Public Review Draft

January 13th, 2017

Ciba-Geigy National Priorities List Site, McIntosh, Alabama

Draft Restoration Plan and Programmatic Environmental Assessment

Prepared by:

Natural Resource Trustees for the Ciba-Geigy NPL Site

U.S. Department of the Interior

National Oceanic and Atmospheric Administration

Alabama Department of Conservation and Natural Resources

Geological Survey of Alabama

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Ciba-Geigy
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McIntosh, Alabama

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FOR PUBLIC REVIEW

Suggested Citation

Ciba-Geigy NRDAR Trustees. 2017. Ciba-Geigy NPL Site Draft Restoration Plan/Programmatic Environmental Assessment. Prepared by the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Alabama Department of Conservation and Natural Resources, and Geological Survey of Alabama.

FACT SHEET

Draft Restoration Plan/Programmatic Environmental Assessment for the Ciba-Geigy National Priorities List (NPL) Site

Trustee Agencies: U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Alabama Department of Conservation and Natural Resources, and Geological Survey of Alabama

Abstract: The Natural Resource Trustee Agencies (Trustees) present a description of the assessed natural resource injuries and losses resulting from releases of hazardous substances from the Ciba-Geigy NPL Site in McIntosh, Alabama, and the restoration project types proposed for use to compensate for those injuries and losses. Releases of hazardous substances, which include e primarily dichlorodiphenyltrichloroethane (DDT) and DDT-isomers, likely affected fish, birds, sediment, and sediment-dwelling biota. The Trustees identified habitat enhancement and restoration on newly acquired lands and habitat enhancement and restoration of state-owned lands as appropriate and reasonable strategies for restoration of natural resources or services like those injured or lost. This would include acquisition of forested, bottomland hardwood forest wetlands and/or restoration of degraded lands in the Upper Mobile-Tensaw River Delta. The restoration of degraded floodplain habitats such as bottomland hardwood forests would provide direct benefits to fish, resident wildlife, migratory birds, and threatened and endangered species potentially injured by the release of hazardous substances from the Ciba-Geigy NPL Site. Acquired lands would be deeded to ADCNR to be managed in perpetuity as part of the Mobile-Tensaw River Delta Wildlife Management Area complex.

Contact Agency:

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Townsend, GA 31331
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Public Meeting Date and Location:

A public meeting will be held at the McIntosh Town Hall at 206 Commerce Street, McIntosh, Alabama on January 31st, 2017 at 6pm.
Submit comments to contact agency by February 27th, 2017

Copies: Copies of the Draft Restoration Plan/ Programmatic Environmental Assessment are available from USFWS at the above address. Copies are also available online at http://www.cerc.usgs.gov/orda_docs/CaseDetails?ID=870

EXECUTIVE SUMMARY

The Ciba-Geigy Chemical Corporation (Ciba-Geigy) began production of the pesticide dichlorodiphenyltrichloroethane (DDT) in the early 1950s at a facility in McIntosh, Alabama, adjacent to the Tombigbee River. Ciba-Geigy subsequently produced many other chemicals at this facility over its operational history. Hazardous substances, including DDT and DDT-isomers, generated by Ciