by other restoration projects. *0 = project does not provide any unique benefits, 5 = provides benefits entirely unique to the project.*	(Score 0-5)
b) Complements planned response actions. Does not provide benefits already provided by response actions. *0 = does not complement response action, overlaps with clean-up actions, 5 = project complements but is not redundant to the response action.*	(Score 0-5)
c) Provides the greatest scope of benefits to the largest area or natural resource population. *0 = benefits accrue only to a small, localized area, 5 = benefits a large geographical area or population.*	(Score 0-5) x 2
4. Time required for restoration (5 points possible):	
a) Time required to return resources to baseline condition is minimized. Proposal identifies expected timeline to return to baseline. *0 = no timeline is indicated or project may take a long time to return resources to baseline condition, 5 = a timeline is included and baseline conditions will be achieved in the short term.*	(Score 0-5)
5. Adverse environmental effects from actions (5 points possible):	
a) Minimal adverse impact to natural resources will occur from the proposed actions over the long term. *0 = the project results in lasting adverse environmental effects, 5 = project results in no adverse environmental effects.*	(Score 0-5)
6. Cost-effectiveness (20 points possible):	
a) Utilizes cost-effective means. *0 = project uses inflated or overly expensive means, 5 = project creatively and efficiently maximizes the use of restoration funds.*	(Score 0-5)
b) Additional funds (matching or scaled) are provided by proposal source (submitter) or to be pooled with other funding sources.	(Score 0-5) x 2

0 = no additional matching funds or in kind services are provided, 5 = more than half of project funds are provided or matched by sources other than Trustees' restoration funds.	
c) Project involves partnerships between multiple entities *0 = no additional partnerships are identified in the project proposal, 5 = proposal submitted by multiple cooperating entities.*	(Score 0-5)
7. Evaluation component (15 points possible):	
a) Project includes a monitoring component. *0 = no monitoring component, 5 = includes a detailed, funded plan for monitoring restoration success*	(Score 0-5)
b) Project identifies performance measures for successful restoration. *0 =performance measures for success are not included, 5 = workable and applicable performance criteria are directly specified in the proposal.*	(Score 0-5)
c) If goals of restoration are not being achieved, the project identifies the "next steps" to achieve restoration. *0 = proposal fails to identify any contingency steps or plans, 5 = detailed contingencies are provided for a variety of scenarios.*	(Score 0-5)
8. Technical Feasibility (5 points possible):	
a) Uses methods that are known to be technically practicable or has research to support the feasibility of the project. *0= completely novel technology, 5= internationally, peer-reviewed, and recognized methods*	(Score 0-5)

140 Possible **Total=** 0

Appendix B—Evaluation and Selection Process for Compensatory Restoration Projects

Southeast Missouri Ozarks Regional Restoration Plan

1. There are two ways that a compensatory restoration project can be proposed:

    a. The Trustee Council will publish a notice of a Request for Proposal (RFP) in local newspapers and the Trustee Council websites with at least sixty (60) days for the proposal application process. The Trustee Council will hold at least one public meeting to discuss the particular RFP.

    b. An agency member of the Trustee Council will submit to the Trustee Council a restoration proposal based on the goals of the Southeast Missouri Ozarks Regional Restoration Plan within the same period.

2. Following the proposal submission deadline, the Trustee Council representatives will convene to review the project proposals. The Trustee Council representatives will identify projects that do not meet the acceptability criteria (See Appendix A. *Decision Matrix*) and inform the submitter. At the same time, the Trustee Council representatives will conduct a joint review of the Decision Matrix criteria, to identify any potential common concerns with the projects that meet the acceptability criteria. The Trustees reserve the right to reject proposals even if they meet the acceptability criteria.

3. The representatives for each Trustee Council agency will then separately evaluate and score the project proposals using the Decision Matrix ranking criteria, consulting internal and external experts relevant to the proposals.

4. The Trustee Council representatives will reconvene to discuss their Decision Matrix criteria evaluation of the projects. The objective of this discussion is to prioritize and reach consensus on the scoring of the submitted projects based on the Decision Matrix. In the case of disagreement among the Trustee Council for a particular Decision Matrix criterion, a mean score will be generated from the individual scores generated by each Trustee.

5. The projects will be ranked by the consensus-based Decision Matrix scores and the Trustee Council representatives will adopt a resolution recommending the highest-ranked project proposals to the federal and state Trustees for funding. The number of projects recommended will be dependent upon the funds available and on the requested funds of the priority projects.

6. In the event that the Trustee Council representatives are in disagreement over the recommendation of potential restoration projects, the matter shall be elevated to the state and federal Trustees pursuant to the Memorandum of Understanding between the Missouri Department of Natural Resources, the United States Department of Agriculture, and the United States Department of the Interior.

7. Once the state and federal Trustees reach unanimous approval of the projects to be funded, the Trustee Council representatives will notify all submitters of the decision of the Trustee Council, and will identify next steps to the submitters of funded project proposals.

Appendix C—List of Other Relevant Statutes, Regulations, or Guidance

Southeast Missouri Ozarks Regional Restoration Plan

Note: This list is not exhaustive.

The Trustees have or will comply with all applicable laws, Executive Orders, policies, and regulations for each restoration project relating to

- *Clean Water Act of 1972, as amended***.** The Clean Water Act (CWA) is the first federal statute to comprehensively authorize recovery of Natural Resource Damages (NRD). The CWA mandates that any NRD recoveries are used to restore, replace or acquire the equivalent of the injured natural resources.

- *Endangered Species Act of 1973, as amended.* The Endangered Species Act (ESA) requires federal agencies to determine whether their actions may adversely affect any federally listed or proposed threatened or endangered species. If so, formal consultation pursuant to Section 7 of the ESA is initiated. The FWS will initiate and complete ESA consultation on each project that is selected under the SEMORRP.

- *Migratory Bird Treaty Act of 1918, as amended.* The Trustees will make every effort to insure that migratory bird species are protected and their habitats enhanced, as appropriate, as a result of restoration activities selected under this plan.

- *National Environmental Policy Act of 1969*. The National Environmental Policy Act (NEPA) requires federal agencies to consider the environmental effects of proposed federal actions. While the SEMORRP includes an Environmental Assessment for restoration planning, the federal Trustees will conduct additional NEPA analysis for subsequent restoration planning and implementation that falls under the SEMORRP.

- *National Historic Preservation Act of 1966, as amended.* The MDNR will provide project information to the State of Missouri Historic Preservation Officer for each selected project prior to implementation, requesting their input to ensure project compliance with Section 106 of the National Historic Preservation Act.

- *National Wildlife Refuge (NWR) System Administration Act of 1966, as amended.* The Pilot Knob National Wildlife Refuge is located in the SEMO. The project alternatives in this SEMORRP will not have any significant adverse effects on the refuge. Projects proposed under the SEMORRP could positively contribute to the management of Pilot Knob NWR.

- *Executive Order 11990, Protection of Wetlands.* Implementation of any project alternative in this SEMORRP is not anticipated to have or cause any significant adverse effects on wetlands.

- *Executive Order 11988, Floodplain Management.* The project alternatives in this SEMORRP will not have any significant adverse effects associated with modification and occupancy of floodplains.

- *Executive Order 12962, Aquatic Systems and Recreational Fisheries.* Executive Order 12962 directs federal agencies to add additional public access to fisheries nationwide by conserving, restoring, and enhancing aquatic systems. Implementation of some project selected under the SEMORRP may cause short-term adverse effects to aquatic systems but will be designed to minimize these effects and to maximize long-term benefits to aquatic systems.

- *Executive Order 13112, Invasive Species.* Implementation of any alternative in this SEMORRP will use existing integrated pest management strategies to prevent the introduction of invasive species, such as noxious weeds, and will not authorize or carry out actions that are likely to cause the introduction or spread of invasive species.

- *Executive Order 13186, Protection of Migratory Birds.* Implementation of any alternative in this SEMORRP is not anticipated to cause measurable negative effects on migratory bird populations.

- *Department of the Interior Departmental Manual, Parts 517 and 609, Pesticides and Weed Control.*
  Consistent with DOI policy, implementation of any alternative in this SEMORRP will use integrated pest management strategies. Pesticides will be used only after a full consideration of alternatives, and if used, the least hazardous material that will meet restoration objectives will be chosen.

- *DOI Departmental Manual Part 602: Land Acquisition, Exchange and Disposal.*
  Consistent with DOI policy, any selected alternative that involves land acquisition will comply with appropriate pre-acquisition standards, particularly American Society for Testing and Materials (ASTM) Standards on Environmental Site Assessments for Commercial Real Estate in effect at the time. Pre-acquisition assessments will be done by qualified individual(s) and will be done within 12 months of the date of acquisition. Any required approvals will be obtained, and acquisition conditions set out in Part 602 will be met.

- *341 FW 3. Pre-Acquisition Environmental Site Assessments.* All conditions set forth in FW3, including environmental site assessment requirements, including pre- and post-acquisition requirements, Level I, II, or III assessment, assessment standards and conditions, retention of records, and time limits will be met.

APPENDIX D--Detailed Explanation of Potentially Affected Resources in the Southeast Missouri Ozarks

Southeast Missouri Ozarks Regional Restoration Plan

For purposes of the Southeast Missouri Ozarks Regional Restoration Plan (SEMORRP), the Southeast Missouri Ozarks (SEMO) is defined by the following seven watersheds: the Big River, the Black River, the Bourbeuse River, the Current River (includes the Jacks Fork River), the Eleven Point River, the Meramec River, and the upper portion of the St. Francis River (Figure 1). Each watershed will have a Physical Resources section that will describe the topography, bedrock, soil, surface water, and ground water that can be associated with that watershed. Biological resources for the entire SEMO region are listed in the second portion of this appendix.

Differences in landform, lithology, soils, and vegetation produce a grouping of sixteen ecological subsections collectively known as the Ozarks as defined by Nigh and Schroeder's 2002 Atlas of Missouri Ecoregions. Seven of these 16 ecological subsections are identified in the SEMO border and will be briefly described in their respective watersheds (Figure 2). The following ecological subsections are located in the SEMO: Central Plateau (CP), Meramec River Hills (MRH), St. Francois Knobs and Basins (SKB), Current River Hills (CRH), Black River Ozark Border (BRO), and Inner Ozark Border (IOB).

Big River Watershed

The Big River Watershed is composed of the following three Missouri ecological subsections: Meramec River Hills (MRH), St. Francois Knobs and Basins (SKB), and Inner Ozark Border (IOB) (Nigh and Schroeder, 2002). Almost half of the Big River Watershed is composed of the MRH. The SKB is located in the upper watershed with a small portion of IOB defining all the northeast boundary of the Big River Watershed.

Physical Resources

Topography

Land elevations throughout the Big River Watershed range from 435 feet above mean sea level (msl) at the mouth of the Big River to 1,740 feet above msl in the headwaters at Buford Mountain (MDC, 1997). Almost half of the Big River Watershed is found to be located within the MRH subsection which consists of hilly to rugged lands with steep slopes and narrow valley bottoms. Local karst, losing streams, and large springs are characteristic (Nigh and Schroeder, 2002). The MRH lies within the Ozark uplift, an asymmetrical dome-shaped landform lying in southern Missouri and portions of Arkansas, Kansas, and Oklahoma. Strata dip gently northwestward and relief throughout this area is moderately high 200-350 feet or more (Nigh and Schroeder, 2002).

The SKB subsection is prevalent throughout the southeast section of the Big River Watershed and is distinctive for the presence of bedrock of Precambrian age and bedrock of Cambrian age

that fills in spaces among and around the Precambrian areas (Nigh and Schroeder, 2002). The subsection has three different topographic features: the igneous knobs and hills, the smooth floored basins and valleys on dolomites and sandstones, and the dolomite, sandstone, and cherty hills (Nigh and Schroeder, 2002). The southeastern portion of the watershed drains the northern edge of the unaltered rugged, igneous peaks of the St. Francois Mountains (MDC, 1997). Since these formations are highly-resistant to erosion, streams tend to be high gradient and form very narrow river valleys through thin residuum (MDC, 1997). Relief is generally high with local elevation changes of 300 – 1,000 feet (Nigh and Schroeder, 2002). Pre-settlement vegetation was a mixture of forest, open woodlands, glades, and small prairies in the basins (Nigh and Schroeder, 2002). Exceptionally large areas of igneous glade and woodland complexes remain, pastures and grazed woodlands occupy the basins, and lead mining has scarified the land (Nigh and Schroeder, 2002).

Bedrock

The Big River Watershed contains diverse representation of various geologic formations ranging in age from Mississippian to Precambrian which includes the Cambrian age cherty dolomites and sandstones, Ordovician cherty dolomites and the Precambrian igneous rock. The dolomites are soluble and create impressive local karst, including some very large springs, extensive caverns and numerous dry valleys (Nigh and Schroeder, 2002). The dolomites and sandstones have eroded away from the hills and are found mainly in the basins (Nigh and Schroeder, 2002). A majority of these watershed streams flow through the Salem Plateau, a dissected plateau of sedimentary rock topped by a thin layer of glacial loess (MDC, 1997). This plateau commonly forms rolling to narrowly-cut river valleys. As the Big River flows northward, it cuts through progressively younger limestone and dolomite (MDC, 1997). Sandstone is common in Jefferson County and shale becomes prominent in the lower basin (MDC, 1997).

According to the Missouri Department of Natural Resources (MDNR), substantial deposits of lead, zinc, copper, magnesium, and barite have attracted mining operations to Jefferson, St. Francois, and Washington Counties beginning over 200 years ago (as cited in MDC, 1997). Historic iron and lead surface mining disturbed numerous scattered tracts of land and caused the denudation of thousands of acres of timber for fuel for smelting (Nigh and Schroeder, 2002). Subterranean iron and lead mining continues and causes environmental concern (Nigh and Schroeder, 2002).

Soil

Soil type and quantity varies among the three subsections within the Big River Watershed. The MRH soils are closely related to bedrock lithology and landscape position, while the SKB soils in igneous bedrock areas are moderately deep and the diverse IOB soils vary with parent material and landscape position (Nigh and Schroeder, 2002).

USDA lists the primary soil series in the upper Watershed which include: Crider, Fourche, and Hildebrecht on ridge tops; Gasconade, Goss, and Irondale on slopes; and Haymond and Midco in the bottoms (as cited by MDC, 1997). Soils on ridge tops and slopes are highly erodible, while

upland soils are moderately shallow and consist of a combination of loess and residuum derived from in-place weathering of dolomite (MDC, 1997).

The lower elevations of these soils tend to be clayey with high chert content, thin, droughty, infertile, and stony, and are best suited for grasslands and forest according to USDA (as cited by MDC, 1997). In the river bottoms, very fertile silt-loam, developed from alluvium, has been deposited over cherty gravel and is suitable for row crops, bottomland forest, and pasture (MDC, 1997). These basins have very deep, reddish, silty clay loam subsoils, such as the Crider, Fourche, and Courtois series (Nigh and Schroeder, 2002).

MRH soils formed in the Roubidoux Formation are low in soluble bases such as calcium and magnesium, and include the Viburnum and Tonti series (Nigh and Schroeder, 2002). Backslope soils include the very deep Coulstone and moderately deep Bender series, both of which are very cherty (Nigh and Schroeder, 2002). Soils formed in the Gasconade and Eminence-Potosi Formations are higher in soluble bases and include the Rueter and Hildebrecht soils (Nigh and Schroeder, 2002). Throughout the MRH, backslope soils can be very deep and cherty, while the basins have deep, reddish, silty clay loam subsoils (Nigh and Schroeder, 2002).

Within the igneous bedrock areas of the SKB, soils are moderately deep and acidic (Nigh and Schroeder, 2002). Knobtop soils are on the summits, with very cobbly Irondale soils on the shoulders, and the loamy, boulder Syenite soils on the backslopes (Nigh and Schroeder, 2002).

Surface Water

The Big River Watershed encompasses 955 square miles and can be found in the following counties: Franklin, Jefferson, Washington, Saint Francois, Sainte Genevieve, and Iron. Main sub-basins throughout the watershed range from 26 to 189 square miles, with the largest being Mineral Fork. Big River becomes a sixth order stream at the confluence of Cedar Creek at river mile (RM) 118 in Washington County. According to Funk, there are 129 miles of permanent streams and 220 miles of intermittent streams in the basin (as cited by MDC, 1997).

Within the watershed, springs, some of them very large, are numerous and provide significant amounts of base flow to the streams. No natural lakes or ponds are present, except for sinkhole ponds, but numerous small lakes and ponds have been constructed for water supplies, stock watering, and to trap mining tailings (Nigh and Schroeder, 2002). Water quality is high, except where affected by lead mining or urbanization (Nigh and Schroeder, 2002).

Ground Water

The Big River Watershed lies within the Ozark Plateau's aquifer system, located throughout southern Missouri, southwestern Kansas, eastern Oklahoma and northwestern Arkansas. The Big River Watershed is comprised of two aquifers, the Ozark aquifer and the deeper St. Francois aquifer.

The aquifers are composed of limestones, dolomites, and sandstones, separated by a shale confining unit of minimal permeability (Miller and Appel, 1997). Recharge of aquifers occurs

primarily through precipitation at outcrop areas, but also minimally across the confining unit (comprised of minimally permeable shale and permeable limestone) (Miller and Appel, 1997). Water primarily passes through the aquifers via fractures and bedding planes, resulting in the dissolution of carbonate rocks, enlarged byways, and additional karstic features (Miller and Appel, 1997).Water discharges from the aquifers as base flow into streams or springs and seeps (Miller and Appel, 1997).

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province, the geographic area comprising most of southern Missouri, exclusive of the Missouri bootheel (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing more than 1,000 gallons per minute (Miller and Appel, 1997). Water from this aquifer is considered "suitable for most uses" with dissolved-solid concentrations less than 1,000 milligrams per liter (except in the most westernmost parts of the aquifer) (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

The St. Francois aquifer subtends the Ozark aquifer and is 300-400 feet thick in south-central Missouri. Water is withdrawn from the aquifer principally in the St. Francois Mountains, where the aquifer crops out or is close to the surface (Miller and Appel, 1997). The aquifer is at the surface at that location due to uplift and subsequent erosion. Where water is withdrawn, it is considered "suitable for most uses" with dissolved-solid concentrations between 200 and 450 milligrams per liter (Miller and Appel 1997). Depending on location, yields of from 70 to more than 125 gallons per minute are possible from the St. Francois aquifer (MDNR, 2012a).

Black River Watershed

The boundary of the Southeast Missouri Ozarks Regional Restoration Plan restricts the Black River Watershed to the extent of the Ozark physiographic province, limiting coverage of this Watershed to the upper section. Due to the differences in topography, bedrock, soil, surface water, and groundwater, the Missouri portion of the Black River Watershed will be separated into two subbasins throughout this section: the upper subbasin is the area above Clearwater Dam and the lower subbasin is the area downstream of Clearwater Dam to approximately Poplar Bluff and the southeast Missouri lowlands.

The following three of Nigh & Schroeder's ecological subsections can be found throughout the Upper Black River Watershed: Current River Hills (CRH), Black River Ozark Border (BRO), and St. Francois Knobs and Basins (SKB). The CRH makes up more than half of this Watershed and can be found predominantly along the western section and up to most of the northern border of the Watershed. The SKB cross over into the Watershed in two small sections located at the Watershed's northeast border and a smaller section in the middle of the eastern border of the Watershed.

Physical Resources

Topography

The upper subbasin of the Black River Watershed in Missouri lies in the Ozark Plateau within two subdivisions, St. Francois Mountain and the Salem Plateau, according to MDNR (as cited in MDC, 2004). Land elevations in this upper subbasin range from 1,772 feet above msl at Taum Sauk Mountain, the highest point in Missouri, to 494 feet above msl at Clearwater Dam (MDC, 2004).

The overall topographic features vary greatly throughout both subbasins. Much of the upper subsection of the Watershed has topographic features similar to the SKB and CRH subsection which include igneous knobs and hills, cherty hills, gently rolling hills giving way to steep slopes, narrow ridges, and narrow valley bottoms. The lower subbasin, consisting of the BRO subsection consists of moderately dissected hills and local flatwoods, and the relief in this area is considerably lower than that found in the upper subbasin.

Upper subbasin pre-settlement vegetation was a mixture of forest, mostly forests of oak and shortleaf pine, open woodlands, glade, and small prairies. Pre-settlement vegetation for the lower subbasin consisted of oak and pine-oak woodland and forest, with post oak flatwoods on high, flat areas with the bottomland forests of scattered flatwoods, swamps, marshes, and sand prairies.

Bedrock

The eastern part of the upper subbasin of the Black River Watershed drains the St. Francois Mountains, which are formed on Precambrian igneous and Cambrian sedimentary rocks as reported by MDNR (as cited in MDC, 2004). Much of this Precambrian rock is weather-resistant rhyolite, and consequently, stream valleys are formed in the easily erodible Cambrian dolomite (MDC, 2004). The area contains mineral deposits of lead, iron, manganese, silver, and cobalt (Nigh and Schroeder, 2002). Deep subsurface lead mining occurs in the upper Black River basin and the potential for more lead mining is present (Nigh and Schroeder, 2002).

MDNR defines the western and northern part of the lower subbasin as lying in the Salem Plateau, which is formed on Cambrian and Ordovician carbonate rocks and topped by a thin layer of glacial loess (as cited by MDC, 2004).

Soil

Located in the upper subbasin of the Black River Watershed, in the Salem Plateau, Goss-Viburnum and Clarksville-Wilderness associations dominate in the uplands while Delassus-Syenite associations dominate in the river valleys (USDA as cited by MDC, 2004). Goss and Clarksville soils are found on the sides of ridges and are well drained and Viburnum and Wilderness soils are located on the ridge tops (MDC, 2004). While Wilderness soils are well drained, Viburnum soils are poorly drained. The Goss-Viburnum soils are suited for either pasture or trees, while the remaining soils are best suited for trees. Both the Delassus and Syenite

series are moderately well drained and best suited for northern red, white, and black oaks (MDC, 2004).

Throughout the upper subbasin, in the St. Francois Mountains, Irondale-Killarney-Knobtop associations dominate with Irondale and Killarney soils found on side slopes and Knobtop soils on ridge tops (USDA as cited by MDC, 2004). Due to the high potential for erosion, stony surfaces, and drought, all of these moderately well drained, highly erodible soils are unsuitable for row crops or pasture (MDC, 2004). The soil types in northern and western sides of the lower subbasin are Loring-Captina-Clarksville and Clarksville-Captina associations (USDA as cited in MDC, 2004).

Surface Water

The Black River Watershed drains a total area of 1,756 square miles in Missouri. The Black River originates in Iron and Reynolds Counties, Missouri and flows south through Reynolds, Wayne, and Butler Counties to the state line and then southwesterly in Arkansas to empty into the White River in Arkansas (MDC, 2004).

Two reservoirs exist in the watershed and both of these are located in the upper subbasin of the Black River. The Black River flows through Clearwater Reservoir in Wayne County and Lower Taum Sauk Lake is located on the East Fork of the Black River (MDC, 2004). These two reservoirs in the upper subbasin affect stream flows and fish movement and the flow in the lower Black River is primarily regulated by water released through Clearwater Dam (MDC, 2004). The watershed streams generally exhibit good water quality throughout the Ozark portion of both subbasins (MDC, 2004).

Springs are common within this watershed. Ponds have been constructed for stock watering and there are no flood control structures, except Clearwater Dam on the middle Black River basin (Nigh and Schroeder, 2002).

Ground Water

The Black River Watershed is comprised of two aquifers, the Ozark aquifer and the St. Francois aquifer. The Ozark aquifer is the major aquifer of the Watershed with a minor portion of the St. Francois aquifer found at the surface near the northeast boundary and subtending the Ozark aquifer elsewhere.

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing more than 1,000 gallons per minute (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

The St. Francois aquifer subtends the Ozark aquifer and is 300-400 feet thick in south-central Missouri. Water is withdrawn from the aquifer principally in the St. Francois Mountains, where the aquifer crops out or is close to the surface (Miller and Appel, 1997). The aquifer is at the

surface at that location due to uplift and subsequent erosion. Where water is withdrawn, it is considered “suitable for most uses,” and has typical yields of 60 to 150 gallons per minute (Miller and Vandyke, 1997).

Bourbeuse River Watershed

The ecological subsection Central Plateau (CP) can be found throughout the Bourbeuse River Watershed almost in its entirety, with the exception of the boundary of the upper Watershed where minimal portions of the Outer Ozark Border, the Meramec River Hills, and the Inner Ozark Border subsections can be found. The CP will be the only ecological subsection addressed in this watershed description due to negligible extent of other subsections.

Physical Resources

Topography

The Bourbeuse River Watershed lies within the Salem Plateau subdivision of the Ozark Plateau and is defined as a region composed of steep-sided hills and deep valleys, separated by gently rolling uplands (MDC, 1999). Located within the northeastern quarter of the Ozark Plateau, the Bourbeuse River Watershed’s main channel gradient is low compared to the other streams of this area, with gradients of the tributaries slightly higher in the lower watershed compared to the upper watershed (MDC, 1999). Within the headwaters of the river near Rolla, MO, elevation starts at 1,140 feet above msl and ends near Union at approximately 500 feet above msl (MDC, 1999).

The CP subsection consists of some of the least dissected portions of the Ozark Highlands and therefore a portion that retains the semblance of a true plateau surface (Nigh and Schroeder, 2002). For the majority of the plateau margin there is a more gradual transition to greater dissection of the land surface with the exception being the break with the river hills which is very sharp and unmistakable in the landscape (Nigh and Schroeder, 2002). Pre-settlement vegetation was mostly savanna or grassy woodland, and prairie (Nigh and Schroeder, 2002).

Bedrock

The geology of the Bourbeuse River valley is similar to the upper Meramec River watershed (MDC, 1999). However, MDNR further clarifies that the Bourbeuse River Watershed possesses a range of surface rocks varying in age from the younger Pennsylvanian to the older Ordovician Period (as cited by MDC, 1999). Therefore, the Bourbeuse River Watershed has younger rocks than the Pre-Cambrian Age rock formations of the Meramec River Watershed (MDC, 1999). Periodic uplift has locally elevated older Ordovician rock above younger Pennsylvanian (MDC, 1999).

There are two north trending faults that "sandwich" the newer Pennsylvanian Age formations between the older Ordovician Age formations in the Bourbeuse River Watershed (MDC, 1999). The interior contains, from greater to lesser extent, the Pennsylvanian undifferentiated, the Roubidoux Formation, and a collection of Ordovician Formation rock types containing

Smithville, Powell Cotter, and Jefferson City Dolomite formations (MDC, 1999). On either side of this interior are the Roubidoux Formation and Gasconade Dolomite (MDC, 1999). It is possible that along with the various rock types, the fault contributes to formation of the springs within the Watershed.

Soil

Ozark region soil types can be variable, most often having infertile, stony clay soils in some areas and fertile, loess-capped soils in others (MDNR as cited by MDC, 1999). Stony cherty soils characterize much of the Ozarks (MDC, 1999). Clarksville is excessively drained and formed in cherty dolomite and limestone residuum (MDC, 1999). Allgood and Persinger describe the surface soil as a very cherty silt loam underlain by a very cherty, silty clay loam (as cited by MDC, 1999). Lastly, Coulstone is a deep, somewhat excessively drained soil formed in sandstone and cherty dolomite on side slopes of ridges (MDC, 1999). In the extreme north of the Bourbeuse River Watershed a boundary is drawn where loess becomes a significant characteristic of the upland surface (Nigh and Schroeder, 2002).

Ridge-tops in the Bourbeuse River Watershed have a thin mantle of loess caps and subsoils formed in fragipans which appear cemented and restrict roots (Allgood and Persinger as cited in MDC, 1999). Within the Ozark Border region, soil types are unlike the soils of the Ozark region, having the classifications Union, Gasconade, Goss, and Peridge (MDC, 1999). Union, Hobson, Goss, and Peridge are found on uplands and four soil types are found in the river bottom areas along the Bourbeuse River: Nolin, Hartville, Cedargap, and Ashton (MDC, 1999).

Cropland and pasture, found primarily within the floodplain areas, are the land uses for 45% of the Bourbeuse River Watershed (MDC, 1999). Fifty-one percent of the total land area within the watershed is deciduous forest (MDC, 1999). Other forest types are evergreen and mixed forest land (MDC, 1999).

Surface Water

The Bourbeuse River Watershed, excluding the Meramec River and the Big River Watersheds, drains 842.9 square miles (MDC, 1999). The main channel of the Bourbeuse River flows northeasterly through Phelps, Gasconade, and Franklin Counties to join the Meramec River with its watershed encompassing portions of Maries, Osage, and Crawford Counties (MDC, 1999). The Bourbeuse River is 147 miles from mouth to headwaters (MDC, 1999).

The Bourbeuse River Watershed has fewer springs with smaller discharges than the Meramec River Watershed (MDC, 1999). Stream water quality varies according to agricultural runoff and runoff from urbanized areas (Nigh and Schroeder, 2002).

Ground Water

The Bourbeuse River Watershed is underlain entirely by the Ozark aquifer. It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing yields of more than 1,000 gallons per minute (Miller and Appel, 1997).

Water from this aquifer is considered "suitable for most uses" with dissolved-solid concentrations less than 1,000 milligrams per liter (except in the most westernmost parts of the aquifer) (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

The surface karst of the CP is one of the chief sources for groundwater that resurfaces in the numerous large springs of the surrounding entrenched-river subsections (Nigh and Schroeder, 2002). The CP is a major source area for groundwater that emerges in springs in the entrenched stream valleys on its sides (Nigh and Schroeder, 2002). Throughout these areas, decomposed bedrock has formed an unconsolidated residual material, allowing high rates of groundwater discharge according to Vandike (as cited in MDC, 1999). Subsurface water is abundant and of high quality, except for "hardness" (Nigh and Schroeder, 2002).

Current River Watershed (including the Jacks Fork River Watershed)

The boundary of the Southeast Missouri Ozarks Regional Restoration Plan restricts the Current River Watershed to the extent of the Arkansas/Missouri state boundary, therefore limiting this watershed discussion to focus on Missouri's physical resources. The SEMORRP boundary includes the Jacks Fork River, a tributary of the Current River, which is sectioned off in the Current River Watershed (Figure 1). Therefore, this section will address both the Current River Watershed and the Jacks Fork Watershed.

A majority of the middle section of the Current River and Jacks Fork's watershed consists of the Current River Hills (CRH). The Central Plateau (CP) subsection is found in four small fragments to the north, west, and south of the watershed. The Black River Ozark Border (BRO) has a small segment located to the very southeast of the Watershed boundary.

Physical Resources

Topography

Both the Current River and Jacks Fork River Watersheds lie within the Salem Plateau Subdivision of the Ozark Plateau Physiographic Region (MDC, 2003 and MDC, 2001a). MDNR describes the Salem Plateau Subdivision as a highly dissected plateau with upland elevations ranging from 1,000 to 1,400 feet above msl and local relief ranging from 100 - 200 feet in the uplands to 200 - 500 feet elsewhere (as cited by MDC, 2001a).

Elevations within the Current River Watershed range from a maximum of approximately 1500 feet above msl in the uplands to approximately 280 feet above msl in the lower portions (MDC, 2003). The Jacks Fork Watershed elevations range from a maximum of approximately 1,600 feet above msl in the uplands to approximately 580 feet at the confluence of the Jacks Fork and Current Rivers (MDC, 2001a). Local relief data from the MDC Fisheries Research Fish Collection Database indicate a minimum local relief of 316 feet and a maximum of 468 feet within the watershed (as cited by MDC, 2003).

The historical land cover of the Current River Watershed uplands primarily consisted of pine and mixed pine/oak woodland with an open understory of grasses and shrubs (MDC, 2003 and Nigh and Schroeder, 2002). Prairie and savanna openings were also occasionally common in some areas (MDC, 2003 and Nigh and Schroeder, 2002).

The CRH subsection consists of gently rolling hills which give way to steep slopes, narrow ridges, and narrow valley bottoms whereas the CP subsection consists of some of the least dissected portions in this area and therefore a portion that retains the semblance of a true plateau surface (Nigh and Schroeder, 2002). In most places in the CP, there is a more gradual transition to greater dissection of the land surface with the break of the river hills being very sharp and unmistakable in the landscape (Nigh and Schroeder, 2002). The BRO subsection consists of moderately dissected hills with a local relief up to 300 feet, and the local flatwoods of much less relief (Nigh and Schroeder, 2002). The western boundary of the BRO subsection with the CRH Subsection is drawn where the lower local relief of this subsection increases to more than 250 feet (Nigh and Schroeder, 2002).

Bedrock

The geology of the Current River and Jacks Forks Watersheds consists primarily of dolomites and sandstone/dolomites of Ordovician age (MDC, 2003 and MDC, 2001a). Significant exposures of Cambrian Dolomite and Precambrian Igneous Rock associated with the St. Francois Uplift are present in the middle portion of the Current River Watershed (MDC, 2003). This same dolomite is present in the lower portion of the Jacks Fork Watershed along with small exposures of Mississippian limestone and Precambrian igneous rock (MDC, 2001a). Quaternary Alluvium, associated with the Bootheel area of Missouri, exists in the southeastern portion of the Current River Watershed (MDC, 2003). In addition, a few small areas of Mississippian limestone and limestone/sandstone occur on the Current River Watershed's eastern boundary.

As is the case in most watersheds of the Ozarks, the geology of the Current River and the Jacks Fork River Watersheds in combination with the climate has created a karst landscape within the watersheds (MDC, 2003 and MDC, 2001a). This karst landscape is characterized, in part, by a close relationship between the surface water and groundwater systems and these points or areas of surface water/ground water interaction include losing streams, sinkholes, and springs (MDC, 2003 and MDC, 2001a).

Soil

The Current River and Jacks Fork Watersheds occur primarily within the Ozarks Soil Region, which Allgood and Persinger describe as "cherty limestone ridges that break sharply to steep side slopes of narrow valleys" (as cited in, MDC, 2003). Loess occurs in a thin mantle or is absent throughout this region. Soils formed in the residuum from cherty limestone or dolomite range from deep to shallow and contain a high percentage of chert in most places. Some of the soils formed in a thin mantle of loess are on the ridges and have fragipans, which restrict root penetration (MDC, 2001). Soil mostly formed under forest vegetation with native, mid-tall and tall grasses common in open or glade area.

Both of these watersheds occur within the Ozark Soil Region. The following ten soil associations occur within the Current River Watershed: Captina-Clarksville-Doniphan, Captina-Macedonia-Clarksville, Captina-Macedonia-Doniphan-Poynor, Hartville-Ashton-Cedar Gap-Nolin, Hobson-Coulstone-Clarksville, Lebanon-Hobson-Clarksville, Loring-Union-Doniphan, Wilderness-Clarksville-Coulstone, Calhoun-Amagon, and Bosket-Tuckerman (Allgood and Persinger as cited by MDC, 2003). Allgood and Persinger provide the following list of five soil associations found in the Jacks Fork Watershed: Captina-Clarksville-Doniphan, Captina-Macedonia-Doniphan-Poynor, Hobson-Coulstone-Clarksville, Lebanon-Hobson-Clarksville, and Wilderness-Clarksville-Coulstone (as cited by MDC, 2001a).

Surface Water

Total drainage area of the Current River Watershed, including the Jacks Fork River Watershed, is approximately 2,621 square miles (MDC, 2003). The Jacks Fork River is formed by the confluence of the North Prong and South Prong of the Jacks Fork (MDC, 2003). From this confluence, the Jacks Fork River flows in an easterly direction for approximately 49 miles before joining the Current River (MDC, 2001a). Approximately 18% of the Current River Watershed is drained by the Jacks Fork River (MDC, 2003). The Current River flows approximately 184 miles in a southeasterly to south direction through portions of 9 counties in Missouri and 2 counties in Arkansas (MDC, 2003).

Missouri counties that the Current River Watershed occupies include Texas, Dent, Reynolds, Shannon, Howell, Oregon, Carter, Butler, and Ripley. The Jacks Fork Watershed occupies a land area of 445 square miles in portions of Howell, Shannon, and Texas Counties (MDC, 2001a).

Springs, some of them exhibiting huge discharge (Big Spring has an average discharge of 440 cubic feet per second), are numerous and provide significant amounts of base flow and reduce seasonal fluctuations (Nigh and Schroeder, 2002). Spring flow accounts, to a large extent, for the higher sustained flows of many Ozark streams relative to streams in other regions of Missouri (MDC, 2003). Likewise, stream flow within the Jacks Fork Watershed is also enhanced by springs (MDC, 2003). Natural ponds or lakes are absent, except for sinkhole ponds (Nigh and Schroeder, 2002). Overall water quality within the watershed appears to be relatively good based on the limited scope of analysis provided in this document (MDC, 2003).

Ground Water

The Current River and Jacks Fork Watersheds are comprised of one aquifer, the Ozark aquifer. The St. Francois aquifer subtends each of these areas and is not often used for supplying drinking water.

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing well yields of more than 1,000 gallons per minute (Miller and Appel 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel 1997).

Eleven Point River Watershed

Two ecological subsections, the Current River Hills (CRH) and the Central Plateau (CP) are found in the Eleven Point River Watershed. The CRH is located in the northeast corner of the Eleven Point River watershed boundary while the CP encompasses the western, southwestern, and southern sections of the Watershed.

Physical Resources

Topography

The Eleven Point Watershed lies within the Salem Plateau Subdivision of the Ozark Plateau and is defined by MDNR as a heavily dissected plateau with upland elevations of between 1,000 and 1,400 feet (as cited in MDC, 2001b). Local relief on the uplands is between 50 to 200 feet and in the deeply entrenched valleys between 200 to 600 feet (MDC, 2001b and Nigh and Schroeder, 2001). Elevations within the Watershed range between 1,500 feet above msl in the uplands to less than 340 feet above msl in the lower portions of the watershed within Missouri, specifically the Eleven Point River near the Missouri-Arkansas state line (MDC, 2001b).

Long gentle slopes are separated by broad, rounded ridges and wide, flat valleys, while drainages north of the Eleven Point River, in the CRH subsection, are characterized by highly dissected hills with narrow ridges and steep side slopes (MDC, 2001b). Areas in the CRH can be locally identified as gently rolling hills giving way to steep slopes, narrow ridges, and narrow valley bottoms while the CP occupies the higher, minimally dissected parts of the Ozark Highlands. (Nigh and Schroeder, 2002). Local karst, losing steams, and large springs are characteristic (Nigh and Schroeder, 2002).

Pre-settlement vegetation throughout the CRH was mainly woodlands and forests of oak and shortleaf pine (Nigh and Schroeder, 2002). Second-growth forests now dominate the landscape, with cleared land in valley bottoms (Nigh and Schroeder, 2002). CP pre-settlement vegetation was mostly savanna or grassy woodland, and prairie (Nigh and Schroeder, 2002).

Bedrock

A majority of the Eleven Point Watershed is underlain by Ordovician age dolomites and sandstone/dolomites as defined by the Missouri Spatial Data Information Service (as cited in MDC, 2001b). Isolated areas of Mississippian age limestone and limestone/sandstone are also present. According to Nigh, the light brownish-gray, cherty dolomite of the Gasconade Formation form the prominent bluffs and steep rugged hillsides along the Eleven Point River (as cited by MDC, 2001b). The bluff and hillsides are capped by a thick layer of Roubidoux Sandstone on the ridges and upper slopes (MDC, 2001b). The Jefferson City-Cotter Formation, a cherty dolomite occurring along ridge tops, is a common Ordovician age formation in the uplands of the Watershed (from Nigh, 1988 and MDC, 1997 as cited in MDC, 2001b).

Bedrock in the CRH consists of Cambrian age cherty dolomites and Ordovician cherty dolomites and sandstones (Nigh and Schroeder, 2002). The dolomites are soluble and create karst topography, including some very large springs and caverns, sinkholes, box valleys, and dry valleys (Nigh and Schroeder, 2002).

In the CP subsection, large, well-developed karst tracts are found around Howell and Oregon Counties (Nigh and Schroeder, 2002). Throughout the CP, most of the uplands shows the effects of severe, pervasive, and long-enduring dissolution of the carbonate bedrock and the surficial materials are characteristically naturally rocky and have been made more so by human-induced erosion of fines following clearing of the land (Nigh and Schroeder, 2002).

Soil

The Eleven Point Watershed occurs within the Ozark Soils Region, which Allgood and Persinger describe as "cherty limestone ridges that break sharply to steep side slopes of narrow valleys" (as cited in MDC, 2001b). Soils are rocky and formed mainly from carbonate and sandstone bedrock (Nigh and Schroeder, 2002). The following are soil associations found in the Eleven Point Watershed: Captina-Macedonia-Clarksville, Captina-Clarksville-Doniphan, Wilderness-Clarksville-Coulstone, and Hartville-Ashton-Cedargap-Nolin (alluvial). Soils formed in the residuum from cherty limestone or dolomite range from deep to shallow and contain a high percentage of chert in most places (MDC, 2001b). Loess occurs in a thin mantle or is absent and some of the soils formed in a thin mantle of loess are on the ridges and have fragipans, which restrict root penetration (MDC, 2001b).

Surface Water

The drainage area of the Eleven Point Watershed in Missouri is 1024.7 square miles (MDC, 2001b). MDNR reports that the Eleven Point Watershed is exceptional for the number and length of losing streams in the upper and middle portions of the watershed (as cited in MDC, 2001b). Much of the water produced by the Eleven Point Watershed emerges from springs originating within other watersheds and it is likely that springs within the Watershed contain ground water from other watersheds (MDC, 2001b). These springs assist in maintaining base flows in the middle and lower portions of the Eleven Point River, while streams in the headwaters of the watershed are frequently dry due to decreased significant spring input (MDNR as cited by MDC, 2001b).

Stream gradients in the CRH subsection are moderately steep to steep and typical streams in this area carry large bedloads of sand and gravel, and their channels have gravel and sandbars with pools, and riffles and little suspended sediment (Nigh and Schroeder, 2002). The CP section of the Watershed, is where widespread karst conditions inhibit the development of surface streams (Nigh and Schroeder, 2002).

Ground Water

The Eleven Point River Watershed lies within the Ozark Plateau's aquifer system, located throughout southern Missouri, southwestern Kansas, eastern Oklahoma and northwestern

Arkansas. The Watershed is underlain entirely by the shallow Ozark aquifer (Nigh & Schroeder, 2002).

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing more than 1,000 gallons per minute (Miller and Appel, 1997). Water from this aquifer is considered "suitable for most uses" with dissolved-solid concentrations less than 1,000 milligrams per liter (except in the most westernmost parts of the aquifer) (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

Subsurface water is abundant and of high quality, except for "hardness" in the CP and this subsection is a major source area for groundwater that emerges in springs in the entrenched stream valleys on its sides (Nigh and Schroeder, 2002).

The St. Francois aquifer subtends the Ozark aquifer and is 300-400 feet thick in south-central Missouri. Water is withdrawn from the aquifer only principally in the St. Francois Mountains, where the aquifer crops out or is close to the surface (Miller and Appel, 1997). The aquifer is at the surface at that location due to uplift and subsequent erosion. Where water is withdrawn, it is considered "suitable for most uses" with dissolved-solid concentrations between 200 and 450 milligrams per liter (Miller and Appel, 1997). Depending on location, yields of from 70 to more than 125 gallons per minute are possible from the St. Francois (MDNR, 2012a).

Meramec River Watershed

Physical Resources

As one of the ecological subsections identified by Nigh and Schroeder in their 2002 Atlas of Missouri Ecoregions, the Meramec River Hills (MRH) comprises a majority of the Meramec River Watershed. The lower Watershed can be found in a small section of the Inner Ozark Border (IOB) before draining into the Mississippi River while the upper Watershed, located on the west to southwestern border is defined by the ecological subsection, Central Plateau (CP).

The Bourbeuse and Big Rivers are technically classified in the Meramec River Watershed, since they are tributaries of the Meramec River. In this Southeast Missouri Ozarks Regional Restoration Plan the Big, Bourbeuse and Meramec Rivers are treated in separate watershed sections.

Topography

Most of the Meramec River Watershed lies within the Salem Plateau subdivision of the Ozark Plateau. The lower Meramec River lies within the Central Lowland Region (MDC, 1998). The Watershed is located in the northeastern quarter of the Ozark Highlands and excluding the Bourbeuse and the Big Rivers, drains 2,149 square miles into the upper Mississippi River Watershed according to the MDC Fisheries Research Section (as cited by MDC, 1998). The

lower Watershed flows through urbanized areas of St. Louis and Jefferson Counties, while the upper Watershed meanders through forested and agricultural areas (MDC, 1998).

The Meramec River Watershed is one of the most rugged regions of the Midwest, especially throughout the MRH subsection where it consists of hilly to rugged lands with steep slopes and narrow valley bottoms (Nigh and Schroeder, 2002). Topography varies from wide ridges and gentle slopes to narrow ridges, steep slopes and bluffs (MDC, 1998). USDA defines the north and west portions of this area as gently rolling topography while steep rolling topography is found in the south-central portions (as cited by MDC, 1998). Land elevations range from 400 feet to 1,400 feet above msl (MDC, 1998). Local karst, losing streams, and large springs are characteristic (Nigh and Schroeder, 2002). Pre-settlement vegetation was a pine-oak and mixed-oak woodland and forest (Nigh and Schroeder, 2002).

Bedrock

The Meramec River Watershed contains a range of surface rocks varying in age from the Pennsylvanian to the Precambrian period (MDNR as cited by MDC, 1998). The majority of these surface rock types consists of Cambrian age cherty dolomites and Ordovician cherty dolomites and sandstones (Nigh and Schroeder, 2002). The dolomites are soluble and create impressive local karst, including some very large springs, extensive caverns and numerous dry valleys and are locally prominent in the Salem Plateau (Nigh and Schroeder, 2002 and MDC, 1998).

On a smaller scale, MDNR classifies bedrock found in the lower portions of the Watershed near the Mississippi River as rock of the Mississippian Age, which includes the St. Louis Limestone, Salem Formation, Keukok Limestone, and Burlington Limestone (as cited by MDC, 1998). Between Gray Summit and Valley Park, the river meanders through the geologically older Ordovician Age rocks are stratified from oldest to youngest by the St. Peter Sandstone, Joachim Dolomite, and Plattin Formation (limestone, shale, and chert) (MDC, 1998). Potosi Dolomite is found primarily along the bottomlands of the upper and middle Meramec River (MDC, 1998).

Soil

The Natural Resources Conservation Service (NRCS) Soil Survey characterizes the area within the northern most parts of the Meramec River Watershed in an aggregate of soils known as the Deep Loess Hills, shifting to the Ozark Border and the Ozark Plateau to the southwestern extent (NRCS, as cited by MDNR, 1986 in MDC, 1998). A variety of separate soil types can be found in this area due to the local variations in climate and parent material, landforms, and vegetation (MDC, 1998). The Hartville-Ashton-Cedargap-Nolin Association parallels the Meramec River channel (MDC, 1998).

As defined by Allgood and Persinger, within the Deep Loess Hills area, the Menfro-Winfield Association comprises part of the Meramec River Watershed (as cited by MDC, 1998). Menfro is a deep, well-drained soil, formed in loess ridge tops and side slopes. Winfield is moderately well drained soil (MDC, 1998). The surface is silt loam underlain by moderately permeable, silty clay loam subsoil (MDC, 1998).

The Ozark Border is a transitional area between the Deep Loess Hills area and the Ozark Plateau, and within this Border, there are two major soil associations: the Union-Goss-Gasconade-Peridge Association and the Hobson-Clarksville-Gasconade Association (MDC, 1998). Allgood and Persinger characterize ridge tops as having a thin mantle of loess caps and soils formed in fragipans (as cited in MDC, 1998). Soil associations are also similar to the Ozark Plateau with the exclusion of the Union and the Gasconade (MDC, 1998). Deep, cherty clayey soils are red in color, due to the high iron content that oxidizes on exposure (MDC, 1998).

Forests, scattered glades, and prairie areas are found in the Ozark Plateau and the stony, cherty soil types in this area are variable, generally having infertile, stony clay soils in some areas and fertile, loess-capped soils in others (MDC, 1998). Soil formation is slow from the result of the weathering limestones, an important soil forming rock, and it leaves little behind except chert (Pflieger as cited by MDC, 1998). Within the Ozark Plateau four soil associations predominate: the Lebanon-Hobson-Clarksville Association, Hobson-Coulstone-Clarkville Association, the Captina-Clarksville-Doniphan Association, and the Hartville-Ashton-Cedargap-Nolin Association (Allgood & Persinger as cited by MDC, 1998).

Surface Water

The Meramec River Watershed is located in Crawford, Dent, Franklin, Iron, Jefferson, Phelps, Reynolds, St. Louis, Texas, and Washington Counties. The main channel of the Meramec River flows through 218 miles carrying water from the scarcely populated, forested, and agricultural upper watershed north easterly to the heavily populated and urbanized lower watershed to enter the Mississippi River below St. Louis (MDC, 1998). The Meramec River and its tributaries drain 2,149 square miles (MDC, 1998).

Springs in the Meramec River Watershed are numerous and provide significant amounts of base flow, reducing seasonal fluctuations (Nigh and Schroeder, 2002). Meramec River base flows are well sustained by these springs and by drainage from the two large major tributaries, the Big and Bourbeuse Rivers (MDC, 1998). This Watershed has many moderately mineralized springs with calcium, magnesium, and bicarbonate as the predominant dissolved components, but sulfate and chloride comprise a significant portion of the dissolved solids in the water (MDC, 1998).

Overall, water quality within the Meramec River Watershed is good. In the upper Watershed (Dent, Phelps, and parts of Crawford Counties), impoundments containing mining tailings pose a potential threat to stream water quality (MDC, 1998). In the upper and middle Watershed, cattle grazing on bottomland pasture is very common. The lower Watershed is an urbanized zone that poses other threats to water quality from sediment, land disturbance, and pollution-laden runoff entering into the lower Meramec system rapidly because of impervious surfaces from development and the channelization of tributaries (MDC, 1998).

Ground Water

The Meramec River Watershed is underlain entirely by the Ozark aquifer. The St. Francois aquifer underlays the Ozark aquifer in this region. It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing

more than 1,000 gallons per minute (Miller and Appel, 1997). Water from this aquifer is considered "suitable for most uses" with dissolved-solid concentrations less than 1,000 milligrams per liter (except in the most westernmost parts of the aquifer) (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997).

The surface karst of the CP is one of the chief sources for groundwater that resurfaces in the numerous large springs of the surrounding entrenched-river subsections (Nigh and Schroeder, 2002). The CP is a major source area for groundwater that emerges in springs in the entrenched stream valleys on its sides (Nigh and Schroeder, 2002). Throughout these areas, decomposed bedrock has formed an unconsolidated residual material, allowing high rates of groundwater discharge according to Vandike (as cited in MDC, 1999). Subsurface water is abundant and of high quality, except for "hardness" (Nigh and Schroeder, 2002).

Upper St. Francis River Watershed

The boundary of the Southeast Missouri Ozarks Regional Restoration Plan, as well as the Missouri/Arkansas state boundary limits the St. Francis River Watershed to the upper section of the watershed. The Upper St. Francis River Watershed is composed of the following three Missouri ecological subsections as defined by Nigh and Schroeder's 2002 Atlas of Missouri Ecoregions: St. Francois Knobs and Basins (SKB), Black River Ozark Border (BRO), and Inner Ozark Border (IOB).

Approximately two thirds of the Watershed is composed of the SKB with the lower section of the Upper St. Francis Watershed basin located in the BRO subsection. A sliver of the IOB can be found at the northern border of the Upper St. Francis River Watershed. Because this IOB area is so minute within this Watershed it will receive minimum treatment relative to the other two ecological subsections in this Watershed description.

Physical Resources

Topography

The Upper St. Francis River Watershed is found in Missouri and is equally divided, north and south, between the high-relief Ozark Plateau and the low-relief Mississippi Alluvial Plain. The SKB subsection has three different topographic features: the igneous knobs and hills, the smooth floored basins and valleys on dolomites and sandstones, and the dolomite, sandstone, and cherty hills (Nigh and Schroeder, 2002). Relief is generally high with local relief of 300 – 1,000 feet (Nigh and Schroeder, 2002). Pre-settlement vegetation was a mixture of forest, open woodlands, glades, and small prairies in the basins (Nigh and Schroeder, 2002). Exceptionally large areas of igneous glade and woodland complexes remain, pastures and grazed woodlands occupy the basins, and lead mining has scarified the land especially in the far upper part of the Watershed in the SKB (Nigh and Schroeder, 2002).

The BRO lies on the southern border of the Ozark uplift. Impeded drainage occurs in the soil and residuum where stream dissection is weak. Elsewhere, slopes are relatively steep and rocky

(Nigh and Schroeder, 2002). Within the BRO, local relief in the dissected parts is up to 200 feet, significantly less than the hillier north and west subsections (Nigh and Schroeder, 2002).

The absence of a deep cherty residuum in the igneous Ozark uplift and the formation of erosion resistant upland soils results in little gravel accumulation in the alluvial floodplain soils (MDC, 2001c). Channel substrates found in the St. Francis contain a significant proportion of stable cobble, stone, and boulders, and streambank soils are more cohesive than in most Ozark streams because of lower densities of gravel (MDC, 2001c).

Bedrock

The headwater area of the St. Francis River is dominated by the Ozark uplift which has exposed outcrops of Precambrian igneous rock on as much as 50 percent of the surface on some slopes as reported by MDNR (as sited in MDC, 2001c). These hard igneous rocks have no overburden, and shut-ins, cascades, and waterfalls produce ancient rigid boundaries that control the course, gradient, and floodplain features of the first 80 miles of the St. Francis River channel (MDC, 2001c). The predominance of impervious rock in this area limits infiltration and subsurface flows causing rapid runoff, flashy hydrographs, frequent flooding, and a poor aquifer that provides low, unstable base flows (MDC, 2001c).

Downstream, igneous rock is replaced by bedrock consisting of hard Cambrian dolomites and sandstone in the SKB. In the hills, the dolomites and sandstones have eroded and are found mainly in the basins (Nigh and Schroeder, 2002). Eventually, cherty Ordovician dolomite becomes the primary underlayment adjacent to the Wappapello Lake basin (MDC, 2001c).

The BRO is underlain by thick cherty dolomites and sandstones of the Ordovician Gasconade and Roubidoux Formations (Nigh and Schroeder, 2002). Throughout the BRO, dolomites are soluble and create karst conditions while signature sinkholes and caverns that are found in the Ozarks are occurs less frequently (Nigh and Schroeder, 2002).

Soil

According to NRCS, soils formed in the hard, igneous rock of the upland ridge tops lack an overburden of chert or loess and are typically described as extremely bouldery, cobbly, or stony with outcrops sometimes occupying 50 percent of the surface area (as cited by MDC, 2001c). Within these igneous bedrock areas, soils are moderately deep and acidic (Nigh and Schroeder, 2002). The combination of low soil fertility, acidic reactions, rapid runoff, and low water capacity, contributes to produce extremely droughty conditions that are most suitable for woodlands and limited grass production (MDC, 2001c). Soil series most frequently associated with the uplands are Irondale, Syenite, Delassus, and Clarksville (MDC, 2001c).

A large proportion of stones and boulders can be found in the finer silt-loam soils formed on the slopes, and a chert overburden appears on some of the foot slopes (MDC, 2001c). A fragipan is usually present which creates a root restriction depth of less than three feet (MDC, 2001c). Soils on interfluve positions include the moderately well-drained Captina series, with a root-restricting fragipan in the very gravelly residuum below the silty clay loam loess subsoil (Nigh and

Schroeder, 2002). Soil series most frequently associated with the slopes are Auxvasse, Killarney, Courtois, Fourche, and Wilber (MDC, 2001c).

The sand-silt-clay loams formed in St. Francis River floodplains are highly fertile, but fertility tends to decrease to moderate in a downstream direction (MDC, 2001c). Soils range from neutral to only slightly acidic, runoff is moderate, and water capacity is high (MDC, 2001c). Soil series most frequently associated with the floodplains are Wakeland, Haymond, and Pope (MDC, 2001c).

Surface Water

The St. Francis River drains the south-central portion of the SKB, with much of the BRO containing the section of the St. Francis River that creates Wappapello Lake. The St. Francis River originates in northeast Iron County, on a divide that separates the Black, Big, and St. Francis River drainages. The St. Francis River flows to the northeast around the St. Francois Mountains uplift (St. Francois County), then turns south and flows through Madison and Wayne Counties before flowing through Wappapello Lake to the Missouri/Arkansas border, and then continues through Arkansas and into the Mississippi River (MDC, 2001c).

The St. Francis River, from its headwaters to the Arkansas/Missouri border, is 225 miles long and its basin drains 1,839 square miles in Missouri (MDC, 2001c). In the upper basin, six dams are located which can affect flows and fish movement (MDC, 2001c). These include Wappapello Dam and Lake and the dam at DiSalvo Lake on the mainstem and four dams located on mainstem tributaries (MDC, 2001c). The upper basin is drier than most Ozark drainages on the Salem Plateau because of poor groundwater recharge associated with the predominance of impervious, igneous rock (MDC, 2001c).

Ground Water

The Upper St. Francis River Watershed lies within the Ozark Plateau's aquifer system, located throughout southern Missouri, southwestern Kansas, eastern Oklahoma and northwestern Arkansas. The aquifer within the upper section of the St. Francis Watershed is comprised of two aquifers, the Ozark aquifer and the deeper St. Francois aquifer.

The aquifers are composed of limestones, dolomites, and sandstones, separated by a shale confining unit of minimal permeability (Miller and Appel, 1997). The predominance of impervious rock in this area limits infiltration and subsurface flows causing rapid runoff, flashy hydrographs, frequent flooding, therefore, creating a poor aquifer for this area that provides low, unstable base flows (MDC, 2001c). Recharge of aquifers occurs primarily through precipitation at outcrop areas, but also minimally across the confining unit (comprised of minimally permeable shale and permeable limestone) (Miller and Appel, 1997). Water primarily passes through the aquifers via fractures and bedding planes, resulting in the dissolution of carbonate rocks, enlarged byways, and additional karstic features (Miller and Appel, 1997).Water discharges from the aquifers as base flow into streams or springs (Miller and Appel, 1997).

The Ozark aquifer is the primary water source for the Ozark Plateau Physiographic Province (Miller and Appel, 1997). It is the thickest aquifer within the Ozark Plateau aquifer system, averaging 1,000 feet in depth in south-central Missouri, and providing more than 1,000 gallons per minute (Miller and Appel, 1997). Water from this aquifer is considered "suitable for most uses" with dissolved-solid concentrations less than 1,000 milligrams per liter (except in the most westernmost parts of the aquifer) (Miller and Appel, 1997). Water from the Ozark aquifer is used for municipal, industrial, and domestic supplies (Miller and Appel, 1997). MDNR indicates that no irrigation occurs in the upper watershed (as cited in MDC, 2001c).

The St. Francois aquifer subtends the Ozark aquifer and is 300-400 feet thick in south-central Missouri. Water is withdrawn from the aquifer principally in the St. Francois Mountains, where the aquifer crops out or is close to the surface (Miller and Appel, 1997). The aquifer is at the surface at that location due to uplift and subsequent erosion. Where water is withdrawn, it is considered "suitable for most uses" with dissolved-solid concentrations between 200 and 450 milligrams per liter (Miller and Appel, 1997). Depending on location, yields of from 70 to more than 125 gallons per minute are possible from the St. Francois (MDNR, 2012a).

Biological Resources

Terrestrial Habitat

Before settlement, the Ozarks were mainly timbered with oak and oak-pine forests and woodlands (Nigh and Schroeder, 2002). Open oak and pine woodlands with bluestem grass occupied higher, gentler ground and steep exposed slopes (Nigh and Schroeder, 2002). Closed forest of oak, shortleaf pine, and mixed deciduous species were best developed on the roughest, most dissected lands (Nigh and Schroeder, 2002). Glades, fens, and sinkhole ponds added to the diversity (Nigh and Schroeder, 2002). Bottoms were mainly forested with mixed hardwood and riverfront sycamore-cottonwood types (Nigh and Schroeder, 2002).

At present, the Southeast Missouri Ozarks (SEMO) are still mainly timbered, except for cleared bottomlands and some ridges (Nigh and Schroeder, 2002). The forests and woodlands have been altered by past management practices and have become much more dense, shortleaf pine is less abundant, and much of the forest is dominated by oak of nearly even age (Nigh and Schroeder, 2002). Remnants for the lowland forest that once covered the region occur in small, managed tracts (Nigh and Schroeder, 2002).

Major natural community types found throughout the SEMO include (Nigh and Schroeder, 2002).

- Central Post Oak Dry Barrens (Savanna)
- Central Post Oak Flatwoods
- Chinquapin Oak-Ash (Eastern Red Cedar)/Little Bluestem Dry Limestone Dolomite Woodland
- Midwest Dry-Mesic Chert Prairie
- Midwest Mixed Emergent Marsh
- Mixed Oak-Hickory/Dogwood Dry-Mesic Chert Forest

- Mixed Oak-Hickory/Dogwood Dry Mesic Igneous and Chert Forest
- Ozark Dolomite Glade
- Ozark Igneous Glades
- Pin Oak-Willow Oak/Deciduous Holly Wet Bottomland Forest
- Post Oak, Black Oak, Scarlet Oak Dry Chert of Sandstone Woodland
- Post Oak, Black Oak, Scarlet Oak Dry Chert Woodland
- Post Oak, Black Oak, Scarlet Oak Dry Igneous and Chert Woodland
- Post Oak-Blackjack Oak/Bluestem Dry Chert or Sandstone Woodland
- Post Oak-Blackjack Oak/Bluestem Dry Igneous and Chert Woodland
- Post Oak Flatwoods
- Red Oak-White Oak-Sugar Maple Mesic Dolomite and Bottomland Forest
- Shortleaf Pine/Bluestem Dry Chert and Igneous Woodland
- Shortleaf Pine/Bluestem Dry Chert Woodland
- Shortleaf Pine-Oak/Vaccinium Dry Chert and Igneous Woodland
- Shortleaf Pine-Oak/Vaccinium Dry Chert Woodland
- Shortleaf Pine-Oak/Vaccinium Dry Sandstone Woodland
- Swamp Chestnut Oak-Sweetgum Wet-Mesic Bottomland Forest
- White Oak-Black Oak Dry-Mesic Chert Woodland
- White Oak/Dogwood Dry Mesic Chert Forest
- White Oak/Dogwood Dry Mesic Igneous and Chert Forest
- White Oak-Mixed Oak/Redbud Dry-Mesic Limestone/Dolomite Forest
- White Oak, Red Oak, Sugar Maple Mesic Dolomite Forest

Rare natural communities in this region include dolomite cliff communities, caves, springs, fens, and sinkhole ponds (Nigh and Schroeder, 2002). Most glade/woodland complexes have been overgrown with cedar, except in the St. Francois Mountains, where numerous high quality igneous glades still exist (Nigh and Schroeder, 2002).

Aquatic Habitat

Streams in the SEMO are clear with gravel or bedrock substrate (Nigh and Schroeder, 2002). Shut-ins, where streams flow through a narrow part of the valley of highly resistant igneous rock, are found in the St. Francois, Castor, and Black Rivers (Nigh and Schroeder, 2002). Springs are numerous with several being large (Nigh and Schroeder, 2002). Many endemic and state- and federally-listed aquatic and semi-aquatic species and species of concern are found in the SEMO (Nigh and Schroeder, 2002).

Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) represent areas with unique species and habitats that are prioritized for conservation. The Missouri Department of Conservation has identified five COAs in the SEMO: the Middle Meramec, St. Francois Knobs, Current River Hills, LaBarque Creek Watershed, and Eleven Point Hills (CCM, 2012).

The Middle Meramec COA is located within the middle reaches of the Meramec River (CCM, 2012). The Middle Meramec landscape supports a variety of plants and animals, including the federally endangered Indiana bat, Gray bat, and Hine's Emerald dragonfly (CCM, 2012). Cerulean warblers and other high priority interior forest birds are relatively abundant in this area (CCM, 2012).

The St. Francois Knobs COA is the primary igneous rock landscape in Missouri (CCM, 2012). It is where Missouri's highest mountain, Taum Sauk Mountain, at 1,772 feet, and the tallest waterfall are located (CCM, 2012). The landscape features igneous glades, cliffs, fens, caves, shut-ins, and small springs (CCM, 2012).

The Current River Hills COA includes one of the largest tracts of forests and woodlands in the lower Midwest (CCM, 2012). The region is best known for extensive shortleaf pine-forests and woodlands that supported an exceptional timber boom at the turn of the twentieth century (CCM, 2012). The landscape features glades, cliffs, fens, sinkhole ponds, caves, and springs (CCM, 2012). The Current River is the most significant mid-sized river in mid-continent North America (CCM, 2012).

The LaBarque Creek Watershed COA features a high quality stream and rugged sandstone terrain, creating an area rich in diversity, surprisingly close to St. Louis in northwestern Jefferson County (CCM, 2012). Ecological values and development patterns make the watershed an excellent candidate for conservation efforts (CCM, 2012). LaBarque Creek provides over six miles of permanently flowing stream that supports 42 species of fish (CCM, 2012). The COA's underlying sandstone geology produces a dramatic landscape where flowing water carves cliffs, waterfalls, bowls and overhangs into the soft sandstone (CCM, 2012). The resulting deep, sheltered, moist canyons and ravines contain several state-listed plants found on only a few other sites in Missouri (CCM, 2012).

The Eleven Point River meanders through the picturesque Ozark hills of southern Missouri flowing through the shadows of steep bluffs, through sloping forested valleys and low-lying riparian ecosystems (CCM, 2012). Springs pouring from dolomite bluffs or rushing up from a vast network of underground flow systems provide a continuous source of water (CCM, 2012). The Eleven Point Hills COA lies in some of the most rugged and least developed portions of the Missouri Ozarks (CCM, 2012). The deeply dissected hills adjacent to the Eleven Point and Current Rivers contain relict populations of plants associated with steep bluffs, cave entrances, fens, springs and sinkholes (CCM, 2012). Through the years, woody groundcover has flourished – a byproduct of overgrazing and fire suppression (CCM, 2012). The Eleven Point Hills COA contains excellent opportunities for restoring rare natural communities and associated plants and animals (CCM, 2012).

Federally- and State-listed Species and Candidate Species

Federally listed species include any plant or animal species listed as *endangered* or *threatened* in the Endangered Species Act of 1973 as amended. *Endangered* species include any species that is in danger of becoming extinct. *Threatened* species include any species that is likely to become endangered in the foreseeable future. *Candidate* species include any species that is being

reviewed by the FWS for possible addition to the list of endangered and threatened species. Missouri state listed species include any species listed as *endangered* in the Wildlife Code of Missouri (Rule 3 CSR10-4, 111 Endangered Species).

Thirty-four species in the SEMO are state or federally listed, or are candidates for listing, including 19 species with federal status and 15 species with state status (Table 3 of the SEMORRP). When issuing a request for restoration proposals, the Trustees will identify the current list of state and federal species associated with the injury caused by the release of hazardous substances.

All known federal or state threatened or endangered species, or federal candidate species in the SEMO, are described here. The list of species provided in Table 3 was compiled from county-specific information available online from the MDC Heritage Program (MDC, 2011a) and the Service (USFWS, 2012a). This list is current for the year 2012. More species may be added to this list as a result of newly discovered information.

Birds

American bittern (*Botaurus lentignosus*) is a solitary medium-sized heron with a stocky build and stripes of brown, tan, and white. American bitterns prefer wetland marshes or extensive meadows, mixed with areas of dense vegetation and open waters (MDC, 2009). It is a statewide summer resident in Missouri, listed as state endangered due to loss of wetland habitat (MDC, 2009). Preservation of wetland areas is essential for the protection of this species.

Northern harrier (*Circus cyaneus*) is a medium-sized raptor with a long barred tail, distinctive white rump, and owl-like facial disk. This species relies upon open grasslands and marshes that are densely vegetated (MDC, 2011b). The northern harrier is a rare summer resident and uncommon winter resident, listed as state endangered (MDC, 2011b). It benefits from the preservation and development of marsh lands, human use restrictions, and crop rotation (MDC, 2011b).

Peregrine falcon (*Falco peregrinus*) is a small to medium sized raptor with a black crown and nape, and a black wedge extending below the eye (MDC, 2011c). They are white with narrow dark bars in front, with a gray-blue back (MDC, 2011c). They historically nested in the bluffs along the Mississippi, Missouri, and Gasconade Rivers, but only a few pairs remained by the late 1800s (MDC, 2011c). It is state endangered due to the previous use of certain pesticides. Peregrine falcons have been reintroduced in the major urban areas where they use tall buildings as a substitute for cliffs (MDC, 2011c). Continued reintroductions will help to increase the population (MDC, 2011c).

Swainson's warbler (*Limnothlypis swainsonii*) is a large heavy bodied warbler with a long, spike-like bill and is brown on top with white to yellowish undersides, and white eyebrow (CLO, 2011). Swainson's warbler is a rare summer resident and can be found in bottomland forests with a dense overstory (MDC, 2011d). It benefits from maintaining riparian habitats, human use restrictions, control grazing of livestock, and to develop and maintain wetlands (MDC, 2011d).

Bachman's sparrow (*Peucaea aestivalis*) is a medium-sized sparrow with a long brown tail, flat forehead, and pleasant song. This species occupies glade habitats, characterized by open pine or oak-hickory woods with a well-developed understory of grass and shrubs (MDC, 2011e). Bachman's sparrow resides in southern Missouri in the summer, where it is on the northern edge of its range (MDC, 2011e). It is state endangered due to declining glade habitats and invading cedar trees (MDC, 2011e). This species benefits from the protection of mature pine forests, managed for open grassy areas (MDC, 2011e).

Mammals

Gray bat (*Myotis grisescens*) is 3-4 inches in length and is distinguished from other bat species by wing membranes that attach at the ankle (rather than the toe) (MDC, 2011f). Gray bats hibernate and roost in caves undisturbed by humans, and forage over streams, rivers, and reservoirs (MDC, 2011f). They require a corridor of mature trees between cave and foraging sites (MDC, 2011f). This species is primarily found in the Ozark highlands, but also occurs throughout Missouri where there are caves (MDC, 2011f). It is both federally and state endangered due to deforestation around caves and foraging areas, alteration of riparian habitats, human disturbance of caves, and flooding of caves from the development of reservoirs (MDC, 2011f). Management efforts to protect the gray bat include the acquisition of caves and the maintenance of foraging habitats, such as riparian corridors and old growth forests (MDC, 2011f).

Indiana bat (*Myotis sodalis*) is a medium-sized bat with brownish-gray fur with cinnamon overtones and is distinguished from other bat species by a distinct keel on its heel (MDC, 2011g). They need cool caves with stable temperatures of around 50 degrees Fahrenheit and high humidity (MDC, 2011g). Of Missouri's 6,500 known caves, only 27 have ever had sizeable Indiana bat populations (MDC, 2011g). More than 85 percent of Missouri's total population of Indiana bats hibernate in only eight specific locations, three of which are located in Shannon, Washington, and Iron Counties (MDC, 2011g). It is both federally and state endangered due to alteration of riparian habitats, human disturbance of caves in winter, and climate change (MDC, 2011g). Management efforts to protect the Indiana bat include avoiding disturbing hibernating bats, maintaining cave habitats, improving streamside habitats, and reducing use of pesticides (MDC, 2011g).

Plains spotted skunk (*Spilogale putorius interrupta*) is black with distinct white facial spots and four to six broken white stripes along the sides and back (MDC, 2011h). This species is a habitat generalist, occupying fencerows, vegetated gullies and brushy borders, brush piles, snags, rocky outcrops, open prairies, and riparian woodlands (MDC, 2011h). The plains spotted skunk occurs rarely in northern Missouri and in small sections of the Ozarks. It is state endangered in Missouri, primarily due to changing agricultural practices, such as the removal of hedgerows, "cleaner" harvest practices, and loss of habitat with a shift from small to large-scale farms (MDC, 2011h). This species benefits from the preservation of small glades and rocky outcroppings, the maintenance and development of edges, hedgerows, brush piles, and reduction in the use of pesticides on farms (MDC, 2011h).

Mollusks

Spectaclecase (*Cumberlandia monodonta*) is a large, elongated and sometimes inflated mussel that can grow to at least 9 inches (USFWS, 2011a). It is found in sheltered areas, away from the current in large rivers (USFWS, 2011a). Historically, this species was found throughout the Midwest, but is now found in only 19 streams in 11 states (USFWS, 2011a). In Missouri the spectaclecase is found in the Big, Big Piney, Bourbeuse, Gasconade, Meramec, and Mississippi Rivers (USFWS, 2011a). It is federally endangered due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations. The spectaclecase benefits from erosion control, improving habitat, and controlling pollution (USFWS, 2011a).

Elephant-ear (*Elliptio crassidens)* is a triangular shaped mussel with a thick dark brown to black shell (MDC, 2011i). The elephant-ear is found in swift creeks to large rivers in mud, sand, or fine gravel (MDC, 2011i). It is widespread in distribution but is considered rare. The elephant-ear has been found in the Mississippi, Meramec, Osage, Little Black, and Castor River drainages (MDC, 2011i). It is state endangered and is a candidate for federal listing due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations (MDC, 2011i). The elephant-ear benefits from the control of erosion and water pollution and improving the habitat for its host fish (MDC, 2011i).

Curtis' pearlymussel (*Epioblasma florentina curtisii)* is a small freshwater mussel with a dark brown shell (USFWS, 2012b). This mussel is typically found in small creeks and shallow, flowing rivers that have stable substrates (MDC, 2012a). It prefers to bury in clean, silt-free substrates of sand and gravel to gravel, cobble, and boulder in riffles and runs that are transitional areas between headwaters and lowlands (MDC, 2012a). It is both federally and state endangered as a result of rural and urban development that have adversely reduced available habitat, increased stagnation of bottom waters, increased siltation, and possibly eliminated or reduced numbers of fish hosts (MDC, 2012a). In Missouri, practices such as gravel mining, removal of trees and undergrowth along the streambank, and non-point source pollution from agriculture and urban areas have likely contributed to the decline of this species (MDC, 2012a).

Snuffbox (*Epioblasma truquetra)* is a small, triangular mussel in males and somewhat elongate in females, with a yellow, green, or brown shell. This species was historically widespread in the Midwestern states, but is steadily declining (MDC, 2011j). In Missouri, the snuffbox is found in the Meramec, Bourbeuse, Castor, St. Francis, and Current Rivers (MDC, 2011j). It is state endangered and is a candidate for federal listing due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations (MDC, 2011j). The snuffbox benefits from control of erosion and water pollution and improving the habitat for its host fish (MDC, 2011j).

Ebonyshell *(Fusconaia ebena*) is a heavy, rounded or oval mussel with a smooth dark brown to black shell in adults; young mussels have a light brown shell. The ebonyshell is found in swift rivers with a fine gravel to cobble substrate (MDC, 2011k). In Missouri, the ebonyshell has been found in the Mississippi, Meramec, Osage, and Little Black rivers (MDC, 2011k). It is state endangered and is a candidate for federal listing due to alteration or degradation of its habitat,

deterioration of water quality, and decline in the fish hosts' populations (MDC, 2011k). The ebonyshell benefits from control of erosion and water pollution and improving the habitat for its host fish (MDC, 2011k).

Pink mucket (*Lampsilis abrupta)* is a rounded to slightly elongate mussel with a thick, smooth yellowish-brown shell. The pink mucket burrows into beds of gravel, cobble, and sand in large streams (MDC, 2009h). This species is uncommon throughout its range (MDC, 2011h). In Missouri, the pink mucket is present in the Meramec, Gasconade, Black, and Osage Rivers (MDC, 2009h). It is state and federally endangered due to habitat loss, siltation, and deterioration of water quality (MDC, 2011h). The pink mucket benefits from control of erosion and water pollution (MDC, 2009h).

Scaleshell (*Leptodea leptodon)* is a relatively small, elongate mussel with a thin, compressed, and smooth light brown shell (MDC 2011i). The scaleshell is found in clear, non-polluted riffles with moderate current and firm gravel, cobble, or sand bottoms (MDC 2011i). This species was found throughout the river systems of the Midwestern states, and is currently found in only a few rivers in Missouri, Arkansas, and Oklahoma (MDC 2011i). In Missouri, the scaleshell is present in the Gasconade and Meramec River basins (MDC 2011i). It is state and federally endangered due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations (MDC, 2011i). The scaleshell benefits from control of erosion and water pollution and improving the habitat for its host fish (MDC, 2011i).

Sheepnose (*Plethobasus cyphyus)* is an oval or oblong mussel with a thick, smooth chestnut to dark brown shell (MDC 2011j). The sheepnose is found in medium to large rivers with gravel or mixed sand and gravel bottoms (MDC 2011j). This species was found throughout the river systems of the Midwestern states, but is steadily declining (MDC 2011j). In Missouri, the sheepnose is found in the Mississippi River north of the Missouri River, and the Meramec, Bourbeuse, Big, and Gasconade Rivers (MDC 2011j). It is state endangered and is a candidate for federal listing due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations (MDC, 2011j). The sheepnose benefits from control of erosion and water pollution and improving the habitat for its host fish (MDC, 2011j).

Rabbitsfoot (*Quadrula cylindrica cylindrica*) is a rectangular shaped mussel with a green or light brown shell containing numerous tubercles, pustules, and chevron-shaped markings (INHS, 2011). It is found in medium to large rivers in mixed sand and gravel substrates (INHS, 2011). In smaller streams it can be found on gravel bars close to fast currents, and often at the top of the substrate (MDC, 2009). This species occupies streams in southwestern and southeastern Missouri, such as the St. Francis River and Spring River basins (MDC, 2009). This species is rare throughout its range and is a candidate for federal listing as a result of lost habitat and declining water quality (MDC 2009). The rabbitsfoot benefits from the control of erosion and water pollution.

Winged mapleleaf (*Quadrula fragosa*) is an irregularly circular mussel with a rough, thick greenish brown to dark brown shell (USFWS, 2009). It is found in riffles with clean gravel, sand or rubble bottoms in clear, high quality water (USFWS, 2009). Historically the winged mapleleaf was found in scattered tributaries of the Mississippi River (USFWS, 2009). It is both

state and federally listed due to alteration or degradation of its habitat, deterioration of water quality, and decline in the fish hosts' populations (USFWS, 2009). The winged mapleleaf benefits from erosion control, improving habitat, and controlling pollution (USFWS, 2009).

Fish

Lake sturgeon (*Acipenser fulvescens*) is a large fish, up to eight feet in length, with a shark-like body, a long bony snout, and armored plates (MDC, 2012b). They have a sucker-type mouth under the snout with four smooth barbels (MDC, 2012b). Young lake sturgeon are mottled light and dark brown and turn to solid dark brown or slate colored with a white belly as adults (MDC, 2012b). Lake sturgeon inhabit rivers with firm, silt free bottoms of sand, gravel and rock and is found in the Missouri and Mississippi rivers and their larger tributaries (MDC, 2012b). It is state endangered due to overharvest and alterations of river channels (MDC, 2012b). Management should include protection from fishing, reestablishing self-sustaining populations, habitat improvement, river management, and artificial propagation (MDC, 2012b).

Crystal darter (*Crystallaria asprella*) is a large darter (5-6 inches) that is extremely slender with the back and upper sides a yellowish green, three or four broad saddle marks over the back, and 10 to 12 dark, oblong blotches along the sides (WIDNR, 2011). They inhabit open channels of large, clear streams with low to moderate gradients and long stretches of silt-free sand and small gravel substrate (MDC, 2011l). Populations have been found in the Meramec, St. Francis, Black, and Big Rivers in Missouri (MDC, 2011m). It is state endangered due to channelization, dredging, and impoundments (MDC, 2011l). Management should include the prohibition of dams and other impoundments in streams throughout the crystal darters range; avoid removing and altering the riparian corridor along streams; and, erosion and sediment controls (MDC, 2011l).

Swamp darter (*Etheostoma fusiforme*) is a slender darter that has a brownish back and upper sides, with indistinct dark saddles on the back and indistinct dark blotches along the sides; lateral line stands out as a pale line (MDC, 2012c). Lower sides and belly are cream-colored with scattered brownish spots and fins are banded with brownish lines (MDC, 2012c). These darters have been known to occupy sloughs, cypress swamps, and abandoned stream channels in Missouri (MDC, 2012c). It is almost always associated with dense aquatic vegetation in areas of water without current over the bottom of mud and detritus (MDC, 2012c). It is listed as a state endangered species in Missouri because of its limited habitat and small numbers within Missouri (MDC, 2012c). It has probably never been common or widespread in Missouri, but draining the southeastern wetlands and converting them to agricultural and urban areas has decreased the habitat for this fish (MDC, 2012c).

Goldstripe darter (*Etheostoma parvipinne*) is a rather stout, mottled-brown darter without definite crossbars on the back (MDC, 2012e). This darter habitat requirements are small, shallow, spring-fed streams with low to moderate gradient, with a sandy bottom and rooted aquatic plants due to the shade from trees above (MDC, 2012e). Within these kind of streams, this fish hides among twigs, leaves and other detritus in sandy areas with lighter current (MDC, 2012e). In Missouri, the goldstripe has only been found in locations in southeastern section of the state (MDC, 2012e). It is considered state endangered with its presence jeopardized by

excessive siltation, restriction of channel flow, water impoundment and removal of the tree canopy that helps keep the water cool and clear of algae. Agricultural and urban development have lowered the water table and added pollutants to the water.

Sabine shiner (*Notropis sabine*) is a slender, silvery minnow with a pale olive-yellow back without a definite streak along midline or dark edgings on scales (MDC, 2012g). A lowland species, this minnow species is known to inhabit a 25-mile stretch of the Black River in Missouri. It has been collected near sandbars in slight to moderate current, and it lives on or near the bottom (MDC, 2012g). It is state endangered due to its small amount of current and potential habitat (MDC, 2012g).

Mountain madtom (*Noturus eleutherus*) is a small, moderately chubby catfish that is profusely mottled with brownish blotches and bars and a square shaped tail fin (MDC, 2012h). In Missouri it is known only from only a few locations in large, moderately clear rivers in or near the transition between Ozark and Lowland regions, in gravelly riffles, sometimes where there are thick growths of aquatic vegetation (MDC, 2012h). It is state endangered due to habitat degradation (siltation, sedimentation and pollutants) resulting from human land use near streams (MDC, 2012h).

Longnose darter (*Percina nasuta*) is a two to three inch long darter with a slightly elongate head and snout and is a dull yellowish color with 10-14 dark vertical blotches on each side (OKDWC, 2011). They occur in medium to large rivers with rocky bottoms in the riffles and quiet backwaters near thick growths of aquatic vegetation (MDC, 2011n). It is state endangered due to the construction of impoundments, increase in sedimentation, and non-point source pollution (MDC, 2011o). Management should include avoidance of dam construction; avoidance of sand and gravel removal, and erosion and sediment controls (MDC, 2011o).

Pallid sturgeon (*Scaphirhynchus albus*) is a three to six foot long fish with a long pointed snout with barbels at the base of the mouth (MDC, 2012j). The back is grayish white with a lighter belly (MDC, 2012j). It is found in the main channels of the Mississippi and Missouri rivers and their larger tributaries in areas with strong currents and firm sand bottoms (MDC 2012j). It is state and federally endangered due to overfishing, dam construction and habitat loss. Management should include habitat protection and restoration (MDC, 2012j).

Insects

Hine's emerald dragonfly (*Somatochlora hineana*) is an extremely rare dragonfly that has brilliant emerald-green eyes and a dark brown and metallic green body, with yellow stripes on its sides (USFWS, 2006). They are found in spring-fed marshes (fens) and sedge meadows overlaying dolomite (USFWS, 2006). The Hine's emerald dragonfly was not known to reside in Missouri until 1999, when they were discovered in a fen in Reynolds County (MDC, 2009). It is state and federally endangered due to being found in only a few locations in four states (MDC, 2009). Management should include control of pollution, protect springs and the wetlands around them, and keep livestock and vehicular traffic out of streams, springs, seeps, and wetlands (USFWS, 2006).

Amphibians

Eastern hellbender (*Cryptobranchus a. alleganiensis*) is a large, aquatic salamander that grows to over 20 inches in length (MDC, 2011p). They have a wide, flat head with tiny eyes and a broad and vertically compressed tail (MDC, 2011p). The body and legs are covered with prominent folds to provide more surface area for respiration (MDC, 2011p). The eastern hellbender is brown to grayish-brown with a number of dark blotches and a yellowish-brown belly (MDC, 2011p). They need cool, clear streams and rivers with many large rocks (MDC, 2011p). The eastern hellbender is state endangered and has experienced a 77 percent drop in populations in the last 30 years (MDC, 2011p). Management efforts to protect the eastern hellbender include continued research into the reasons for the rapid decline in populations, control of sedimentation and pollution, and propagation and reintroduction.

Ozark hellbender (*Cryptobranchus a. bishopi*) is a large, aquatic salamander that grows to 24 inches in length (USFWS, 2011b). The Ozark hellbender is brownish in color with numerous dark blotches and has a flat body, which enables them to move in fast flowing streams by crawling on the bottom (USFWS, 2011b). They have numerous folds along the sides of the body for respiration (USFWS, 2011b). The Ozark hellbender requires clear cool streams with large flat rocks and are found only in southern Missouri and northern Arkansas (USFWS, 2011b). It is state endangered and was recently listed as federally endangered due to a dramatic decrease in their populations caused by several factors, including habitat degradation (impoundments, ore and gravel mining, sedimentation, and pollution) (USFWS, 2011b). The "chytrid fungus" is an increasing threat to amphibians here and around the world and has been found in all Ozark hellbender populations in Missouri (USFWS 2011b). Management efforts to protect the Ozark hellbender include continued research into the reasons for the rapid decline in populations, control of sedimentation and pollution, and captive propagation and reintroduction.

Plants

Mead's milkweed (*Asclepias meadii*) is a long-lived perennial herb belonging to the milkweed family (USFWS, 2005). It has a tall single slender stem; milky sap; and opposite, narrow tapered leaves (USFWS, 2005). Mead's milkweed blooms from May through mid-June, displaying yellowy/creamy-green flowers, contained in clusters of 5 to 14 flowers (MDC, 2011q). It occurs in moderately dry to dry upland tallgrass prairies, or in glades (MDC, 2011q; USFWS, 2005). Within Missouri, Mead's milkweed is primarily found in the western and southwestern counties, but is also found in a few locations in southeast and northern Missouri (MDC, 2011r). It is a state endangered species and a federally threatened species, primarily as a result of lost tallgrass prairie habitat, habitat fragmentation, and early haying (which removes immature fruits from the plant) (USFWS, 2005). Management for this species should include delaying haying until September (after the fruits mature), periodic prescribed prairie burning, and rotational grazing (USFWS, 2005).

Decurrent false aster (*Boltonia decurrens*) is a perennial that grows from 1 to 5 feet, occasionally reaching over 6 feet (MDC, 2012l). This plant blooms from July to October with quarter sized flowers with composite heads of yellow disk flowers and white to pinkish to purplish ray flowers (MDC, 2012l). This plant bears seeds from August to October (MDC, 2012l). It is known or believed to occur in the following SEMORRP counties: Howell, St. Louis, and Franklin

(USFWS, 2012c). It is listed as a state endangered species and a federally threatened species, due to the loss of historic river floodplains and wetland habitat, caused by the construction of levees and locks along the rivers, which have prevented flooding in many areas (MDC, 2012l). Management of this species should include periodic flooding or disturbance to eliminate competing vegetation and to provide high light and moist soil that the seeds require to germinate (MDC, 2012l).

Virginia sneezeweed (*Helenium virginicum*) is a golden-flowered fibrous rooted perennial, belonging to the aster family (USFWS, 2000). This plant stands at 1 to 5.5 feet tall with a simple stem (MDC, 2011s). Flowering occurs from July through November, revealing a nearly ball-shaped central disk with golden wedge-shaped petals (USFWS, 2000). The Virginia sneezeweed occurs near seasonally wet sinkhole ponds with acidic clayey soils overlain with limestone bedrock (MDC, 2011s). At the time of its listing (in 1998) the Virginia sneezeweed was thought to occur only in sinkhole ponds in Virginia. Populations of the Virginia sneezeweed have since been discovered in the Missouri Ozarks in the south-central and southwestern counties (MDC, 2011s). The Virginia sneezeweed is a state endangered and federally threatened species, primarily as a result of lost habitat (due to urbanization) and incompatible agricultural practices (MDC, 2011s).

Pondberry (*Lindera melissifolia*) is a deciduous shrub that grows to approximately 6 feet tall belonging to the Laurel family (USFWS, 2011c). Pale yellow, dioecious flowers appear in the spring before the leaves emerge and the green oval-shaped fruits are 0.5 inch long, and turn bright red in the fall (USFWS, 2011c). Reproduction is primarily vegetative by means of stolons which the plants grow in clones of numerous stems which flower when little more than 2 to 3 years of age, but appear to live for only a few years (USFWS, 2011c). Pondberry is found in wetland habitats such as bottomland and hardwoods in the margins of sinks, ponds and other depressions (USFWS, 2011c). The plants generally grow in shaded areas but may also be found in full sun. Pondberry is a state endangered and federally endangered species, as a result of habitat alteration from drainage ditching and subsequent conversion of its habitat to other uses (USFWS, 2011c). Domestic hogs, cattle grazing, and timber harvesting have also impacted the plants at some sites (USFWS, 2011c).

Running buffalo clover (*Trifolium stoloniferum*) is a perennial that grows 4 to 20 inches tall (MDC, 2011t). The leaves have three leaflets and the flowers are white (MDC, 2011t). It sends out creeping runners, which grow along the ground and take root (MDC, 2011t). It is found in open woodlands, savannas, grasslands, stream-banks, floodplains and shoals (MDC, 2011t). Running buffalo clover was thought to be extirpated in Missouri until some plants were found in St. Louis in 1989 (MDC, 2011t). Two additional sites have been found, one in Madison County and one in Maries County, and is being reintroduced on MDC lands and U.S. Forest Service lands (MDC, 2011t). It is state and federally endangered due to competition from exotic clovers (MDC 2011t). Management should include continuing to reintroduce running buffalo clover on protected lands and controlling exotic clovers on those lands.

Missouri Species of Concern

In addition to the listed species, the Missouri Department of Conservation maintains a database of rare plant and animals – the "Missouri Species of Concern." Plants and animals are given a

numeric rank (S1 through S5) based upon number of occurrences within Missouri. Missouri's species of concern are classified as *critically imperiled* (S1), *imperiled* (S2), *vulnerable* (S3), *apparently secure* (S4), and *secure* (S5). The number of critically imperiled (S1) or imperiled (S2) species that occupy the SEMO totals 337 species (Appendix E) (MDC, 2012m). *Critically imperiled* species typically have 5 or fewer occurrences or very few remaining individuals (<1,000), and *imperiled* species typically have 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

Extirpated Species

Extirpated species are species that previously existed in Missouri, but are no longer found in Missouri (MDC, 2012m). The extirpation of a species is of concern because all species have a unique role (or "niche") that they fulfill in an ecosystem. Extirpated species in the Ozarks include elk (*Cervus canadensis*), bison (*Bison bison*), gray wolf (*Canis lupus*), red wolf (*Canis lupus rupus*), and American burying beetle (*Nicrophorus americanus*). Some extirpated species are being reintroduced into Missouri. The desired endpoint of species reintroductions is to both reestablish populations of the extirpated species and also to benefit the ecosystem by replacing the lost functionality. Examples of reintroduction plans currently underway in Missouri include plans for the American burying beetle, bison, and elk. When appropriate, the restoration of injured resources may include the reintroduction of previously extirpated species.

The iconic bison is one of the largest animals in North America. They are native to Missouri's prairies where they played key ecological roles. Where they exist, bison increase native plant diversity and help control dominant prairie plants as they graze on dominant sedges and grasses and provide healthy disturbances in a prairie ecosystem (i.e., through wallowing, tree horning, and roaming) (TNC, 2011). Unfortunately, due to the overhunting of bison and changes in prairie management (e.g. competition from cattle grazing, plowing, and fire suppression), bison were extirpated from Missouri shortly after the 1840s (MDC, 2011u). Bison have since been reintroduced to some of Missouri's prairies. For example, a herd of 100 bison live at Prairie State Park in Barton County, and plans are underway to reintroduce more bison herds in Missouri.

Elk were historically found throughout Missouri, but were likely extirpated from Missouri by 1865 (MDC, 2010). The MDC developed a restoration plan for elk in the state of Missouri, and is reintroducing elk in areas where suitable habitat was found and where other management considerations were met (MDC, 2010). Elk reintroduction programs in other states have been successful and provided natural resource management, recreational, and economic benefits to the public (MDC, 2010). Areas suitable for elk reintroductions include areas with forest openings, glades, and open woodland habitats that provide an understory of herbaceous vegetation (MDC, 2010). Other important factors used to select areas for elk reintroductions include high public land ownership and access; low public road density; low density of row crops and livestock; and landowner support (MDC, 2010).

Migratory Bird Species

The SEMO is located within the Mississippi Flyway, one of the major migration routes in the United States. The Missouri portion of the flyway is narrower than portions north of it, resulting in increased numbers of migratory bird species in Missouri. The number of bird species identified in the SEMO totals more than 350 species (MAS, 2011).

Game Animals

Commonly hunted game mammals in the SEMO include white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus carolinensis carolinensis*), and eastern cottontail rabbit (*Sylvilvagus floridanus*). Other game or furbearing mammals include, but are not limited to, beaver (*Castor canadensis carolinensis*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes fulva*), mink (*Mustela vison letifera*), muskrat (*Ondatra zibethicus*), opossum (*Didelphis v. virginiana*), raccoon (*Procyon lotor hirtus*), and striped skunk (*Mephitis mephitis avia*). Beaver, gray and red fox, mink, and muskrat are also listed as commercial species.

Popular sportfish in the SEMO's reservoirs and streams include, but are not limited to, a variety of bass species, such as largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), white bass (*Morone chrysops*), and spotted bass *(Micropterus punctulatus)*; black crappie *(Pomoxis nigromaculatus)*, white crappie (*Pomoxis annularis*), bluegill *(Lepomis macrochirus)*, redear sunfish (*Lepomis microlophus*), rock bass (*Ambloplites rupestris*), flathead catfish (*Pylodictis olivaris*), channel catfish (*Ictalurus punctatus*), chain pickerel (*Esox niger*), and walleye (*Sander vitreus*). Coolwater fish, such as rainbow trout *(Oncorhynchus mykiss)* and brown trout *(Salmo trutta)*, are also present in the Current and Meramec River basins. Commercial fish include freshwater drum (*Aplodinotus grunniens*), bigmouth buffalo (*Ictiobus cyprinellus*), common carp (*Cyprinus carpio*), river carpsucker (*Carpiodes carpio*), channel catfish (*I. punctatus*), and flathead catfish (*P. olivaris*).

Commonly hunted game birds in the SEMO include wild turkey (*Meleagris gallopavo silvestris*) and mourning dove (*Zenaida macroura carolinensis*).

References:

Conservation Commission of Missouri (CCM). 2012. "Comprehensive Wildlife Strategy: Conservation Opportunity Areas". Internet. Retrieved from <http://mdc.mo.gov/nathis/cws/coa/> on 1 November 2012.

Cornell Lab of Ornithology (CLO). 2011. "Birds in Forested Landscapes: Swainson's Warbler". Internet. Retrieved from <http://birds.cornell.edu/bfl/speciesaccts/swawar.html> on 9 November 2011.

Illinois Natural History Survey (INHS). 2011. "*Quadrula cylindrica* Rabbitsfoot". Internet. Retrieved from <http://www.inhs.illinois.edu/animals_plants/mollusk/musselmanual/page32_3.html> on 19 September 2011.

Miller, J.A., and C.L. Appel, 1997. Ground water atlas of the United States: Kansas, Missouri, and Nebraska HA 730-D U.S. Geological Survey.

Miller, D E., and J.E. Vandike. 1997. Missouri State Water Plan Series Volume II, Groundwater Resources of Missouri. Missouri Department of Natural Resources' Division of Geology and Land Survey, Water Resources Report No. 46. 210 p.

Missouri Audubon Society (MAS). 2011**. "**Annotated Checklist of Missouri Birds". The Audubon Society of Missouri, July 2010. <http://mobirds.org/listing/listoflists.aspx>

Missouri Department of Conservation (MDC). 1997. "Big River: Inventory and Assessment for Big River Watershed." 1997, July 31. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/big-river> on 21 September 2012.

MDC. 1998. "Meramec River: Executive Summary." 1998, November. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/meramec-river> on 21 September 2012.

MDC. 1999. "Bourbeuse River: Executive Summary." 1999, December. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/bourbeuse-river> on 21 September 2012.

MDC. 2001. "Jacks Fork River: Executive Summary." 2001, April. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/jacks-fork-river> on 25 October 2012.

MDC. 2001. "Eleven Point River: Executive Summary." 2001, March. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/eleven-point-river> on 21 September 2012.

MDC. 2001. "St. Francis River: Executive Summary." 2001, July. Internet. Retrieved from <http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/st-francis-river> on 21 September 2012.

MDC. 2003. "Current River: Inventory and Assessment for Current River Watershed." 2003, January. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/current-river> on 21 September 2012.

MDC. 2004. "Black River: Inventory and Assessment." 2004, February. Internet. Retrieved from < http://mdc.mo.gov/landwater-care/stream-and-watershed-management/missouri-watersheds/black-river> on 21 September 2012.

MDC. 2009. "Missouri Fish and Wildlife Information System". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400122> on 19 September 2011.

MDC. 2010. "Elk History and Restoration". 17 August 2010. Internet. Retrieved from <http://mdc.mo.gov/conmag/2010/09/elk-history-and-restoration> on 27 July 2011.

MDC. 2011 a. "Heritage Program". Internet. Retrieved from <http://mdc.mo.gov/landwater-care/heritage-program> on 3 July 2011.

MDC. 2011 b. "Detailed Report – Northern Harrier". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400122> on 19 September 2011.

MDC. 2011 c. "Detailed Report – Peregrine Falcon". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400122> on 19 September 2011.

MDC. 2011d. "Endangered Species in the Fieldguide –Swainson's Warbler". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0400340> on 9 November 2011.

MDC. 2011e. "Detailed Report – Bachman's Sparrow". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=04002527> on 19 September 2011.

MDC. 2011f. "Endangered Species in the Fieldguide – Gray Bat". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/gray-bat> on 22 July 2011.

MDC. 2011g. "Endangered Species in the Fieldguide – Indiana Bat". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/indiana-bat> on 22 July 2011.

MDC. 2011h. "Endangered Species in the Fieldguide – Eastern Spotted Skunk". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/eastern-spotted-skunk> on 4 November 2011.

MDC. 2011i. "Endangered Species in the Fieldguide – Elephantear". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/elephantear-elephants-ear> on 3 August 2011.

MDC. 2011j. "Endangered Species in the Fieldguide – Snuffbox". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/snuffbox> on 3 August 2011.

MDC. 2011k. "Endangered Species in the Fieldguide – Ebonyshell". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/ebonyshell> on 2 August 2011.

MDC. 2011l. "Detailed Report – Crystal Darter". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0100051> on 10 September 2011.

MDC. 2011m. "Best Management Practices – Crystal Darter". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9545_6485.pdf> on 13 September 2011.

MDC. 2011n. "Detailed Report – Longnose Darter". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=0100061> on 13 September 2011.

MDC. 2011o. "Best Management Practices – Longnose Darter". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9548_6488.pdf> on 13 September 2011.

MDC. 2011p. "Endangered Species in the Fieldguide – Hellbender". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/hellbender> on 23 August 2011.

MDC. 2011q. "Endangered Species in the Fieldguide – Mead's Milkweed". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/meads-milkweed> on 3 August 2011.

MDC. 2011r. "Detailed Report – Mead's Milkweed". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=2001400> on 3 August 2011.

MDC. 2011s. "Detailed Report – Virginia Sneezeweed". Internet. Retrieved from <http://mdc4.mdc.mo.gov/applications/mofwis/Mofwis_Detail.aspx?id=2003311> on 3 August 2011.

MDC. 2011t. "Endangered Species in the Fieldguide – Running Buffalo Clover". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/running-buffalo-clover> on 3 August 2011.

MDC. 2011u. "Bison". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/bison> on 27 July 2011.

MDC. 2012a. "Best Management Practices for Curtis Pearlymussel". Internet. Retrieved from <http://mdc.mo.gov/sites/default/files/resources/2010/08/9565_6505.pdf> on 31 October 2012.

MDC. 2012b. "XPlor Field Guide: Lake Sturgeon". Internet. Retrieved from <http://xplor.mdc.mo.gov/discover-nature/field-guide/lake-sturgeon> on 30 January 2012.

MDC. 2012c. "Field Guide: Swamp Darter". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/swamp-darter> on 2 November 2012.

MDC. 2012e. "Field Guide: Goldstripe Darter". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/goldstripe-darter> on 2 November 2012.

MDC. 2012g. "Field Guide: Sabine Shiner". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/sabine-shiner> on 2 November 2012.

MDC. 2012h. "Field Guide: Mountain Madtom". Internet. Retrieved from <http://mdc.mo.gov/discover-nature/field-guide/mountain-madtom> on 2 November 2012.

MDC. 2012j. "XPlor Field Guide: Pallid Sturgeon". Internet. Retrieved from <http://xplor.mdc.mo.gov/discover-nature/fieldguide/pallid-sturgeon> on 30 January 2012.

MDC. 2012l. "XPlor Field Guide: Decurrent False Aster". Internet. Retrieved from http://xplor.mdc.mo.gov/discover-nature/field-guide/decurrent-false-aster> on 31 October 2012.

MDC. 2012m. "Missouri Species and Communities of Conservation Concern Checklist - January 2012". Missouri Department of Conservation, Jefferson City. 51pp.

MDC. 2012n. "XPlor Field Guide: Decurrent False Aster". Internet. Retrieved from http://xplor.mdc.mo.gov/discover-nature/field-guide/decurrent-false-aster> on 31 October 2012.

Missouri Department of Resources (MDNR)-Water Resources Center. 2012a. "Salem Plateau Groundwater Province". Internet. Retrieved from <http://www.dnr.mo.gov/env/wrc/groundwater/education/provinces/salemplatprovince.htm> on 26 October 2012.

Nigh, T.A. and W.A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City. 212 pp.

Oklahoma Department of Wildlife Conservation (OKDWC). 2011. "Endangered species – Longnose Darter". Internet. Retrieved from <http://wildlifedepartment.com/wildlifemgmt/endangered/darter.htm> on 13 September 2011.

The Nature Conservancy (TNC). 2011. "The bison are coming!" Internet. Retrieved from <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/missouri/the-bison-arecoming.xml> on 27 July 2011.

U.S. Fish and Wildlife Service (USFWS). 2000. Virginia Sneezeweed (*Helenium virginicum*) Recovery Plan. September 2000. USFWS Region Five, Hadley, Massachusetts. 66 pp.

USFWS. 2005. Mead's Milkweed Fact Sheet. June 2005. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS. 2006, March. Hine's Emerald Dragonfly Fact Sheet. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS. 2009, November. Winged Mapleleaf Fact Sheet. USFWS Endangered Species Division. Fort Snelling, Minnesota. 2 pp.

USFWS. 2011a. Spectaclecase Fact Sheet. January 2011. USFWS Endangered Species Division, Fort Snelling, Minnesota. 2 pp.

USFWS. 2011b. "Ozark Hellbender Fact Sheet". October 2011. USFWS Endangered Species Division, Fort Snelling, Minnesota. 2 pp.

USFWS- Raleigh Ecological Servcies Field Office. 2011c. "Pondberry (*Lindera melissifolia*)". 2011, August. Internet. Retrieved from http://www.fws.gov/raleigh/species/es_pondberry.html> on 31 October 2012.

USFWS. 2012a. "Missouri Federally-Listed Threatened, Endangered and Candidate Species County Distribution". Internet. Retrieved from <http://www.fws.gov/midwest/endangered/lists/missouri-spp.html> on 26 October 2012.

USFWS. 2012b. "Curtis' Pearlymussel". Internet. Retrieved from <http://www.fws.gov/ecos/ajax/docs/life_histories/F00J.html> on 31 October 2012.

USFWS. 2012c. "Species Profile: Decurrent False Aster (*Boltonia decurrens*)". Internet. Retrieved from <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q26A> on 31 October 2012.

USFWS, U. S. Department of Commerce, and U. S. Census Bureau. 2006. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. 91pp.

Wisconsin Department of Natural Resources (WIDNR). 2011. "Endangered Resources Program Species Information: Crystal Darter". Internet. Retrieved from <http://dnr.wi.gov/org/land/er/biodiversity/index.asp?mode=info&grp=13&speccode=afcqc01010> on 13 September 2011.

APPENDIX E - 2012 Missouri Species of Concern in the Southeast Missouri Ozarks

Southeast Missouri Ozarks Regional Restoration Plan

Common Name	Scientific Name	State Rank
Amphibians		
Mole salamander	*Ambystoma talpoideum*	S2
Three-toed amphiuma	*Amphiuma tridactylum*	S2
Eastern hellbender	*Cryptobranchus a. alleganiensis*	S1
Ozark hellbender	*Cryptobranchus a. bishopi*	S1
Grotto salamander	*Eurycea spelaea*	S2S3
Eastern spadefoot	*Scaphiopus holbrookii*	S2
Reptiles		
Western chicken turtle	*Deirochelys reticularia miaria*	S1
Western mudsnake	*Farancia abacura reinwardtii*	S2
Alligator snapping turtle	*Macrochelys temminckii*	S2
Birds		
Sharp-shinned hawk	*Accipiter striatus*	S2
American bittern	*Botarus lentiginosus*	S1
Northern harrier	*Circus cyaneus*	S2
Cerulean warbler	*Dendroica cerulea*	S2S3
Peregrine falcon	*Falco peregrinus*	S1
Common moorhen	*Gallinula chloropus*	S2
Swainson's warbler	*Limnothlypis swainsonii*	S2
Bachman's sparrow	*Peucaea aestivalis*	S1
Crustaceans		
Fustis cave isopod	*Caecidotea fustis*	S2
Salem cave isopod	*Caecidotea salemensis*	S2
Serrated cave isopod	*Caecidotea serrata*	S1
Stygian cave isopod	*Caecidotea stygia*	S1
Digger crayfish	*Fallicambarus fodiens*	S2S3
Shield crayfish	*Faxonella clypeta*	S2S3
Coldwater crayfish	*Orconectes eupunctus*	S2
Mammoth spring crayfish	*Orconectes marchandi*	S1S2
Big Creek crayfish	*Orconectes peruncus*	S2
St. Francis River crayfish	*Orconectes quadruncus*	S2
Fish		
Lake sturgeon	*Acipenser fulvescens*	S1
Alabama shad	*Alosa albame*	S2

Common Name	Scientific Name	State Rank
Western sand darter	*Ammocrypta clara*	S2S3
Highfin carpsucker	*Carpiodes velifer*	S2
Crystal darter	*Crystallaria asprella*	S1
Lake chubsucker	*Erimyzon sucetta*	S2
Swamp darter	*Etheostoma fusiforme*	S1
Harlequin darter	*Etheostoma histrio*	S2
Least darter	*Etheostoma microperca*	S2
Niangua darter	*Etheostoma nianguae*	S2
Goldstripe darter	*Etheostoma parvipinne*	S1
Starhead topminnow	*Fundulus dispar*	S2
Western silvery minnow	*Hybognathus argyritis*	S2
Plains minnow	*Hybognathus placitus*	S2
Southern brook lamprey	*Ichthyomyzon gagei*	S2S3
American brook lamprey	*Lampetra appendix*	S2
Dollar sunfish	*Lepomis marginatus*	S2
Bantam sunfish	*Lepomis symmetricus*	S2
Ghost shiner	*Notropis buchanani*	S2
Blacknose shiner	*Notropis heterolepis*	S2
Taillight shiner	*Notropis maculatus*	S1
Ozark shiner	*Notropis ozarcanus*	S2
Sabine shiner	*Notropis sabinae*	S1
Mountain madtom	*Noturus eleutherus*	S1S2
Bluestripe darter	*Percina cymatotaenia*	S2
Longnose darter	*Percina nasuta*	S1
Stargazing darter	*Percina uranidea*	S2
Eastern slim minnow	*Pimephales tenellus parviceps*	S2S3
Flathead chub	*Platygobio gracillis*	S1
Pallid sturgeon	*Scaphirhynchus albus*	S1
Southern cavefish	*Typhlichthys subterraneus*	S2S3
Insects		
Ozark stone	*Acroneuria ozarkensis*	S2
Duke's skipper	*Euphyes dukesi*	S1
Missouri glyphopsyche caddisfly	*Glyphopsyche missouri*	S1
Bald cypress katydid	*Inscudderia taxodii*	S1
Hoosier grasshopper	*Paroxya hoosieri*	S1
Applachian eyed brown	*Satyrodes appalachia leeuwi*	S1
Frison's seratellan mayfly	*Serratella frisoni*	S2
Hine’s emerald	*Somatochlora hineana*	S2
Ozark emerald	*Somatochlora ozarkiensis*	S2S3
Spined grouse locust	*Tettigidea armata*	S2S3
Millipedes		

Common Name	Scientific Name	State Rank
Causeyella cave millipede	*Causeyella dendropus*	S2
Mammals		
Southeastern bat	*Myotis austroriparius*	S1
Indiana bat	*Myotis sodalist*	S1
Plains spotted skunk	*Spilogale putorius interrupta*	S1
Swamp rabbit	*Sylvilagus aquaticus*	S2
Mollusks		
Elktoe	*Alasmidonta marginata*	S2
Slippershell mussel	*Alasmidonta viridis*	S2
Flat floater	*Anodonta suborbiculata*	S2
Cylindrical papershell	*Anodontoides ferussacianus*	S1
Western fanshell	*Cyprogenia aberti*	S2
Elephantear	*Elliptio crassidens*	S1
Curtis' pearlymussel	*Epioblasma florentina curtisii*	S1
Snuffbox	*Epioblasma triquetra*	S1
Enigmatic cavesnail	*Fontigens antroectes*	S2
Proserpine cavesnail	*Fontigens proserpina*	S1
Ebonyshell	*Fusconaia ebena*	S1
Pink mucket	*Lampsillis arupta*	S2
Scaleshell	*Leptodea leptodon*	S1
Black sandshell	*Ligumia recta*	S2
Southern hickorynut	*Obovaria jacksoniana*	S1
Sheepnose	*Plethobasus cyphyus*	S2
Rabbitsfoot	*Quadrula cylindrica cylindrica*	S1
Winged mapleleaf	*Quadrula fragosa*	S1
Salamander mussel	*Simpsonaias ambigua*	S1
Purple lilliput	*Toxolasma lividus*	S2
Capital vertigo	*Vertigo oscariana*	S1
Plants		
Large seeded mercury	*Acalypha deamii*	S1
Purple false foxglove	*Agalinis purpurea*	S2
Green false foxglove	*Agalinis viridis*	S1
Wild leek	*Allium burdickii*	S2
Floating foxtail grass	*Alopecurus aequalis*	S2
A moss	*Amblystegium polygamum*	S1
Ciliate blue star	*Amsonia ciliata var. filifolia*	S2S3
Wood anemone	*Anemone quinquefolia*	S1
Wild sarsaparilla	*Aralia nudcaulis*	S2
Mead's milkweed	*Asclepias meadii*	S2
Yellow bartonia	*Bartonia virginica*	S1

Common Name	Scientific Name	State Rank
American barberry	*Berberis canadensis*	S2
Bergia	*Bergia texana*	S2
A beggar's tick	*Bidens laevis*	S1
Decurrent false aster	*Boltonia decurrens*	S1
Few-lobbed grape fern	*Botrychium biternatum*	S1
Blue grama	*Bouteloua gracilis*	S1
A moss	*Brachelyma subulatum*	S1
Sword moss	*Bryoxiphium norvegicum*	S1
A moss	*Bryum miniatum*	S1
Northern reedgrass	*Calamagrostis stricta ssp. inexpansa*	S2S3
French mulberry	*Callicarpa americana*	S1
Grass pink orchid	*Calopogon tuberosus*	S2
Marsh bellflower	*Campanula aparinoides*	S1
Harebell	*Campanula rotundifolia*	S1
A moss	*Campylopus tallulensis*	S1
A sedge	*Carex abscondita*	S1
Broadwing sedge	*Carex alata*	S2S3
Bellow beaked sedge	*Carex albicans var. australis*	S1
Greenish-white sedge	*Carex albolutescens*	S1S2
A sedge	*Carex aquatilis var. substricta*	S1
A sedge	*Carex atlantica ssp. atlantica*	S1
A sedge	*Carex bromoides ssp. Bromoides*	S2
Brown bog sedge	*Carex buxbaumii*	S2
Cherokee sedge	*Carex cherokeensis*	S2
Fibrous-root sedge	*Carex communis var. communis*	S2
Bristly sedge	*Carex comosa*	S2
White-edge sedge	*Carex debilis var. debilis*	S1
A sedge	*Carex fissa var. fissa*	S1
A sedge	*Carex flaccosperma*	S2
Giant sedge	*Carex gigantea*	S1S2
Graceful sedge	*Carex gracillima*	S1
A sedge	*Carex microdonta*	S1
A sedge	*Carex molestiformis*	S2
A sedge	*Carex nigromarginata var. floridana*	S1
Sharp-scale sedge	*Carex oxylepis*	S2
A sedge	*Carex reznicekii*	S2
A sedge	*Carex socialis*	S2
A sedge	*Carex sterilis*	S2
Straw sedge	*Carex straminea*	S1
Shaved sedge	*Carex tonsa var. rugosperma*	S1
Triangular sedge	*Carex triangularis*	S2
Hairy-fruited sedge	*Carex trichocarpa*	S1
A sedge	*Carex vesicaria var. monile*	S2

Common Name	Scientific Name	State Rank
Willdenow's sedge	*Carex willdenowii*	S1
Ozark chinquapin	*Castanea pumila var. ozarkensis*	S2
A gourd	*Cayaponia quinqueloba*	S1
Coontail	*Ceratophyllum echinatum*	S1
Slender spike grass	*Chasmanthium laxum ssp. laxum*	S1
Rose turtlehead	*Chelone oblique*	S2
A leatherflower	*Clematis viorna*	S1
Joint grass	*Coelorachis cylindrica*	S1
Fleabane	*Conyza canadensis var. pusilla*	S1S2
A Corydalis	*Corydalis micrantha ssp. australis*	S2
Parsley haw	*Crataegus marshallii*	S1
A hawthorn	*Crataegus spathulata*	S1
A marsh elder	*Cyclachaena xanthifolia*	S1
Finger Dog-shade	*Cynosciadium digitatum*	S2
Umbrella flatsedge	*Cyperus diandrus*	S1
An umbrella sedge	*Cyperus flavicomus*	S1
Umbrella sedge	*Cyperus retroflexus*	S1
Teasel-like cyperus	*Cyperus retrofractus*	S1S2
Small white lady-slipper	*Cypripedium candidum*	S1
Showy lady-slipper	*Cypripedium reginae*	S2S3
A bladderfern	*Cystopteris tenuis*	S1
Gattinger prairie-clover	*Dalea gattingeri*	S1
Swamp loosestrife	*Decodon verticillatus*	S1
Tall larkspur	*Delphinium exaltatum*	S2
Hay-scented fern	*Dennstardtia punctilobula*	S2
Tansy mustard	*Descurainia pinnata ssp. pinnata*	S2S3
American beakgrain	*Diarrhena americana*	S1
A lichen	*Dibaeis absoluta*	S1
A moss	*Dichelyma capillaceum*	S1
Pony-foot grass	*Dichondra carolinensis*	S1
A moss	*Dicranum polysetum*	S1
A moss	*Didymodon rigidulus var. rigidulus*	S1
Amethyst shooting star	*Dodecatheon amethystinum*	S2
French's shooting star	*Dodecatheon frenchii*	S1
Spinulose shield fern	*Dryopteris carthusiana*	S2
Log fern	*Dryopteris celsa*	S1
Goldie's fern	*Dryopteris goldiana*	S2
Evergreen woodfern	*Dryopteris intermedia*	S1
Dwarf burhead	*Echinodorus tenellus var. parvulus*	S1
Lance-like spike rush	*Eleocharis laceolata*	S1
A love grass	*Eragrostis glomerata*	S1
Plume grass	*Erianthus giganteus*	S1
Umbrella plant	*Eriogonum longifolium var. longifolium*	S2

Common Name	Scientific Name	State Rank
Strawberry bush	*Euonymus americanus*	S2
A thoroughwort	*Eupatorium rotundifolium var. scabridum*	S1
A thoroughwort	*Eupatorium semiserratum*	S1S2
Forked aster	*Eurybia furcata*	S2
Big-leaved aster	*Eurybia macrophylla*	S2
Queen of the prairie	*Filipendula rubra*	S2
A moss	*Forsstroemia producta*	S1
Northern bedstraw	*Galium boreale ssp. septentriolnale*	S2
Black huckleberry	*Gaylussacia baccata*	S1
Closed gentian	*Gentiana andrewsii*	S1
Pale avens	*Geum virginianum*	S1
Hedge hyssop	*Gratiola viscidula ssp. Viscidula*	S1
A bluet	*Hedyotis boscii*	S1
Swamp sunflower	*Helianthus angustifolius*	S2
Little leaved alum root	*Heuchera parviflora var parviflora*	S1
Sharp's homaliadelphus	*Homaliadelphus sharpii*	S1
Featherfoil	*Hottonia inflata*	S2
Fir clubmoss	*Huperzia porophila*	S2
Floating pennywort	*Hydrocotyle ranunculoides*	S1S2
Ovate fiddleleaf	*Hydrolea ovata*	S2
A St. John's wort	*Hypericum lobocarpum*	S1
A moss	*Hypnum cupressiforme var. filiforme*	S1
A moss	*Hypnum pallescens*	S1
Engelmann's quillwort	*Isoetes engelmannii var. engelmannii*	S1
A moss	*Isopterygiopsis muelleriana*	S1
Large whorled pogonia	*Isotria verticillata*	S1S2
Toad rush	*Juncus bufonius var. bufonius*	S1
Cananda rush	*Juncus canadensis var. canadensis*	S1
Weak rush	*Juncus debilis*	S1
A rush	*Juncus validus*	S1
A water willow	*Justicia ovata var. lanceolata*	S2
A liverwort	*Kurzia sylvatica*	S1
Corkwood	*Leitneria floridana*	S2
Star duckweed	*Lemna trisulca*	S2
A blazing star	*Liatris scaiosa var. nieuwlandii*	S2
Turk’s cap lily	*Lilium superbum*	S1
American frogbit	*Limnobium spongia ssp. spongia*	S2
Pondberry	*Lindera melissifolia*	S1
Loesel’s twayblade	*Liparis loeselii*	S2
Primrose willow	*Ludwigia leptocarpa*	S2
A false loosestrife	*Ludwigia microcarpa*	S2
Round-branched ground pine	*Lycopodium dendroideum*	S1
A clubmoss	*Lycopodium digitatum*	S2

Common Name	Scientific Name	State Rank
Ground cedar	*Lycopodium tristachyum*	S1
A liverwort	*Marsupella sphacelata*	S1
Ostrich fern	*Matteuccia struthiopteris var. pensylvanica*	S2
Water hyssop	*Mecardonia acuminata*	S1
Two-flowered melic grass	*Melica mutica*	S1
Bogbean	*Menyanthes trifoliate*	S1
A liverwort	*Metzgeria conjugate*	S1S2
A moss	*Micromitrium megalosporum*	S1S2
Miterwort	*Mitreola petiolata*	S1
Thread-like naiad	*Najas gracillima*	S2
Sphagnum sprite	*Nehalennia gracilis*	S1
Prairie iris	*Nemastylis geminiflora*	S2
Shrubby sundrops	*Oenothera fruticosa ssp. fruticosa*	S1
Small sundrops	*Oenothera perennis*	S1
Stemless evening primrose	*Oenothera triloba*	S2
A bromerape	*Orobanche ludoviciana*	S1
A panic grass	*Panicum dichotomum var. nitidum*	S1
A panic grass	*Panicum dichotomum var. yadkinense*	S1
A panic grass	*Panicum portoricense*	S1
A lichen	*Pannaria rubiginosa*	S1
A lichen	*Parmotrema hypoleucinum*	S1
A lichen	*Parmotrema tinctorum*	S2
Slender paspalum	*Paspalum setaceum var. setaceum*	S1
Missouri cliffbrake	*Pellaea glabella missouriensis*	S1S2
Arrow arum	*Peltandra virginica ssp. virginia*	S2
A hornwort	*Phaeoceros oreganus*	S1
Mock orange	*Philadelphus pubescens var. verrucosus*	S1
Carolina phlox	*Phlox carolina ssp. carolina*	S1
Wild sweet william	*Phlox maculate pyramidalis*	S2
A moss	*Physcomitrium collenchymatum*	S1
A false dragonhead	*Physostegia intermedia*	S1
A moss	*Plagiothecium dinticulatum*	S1
Woolly plantain	*Plantago patagonica*	S2
Yellow-fringed orchid	*Platanthera ciliaris*	S1
Green wood orchid	*Platanthera clavellata*	S2
Pale green orchid	*Platanthera flava var. flava*	S2
Northern rein orchid	*Platanthera flava var. herbiola*	S2
Snake-mouth orchid	*Pogonia ophioglossoides*	S1
Water smartweed	*Polygonum amphibium var. stipulaceum*	S1
Halberd-leaved tear thumb	*Polygonum arifolium*	S1
Juniper-leaf	*Polypremum procumbens*	S2
Big-toothed aspen	*Populus grandidentata*	S1
Spotted pondweed	*Potamogeton pulcher*	S2S3

Common Name	Scientific Name	State Rank
Slender pondweed	*Potamogeton pusillus var. pusillus*	S1
A lichen	*Pseudocyphellaria aurata*	S1
A liverwort	*Ptilidium pulcherrimum*	S1
A moss	*Ptychomitrium sinense*	S1
Blunt Mountain Mint	*Pycanthemum muticum*	S2
A lichen	*Pycnothelia papillaria*	S1
Water oak	*Quercus nigra*	S2
Nuttall's oak	*Quercus texana*	S2
A lichen	*Ramalina intermedia*	S1
A moss	*Rhabdoweisia crispata*	S1
Horned rush	*Rhynchospora macrostachya var. macrostac*	S1
Golden glade-moss	*Rhytidium rugosum*	S1
A liverwort	*Riccardia multifida*	S1
A lichen	*Rimelia subisidiosa*	S1
Lake cress	*Rorippa aquatica*	S2
Rough coneflower	*Rudbeckia grandiflora var. grandiflora*	S1
Marsh pink	*Sabatia brachiata*	S1
American cupscale	*Sacciolepis striata*	S1
Giant bulrush	*Schoenoplectus californicus*	S1
Canby's Bulrush	*Schoenoplectus etuberculatus*	S1
Hall's bulrush	*Schoenoplectus hallii*	S2
Weakstalk bulrush	*Schoenoplectus purshianus*	S1
Muhlenberg's nut-rush	*Scleria reticularis var. pubescens*	S1
A moss	*Seligeria donniana*	S1
A moss	*Sematophylium marylandicum*	S1
Elliot sida	*Sida elliottii*	S1
Eastern blue-eyed grass	*Sisyrinchium atlanticum*	S2
Narrowleaf peatmoss	*Sphagnum angustifolium*	S1
Northern peatmoss	*Sphagnum capillifolium*	S1
Sphagnum	*Sphagnum inundatum*	S1
Hardhack	*Spiraea tomentosa*	S1
Sullivantia	*Sullivantia sullivantii*	S2
Tradescant aster	*Symphyotrichum dumosum var. strictior*	S2
Small white aster	*Symphyotrichum racemosum var. subdumosum*	S2
Saltmarsh aster	*Symphyotrichum subulatum var. ligulatum*	S2
A moss	*Syrrhopodon texanus*	S1
Water canna	*Thalia dealbata*	S2
A moss	*Thamnobryum alleghaniense*	S1
Cranefly orchid	*Tipularia discolor*	S2
Pale manna grass	*Torreyochloa pallida var. pallida*	S1
Ozark spiderwort	*Tradescantia ozarkana*	S2
A noseburn	*Tragia ramose*	S2
False bugbance	*Trautvetteria caroliniensis*	S2

Common Name	Scientific Name	State Rank
Trepocarpus	*Trepocarpus aethusae*	S1
Marsh St. John's wort	*Triadenum tubulosum*	S1
Running buffalo clover	*Trifolium stoloniferum*	S1
Ozark wake robin	*Trillium pusillum var. ozarkanum*	S2
Cedar elm	*Ulmus crassifolia*	S1
Rock elm	*Ulmus thomasii*	S2
Slender bladderwort	*Utricularia subulata*	S1
Ozark arrow wood	*Viburnum ozarkense*	S2S3
Northern arrow-wood	*Viburnum recognitum*	S1
Smooth white violet	*Viola macloskeyi ssp.pallens*	S2
Barren strawberry	*Waldsteinia fragarioides ssp. fragarioid*	S2
Wolffiella	*Wolffiella gladiata*	S1
Netted chain fern	*Woodwardia areolata*	S2
Yellow-eyed grass	*Xyris torta*	S1
Arkansas yucca	*Yucca arkansana*	S2
White camas	*Zigadenus elegans ssp. glaucus*	S2
Death camas	*Zigadenus nuttallii*	S1

Appendix F—List of Public Lands in the Southeast Missouri Ozarks
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County	Public Land	Ownership
Butler	Allred Lake Natural Area	MO Department of Conservation
	Big Cane Conservation Area	MO Department of Conservation
	Carmichael State Forest	MO Department of Conservation
	Coon Island Conservation Area	MO Department of Conservation
	Corkwood Conservation Area	MO Department of Conservation
	Dan River Access	MO Department of Conservation
	Fisk Access	*MO Department of Conservation
	Harviell Access	MO Department of Conservation
	Hendrickson Access	**U.S. Forest Service
	Hilliard Access	*MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Poplar Bluff Commercial Historic District	National Register of Historic Places
	Poplar Bluff Conservation Area	*MO Department of Conservation
	Ringo Ford Access	*MO Department of Conservation
	South Sixth Street Historic District	National Register of Historic Places
	Sportsman's Park Access	**City of Poplar Bluff
	Sun Conservation Area	MO Department of Conservation
	University Forest Conservation Area	*MO Department of Conservation
Carter	Big Spring Historic District	National Register of Historic Places
	Carter Creek Conservation Area	MO Department of Conservation
	Chilton Creek	The Nature Conservancy
	Current River Conservation Area	MO Department of Conservation
	Hunter Towersite	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Miller Community Lake	MO Department of Conservation
	MO Lumber and Mining Company District	National Register of Historic Places
	Ozark National Scenic Riverways	U.S. National Park Service
	Peck Ranch Conservation Area	MO Department of Conservation
	Rocky Creek Conservation Area	MO Department of Conservation
	Van Buren Riverfront Park	**City of Van Buren
Crawford	Anderson Memorial Conservation Area	MO Department of Conservation
	Bird's Nest Access	**Crawford County
	Blue Springs Creek Conservation Area	*MO Department of Conservation
	Campbell Bridge Access	*MO Department of Conservation
	Crooked Creek Conservation Area	MO Department of Conservation
	Dillard Mill State Historic Site	*LAD Foundation
	Huzzah Conservation Area	*MO Department of Conservation
	Keysville Towersite	MO Department of Conservation
	Maramec Spring Fish Hatchery	**The James Foundation
	Maramec Spring Park	**The James Foundation
	Mark Twain National Forest	U.S. Forest Service
	Meramec State Park	MO Department of Natural Resources

*Leased
**MO Department of Conservation Agreement Land

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County	Public Land	Ownership
	Mint Spring Access	MO Department of Conservation
	Onondaga Cave State Park	MO Department of Natural Resources
	Onyx Cave Conservation Area	*MO Department of Conservation
	Riverview Access	MO Department of Conservation
	Sappington Bridge Access	*MO Department of Conservation
	Scotia Iron Furnace Stack	National Register of Historic Places
	Scotts Ford Access	MO Department of Conservation
	Sizemore Memorial Conservation Area	MO Department of Conservation
	Snelson-Brinker House	National Register of Historic Places
	Wagon Wheel Motel Historic District	National Register of Historic Places
	Woods Memorial Conservation Area	MO Department of Conservation
Dent	Brown Conservation Area	MO Department of Conservation
	Cedar Grove Conservation Area	MO Department of Conservation
	Hyer Woods Conservation Area	MO Department of Conservation
	Indian Trail Conservation Area	MO Department of Conservation
	Lenox Towersite	MO Department of Conservation
	Lower Parker School	National Register of Historic Places
	Mark Twain National Forest	U.S. Forest Service
	Montauk Fish Hatchery	*MO Department of Conservation
	Montauk State Park	MO Department of Natural Resources
	Montauk Towersite	MO Department of Conservation
	Nichols Farm District	National Register of Historic Places
	Nova Scotia Ironworks Historic District	National Register of Historic Places
	Ozark National Scenic Riverways	U.S. National Park Service
	Shawnee Mac Lakes Conservation Area	MO Department of Conservation
	Short Bend Access	MO Department of Conservation
	White River Trace Conservation Area	MO Department of Conservation
Franklin	Catawissa Conservation Area	MO Department of Conservation
	Chouteau Claim Access	MO Department of Conservation
	East Central Regional Office	MO Department of Conservation
	Little Indian Creek Conservation Area	MO Department of Conservation
	Long Ridge Conservation Area	MO Department of Conservation
	Mayers Landing Access	MO Department of Conservation
	Meramec Conservation Area	MO Department of Conservation
	Meramec State Park	MO Department of Natural Resources
	Meramec State Park Beach Area Historic District	National Register of Historic Places
	Mill Rock Access	MO Department of Conservation
	Redhorse Access	MO Department of Conservation
	Reiker Ford Access	MO Department of Conservation
	River ‘Round Conservation Access	MO Department of Conservation
	Robertsville State Park	MO Department of Natural Resources
	Sand Ford Access	*MO Department of Conservation

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County	Public Land	Ownership
	Uhlemeyer Access	MO Department of Conservation
	Union Access	*MO Department of Conservation
	Wenkel Ford Access	MO Department of Conservation
Gasconade	Mint Spring Access	MO Department of Conservation
	Mint Spring Conservation Area	MO Department of Conservation
	Tea Access	MO Department of Conservation
Howell	Davidson-Paris Wildlife Area	MO Department of Conservation
	Davis Conservation Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Mountain View Towersite	MO Department of Conservation
	Ozark National Scenic Riverways	U.S. National Park Service
	Sims Valley Community Lake	MO Department of Conservation
Iron	Bismarck Conservation Area	MO Department of Conservation
	Buford Mountain Conservation Area	MO Department of Conservation
	Elephant Rocks State Park	MO Department of Natural Resources
	Fort Davidson State Historic Site	MO Department of Natural Resources
	Funk Memorial State Forest and Wildlife Area	MO Department of Conservation
	Graves Mountain Conservation Area	MO Department of Conservation
	Ketcherside Mountain Conservation Area	MO Department of Conservation
	Johnson's Shut-Ins State Park	MO Department of Natural Resources
	Mark Twain National Forest	U.S. Forest Service
	Pilot Knob National Wildlife Refuge	U.S. Fish & Wildlife Service
	Riverside Conservation Area	MO Department of Conservation
	Sam A. Baker State Park	MO Department of Natural Resources
	Taum Sauk Mountain State Park	MO Department of Natural Resources
	Ursuline Academy-Arcadia College Historic District	National Register of Historic Places
Jefferson	Brown's Ford Access	MO Department of Conservation
	Flamm City Access	*MO Department of Conservation
	LaBarque Creek Conservation Access	MO Department of Conservation
	Mammoth Access	MO Department of Conservation
	Merrill Horse Access	MO Department of Conservation
	Pacific Palisades Conservation Area	MO Department of Conservation
	Teszars Woods Conservation Area	MO Department of Conservation
	Valley View Glades Natural Area	MO Department of Conservation
	Washington State Park	MO Department of Natural Resources
	Washington State Park CCC Historic District	National Register of Historic Places
	Young Conservation Area	MO Department of Conservation
Madison	Fredricktown City Lake	**City of Fredericktown

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County	Public Land	Ownership
	Mark Twain National Forest	U.S. Forest Service
	Millstream Gardens Conservation Area	MO Department of Conservation
	Roselle Access	MO Department of Conservation
	Thompson Ford Access	MO Department of Conservation
Maries	Spring Creek Gap Conservation Area	MO Department of Conservation
Oregon	Alton Forestry Sub-Office	*MO Department of Conservation
	Cover Memorial Wildlife Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Myrtle Access	MO Department of Conservation
	Rose Hill Towersite	MO Department of Conservation
Phelps	Little Prairie Conservation Area	MO Department of Conservation
	Maramec Iron Works District	National Register of Historic Places
	Maramec Spring Fish Hatchery	**The James Foundation
	Maramec Springs Park	**The James Foundation
	Mark Twain National Forest	U.S. Forest Service
	Rolla Ranger Station Historic District	National Register of Historic Places
	Rosati Towersite	MO Department of Conservation
	Schuman Park Lake	**City of Rolla-Parks Department
	Scioto Lake	**The James Foundation
	Woods Memorial Conservation Area	MO Department of Conservation
Reynolds	Buford-Carty Farmstead	National Register of Historic Places
	Centerville Access	MO Department of Conservation
	Clearwater Conservation Area	MO Department of Conservation
	Clearwater Lake Management Lands	*MO Department of Conservation
	Current River Conservation Area	MO Department of Conservation
	Grasshopper Hollow	The Nature Conservancy
	Johnson's Shut-ins State Park	MO Department of Natural Resources
	Ketcherside Mountain Conservation Area	MO Department of Conservation
	Lesterville Access	MO Department of Conservation
	Logan Creek Conservation Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Nova Scotia Ironworks Historic District	National Register of Historic Places
	Riverside Conservation Area	MO Department of Conservation
	Rocky Creek Conservation Area	MO Department of Conservation
	Taum Sauk Mountain State Park	MO Department of Natural Resources
Ripley	T.L. Wright Memorial Access	**T.L. Wright Lumber Co. & City of Doniphan
	Doniphan Towersite	MO Department of Conservation
	Fourche Creek Conservation Area	MO Department of Conservation

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County	Public Land	Ownership
	Greenville Ford Access	MO Department of Conservation
	Hemenway Conservation Area	MO Department of Conservation
	Little Black Conservation Area	MO Department of Conservation
	Mudpuppy Conservation Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Ozark National Scenic Riverways	U.S. National Park Service
	Sand Pond Conservation Area	MO Department of Conservation
St. Francois	Bismarck Conservation Area	MO Department of Conservation
	Bonne Terre City Lake	**City of Bonne Terre
	East Columbia Historic District	National Register of Historic Places
	Farmington Court House Square	National Register of Historic Places
	Giessing Lake	**City of Farmington
	Gruner Ford Access	MO Department of Conservation
	Hager Lake	**City of Farmington
	Iron Mountain Lake	**City of Iron Mountain
	Knob Lick Towersite	MO Department of Conservation
	Leadwood Access	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Mineral Area College Range	**Mineral Area College
	Missouri Mines State Historic Site	MO Department of Natural Resources
	Presbyterian Orphanage of Missouri	National Register of Historic Places
	Quarry Pond	**Mineral Area College
	St. Francois State Park	MO Department of Natural Resources
	St. Joe State Park	MO Department of Natural Resources
	St. Joseph Lead Mine at Bonne Terre	National Register of Historic Places
	Syenite Access	MO Department of Conservation
	Thomas Lake	**City of Farmington
	Washington State Park	MO Department of Natural Resources
St. Louis	Allenton Access	MO Department of Conservation
	Alswel-William Lemp Estate	National Register of Historic Places
	Aselman Memorial Addition to Forest 44 CA	MO Department of Conservation
	Barretts Tunnels	National Register of Historic Places
	Bee Tree Park Lake	**St. Louis County Parks
	Carp Lake	**St. Louis County Parks
	Castlewood State Park	MO Department of Natural Resources
	Emmenegger Nature Park	*MO Department of Conservation
	Forest 44 Conservation Area	MO Department of Conservation
	Goodson Conservation Area	MO Department of Conservation
	Greentree Park Access	**City of Kirkwood
	Henry Avenue Historic District	National Register of Historic Places
	Island Lake	**St. Louis County Parks
	Klamberg Woods Conservation Area	*MO Department of Conservation

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County	Public Land	Ownership
	Kraus, Russel & Ruth Goetz House	National Register of Historic Places
	New Ballwin Park Lake	**City of Ballwin
	Pacific Palisades Conservation Area	MO Department of Conservation
	Phantom Forest Conservation Area	MO Department of Conservation
	Possum Woods Conservation Area	MO Department of Conservation
	Powder Valley Nature Center	MO Department of Conservation
	Rockwoods Range	MO Department of Conservation
	Rockwoods Reservation	MO Department of Conservation
	Route 66 State Park	MO Department of Natural Resources
	Route 66 State Park Access	**MO Department of Natural Resources
	Saint Stanislaus Conservation Area	*MO Department of Conservation
	Simpson Park Lake	**St. Louis County Parks
	Valley Park Access	MO Department of Conservation
	Vlasis Park Lake	**City of Ballwin
Ste. Genevieve	Hawn State Park	MO Department of Natural Resources
	Hickory Canyons Natural Area	LAD Foundation
	Mark Twain National Forest	U.S. Forest Service
Shannon	Alton Club	National Register of Historic Places
	Angeline Conservation Area	MO Department of Conservation
	Birch Creek Conservation Area	MO Department of Conservation
	Buttin Rock Access	MO Department of Conservation
	Buttin Rock School	National Register of Historic Places
	Chilton Creek	The Nature Conservancy
	Chilton-Williams Farm Complex	National Register of Historic Places
	Current River Conservation Area	MO Department of Conservation
	Current River State Park	MO Department of Natural Resources
	Mark Twain National Forest	U.S. Forest Service
	Ozark National Scenic Riverways	U.S. National Park Service
	Peck Ranch Conservation Area	MO Department of Conservation
	Reed Log House	National Register of Historic Places
	Rocky Creek Conservation Area	MO Department of Conservation
	Roger Pryor Pioneer Backcountry	LAD Foundation
	Shut-In Mountain Fens	The Nature Conservancy
	Sunklands Conservation Area	MO Department of Conservation
	Thomasville Towersite	MO Department of Conservation
	Thorny Mountain	The Nature Conservancy
	Twin Pines Conservation Education Center	MO Department of Conservation
	Two Rivers Access	**Ozark National Scenic Riverways
	Winona Ranger Station Historic District	National Register of Historic Places
Texas	Barn Hollow Natural Area	MO Department of Conservation
	Gist Ranch Conservation Area	MO Department of Conservation

*Leased
**MO Department of Conservation Agreement Land

Appendix F—List of Public Lands in the Southeast Missouri Ozarks
Southeast Missouri Ozarks Regional Restoration Plan

County	Public Land	Ownership
	Mark Twain National Forest	U.S. Forest Service
	Midvale Conservation Area	MO Department of Conservation
	Ozark National Scenic Riverways	U.S. National Park Service
	South Prong Access	MO Department of Conservation
	Summersville Towersite	MO Department of Conservation
Washington	Bismarck Conservation Area	MO Department of Conservation
	Bootleg Access	MO Department of Conservation
	Buford Mountain Conservation Area	MO Department of Conservation
	Caledonia Historic District	National Register of Historic Places
	Hughes Mountain Natural Area	MO Department of Conservation
	Kingston Access	MO Department of Conservation
	Little Indian Creek Conservation Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Meramec State Park	MO Department of Natural Resources
	Pea Ridge Conservation Area	MO Department of Conservation
	Roger Bilderback Lake	**City of Potosi
	Washington State Park	MO Department of Natural Resources
	Washington State Park Access	**MO Department of Natural Resources
	Washington State Park CCC Historic District	National Register of Historic Places
Wayne	Clearwater District Headquarters	MO Department of Conservation
	Clearwater Lake Management Lands	*MO Department of Conservation
	Coldwater Access	MO Department of Conservation
	Coldwater Conservation Area	MO Department of Conservation
	Flatwoods Conservation Area	MO Department of Conservation
	Graves Mountain Conservation Area	MO Department of Conservation
	Hammer Memorial Conservation Area	MO Department of Conservation
	Lake Wappapello State Park	MO Department of Natural Resources
	Lon Sanders Canyon Conservation Area	MO Department of Conservation
	Mark Twain National Forest	U.S. Forest Service
	Mingo National Wildlife Refuge	U.S. Fish & Wildlife Service
	Riverside Conservation Area	MO Department of Conservation
	Sam A. Baker State Park	MO Department of Natural Resources
	Sam A. Baker State Park Historic District	National Register of Historic Places
	University Forest Conservation Area	*MO Department of Conservation
	Wappapello Lake Management Lands	*MO Department of Conservation
	Yokum School Conservation Area	MO Department of Conservation

*Leased
**MO Department of Conservation Agreement Land

Appendix G—Exemplar Request for Proposals
Southeast Missouri Ozarks Regional Restoration Plan

Request for Proposals
Natural Resource Damage Restoration Projects for the [Company Name] Settlement

I. Introduction

This Request for Proposal (RFP) for compensatory restoration projects relates to the **[**Company**]**. Monies recovered from a Natural Resource Damage Assessment and Restoration (NRDAR) settlement are being made available for public proposals by the Missouri Trustee Council in accordance with the Southeast Missouri Ozarks Regional Restoration Plan (SEMORRP). The Missouri Trustee Council (hereafter referred to as "Trustees") is comprised of the Missouri Department of Natural Resources, the U.S. Department of Agriculture represented by the U.S. Forest Service and U.S. Department of the Interior represented by the U.S. Fish & Wildlife Service. The SEMORRP provides a process framework that governs the approach for restoration project identification, evaluation, selection and implementation presented within this RFP.

The purpose of this exemplar RFP is to identify the categories of information that will likely be included in future RFPs issued under the SEMORRP. Each RFP will be different, tailored to the specific circumstances of the type of the release and potential injury sustained and the related compensatory restoration goals of the Trustees.

A. Southeast Missouri Ozarks Regional Restoration Plan

The SEMORRP was developed under the NRDAR regulations implementing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as the federal "Superfund" law) to describe the process that will be used by the Trustees to identify appropriate actions to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by hazardous substance releases. The SEMORRP fulfills requirements under the National Environmental Policy Act of 1969 (NEPA) by taking a "hard look" at the environmental consequences of proposed federal actions, to disclose pertinent information about the actions to the public and provide public review and comment on federal actions that affect environmental resources. This exemplar RFP is part of the public review process. Once specific projects are selected, the Trustees may need to conduct additional NEPA analysis to review the specific proposed federal action as described in the selected RFP.

The development of the SEMORRP is a joint effort among state and federal natural resource Trustees and is coordinated with the public. The SEMORRP is jointly administered by the Trustees to assist in carrying out their natural resource trust mandates under CERCLA, the Oil Pollution Act, and the Clean Water Act. Natural resource damages received, either through negotiated or adjudicated settlements, must be used to restore, rehabilitate, replace and/or acquire the equivalent of those natural resources injured and services lost. The goals of the restoration plan are to:

1) Identify the natural resources and services potentially injured by the release of hazardous substances in the Southeast Missouri Ozarks;

2) Develop a request for proposal (RFP) process to evaluate and select compensatory restoration projects to achieve restoration strategies (specific restoration goals identified as part of the RFP process);

3) Identify types and examples of primary restoration projects that will be implemented by the Trustees and/or their contractors;

4) Gain efficiencies in the NRDAR process; provide for consistency and predictability by detailing the NRDAR process, thereby minimizing uncertainty to the public; and,

5) Expedite restoration of potentially injured natural resources and lost services with existing restoration funds.

This exemplar RFP is compliant with the preferred alternative selected in the SEMORRP. The preferred alternative (SEMORRP, Section 5, Alternative D) is a combination of primary and compensatory restoration. As identified in the SEMORRP, priority is given to primary restoration, whenever feasible. However, the Trustees will implement compensatory, off-site restoration when distinct advantages in cost-effectiveness or unique opportunities in protecting or enhancing important natural resources arise.

For purposes of this restoration plan the term "Compensatory Restoration" will be used to refer to the following restoration types:

- *Acquisition of Equivalent Resources or Replacement*: the substitution of an injured resource with one that provides the same or substantially similar services. 43 C.F.R. §§ 14(a) and (ii). An example is the purchase of a property containing high-quality natural resources that is threatened with development or destruction; and

- *Compensatory Restoration*: any action taken to offset the interim losses of natural resources from the date of the event until recovery (USBLM, 2008). An example of compensatory restoration is the removal of undesirable eastern red cedar trees from a glade habitat to compensate for injuries to substantially similar natural resources that occurred elsewhere.

This exemplar RFP identifies information that will be requested in a compensatory restoration RFP including:

- site-specific information as to the type of natural resources potentially injured and/or services lost;
- location of the potentially injured natural resources and/or lost services;
- restoration goals associated with the NRDAR claim and settlement for the [Company Name]; and
- restoration funds available.

Specifications and requirements for restoration projects and proposal submissions will be provided in individual RFPs.

B. Site, Claim and Settlement Information:

This section will contain a description of operations and other activities of [the Company] and any relevant history of the operation. This description will include specific locations of operations as well as the nature, type, and duration of the release of hazardous substances**.**

This section will also contain a description of the nature of the injury, identifying the type of resources which were injured as a result of the release of hazardous substances

This section will also contain a description of the settlement when final and the total amount of restoration funds available for the RFP.

This section will also contain a description of remedial actions, if any, along with a schedule of remediation and coordination of restoration projects with the proposed and/or ongoing remedial actions in the geographic area and/or other restoration actions.

C. Geographic Priority Areas for Restoration

The Trustees will prioritize areas for restoration in a tiered approach as a means of complying with the SEMORRP preferred alternative and to provide restoration specific options for the resources injured by releases of hazardous substances from [Company's] operations. The RFP will specify the criteria used to identify tiered priority areas. This tiered approach is intended to be flexible, allowing the Trustees to designate the number of tiered priority areas as is appropriate for the specific site.

An example of criteria used to establish tiered priority restoration areas is as follows:

1. Tier 1 areas are the highest priority areas. They are the very nearest to the site of injury but are not impacted by contamination.

2. Tier 2 areas are the second highest priority areas for compensatory restoration. They represent areas close to site of injury but not necessarily directly adjacent or adjoining contaminated sites.

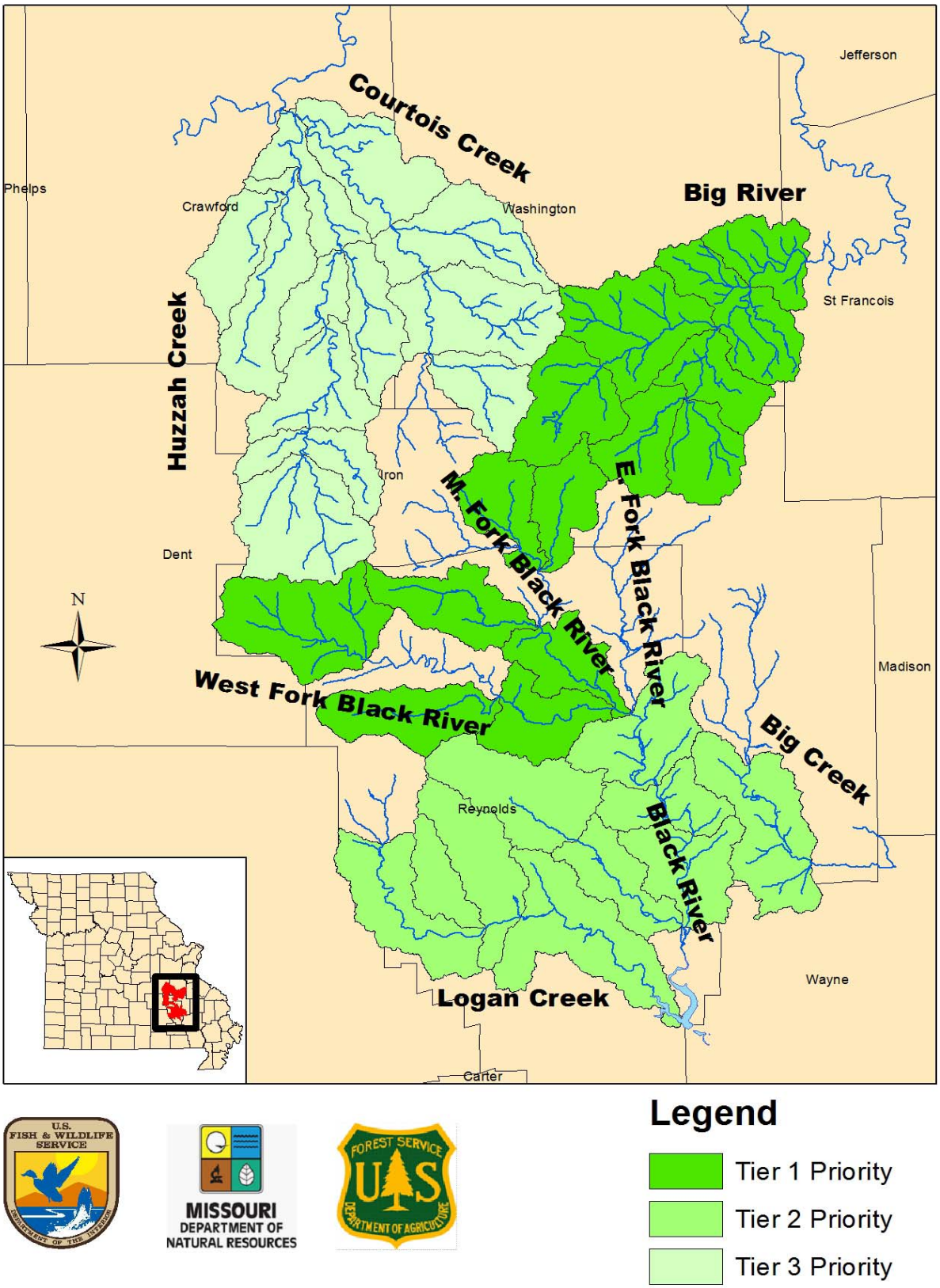
3. Tier 3 priority areas are even farther removed from the site of injury but still represent a priority area for compensatory restoration for the Trustees.

4. Tier 4 priority areas are the lowest priority areas. These sites do not fall within designated priority areas for the Trustees but may represent substantially similar resources to those at the site of injury.

This prioritization scheme will be a factor in the Trustee Decision Matrix included in Appendix A. Projects outside of these priority areas will still be eligible for funding under this RFP but will not receive prioritization**.**

Please note that each RFP will provide a new, updated map of priority restoration areas; Figure 1 is merely an example of how the Trustees may conduct geographic prioritization.

Figure 1. Example Map of Geographic Priority Areas for Restoration



D. Restoration Goals for [Company Name] RFP

NRDAR projects must have a connection to the injured resources. The natural resources within the identified geographic areas include certain injured resources, such as migratory birds and endangered species, other terrestrial and aquatic resources and supporting habitats, and groundwater resources. The restoration goals of [the Company] settlement funds in priority order are to:

1. improve or protect riparian corridor habitat;
2. protect federally threatened, endangered, and candidate aquatic species and their habitat;
3. improve or protect upland migratory bird habitat; and
4. enhance and protect groundwater recharge areas.

Please note: This list of restoration priorities is not inclusive and serves as an example for illustrative purposes only.

II. Restoration Project Types

This example RFP is not being used to solicit actual restoration proposals.

These Restoration Project types will vary for each RFP; however, the following descriptions are included to improve the understanding of the type of information which will be provided on which a project proposal may be developed.

A. Riparian Corridor, Floodplain, and Wetland Restoration

This restoration category is a high priority for the Trustees because it meets multiple restoration goals. Restored riparian corridor improves migratory bird habitat and protects downstream habitat for federally-listed aquatic species.

B. Acquisition/Legal Protection of High Quality Natural Areas

In some cases, existing high quality habitat can be protected through acquisition or through conservation easements. These areas may be in such a high quality condition that they require little to no enhancement or physical restoration. Property purchase or conservation easements/agreements could be the primary mechanism to ensure high quality habitats are protected from development or other degradation over the long-term. The Trustees desired habitats for protection in priority order include riparian corridors, wetlands, savannas, and other woodlands or forest.

C. Enhancement of Un-contaminated Uplands

A high priority upland enhancement project is woodland restoration. Upland restoration could include burning and/or other methods to control invasive species, re-vegetating to restore native flora, erosion controls, and some type of financial and/or legal assurance of long-term maintenance and protection.

D. Enhancement and Protection of Groundwater Recharge Areas

This restoration category is a high priority for the Trustees because it meets multiple restoration goals. Enhancing and protecting groundwater recharge areas improves human and ecological uses. Therefore, enhancement of existing groundwater recharge areas, or protection of high quality groundwater recharge areas

will maximize the value of existing groundwater resources.

E. Natural Resource Restoration-Based Human Use Enhancement Projects

This project category includes construction of some type of enhancement that would increase access, enjoyment, understanding, and/or use of natural resources. Examples of these types of projects include trail construction, constructing boat ramps, educational kiosks, signs, or environmental-based education programs or materials.

III. R e s t o r a t i o n Project Specifications

These Restoration Project Specification descriptions will vary for each RFP, however, for illustrative purposes only, the following descriptions are included to improve the understanding of the type of information which will be provided on which a project may be developed.

Restoration project specifications required within each proposal are included below:

A. Riparian Corridor, Floodplain, and Wetland Restoration

In general, forested canopy is the most beneficial watershed land cover for stream health. A healthy wooded watershed provides for the interception and infiltration of rainfall, leaf litter filters and slows runoff, and the extensive interlocking root systems of forests provide resistance to erosion. The structure of the forested canopy provides shelter for a variety of wildlife, food for insects and other wildlife while growing, and the base of the food chain for stream systems after leaf-fall. The roots of trees near stream channels provide resistance to erosion and downed wood supplies habitat within the stream. In addition, stream health is enhanced by easy (low gradient) transitions between the stream channel and floodplains. Riparian corridor restoration may include lowering banks to provide flood storage and riparian wetland habitat where appropriate. Riparian corridor restoration proposals will include:

<u>Site Preparation and Grading</u>
The proposal will identify the degree of site preparation and grading needed prior to re- vegetation. The proposal will identify any bank re-grading, height, slope details, re- vegetation, and maintenance components. Low angles and low height banks are preferred over high banks and steep angles. Species of conservation interest may exist and should not be disturbed.

<u>Re-vegetation</u>
The proposal will identify the native Missouri tree species to be planted, using the Terrestrial Natural Communities of Missouri (riverfront forest, mesic bottomland forest or appropriate wetland chapters) as a guide. The proposal will identify the season and density of tree planting. For example, the Trustees recommend three gallon RPM (Root Production Method) trees to be planted on 30’ centers in rows that can accommodate future mowing to control competing vegetation. Alternatively, tree planting at a minimum rate of 302 trees per acre on 12' centers for bare root trees. In addition, 50-100 native shrubs (e.g., gray dogwood, *Cornus obliqua*) per acre are recommended, and a native cover crop (e.g., Virginia wild rye, *Elymus virginicus*) seeded. The Trustees recommend planting in fall or early spring.

Conservation Easements, Access, Engineering Controls, and/or Property Purchase
The proposal will identify land in private ownership that requires access agreements necessary to achieve riparian corridor restoration. The proposal will identify other potential engineered or institutional controls to ensure long-term protection of stream and riparian corridor restoration areas such as fencing, alternative water supplies for livestock, temporary or permanent conservation easements including land-owner payment, including fee-title purchasing, if necessary. The proposal will identify who will hold the easement or title of the property, and will provide information on the time period of the easements or other protective mechanism. Conservation easements or other administrative mechanisms that protect land over longer time periods will be preferred over short-term protections, as reflected in the Appendix A Decision Matrix.

Site Maintenance and Monitoring
The proposal will identify the maintenance and monitoring needed after re-vegetation. The proposal will describe the frequency and type of herbicide treatments, fire, and frequency of mowing or other cultural practices used to facilitate the success of tree planting or other vegetation.

B. Acquisition/Legal Protection of High Quality Natural Areas

Site Description
A description of the size, location, natural features, and habitat value of the property proposed for acquisition or other conservation easement should be included. Describe ownership and management of the land. Address what types of activities will take place on the property, if any.

Conservation Easements, Engineering Controls, and/or Property Purchase
The proposal will identify potential engineered or institutional controls to ensure long- term protection of restoration areas such as temporary or permanent conservation easements including land-owner payment and fee title purchase. The proposal will identify who will hold the easement or title of the property, and will provide information on the time period of the easements or other protective mechanism.

Site Maintenance and Monitoring
Acquisition projects that are selected will require a management plan. The management plan will detail methods for permanent protection and enhancement of injured resources. The proposal will identify the maintenance, if any, and monitoring needed for the long- term conservation of the site. The proposal will describe the frequency and type of herbicide treatments, fire, and frequency of mowing and/or other practices used to facilitate long-term habitat stability.

C. Enhancement of Uncontaminated Uplands

Pre-settlement natural community land cover in the SEMO area is estimated to be composed of a complex mosaic of savannahs, glades, woodlands and forests. Today native savannahs, glades, and woodlands are rare in the SEMO area. Therefore, savannah, glade, and woodland restoration will be prioritized first before other restorations.

Site Preparation and Grading
The proposal will identify the degree of site preparation (burning, herbicide application, and/or

grading) needed prior to re-vegetation. Species of conservation interest may exist and site preparation practices should be selected to promote these species.

Re-vegetation
The proposal will identify the native species to be planted, using the *Terrestrial Natural Communities of Missouri* (Nelson, 2005) as appropriate for the area as a guide. The proposal will also identify the season and density of planting.

Conservation Easements, Access, Engineering Controls, and/or Property Purchase
The proposal will identify land in private ownership that requires access agreements necessary to achieve restoration. The proposal will identify other potential engineered or institutional controls to ensure long-term protection of restoration areas such as temporary or permanent conservation easements including land-owner payment, up to fee title purchasing, if necessary. The proposal will identify who will hold the easement or title of the property, and will provide information on the time period of the easements or other protective mechanism.

Site Maintenance and Monitoring
The proposal will identify the maintenance and monitoring needed after re-vegetation. The proposal will describe the frequency and type of herbicide treatments, fire, and frequency of mowing or other cultural practices used to facilitate the success of re- vegetation.

D. Enhancement and Protection of Groundwater Recharge Areas

Groundwater provides many types of services such as human consumptive use and non-consumptive use services. Consumptive use services includes such services as providing drinking water supplies; groundwater contributing to lake water levels, yielding recreational benefits to the public, or irrigation for crops. Non-consumptive use services include such services as the value of groundwater for future generations; reserve stock against droughts, or support of land surfaces to avoid subsidence. In addition, groundwater provides ecological services such as habitat, waters supplies for vegetation and wildlife, or maintenance of hydrologic flows.

Site Description
A description of the size, location, natural features, and value of the property proposed for acquisition or other conservation easement should be included. Describe ownership and management of the land.

Site Preparation and Enhancements
The proposal will identify the current condition of the property prior to any site preparation for enhancements. Species of conservation interest may exist and site preparation should be selected to promote these species. Native species, using the *Terrestrial Natural Communities of Missouri* (Nelson, 2005), will be identified and planted as appropriate. The proposal will identify the season and density of planting, following recommendations from the Trustees. An appropriate annual native or sterile grass cover crop should be planted in the first growing season.

Conservation Easements, Engineering Controls and/or Property Purchase
The proposal will identify potential engineered or institutional controls to ensure long- term protection of restoration areas such as temporary or permanent conservation easements including land-owner

payment, up to fee title purchasing, if necessary. The proposal will identify who will hold the easement or title of the property, and will provide information on the time period of the easements or other protective mechanism.

Site Maintenance and Monitoring
Acquisition projects that are selected will require a management plan. The management plan will detail methods for permanent protection and enhancement of injured resources. The proposal will identify the maintenance, if any, and monitoring needed for the long- term conservation of the site. The proposal will describe the frequency and type of herbicide treatments, fire, and frequency of mowing and/or other cultural practices used to facilitate long-term habitat stability.

E. Natural Resource Restoration-Based Human Use Enhancement Projects

Enhancement Description
A description of the enhancement, location, and how it will directly or indirectly benefit natural resources should be included in the proposal.

Facility Maintenance and Monitoring
The proposal will identify the maintenance, if any, and monitoring needed for the long- term stability or operation of the human-use aspect.

F. General Proposal Requirements

In addition to the specifications listed above, all proposals must include the information provided below in the attached "**Restoration Project Information**" sheet.

IV. Proposal Evaluation

Proposals will be evaluated by the Trustee Council. The Trustee Council will evaluate each proposal in accordance with the Decision Matrix included in Appendix A of the SEMORRP and the Proposal Evaluation Process included in Appendix B. The Trustee Council will review the Decision Matrix and make recommendations to their respective Authorized Official and designated Trustee, who will make the final selection for funding.

V. Proposal Schedule

Proposals will be due no sooner than 60 days after issuance of the RFP. The Trustees may extend this due date, if insufficient proposals are received or other circumstances arise that warrant granting more time.

A pre-proposal conference hosted by the Trustees may be held within 60 days after release of the RFP. Additional on-site, pre-proposal conferences may be held at the discretion of the Trustees.

The Trustees will request additional information as necessary from proposal applicants within 30 days after the proposal due date. The Trustees will provide notification of selection to the Project Coordinator identified on the application within 90 days after the proposal deadline.

VI. Other Legal Contracting Requirements

Successful projects will enter into a contractual or cooperative agreement with agency releasing the RFP. Additional contracting requirements may be applicable for successful projects. For example professional services or certain construction activities may require proof of insurance or bonding coverage. Successful applicants will be notified of contracting and cooperative agreement needs upon selection of proposals. Final approval of a project will occur at the completion of any necessary contracts or formalization of cooperative agreements.

VII. Contacts

RFP submittals should be mailed or submitted electronically to:

Fish and Wildlife Biologist
U.S. Fish & Wildlife Service
101 Park DeVille Dr. Suite A Columbia,
Missouri 65203
Fake_Email@fws.gov or

NRDAR Coordinator
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102-0176
Fake.Email@dnr.mo.gov

If you have questions pertaining to this RFP, please contact the FWS by phone or email at (573) 234-2132 or Fake_Email@fws.gov .

Restoration Project Information Sheet

General Information

Organization:

Date Submitted:

Contact Name: Title:

Street Address:

City: State:

ZIP:

Phone Number:

Email:

Organization Website:

Project Information

Type of Project:

Project Name:

Location:

Latitude (decimal degrees): Longitude (decimal degrees):

County:

Watershed/Basin:

Project Size (Choose One)

Feet Miles Acres Tons

Project Description: Describe the project, including goals, and objectives. Describe how the restoration project will restore, rehabilitate, replace and/or acquire the equivalent of the natural resources injured by the release of hazardous substances into the environment. Describe the specific habitats, wetland types, or vegetation types and quantities to be protected, reestablished or enhanced, if applicable. Include a site map showing the habitats before and after completion of the project, a draft restoration design, pre-restoration site pictures, detailed maps, if possible, monitoring, and maintenance plans, and any relevant available project specifications.

Describe the surrounding land use. Adjacent property uses (either current or future planned uses) should not detract from the effectiveness of the restoration site. Include a description of the size of the project. The size of a habitat area is a major influence on fish and wildlife species diversity and population density. Other things equal, larger areas support more species and higher numbers of individuals per unit area than smaller habitat areas. Ranking will reflect an advantage to those sites which can demonstrate larger areas of permanently protected habitat for natural resources. If the restoration project is contiguous with currently protected habitat, provide details on this habitat.

Project Benefit(s): Describe how the restoration project benefits natural resources or the uses of those resources injured by the release of hazardous substances into the environment. Projects will be evaluated in terms of whether the benefits can be quantified and the success of the project determined.

Proposed Budget: Provide a detailed budget for the funding requested in descriptive summary categories such as personnel, materials, realty costs, monitoring etc. Proposals stating only a total cost with no budget breakdown will not be considered. Include information pertaining to any types of cost sharing, such as other funding sources or in-kind services that will add to the restoration project. Restoration projects supported, in part, from sources other than the settlement funds made available through this RFP will receive more points during the evaluation process than projects supported solely by these restoration funds. Cooperative projects, with matching dollars and/or in-kind services tied to activities that are compatible with the goals of the SEMORRP, have a higher potential to meet community needs while restoring natural resources. Although settlement funds will not be expended on projects more appropriately funded from other sources, where compatible projects adjoin, funding from several sources could provide much greater benefits to impacted resources than many small, scattered projects. Projects should not duplicate or substitute for traditional funding sources.

The goal of the Trustees is to achieve the maximum amount of restoration (in terms of acres, habitat units, or fish and wildlife restored) with the least expenditure. Cost effective restoration is desirable. Cost overruns will be evaluated on a case-by-case basis and may not be covered by settlement funds if insufficient justification is provided. This addresses the Technical Feasibility criteria listed under CERCLA and the NRDAR regulations. Those projects which demonstrate ability to achieve larger amounts of restoration will rank higher during the evaluation process.

Project Partners

Please provide the name, contact, and involvement (equipment, matching funds, design, etc.) of other organizations or agencies with the project activities.

Maintenance Requirements: The proposal should identify the frequency and costs of long-term maintenance (include costs under Proposed Budget section). Proposals should thoroughly take into account long-term maintenance needs.

Compliance with Applicable Laws and Regulations: Implementation of the restoration project must be consistent with applicable Federal, State, and local laws, ordinances and policies. Address what laws, ordinances, zoning restrictions, policies or regulations are applicable to the project. Example: Will a 404 permit be required under the Clean Water Act? Describe what measures would be taken to secure required permits, who will obtain them and what obstacles may delay the attainment of the permits, if any. It is the project applicant's responsibility to comply with all applicable laws and ordinances.

Timeline: Outline the estimated time and steps or phases needed to complete the project, including an estimated completion date. Estimate how long the project will take to reach its full potential. Relative timeliness of the resource recovery action will be evaluated. The restoration project should make a significant contribution to restoration of natural resources injured without a protracted implementation or resource recovery period. Implementation times of less than three years are preferred. Projects with implementation times greater than three years will need to identify why a greater time period is required and the benefits to restoration of the injured resources with the longer restoration period.

Permanence: Address the longevity of the restoration project. Projects that provide restoration in perpetuity are a higher priority and will receive more points during the evaluation process than projects that expire within a defined time period, or require annual or periodic renewal. Explain the longevity of the project and how the project will ensure the longevity through the use of such instruments as conservation easements, cooperative agreements, or other legal means to guarantee management of the trust resources on behalf of the public.

Measures of Success: Develop a plan that measures or evaluates the success and the effectiveness of the restoration project. The measures of success should be related to the goals and objectives of the proposed project. The plan should include performance standards for all phases of the restoration project and describe how the project will be certified as complete and successful. The success, viability and sustainability of the restoration project should be documented at completion.

For example, in section I.-G ("Restoration Goals"), one of the identified restoration goals for this RFP include restoring riparian corridors. Therefore, restoration projects attempting to restore riparian corridor resources will need to document a long term, quantitative increase in riparian corridor and, potentially, increases in migratory bird usage of the restored area. The Trustees will work directly with selected recipients of restoration funding to develop useful and effective restoration monitoring plans on a site specific basis if the recipient lacks the specific expertise to develop monitoring plans. An example of how to successfully conduct monitoring on riparian corridor restoration projects may be found at: http://ucanr.org/freepubs/docs/8363.pdf

Disclaimer: The submission of project information does **not** guarantee project funding. Projects will be evaluated using criteria identified in CERCLA, NEPA implementing regulations, and related laws. Selection and funding determinations will be made by the Trustee Council.

Appendix H—Trustees' Response to Comments Received on the Draft Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment

This appendix presents comments that were received on the Draft Restoration Plan and Environmental Assessment (EA) and provides responses to the comments on behalf of both the federal and state Missouri Trustees for Natural Resources (Trustees).

The Trustees received 3 comments on the Draft Restoration Plan and EA that indicated general support for the Preferred Alternative (Alternative D). Favorable comments on Alternative D came from the Missouri Department of Conservation, the Nature Conservancy and the U.S. Environmental Protection Agency (USEPA). This Response to Comments does not address any comments outside of the scope of the draft Southeast Missouri Ozarks Regional Restoration Plan and Environmental Assessment (SEMORRP or Plan). Comments were received on several of the Trustees' sampling and analysis plans, damage assessment documents, and injury determination reports in addition to the SEMORRP. Because the public comment period for the above described assessment documents has already been conducted and closed, and the documents finalized through the CERCLA Natural Resource Damage Assessment and Restoration (NRDAR) process, the Trustees are no longer accepting public comment on that suite of documents.

The Trustees appreciate the time and effort expended by the commenters to the draft Restoration Plan and EA. We appreciate that the Proposed Action is well received among state and local governments, as well as non-profit groups.

Comment 1: The Nature Conservancy strongly recommends that the Trustees use NRDAR funds to hire an independent (i.e., non-Trustee) coordinator to work with public and private landowners to successfully identify, implement, and manage restoration projects in both the primary and compensatory action areas.

Response: The Trustees intend to use both internal staff and external non-agency staff to accomplish natural resource restoration projects in southeast Missouri to compensate for injuries from the release of heavy metals from mining operations. Thank you for your suggestion.

Comment 2: The Nature Conservancy recommends that the Trustees use initial funding to assess and prioritize all potential restoration areas before allocating funds for on-the-ground restoration.

Response: The Trustees are engaged in the process of using initial funding to identify and develop potential restoration projects and prioritize potential restoration areas to maximize the efficacy of restoration funds in compensating the public for the loss of natural resources and the services they provide. For example, the Trustees have used restoration funds to assess bank stability in the Big River Watershed as well as to examine the potential for chemical immobilization of heavy metal contaminated floodplain soils. Please see our work plans and determination reports located at:

http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html

And

http://dnr.mo.gov/env/hwp/sfund/nrda.htm .

Comment 3: The Nature Conservancy strongly supports the inclusion of "natural stream channel design" (NCD) as a preferred methodology for "Surface Water Quality and Aquatic Resource Restoration Projects." The USFWS is among the nationwide leaders in teaching and enacting NCD techniques for stream restoration and stabilization, which has proven to effectively recover and stabilize degraded streams while maximizing ecological benefit. We further suggest that language be included to reflect the full scope of NCD applications for benefiting the SEMO, which include not only restoring channelized reaches (as stated currently in the draft Plan) but also restoration techniques applicable to stream bank stability and all other factors resulting in instability/degradation of stream channels, riparian corridors, and floodplain connectivity.

Response: The Trustees appreciate your confidence in the USFWS' ability to implement stream restoration and stabilization techniques. The use of NCD will be incorporated as appropriate into stream channel restoration project designs as those projects are selected and funded under the SEMORRP.

Comment 4: We received a total of 6 comments requesting an extension of the comment period from 45 days to 90 days.

Response: The Trustees extended the comment period for an additional 30 days for a total comment period of 75 days from September 21 through December 4, 2013. The original comment period was scheduled to end on November 4, 2013.

Comment 5: Where were these esteemed "trustees" when all the damage was done to this area? Why does this become a responsibility for U.S. taxpaeyrs (sic.) to pay for? Where is the money coming from? What is the damage. No questions are answered in this federal register notice. It appears to be a secret who damaged this land so horribly and why is that? If this is Missouri state land, why aren't they solely responsible for this damage? What does the ag dept. have to do with this? A lot of hidden stuff is going on in this proposal please send me a copy of the plan so I can comment more fully and perhaps find out what is gong (sic.) on here.

Response: The Trustees have been actively engaged in assessing injuries caused by the release of hazardous substances at a wide variety of sites in Missouri for more than a decade; however, many of the ongoing releases are the result of events and activities that occurred in the past from unpermitted or uncontrolled releases to the environment. As detailed on page 12 of the draft Plan, restoration actions selected under this Plan will be funded from settlements with entities potentially responsible for causing the harm to the environment, consistent with the "polluter pays" principle underlying the Comprehensive Environmental Response, Compensation, and Liability Act. Restoration funds are not derived from tax payments. The damage term the Trustees use refers to monetary damages received in compensation for injuries to natural resources and not physical damage (destruction or loss) to the environment. To date, releases of

heavy metals, such as lead, cadmium and zinc, from heavy metal mining in southeast Missouri is the source of the injuries for which the Trustees have received restoration funds. In addition to injuries to natural resources such as wildlife (for example, birds, fish, and mussels), the injuries to natural resources in southeast Missouri have occurred to property owned by the State of Missouri and the United States Department of Agriculture. Additional information concerning the nature and extent of the destruction of natural resources and their services in Southeast Missouri is available at http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html and http://dnr.mo.gov/env/hwp/sfund/nrda.htm. In addition, the Trustees do not intend to obscure any of their process nor the source of the injuries or restoration funds from the public and are happy to discuss anything with members of the public at any time. Please feel free to contact any member of the Trustee Council. Contact information is available in the introduction of the SEMORRP.

Comment 6: My review of the referenced plan document appendix E last evening showed no mention of the eastern butternut tree. As far as I know, that species remains on the protected list of species for our area.

Response: While the Butternut tree (*Juglans cinerea*) is known to be struggling against butternut canker and many individuals are dying across Missouri, the inter-agency plant species of conservation concern committee for Missouri has yet to designate the Butternut as formally on the list of species of conservation concern. Thank you for your attention to this species.

Comment 7: The Trustees received 4 comments in support of the No Action Alternative, Alternative A, in the SEMORRP.

Response: The National Environmental Policy Act (NEPA) of 1969 requires Federal agencies to contemplate a "No Action Alternative" (Alternative A), in their NEPA compliance documents. Additionally, the CERCLA NRDAR regulations provide that a No Action-Natural Recovery alternative be considered by the Trustees, 43 C.F.R. § 11.82(c)(2). As described in the draft Plan (SEMORRP, Sections 3 and 5), the Trustees are unlikely to select the No Action Alternative in this instance. Selection of Alternative A would frustrate the purpose of CERCLA to restore or replace public natural resources (and the services they provide) injured or destroyed by hazardous substance releases.

Comment 8:

10 JANUARY 1996
NOTE ORIGINAL PUBLICATION DATE.
STILL APPLIES TO 2013 SEMO REGIONAL RESTORATION PLAN
FREDERICKTOWN MO
A PRIMER ON THE GAGS' OZARKS BIOREGIONAL WAR PLAN

Green advocacy Groups (GAGs) define a BIOREGION as a CORE WILDERNESS area which may occupy hundreds of square miles or more and in which no humans are permitted to live, surrounded by a BUFFER ZONE which may be tens of miles wide where a few humans may be allowed to 1ive and do permitted work, and usually further surrounded by an outer ZONE OF

COOPERATION several miles wide where many people may 1ive and in which severe restrictions limit the kinds of work that may be done to earn one's living. Adjacent Core Areas are connected by CORRIDORS many miles wide and as long as necessary to allow migration of animals from one Core Area to another without encountering humans.

Designated OZARKS CORE WILDERNESS probably will include the entire range of the Ozarks Mountains from central and northern Arkansas all the way north to central Missouri. A BIOREGIONAL COUNCIL, under federal/GAG management, will control all land and resources. If you live in a Buffer Zone or Zone Of Cooperation, then before you may raise cattle or plant a crop or harvest timber or repair your house or do anything else, even on land that you "own" and pay taxes on, you first must get permission from the Bioregional Council.

The Ozarks are now under GAG attack, but the Bioregion itself is not yet defined nor the Bioregional Council appointed: At this time it is impossible to say exactly which areas will be designated as Wilderness, Corridors or Buffer Zones and where GAGs will and won't allow humans to live.

Within the next five years (by 2001) you can fully expect to see ECOSYSTEM MANAGEMENT planning activity going on in Ozarks counties. The BIOREGIONAL PLAN is likely to be in fully operational and moving people out of the Ozarks within 10 to 15 years (by 2006 to 2011). The Ozarks are a fairly-high GAG priority and relatively pristine. GAGs want to preserve as much as possible and prevent development. The NATURAL STREAMS ACT failed. A second effort is now beginning.

Watch for US DEPARTMENT OF THE INTERIOR'S ECOSYSTEM COORDINATING GROUP to begin MULTIMEDIA ENFORCEMENT on high priority land. TWENTY ONE PARTICIPATING FEDERAL AGENCIES will descend on your farm looking for violations of any law or regulation and will begin active and immediate enforcement against all owners of all land they want to take.

A GAG will create a proposal to SAVE THE OZARKS by designating a GREEN LINE BUFFER ZONE around the Ozarks. As GAGs have done in New York, Maine and many other places, Ozarks GAGs will publish a little brochure with beautiful pictures of scenery and animals. The GAG brochure promises better recreation, improved economies, controlled tourism and a better life for all, if only we citizens will wrap a protective buffer zone around our Ozarks homeland and designate everything inside as a PARK, PRESERVE or GAME REFUGE.
The brochure has a mail-in card that says "WOULD YOU LIKE THIS BEAUTIFUL THING TO HAPPEN? PLEASE RETURN THIS CARD WITH $25 TO HELP US SAVE THE OZARKS. Then the GAG develops a legislative proposal to create a PARK which covers several counties and crosses state lines if possible. Returned cards prove that "People want to create and expand this park." STAKEHOLDERS then create a PUBLIC PRIVATE PARTNERSHIP GOVERNING COUNCIL to manage the park because the park exceeds a single County's (and State's and Nation's if possible) jurisdiction.

The Council takes control of Park land away from mayors, city councils, county commissioners and state legislators and begins RESTRICTING THE KINDS OF WORK permitted in the

designated Park and Buffer Zone so that PEOPLE LOSE THEIR LIVELIHOOD and are driven from their land. This is the initial step toward creation of a BIOREGIONAL COUNCIL that will govern land use within the entire Bioregion. Eventually the entire world will be designated as BIOREGIONS, much as it is now designated as Oceans, Nations, States, and Counties.

Final designation of the Ozarks, or perhaps just parts of the Ozarks such as the Current and Jacks Fork Rivers, as a WORLD HERITAGE SITE and BIOSPHERE RESERVE, and ultimately a World Heritage Site and Biosphere Reserve IN DANGER, will remove control of the Ozarks from even the US Government and place the land under control of UNITED NATIONS WORLD GOVERNMENT.

If your land is in an area that GAGs really want they will first try to buy it. If you won't sell they will offer a deal, such as -- here's cash now and all we want is a CONSERVATION EASEMENT. Or they won't buy your home, just your RIGHT TO DEVELOP your land. Or they may say that if you DONATE YOUR LAND TO A CONSERVANCY you may live in your home for the rest of your life and take an immediate tax deduction. If none of this works, GAGs may CONDEMN YOUR LAND and make you leave.

GAGs will begin a flurry of designating HERITAGE SITES and NATURAL NATIONAL LANDMARKS. An old church or farm house and its surrounding area may be designated as a CULTURAL SITE which will prevent the owner from altering, selling or doing anything with the property. That is the purpose of HERITAGE CORRIDOR studies now underway. The GAGs' objective is to designate everything that they possibly can to prevent any modification of the landscape. Not only is the site protected, but everything within the VIEW SHED of that site is protected.

The ECOSYSTEM MANAGEMENT PLAN will bring together the results of Heritage Group studies, Fish & Wildlife group studies and all other studies of the various environmental organizations, and then develop a MASTER PLAN. A PUBLIC/PRIVATE PARTNERSHIP of GAG organizations and institutions within the ECOSYSTEM MANAGEMENT AREA will be created to implement the Master Plan.

The Master Plan will call for PROTECTING and RESTORING wetlands and wilderness areas. You need to be very careful about those terms PROTECTING and RESTORING. When GAGs say to RESTORE an area they don't just mean clean it up and stop pollution. GAGs mean restoring and rehabilitating the land for the benefit of wildlife all the way back to the condition of the land PRIOR TO THE INTRUSION OF MAN. This is explained quite explicitly in the UNITED NATIONS GLOBAL BIODIVERSITY ASSESSMENT, which is the foundation document underlying this gigantic, world-wide land-grab. To RESTORE your land you must move out. Quit farming. Get cattle off pastures. Stop all resource use. That's how GAGs expect you to do it. Wherever you see RESTORATION AREAS on Management Plan maps, those are areas where people will be strongly encouraged to move away.

Complete depopulation and conversion of the Ozarks into full Bioregion status will take 50 to 100 years. GAGs expect it will take two to three decades to make a significant dent. GAGs and government officials won't start pressuring people to move our right away. They won't just drive

up to your home one day and say "We want your land. You gotta leave." But when you see meetings announced, workshops, or discussion about Ecosystem Management in your county then you and all your neighbors must attend those meetings and probe for the real agenda. Remember, "The world is run by those who show up." Also remember, you can "Just say NO!" to GAG proposals. They can't rule you until you let them take over local government.

Local officials may be well-meaning but uninformed. They may be sold on the GAG environmental program and eager to go along with it. It is important that you know your local officials and educate them on the GAG agenda, particularly the national and United Nations environmental agenda that few people know is going on. If your local officials support GAG programs, seriously consider replacing them. Likewise, Congress. Get their attention. Fifty to sixty House members are now fully aware and alarmed at the takeover of America by GAG radicals and another 50 are becoming aware. But there are at least as many in Congress who know what is going on and want it to go on, who are actually helping this process along. People like Al Gore in particular, who was largely responsible for much of this when he was a Senator and more so now that he is Vice President.

GAG takeover of America is unconstitutional and illegal and is happening without Congressional law authorizing Fish & Wildlife Service or Department of the Interior to do these things. This is all done by administrative policy, not valid legislation. Most congressmen have no clue as to what's going on let alone what the ultimate objective is.

Response: As described in the Draft Plan, (SEMORRP, Section 1.4), the Federal Water Pollution Control Act (CWA, commonly known as the Clean Water Act) [33 U.S.C. §§ 1251-1387] and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, more commonly known as the Federal "Superfund" law) [42 U.S.C. §§ 9601-9675], and its implementing regulations (40 C.F.R. Part 300 and 43 C.F.R. Part 11) authorize states, federally recognized Tribes, and certain federal agencies with authority to manage or control natural resources, to act as Trustees on behalf of the public, and to restore, rehabilitate, replace, and/or acquire natural resources equivalent to those injured by hazardous substances releases. Similar to the CWA and CERCLA, the Oil Pollution Act of 1990 (OPA) [33 U.S.C. §§ 2701-2762] and its implementing regulations, 15 C.F.R. Part 990, also authorize Trustees to pursue natural resource damages on behalf of the public for injury to, destruction of, loss of, or loss of use of natural resources, including the costs of assessing the damage. Additionally, Section 644.096 RSMo authorizes the State of Missouri to bring a cause of action and seek actual damages against any person violating the provisions of the state's Clean Water Law (CWL), for actual damages to restore any waters of the State to their condition prior to the violation. Pursuant to these provisions, the Trustees in southeast Missouri include the Secretary of the U.S. Department of the Interior the Secretary of the U.S. Department of the Agriculture, and the Missouri Department of Natural Resources. (*See* 40 C.F.R. § 300.600 and § 300.605; Draft Plan p.9). It is under this authority that the Trustees developed and published for public comment the SEMORRP. The Trustees are not affiliated with the United Nations or an "ecosystem coordinating group." The Trustees do not have authority to enforce or seek and find violations of environmental laws on private landowners' property. (See 40 C.F.R. § 300.615)

The purpose of the SEMORRP is twofold: (1) serve as an Environmental Assessment (EA) and (2) as a Regional Restoration Plan. The EA is designed to consider alternatives which will restore, rehabilitate, replace, and/or acquire the equivalent of any natural resources and services potentially injured by the release of hazardous substances into the SEMO, pursuant to applicable state, and federal laws and regulations. Additionally, this Plan serves to facilitate public involvement in the restoration plan and to comply with environmental decision-making requirements (SEMORRP, Section 2). The Trustees' intention with the SEMORRP is to work on behalf of the public to restore natural resources and the services they provide for the benefit of the environment and the residents and visitors of the Ozarks. As described in the Draft Plan, (SEMORRP, Sections 6.3.4 and 7.2.1) the Trustees will only work with willing landowners on a voluntary basis; no part of the SEMORRP is compulsory. The Trustees do not have authority to compel private landowners to participate in our process. Like your comment letter suggests, the Trustees are indeed interested in potentially restoring wetlands and other natural areas in southeast Missouri so they can provide ecosystem services and enjoyment to the citizens of the United States. The Trustees are also interested in using conservation easements as a cost effective way to implement natural resource restoration projects and to protect the Trustees' investment of funds into implemented restoration projects. All conservation easements would be voluntary. Of course, there are many benefits to landowners who voluntarily participate in conservation easement programs including property tax deductions as described in your comment. The SEMORRP contains no provisions or interest in moving people out of southeast Missouri to accomplish our restoration goals.

Comment 9:

COMMENTS: TAILINGS CLEANUP AND EARTHQUAKE

BACKGROUND
Mining and agriculture are the twin foundations supporting civilization. During recent decades, radical environmentalists within government agencies and nongovernment organizations (NGO) have actively attacked both mining and agriculture, using 'The Environment' and 'Endangered Species' as justification for slowly shutting down food and fiber production by agriculture and production of fuels and minerals by mining. Policy disasters include the Spotted Owl fiasco which caused great social and economic upset in areas with a local economy based on timber production, and the current attack on farmers who raise dust by driving farm equipment on dusty fields and rural dirt roads.

Now under consideration is removal of mill (mine) tailings from streams. Tailings are the waste product remaining when a desired mineral is separated from host rock. In the Ozarks region of Missouri, tailings usually are dolomite sand in which a small amount of 'heavy metals' such as lead and cadmium remain after milling removes as much as it can of the desired ore mineral. Mill tailings traditionally were stored in open-air piles where the land surface is level or gently sloping, and behind tailings dams in steeper areas and drainages. Some of the tailings escape and wash down-river, causing a miniscule increase of lead and other toxic metals in stream sediments.

CLEANUP COST

The current proposal is to force mining companies to pay the cost of tailings cleanup. This is bad policy. Mining companies operated in compliance with laws in effect at the time mining was occurring. As laws changed, mining companies changed operation to comply with new laws. Mining, milling and tailings disposal were done in a legal manner.

Mining has a much longer operating life than the laws under which mining companies operate. In the Old Lead Belt around Park Hills, Fredericktown, and vicinity, large-scale mining was done for more than a century. A century is a much longer time than the permanence of mining laws which change frequently to reflect changes in public attitude toward mining. Tailings piles created in the century 1900 - 2000 and compliant with the laws of their time still exist in the year 2013, but laws regarding tailings disposal have changed many times during that interval.
To say that a mining company must pay to clean tailings from streams and must pay for other tailings piles cleanup is a form of EX POST FACTO and is prohibited by Article 1, Section 9, of the United States Constitution. Old tailings piles were created according to the law in effect at that time. To say that something done in the past and according to the law then in effect is now unlawful and is a financial liability of the mining company is an ex post facto violation of Constitutional protection.

Federal, state and local governments had more than a century to complain and do something about tailings, but did not complain. Now, government agencies and NGOs have decided that mill tailings must be removed from streams. There is not enough government money available to pay for the cleanup so the plan is to force mining companies to pay the cost of cleanup. Mining companies have Constitutional rights too, and forcing mining companies to pay the entire cost of removing tailings from streams is a rights violation under Amendment 14, Section1 of the Constitution (" . .. equal protection under the laws").

Mining companies profited from mining ores that created tailings. But others also profited. The federal government, state government, county government and city government were enriched through collection of property taxes and income taxes, including taxes paid by mining company employees, labor unions, and local businesses that sold products and services to the mines. These groups, also, participated in mining and received income from mining. These groups, also, must be included in the pool of funders for any cleanup of streams contaminated by mill tailings. To exclude others who profited from mining and go after only mining companies is selective prosecution. Cleanup should be taxpayer-funded so that all participants who profited from mining share equally in the cost of cleanup if cleanup is done. That raises the question of whether stream cleanup is sufficiently valuable to be worth the cost.

Government agencies and NGOs who do not pay for projects such as stream cleanup seem perfectly willing to spend the entire Gross National Product to remove that last part-per-trillion of some unpopular substance. Priority shifts when government agencies and NGOs are themselves required to pay for their grand environmental projects. Often, projects involving environmental cleanup or 'endangered' species have little direct value and are simply tools to advance a larger agenda of shutting down civilization so as to return to some primitive condition supposed to be more desirable and pristine than that offered by modern civilization.

SOME IDEAS

1) DO NOTHING

Re-evaluate the problem of mill tailings in streams. Are tailings really a problem or just a minor nuisance? What disaster will happen if tailings that presently are in streams are allowed to remain? Lead remaining in tailings is lead sulfide which oxidizes to lead sulfate on exposure to air. Both lead sulfide and lead sulfate are extremely insoluble in water. Lead concentration in stream sediments is very low. Some part of that lead comes from the lead geochemical background of outcropping Ozarks rocks and cannot be eliminated other than by paving the entire land surface. Are money and resources committed to lead removal really going to highest priority projects, or is lead in tailings lower down on the priorities list? Doing nothing may be the best option.

2) CONSIDER TAILINGS AS A RESOURCE

Tailings are a huge sand pile. Has a study been done to determine a practical use for all that sand? Remaining metals possibly may be removed and even recovered while cleaning tailings for some useful purpose such as feedstock for an industrial process.

3) COVER AND PLANT.

Some tailings piles are fairly flat-lying on top and could be planted with vegetation that would cover the pile within a few decades. Vegetative cover would help remove water from tailings (see earthquake, later in this letter) and stop blowing dust. Trees and other plants do not grow directly in tailings, but would grow if mounds of soil are constructed on the tailings and trees and other plants are introduced in the soil. Within a few decades vegetation should spread from the soil islands and cover the entire tailings area.

4) RETURN TO MINES

Return tailings underground in the mines where tailings rock originated. Tailings underground are not exposed to air so lead will not oxidize and leach into groundwater. However, filling an old mine with tailings will make the mine unavailable as a water reservoir that may be very valuable in the future.

EARTHQUAKE

Large-scale lead mining began after the major 1811-1812 earthquake on the Reelfoot Rift aulacogen at New Madrid, Missouri. Mines and tailings piles have never been shaken by extreme earth movement. The next major earthquake will change their stability.

The mine tour at Bonne Terre passes parts of the mine where rock over the mine is so thin that tree roots hang down from the mine roof. There is a rotting mine roof support pillar wrapped with cable to prevent collapse of the pillar and overlying mine roof. Deeper into the mine are large mined-out rooms more than 100 feet high that extend close to the surface. An earthquake as strong as the New Madrid earthquake of 1811-1812 will cause general collapse throughout the

mine. Overlying areas of homes and businesses will afterward resemble Venice, Italy - islands surrounded by cliffs, separated by canals of water where rock collapsed into the mine workings. Tailings piles will slide downhill. Consider a common weather situation of several weeks of rainy spring weather and high water in rivers. Considerable rain water will fall on and enter tailings piles. Tailings piles held back by dams already are saturated with water at depth. All tailings piles will be wet from extended rainy weather.

When the earthquake hits, tailings will liquefy. Violent shaking of wet tailings will cause the sand piles to become instant mud and flow downhill to the river. Huge waves of mud driven by earthquake energy slam repeatedly against tailings dams, destroying the dams that hold back tailings. When mud reaches the river a temporary dam will form as tailings stop moving and compact and settle into firmer material.

The river will back up behind the tailings, flooding areas upstream. After a while, water will top the tailings dam. Water flooding across the dam will quickly wash away tailings and create flash-flood downstream, carrying tailings tens of miles down-river. Nearly ALL tailings will be involved, not just the small amount of tailings now in river sediments.

Tailings removed by returning tailings to abandoned mines will prevent mudflows arid flashfloods and at least reduce the danger that mine collapse will create another Venice. Finding a use for tailings and shipping tailings away likewise will remove the danger of mud slides and flash-floods. But is this extreme action worth the extreme cost? The next earthquake may happen tomorrow or not for 500 years.

Response:

The Trustees' response to this comment letter focuses on the commenter's suggestion "SOME IDEAS".

1) DO NOTHING: The Trustees' assessment of the presence of heavy metal bearing tailings in aquatic systems has demonstrated injury to natural resources resulting from the heavy metal contamination in aquatic systems (See aquatic injury studies can be found at http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html and http://dnr.mo.gov/env/hwp/sfund/nrda.htm). In determining injury, the Trustees take into account the background level of lead and other hazardous substances. The Trustees have successfully recovered restoration funds from parties potentially responsible for the release of said hazardous substances and resulting injuries. Implementing restoration project(s) to diminish the source of the injury, by removing the mill tailings with high concentrations of toxic heavy metals in aquatic systems, for example, will return the natural resources and their services to a pre-release condition more quickly. .

   The lead (Pb) in the environment in SEMO is soluble and available for humans and other organisms to absorb. While galena (PbS) is indeed the species of Pb present in the ground as ore, once the PbS is removed from the mine, ground very finely, and then exposed to the environment for years or decades, the transition to other Pb species is based on the environmental surroundings of the molecule. Common species of Pb

present in Southeast Missouri include PbS, cerussite ($PbCO_3$), lead sulfate ($PbSO_4$), and plumboferrite ($PbFe_4O_7$). Galena is insoluble, but all of the other species listed above are orders of magnitude more soluble, and consequently more bioavailable to humans and other organisms.

2) CONSIDER TAILINGS AS A RESOURCE: While the Trustees agree there may be a potential future use for the tailings, the responsibility and benefit for such evaluation would rest on the owners of the tailings. Currently the tailings are contaminated with high levels of lead, among other hazardous substances, and represent an environmental liability as there is no known economically viable use for the tailings in SEMO.

3) COVER AND PLANT: The Trustees agree that covering and planting the tailings is a possible technique, provided adequate safeguards are in place to prevent further exposure to heavy metals. We look forward to designing and possibly implementing that suggestion as soon as possible.

4) RETURN TO MINES: While the prospect of returning the tailings to the location where they originated is attractive in concept, the practical limitation associated with moving millions of tons of tailings several hundred feet underground into water filled voids precludes our ability to execute it. Tailings re-insertion has been attempted successfully in areas like the Tri-State Mining District where mine workings are located at shallower depths and communities do not rely upon the mine voids for municipal water sources.

5) EARTHQUAKES: Earthquake preparation and prevention is outside of the jurisdiction of the Trustees. However, we will take into consideration the suggestion to vegetate and stabilize currently un-vegetated chat and tailings impoundments to the highest degree possible provided that the private and public owners of said tailings are willing to participate in our voluntary process.

Comment 10: The SEMORRP/EA fails to identify any injured natural resources or lost services that will be subject to the regional restoration plan. Further, baseline conditions for these unidentified resources and services are never established. In fact, the SEMORRP/EA expressly disclaims any intention "to quantify the extent of restoration needed" and states that all restoration projects "will be done on a case by case basis." SEMORRP/EA at 5. As noted above, a FONSI can only be issued if the EA presents the reasons that the proposed action will have no significant impact on the environment. The EA does not identify any proposed action. The Trustees might assume that, because no proposed action is identified, there can be no impact on the environment, and therefore a FONSI is justified. But that begs the question of why an EA is prepared in the first place. If there is no action, no EA is required and a FONSI serves no purpose.

Response: The SEMORRP is prepared as a programmatic regional restoration plan or "umbrella" document to introduce the public and stakeholders in the NRDAR process to the Trustees' process for identifying and selecting restoration projects which compensate the public for the loss of natural resources and the services they provide. As such, the SEMORRP does not

attempt to identify all injured natural resources or lost services that may be subject to the Plan. Instead, the SEMORRP specifically states in sections 6 "Compensatory Restoration Project Proposal Process" and 7 "Primary Restoration Implementation Process" that site specific requests for proposals or primary restoration project proposals will be issued by the Trustees at the time when such projects are appropriate given the specific context of the site in question. The proposed action identified in the SEMORRP is the selection of process, including identification of applicable evaluation criteria, which the Trustees will use to identify, select and implement restoration projects. Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation. The Trustees will clarify the Plan to make this process more clear.

Comment 11: The Federal Trustees admit that the extent of the injuries to natural resources or lost services cannot even be determined until planned or currently implemented response actions are completed. SEMORRP/EA at 13. However, the Federal Trustees do not identify which planned or currently implemented response actions are implicated by the regional response plan, much less the location of those response actions, anticipated times until completion, or a description of what those response actions entail, if known. Again, as noted in the prior paragraph, if no action has yet been identified, this EA and any subsequent issuance of a FONSI is not only premature, it is meaningless.

Response: The document under review is not a regional response plan, but rather a regional restoration plan. The SEMORRP/EA is a joint document, developed by both Federal and State Trustees for natural resources federal statutes and implementing regulations. As noted in our response to Comment 10, site specific information on each proposed restoration project will be produced prior to the selection of a project. Planned or currently implemented response actions will be fully described in relation to proposed restoration project. The Trustees again note that the action proposed in the Plan is to select and implement restoration projects. Due to the large geographic scale of the SEMORRP, and the nature of activities potentially involved in the project selection process, the Federal Trustees conducted analysis under NEPA for this Plan (See Comment 13 and response to Comment 13).

Comment 12: The Federal Trustees list several National Priority List ("NPL") sites in the SEMORRP/EA (at 14) but do not indicate whether these natural resources or services at these sites will be subject to the regional restoration plan. Additionally, the SEMORRP/EA states that "there are numerous Superfund Response sites … that currently are not listed on the National Priority List." *Id.* Aside from the single example provided, the Viburnum Trend, the SEMORRP/EA does not identify any of these non-NPL sites or indicate whether or not they are subject to the regional restoration plan.

Response: The SEMORRP's coverage is defined geographically in section 1.2 of the Plan. All sites in this geographic scope where the Trustees recover restoration funds under CWA, OPA or CERCLA are included under the purview of the SEMORRP. A full list of currently recovered funds is available on page 12 of the Draft Plan. As assessments and recoveries for restoration proceed, certain NPL and non-NPL sites may fall under the scope of the SEMORRP. These sites will be identified in the assessment documents produced for each site (e.g. pre-assessment screens, assessment plans, sampling and analysis plans, etc.) which are available to the public.

Comment 13: The Southeast Missouri Ozark region is shown on a map on page 7. This area includes parts of 22 counties and seven distinct watersheds. The area is over 15,000 sq. miles, larger than nine different States (Maryland, Massachusetts, Vermont, New Hampshire, New Jersey, Hawaii, Connecticut, Delaware, or Rhode Island). The SEMORRP/EA never identifies where across this huge expanse the injured resources that will be subject to the regional restoration plan are located. Despite the vast expanse of the identified area, the SEMORRP/EA claims that the regional plan may even include projects outside of this area. SEMORRP/EA at 5 ("Sites outside of the defined boundary of the SEMORRP may be considered under this plan …."). Nor does the inclusion of a watershed in the boundary mean that it will actually be subject to restoration projects. *Id.* If the Federal Trustees intend to structure a program extending across this region, then they must consider use of a programmatic EIS. Attempting to use an EA and FONSI, which do not specify even a single proposed action against which to measure impacts, clearly does not comply with NEPA and applicable regulations.

Response: The Trustees decided to encompass a large portion of southeast Missouri using a regional restoration planning basis to increase the efficiency of government operations. Additionally, the substantial similarity of natural resources across the region compelled the Trustees to consider a regional, programmatic approach. Rather than issuing single, small-scale restoration plans for every site in the SEMO, and authoring potentially redundant information for similar resources and recovered restoration funds, the Trustees selected the regional planning approach to save both time and funds that could be better spent on the restoration of natural resources and the services they provide. This approach is consistent with the recommendations of the Natural Resource Damage Assessment and Restoration Federal Advisory Committee Final Report (May 1, 2007) to encourage an early focus on restoration planning and streamlining the restoration implementation process. (*See* also 73 Fed. Reg. 57262 (Oct. 2, 2008)). Information concerning the natural resources of concern to the Trustees is available in the SEMO Assessment Plan and other resource-specific studies implemented as part of the ongoing natural resource damage assessment in southeast Missouri. This information is available to the public at http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html and http://dnr.mo.gov/env/hwp/sfund/nrda.htm. And finally, the scope of the known injury within the SEMORRP from historic lead mining is broad, effecting tens of thousands of acres and three different watersheds. A regional approach is appropriate for the large-scale of contamination impacts in the district.

Comment 14: The Federal Trustees provide no information at all about the "primary restoration projects" and "compensatory restoration projects" that are the subject of the regional restoration plan. No locations, descriptions, objectives, potential environmental impacts, or costs are provided. Instead, it is said that these criteria will be evaluated and selected in the future based on a "request for proposal" (or "RFP") process. It is wholly inappropriate to rely on a FONSI when future impacts are anticipated, relying on a future process to assess the extent of those impacts piecemeal. Unidentified primary restoration projects will be implemented "where feasible" under the Federal Trustees' preferred alternative. However, there is no definition or understanding of what "feasible" means in the context of this program. This lack of definition or understanding is not surprising, given that the Federal Trustees are unable or unwilling to identify any anticipated actions.

Response: Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation. Please see the Trustees' response to Comment 10 above regarding the availability, quantity, quality, and timing of information which will be released on the individual project scale.

Comment 15: 1. The SEMORRP/EA Does Not Contain a Legitimate Purpose and Need.
In Section 2, Purpose and Need, the SEMORRP/EA describes the Purpose and Need as follows: (1) to serve as an EA; and (2) to serve as a Regional Restoration Plan. SEMORPP/EA at 13. This section utterly fails to identify an actual purpose or need. Serving as an EA and serving as a Regional Restoration Plan are not purposes or needs within the meaning of NEPA. The "Purpose and Need" requires the lead federal agency to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. In other words, the "Purpose and Need" is the goal for undertaking a major federal action, and that goal drives the alternatives analysis for a given project. *See Carmel-By-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1155 ("The stated goal of a project necessarily dictates the range of 'reasonable' alternatives…."); *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991) (an agency may not make the purpose and need so unreasonably narrow as to make selection of the preferred alternative a formality).

The SEMORRP also discusses two specific topics: (1) Residual Injury after Response Action and (2) The Southeast Missouri Lead Mining District. As pointed out in the attached technical comments, neither of these topics can serve as the project's Purpose and Need. For any injury, residual or otherwise, Federal Trustees provide no quantifiable information associated with an identified release. Similarly, the availability of restoration funds for the Southeast Missouri Lead Mining District has no relationship to any specific injured resources, lost services or other criteria, so as to serve as the Purpose and Needs for this project.

Response: The information presented in Section 2 of the SEMORRP "Purpose and Need for Restoration" including Section 2.1 "Residual Injury After Response Actions" and Section 2.2 "The Southeast Missouri Lead Mining District" meets the NEPA requirement to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." These two sections in concert provide contextual information to adequately understand the purpose and need of the federal action, which is the restoration planning, selection, and implementing process proposed in the Draft Plan. The SEMORRP/EA is a joint document, developed by both Federal and State Trustees for natural resources pursuant to federal statutes and implementing regulations. Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation. The SEMORRP is a restoration plan as described in the CERCLA NRDAR regulations. As provided for in the SEMO Assessment Plan, study plans as well as the results of the implemented studies related to the injury determination and quantification phases of the ongoing NRDA are available to the public on the websites (http://www.fws.gov/midwest/es/ec/nrda/SEMONRDA/index.html and http://dnr.mo.gov/env/hwp/sfund/nrda.htm). Upon completion of the assessment, the Trustees may prepare a Report of Assessment which will detail the determinations made by the Trustees

in the injury determination, quantification and damages determination phases. This report will include the data upon which such determinations were made by the Trustees.

Comment 16: Inadequacy of Alternatives
Initially, these alternatives are inadequate for two reasons. First, the Preferred Alternative (Alternative D) subsumes all aspects of Alternatives B (Primary Restoration) and C (Compensatory Restoration). Alternative D simply adds Alternatives B and C together and calls it a "new" alternative. Where Alternative D encompasses all aspects of the proposed action alternatives, however, there can be no meaningful or robust analysis of actual alternatives that provide different potential actions as NEPA requires. This is especially true here because the SEMORRP/EA provides no information about what these "Primary Restoration" projects and "Compensatory Restoration" projects are or how they differ in any meaningful way. This not only frustrates NEPA's purposes, but is contrary to DOI guidance, which requires restoration plans to "clearly identify, and explain to the public, the relationship between each restoration alternative considered and the resource injuries or service losses the action would address. In addition, the plan should establish performance standards (materials and methods), performance criteria (measures of success) and describe the legal protections (easements, deed restrictions) established for the completed restoration projects." DOI, Documentation for Natural Resource Damage Assessment and Restoration Settlements and Covenants not to Sue (May 2004) at 3.

Response: The alternatives presented in the SEMORRP are discrete options that, together, present the full suite of choices available to the Trustees to restore, replace, rehabilitate or acquire the equivalent of injured natural resources and their services. Trustees can do nothing (Alternative A), implement Primary Restoration on site (Alternative B), implement Compensatory Restoration (Alternative C) at off-site locations, or implement both primary restoration on-site as well as compensatory restoration at off-site locations. The information described in the comment, "performance standards (materials and methods), performance criteria (measures of success) and describe the legal protections (easements, deed restrictions) established for the completed restoration projects" will be contained in RFP's (SEMORRP at Appendix G) and Primary Restoration Project Proposals (SEMORRP at Section 7) as described in response to Comment 10.

Comment 17: No True Comparison of Alternatives
Due to the defects in the selection of alternatives, the SEMORRP/EA does not provide any true comparison between the alternatives in its supposed Alternatives Analysis. There are three readily obvious problems with the Alternatives Analysis:
• First, as noted, the chosen "preferred alternative" (D) is simply the sum of the two other action alternatives (B and C).
• Second, neither Alternative B nor Alternative C is described with any specificity. Instead, they are described as merely unidentified on-site restoration projects (Alternative B) and unidentified off-site restoration projects (Alternative C). SEMORRP/EA at 38-39.
• Third, as the SEMORRP/EA states, the actual projects that would be analyzed under the Alternatives Analysis, and their locations, will not be determined until a later date. *Id.* at 1.

Response: Please see the Trustees response to Comment 16 above. Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation

Comment 18: Failure to Identify or Consider Potential Negative Impacts
Importantly, because these restoration projects are purely hypothetical, the SEMORRP/EA provides no identification or consideration of any potential negative or harmful environmental impacts stemming from Alternatives B through D. Identifying and considering the potential negative impacts from a proposed major federal action is the entire point of NEPA. *See, e.g., Calvert Cliff's Coord. Comm. v. U.S. Atomic Energy Comm'n*, 449 F.2d 1109, 1122 (D.C. Cir. 1971) ("The sweep of NEPA is extraordinarily broad, compelling consideration of any and all types of environmental impacts of federal action."). The purpose of an EA in particular is to provide "sufficient evidence and analysis" necessary "for determining whether to prepare an environmental impact statement or a finding of no significant impact…." 40 C.F.R. § 1508.9(a)(1).

Response: Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including consideration of potential negative or harmful environmental impacts stemming from the restoration projects proposed through the process described in the SEMORRP.

Comment 19: The Federal Trustees Should Prepare a Programmatic EIS, If They Can.
The Federal Trustees should consider preparing a Programmatic EIS for the SEMORRP instead of a general EIS (which, as noted, must, at a minimum, be prepared for this proposal), if they can find more data and analyses than that which has been made public to date. See the following discussion on Programmatic EIS requirements and the attached technical comments. The SEMORRP/EA includes various programmatic hallmarks. In the SEMORPP/EA, the Trustees expressly describe the SEMORRP/EA as programmatic in nature. Specifically, the Trustees describe it as an "umbrella to cover multiple NRDAR settlements." SEMORRP/EA at 6. Further, the absence of any project-specific information in the SEMORRP/EA demonstrates that it is more suited to be a programmatic document and is certainly not a "project-level" NEPA document. NEPA, however, does not recognize a "Programmatic EA"; it must be a Programmatic EIS. Even here, however, the Federal Trustees would need information regarding the "individualized, 'on the ground' effects on local environments," *Natural Resources Def. Council v. Morton*, 388 F. Supp. 829, 833 (D.D.C. 1974), and, in order to support project-level decisions regarding restoration activities, an EA or an EIS would be required in order to comply with NEPA for any RFP or other decisions to move forward with the individual restoration projects.

Response: The Trustees appreciate that the commenter recognized the hallmarks of a programmatic document, and agree that a programmatic approach for a regional restoration plan makes the most sense in order to achieve above described efficiencies. A programmatic NEPA analysis is used to assess the environmental impacts of a proposed action that is broad in reach; subsequent actions may be informed by subsequent NEPA analyses. A programmatic analysis may be used for proposed policies, plans and programs that address a given geographic area, or

when environmental impacts are common to a class of actions or activities that are not location specific. Programmatic NEPA analyses may be used when there are limitations on available information or uncertainty regarding the timing, location, and environmental impacts of subsequent implementing actions. A programmatic NEPA analysis may also provide the basis for preliminary decisions prior to a federal agency's consideration of the impacts for specific projects. The value of this level of analysis is that it can programmatically address potential, cumulative, and indirect effects and allow the NEPA analysis for a subsequent action to tier to the programmatic analysis, thereby avoiding duplicative analyses of those impacts in the agency's subsequent NEPA documents and, instead, enabling decision makers and the public to focus on the most pertinent issues for decision.

The Trustees have determined that an Environmental Assessment with programmatic characteristics is the appropriate level of analysis to perform at this time; the Trustees have not made a determination that the proposed SEMORRP itself will have a significant effect on the human environment for NEPA purposes. The SEMORRP identifies broad objectives and potential restoration projects, and describes the process and criteria for selecting and implementing projects to restore or replace injured or destroyed natural resources and their services, but it does not authorize any specific projects or programs; and therefore no direct environmental effects flow from the Plan. The Trustees developed the EA to assist it in determining whether the SEMORRP as proposed results in potentially significant impacts to the quality of the human environment, in which case the Trustees would prepare an EIS.

The SEMORRP summarizes the current environmental setting of the SEMO region, describes the purpose and need for the Plan, identifies the No Action and Proposed Action Alternatives, including a description the Preferred Alternative (Alternative D), and assesses the potential environmental consequences based upon available information. This information is being used to make a threshold determination as to whether the Trustees must prepare an EIS prior to adopting the plan. The draft SEMORRP does not analyze the specific effects of projects that the Trustees may later fund. The appropriate level of NEPA analysis will be performed on proposed projects prior to their selection by the Trustees for funding, as described in response to comment 10.

Comment 20: Nothing in CERCLA or the DOI's NRD regulations authorizes the Trustees to issue a "regional restoration plan." The Trustees claim authority arising under the Oil Pollution Act("OPA"), 33 U.S.C. § 2701, *et seq.*, and its regulations. *See* SEMORRP/EA §§ 1.1, 1.4.1. However, as recognized in the SEMORRP, the OPA only authorizes the Trustees to recover for injuries to natural resources resulting from "an incident involving a discharge or substantial threat of a discharge of oil…." *Id.* § 1.4.1. Thus, it only provides for liability against parties "for a vessel or a facility from which oil is discharged, or which poses the substantial threat of a discharge of oil, into or upon the navigable waters or adjoining shorelines or the exclusive economic zone…." 33 U.S.C. § 2702(a). Consistent with that authority, the regulations permitting a regional restoration plan are only available for natural resource damages "resulting from a discharge of oil…." *Id.* § 2706(e)(1). "Oil" is defined as "oil of any kind or in any form, including petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil…." *Id.* § 2701(23). The Trustees have not, and cannot, claim that the natural resource damages they allege resulted from the discharge of oil.

Given that no alleged natural resource damages resulted from an oil discharge, the Trustees cannot look to OPA's regulations, 15 C.F.R. § 990.56, for authority, nor can they look to these regulations based upon anticipatory future oil discharges. Rather, the Trustees must rely on the U.S. Department of Interior's natural resource damage regulations at 43 C.F.R., Part 11, Subpart E (the "Type B Regulations"). But nothing in the Type B Regulations authorizes a regional approach. Instead, the Type B Regulations require the Trustees to create a Restoration and Compensation Determination Plan. 43 C.F.R. §§11.81, 11.93(a). This is the document through which the Trustees must explore alternatives for the restoration or rehabilitation of injured natural resources or the replacement and/or acquisition of equivalent natural resources. *Id.* §11.81(a). The OPA and its implementing regulations simply do not apply, and so the Trustees cannot avoid creating a Restoration and Compensation Determination Plan by using an OPA regional restoration plan in the absence of oil discharges causing natural resource damages.

Response: The reference to OPA and regional restoration planning authorities contained therein is included in the SEMORRP to encompass the possibility of future damages recovered under OPA in the SEMO. The substantial similarity of natural resources across the SEMO affords the Trustees the ability to plan in an "anticipatory" fashion for such discharges of oil and related substances under OPA. Consequently, the regional structure of the SEMORRP is appropriate for future OPA recoveries. At the time of publication of the SEMORRP, there were no recoveries in SEMO for injuries caused by the release of oil and related substances covered by OPA.

The SEMORRP is not intended to be a Restoration and Compensation Determination Plan (RCDP), nor is it a substitute for an RCDP. With respect to the timing of the development of an RCDP, the DOI Type B regulations provide:

> *If existing data are not sufficient to develop the Restoration and Compensation Determination Plan at the time that the overall Assessment Plan is made available for public review and comment, the Restoration and Compensation Determination Plan may be developed later, after the completion of the Injury Determination or Quantification phases.*

43 C.F.R. §11.81 (d)(1)

The Injury Determination and Quantification phases of the natural resource damage assessments in SEMO are ongoing. Completion of the assessment is dependent upon a variety of factors described in the SEMORRP (pages 13-14) Once the Trustees complete the Injury Determination and Quantification phases, we will subsequently produce an RCDP or multiple RCDPs as appropriate.

As described in the SEMORRP (p. 12) the timing is ripe to prepare a restoration plan for recovered restoration funds. The DOI Type B regulations (43 C.F.R. §11.93(a)) provide:

> *Upon determination of the amount of the award of a natural resource damage claim as authorized by section 107(a)(4)(C) of CERCLA, or sections 311(f)(4) and 311(f)(5) of the*

CWA, the authorized official shall prepare a Restoration Plan as provided in section 111(i) of CERCLA.

Preparation and publication of the SEMORRP establishes the framework for the identification, selection and implementation of restoration projects to be funded using the methods described in the preferred Alternative D. The CERCLA NRDAR regulations do not prohibit the Trustees from using a regional restoration planning approach when damages are recovered per 43 CFR §§11.93(a), above. Regional restoration planning with the purpose of implementing natural resource restoration projects to restore, replace, or acquire the equivalent of the loss of natural resources and their services is well within the authorities of the U.S. Fish & Wildlife Service, the U.S. Forest Service, and the Missouri Department of Natural Resources. It is also consistent with the recommendation of the Natural Resource Damage Assessment and Restoration Federal Advisory Committee to use regional restoration plans for NRDAR. As described previously in our response to comment 13, above, regional restoration planning creates multiple efficiencies for the Trustees which result in a net savings of restoration funds. This in turn allows the Trustees to spend limited recoveries on direct implementation of restoration rather than authoring multiple redundant restoration plans for substantially similar sites with substantially similar natural resources.

Comment 21: The SEMORRP Ignores the Type B Regulation Requirements for a Restoration and Compensation Determination Plan

The SEMORRP violates the Type B Regulations in both timing and substance. As to timing, CERCLA and the Type B Regulations set out a step-by-step process to facilitate natural resource damage identification, quantification, damage assessment, and restoration planning. Creating a plan for restoring damaged natural resources is the *last* step in the process. 43 C.F.R.§ 11.93(a). Here, however, the Trustees have not even quantified natural resource damages, SEMORRP/EA § 1.2, yet have issued what purports to be a draft restoration plan. The content of the SEMORRP communicates that the Trustees have failed to comply with the Type B Regulation process, inferring that in many instances the Trustees have not even identified the scope of allegedly injured natural resources, *see* SEMORRP/EA § 1.2 at 5 ("Sites outside of the" already broadly "defined boundary "of the SEMORRP may be considered for restoration activities"), much less complied with the remaining steps as to injury quantification, damage assessment, and selecting alternatives for restoration planning. As described more fully below, by jumping ahead in the process without even defining the alleged natural resource injuries, the Trustees have produced an unintelligible "plan to plan later" through an RFP ("RFP") system that violates nearly every requirement of the Type B Regulations.

Response: Please see the Trustees' response to Comment 20. The Trustees do not intend for the SEMORRP to take the place of an RCDP(s).

Comment 22: To the extent that the Trustees could use the SEMORRP as a Restoration and Compensation Determination Plan ("Determination Plan"), it fails to comply with the Type B Regulations in almost every way. A Determination Plan requires the Trustees to "list a reasonable number of" restoration alternatives, "select one of the alternatives and the actions

required to implement that alternative; give the rationale for selecting that alternative; and identify the methodologies that will be used to determine the costs of the selected alternatives." 43 C.F.R. § 11.81(a)(1). In doing so, a Determination Plan "shall be of sufficient detail to evaluate the possible alternatives for the purpose of selecting the appropriate alternative to use in determining the cost of baseline restoration, rehabilitation, replacement, and/or acquisition of equivalent resources, and, where relevant, the compensable value." *Id.* § 11.81(a)(2). Trustees "shall use" guidance for preparing Determination Plans in 43 C.F.R. §§ 11.82, .83, and .84. *Id.* § 11.81(2)(b). The SEMORRP, however, violates the Type B Regulations in at least the following ways:

• The Trustees must develop a reasonable number of alternatives that would either restore injured natural resources to "the level of services available at baseline" or replace or acquire the equivalent natural resources capable of providing such services. 43 C.F.R. § 11.82(a); *see also id.* §11.82(b)(1)(i) (restoration activities "are those actions undertaken to return injured resources to their baseline condition"); *id.* § 11.82(b)(1)(ii) (Trustees must "identify services previously provided by the resources in their baseline condition… and compare those services with services now provided by the injured resources"). Here, the Trustees have failed to (1) identify the allegedly injured natural resources, (2) identify the lost services requiring restoration or replacement, and (3) determine the baseline of these lost services. *See* SEMORRP/EA § 2 at 13 (stating that each future RFP will identify "the type of natural resources and/or lost services ….").

• Alternatives must be described in "sufficient detail to evaluate the possible alternatives for the purpose of selecting the appropriate alternative…." *Id.* § 11.81(a)(2). Here, the Trustees offered a No Action Alternative (A), a primary restoration alternative (B), a compensatory restoration project (C), and a combination of B and C (D). The Trustees provide no details regarding any of these alternatives. No information is provided regarding (1) what allegedly injured resources are targeted by the alternative, (2) where they are located, (3) whether lost services would be completely restored to baseline levels (which is impossible, given that the Trustees failed to identify injuries, lost services, and baseline services), (4) the actual actions that would be required to restore and/or compensate for injured natural resources, (5) the cost of those projects, or (6) the time required to implement those projects. Instead, the Trustees provide an abstract discussion of generic projects that could be selected for unidentified natural resources in the future. That selection will be made through an RFP process, if at all. *See* SEMORRP/EA § 2 at 13 ("Each RFP will include, but is not limited to, such information as the type of natural resources injured and/or services lost; location of the potentially injured natural resources and/or lost services; and the amount of restoration funds available.") *Also see* SEMORRP/EA § 6.2 at 44 and Appendix B, Sec. 1.b, p.1 (no RFP for Trustees' own proposals); *Finally, see* SEMORRP/EA § 7.1 at 53 (No RFP for Compensatory Restoration). This is the information required to be presented in a Determination Plan, not through an RFP process sometime in the unspecified future, if it is even presented at all.

• A Determination Plan's alternatives must include a spectrum of potential actions, ranging from "intensive action … to return the various resources and services … to baseline conditions as quickly as possible, to natural recovery with minimal management actions. 43 C.F.R. § 11.82(c)(1). This range "could reflect varying rates of recovery, combinations of management

actions, and needs for resource replacements or acquisitions." *Id.* The SEMORRP presents only a No Action Alternative, two very "intensive" and elaborate alternatives (Alternatives B and C) and a combination of those two alternatives. No alternatives presented in the SEMORRP cover a varying range of more moderate actions.

• Each alternative must include a list of "proposed actions that would restore, rehabilitate, replace, and/or acquire the equivalent of the lost services provided by" the allegedly injured natural resources. *Id.* § 11.82(b)(2)(i). Given the absence of any specificity in describing the alternatives, the Trustees do not list any specific proposed actions that would be undertaken to restore and/or compensate for lost services from the allegedly injured natural resources. Each category of potential actions (as opposed to "proposed actions") is replete with equivocations. *See, e.g.*, SEMORRP/EA §§ 3.3.1 at 18 ("Specific upland restoration projects could include but are not limited to…."); 3.3.3("water quality and aquatic resource improvement projects may include many project categories, but are not limited to those listed below"); 3.4.1 ("Under this Alternative, upland restoration projects could include"). For Alternative D – the Trustees' preferred alternative – the actions to be undertaken are expressly reserved for *future* selection through a "Decision Matrix" that will rank and select projects. *Id.* § 3.5 at 23; Appendix B.

• In describing the implementation of specific projects, a Determination Plan must include "the period of time over which these [lost] services would continue to be lost." 43 C.F.R. § 11.82(b)(2)(i). The SEMORRP does not include this information.

• In selecting the preferred alternative, Alternative D, the Trustees did not assess the ten factors required for consideration under 43 C.F.R. § 11.82(d), including technical feasibility, cost vs. benefits, cost-effectiveness, the results of actual or planned response actions, the natural recovery period or the potential effects on human health and safety. In fact, doing so would be impossible as the Trustees never provide any of this information in the SEMORRP. Instead, the selection of Alternative D is presented as a *fait accompli* based on a series of vague and amorphous factors found nowhere in the Type B Regulations, such as "Uplands," aquatic resources, surface water, biological resources, environmental justice issues, cumulative impacts, and others. *See S*EMORRP/EA, Table 4 at 41-42. To the extent that the Type B Regulation factors are considered at all, they are considered to some degree only in the RFP process, IF an RFP is even issued. *See* SEMORRP/EA § 6.5 at 50 (future projects will be evaluated based on feasibility, cost-effectiveness, timing, and other factors). *Also see* SEMORRP/EA § 6.2 at 44 and Appendix B, Sec. 1.b, p.1 (no RFP for Trustees' own proposals); *Finally see* SEMORRP/EA § 7.1 at 53 (No RFP for Compensatory Restoration). The ten Type B factors must be considered in the Alternatives analysis, not in a future RFP process, if they are even considered at all.

• A Determination Plan must include the Trustees' selection of cost estimating and valuation methodologies for determining the costs of the selected alternative. 43 C.F.R. §11.83. The SEMORRP neither proposes nor selects any of the cost or valuation methodologies included in the Type B Regulations. Even if it was permissible to postpone this selection until a later date (which it is not), the Trustees' "Decision Matrix" fails to include these methodologies when considering future projects. This makes a determination of damages under 42 C.F.R. § 11.84 impossible.

The SEMORRP cannot qualify as a Restoration and Compensation Determination Plan as it meets none of the Type B Regulations' requirements for such a plan. The Trustees must withdraw the SEMORRP and begin a new Restoration Plan that complies with the Type B Regulations, IF they have all the required information. Based upon the Trustees' studies and other information made public to date, Trustees simply do not have the required information. See the foregoing discussion of information required for a Determination Plan.

Response: Please see the Trustees' responses to comments 16 and 20. The SEMORRP is not intended to be an RCDP, nor is it a substitute for an RCDP(s). Once the Trustees complete the Injury Determination and Quantification phases, we will subsequently produce an RCDP or multiple RCDPs as appropriate.

Comment 23: The Trustees also appear to immediately skew their selection away from the "No Action" Alternative by stating that "the terms of existing Consent Decrees require recovered natural resource damages be spent to restore, replace, rehabilitate and/or acquire the equivalent of potentially injured natural resources and their service and, under [the No Action] Alternative, the restoration funds would not be expended." SEMORRP/EA §3.2 at 16. The Trustees cannot contractually bind themselves, through a consent decree, to pre-select alternatives requiring restoration of and/or compensation for injured natural resources. Nor can the potential wastage of funds acquired by the Trustees under a consent decree be considered in selecting an alternative.

Response: While the "No Action" alternative is included for consideration under CERCLA NRDAR regulations, adoption of this alternative does not make sense for the SEMORRP, especially for sites where funds have already been received by the Trustees for restoration of natural resources and the services they provide. Adoption of the "No Action" alternative under this scenario would frustrate the primary intent of NRDAR under CERCLA, which is to provide a mechanism for the restoration to baseline conditions of injured natural resources and the services they provide. Further, selection of the "No Action" alternative is only appropriate at sites where the hazardous substances causing injury to natural resources are capable of naturally attenuating to baseline conditions. The Trustees have not recovered restoration funds at any sites covered by the SEMORRP where the hazardous substances causing injury to natural resources and the services they provide will naturally attenuate on a time scale that is meaningful to the public. Consequently, selection of the "No Action" alternative neither satisfies the Trustees' mandate to restore injured natural resources, nor will the hazardous substances released at our current damage assessment sites naturally attenuate to return the injured resources to baseline conditions.

Comment 24: The SEMORRP, failing to include any of the information required of a Restoration and Compensation Determination Plan, establishes little more than a framework for ignoring the public notice and comment requirements found in the Type B Regulations. Every Restoration and Compensation Determination Plan is subject to public review. 43 C.F.R. §§ 11.80(c); 11.81(d)(2)-(4). And while the public, in theory, may comment on the SEMORRP, it cannot actually comment on the substance of the proposed actions, because the SEMORRP is devoid of any actual information regarding the identity and location of the allegedly injured natural resources, the lost services requiring restoration or replacement, the baseline services the resources provided, and the actual actions proposed to restore or replace those resources.

Instead, the SEMORRP devises a two-stage process that largely limits, or outright eliminates, any meaningful public process on the proposed restoration projects.

Response: Please see the Trustees' response to comment 20. The SEMORRP is not an RCDP. Once the Trustees complete the Injury Determination and Quantification phases, we will subsequently produce an RCDP or multiple RCDPs as appropriate. Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation

Comment 25: Under the compensatory restoration process, the Trustees propose to use an RFP system to select restoration projects. SEMORRP/EA § 6.2 at 43. According to the SEMORRP, the Trustees will only hold a public meeting to announce the RFP. *Id.* The evaluation and selection of the actual compensatory restoration projects, however, will be undertaken by the Trustees behind closed doors and without *any* public input. *Id.* at 43-44. Instead, the public will only receive an "announcement of selected restoration projects" without any opportunity to comment on the proposed selection of those projects. *Id.* § 6.2.1. at 44. This clearly violates the Type B Regulations' requirement for public notice and comment on the proposed selection of restoration projects. The SEMORRP's lack of public notice and comment on the proposed project selection is especially disturbing for a number of reasons. First, the Trustees themselves are exempted from the RFP process and will evaluate their own proposals "objectively using the same criteria as non-trustee submittals." *Id.* § 6.2 at 44. This opportunity for self-dealing is problematic enough, even when done in full view of the public. However, here the Trustees would be able to select their own projects over competing submissions without any public input. Second, it is only through this RFP process that the Trustees will finally identify the nature and location of allegedly injured natural resources and/or services lost. *Id.* § 2 at 13. But this information must be identified as part of the SEMORRP itself, not through a series of periodic RFPs, if at all. Even through this process, however, the Trustees never provide the public notice of the compensatory projects they themselves propose, much less an opportunity to comment. Instead, the Trustees will apply their own vague and amorphous selection process, *id.* §§ 6.3-6.5 at 45-52, outside of public view and without divulging how or why they chose particular compensatory restoration projects. This process violates the Type B Regulations.

Response: Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to its implementation. Please see the Trustees' response to comment 10 regarding compliance with NEPA and our response to comment 16 regarding the provision and evaluation of alternatives. Every project that is selected for funding by the Trustees through the process described in the SEMORRP will be analyzed according to NEPA and the CERCLA NRDAR Type B regulations. Consequently, the public will have the ability to comment on a range of alternatives for every project that is further considered under the NEPA process, and not just the alternatives presented in the body of the SEMORRP.

Comment 26: For primary restoration projects, the Trustees claim that they will not use an RFP process like the one for compensatory restoration, SEMORRP/EA § 7.1 at 53, while simultaneously conceding that they may advertise and request bids for particular pieces of work

on primary restoration projects. *Id.* § 7.2.4 at 56. The Trustees provide no explanation of why they may or may not request bids for any particular project. Regardless of whether or not the Trustees solicit bids for primary restoration projects, the Trustees plan to evaluate proposed projects based on a series of biased and abstract criteria, *id.* § 7.2.1 at 54-56, and announce the decision to the public. *Id.* § 7.2.3 at 56. The fact that the Trustees intend to take public comment, and respond to those comments, prior to implementing any project, does not salvage the legality of the process, which violates the mandate of the Type B Regulations to create and take public comment on a series of alternatives. 43 C.F.R. § 11.81(a)(1). Instead, the Trustees will present the public with only one option, their final decision, making the concept of public input a *pro forma* exercise that will not impact the Trustees' decision. Perhaps recognizing this defect, the Trustees claim that they will increase the transparency by using a Strategic Restoration Implementation Plan ("SRIP"). *Id.* At § 7.1 at 53. Not only does the SRIP fail to properly substitute for the public notice and comment procedures required by the Type B Regulations, the Trustees have not made this SRIP public. The Trustees must, in accordance with the Type B Regulations, propose alternatives for both primary and compensatory restoration projects in a Determination Plan, subject to public notice and comment. The processes outlined in the SEMORRP violate the Type B Regulations and deprive the public of vital information about the nature, location, identity, and extent of allegedly injured natural resources, as well as the Trustees' options for restoring those natural resources.

Response: Each individual restoration project that is implemented under this regional restoration plan will undergo further NEPA (among other statutory and regulatory) analysis, including an opportunity for public comment, prior to their implementation. Please see response to comment 16 regarding the public's ability to comment on a range of alternatives as a project is further analyzed under NEPA. It is the Trustees' intention to solicit bids on certain primary restoration projects where professional services, supplies, and equipment needs exceed the Trustees' in house capacity. Solicitation of bids on a particular project will be discussed in detail when specific project proposals are released, as described in Section 7 of the SEMORRP. It is the Trustees' intention to publish a draft SRIP with the final SEMORRP to advise the public of our potential schedule for the release of restoration funds over the next several years. Information presented in the SRIP will inform the public about the Trustees' likely schedule for restoration and allow for the anticipation of RFPs for compensatory restoration and project proposals for primary restoration. The SEMORRP is not an RCDP, nor is it intended to substitute for an RCDP (See Responses to Comments 16 and 20).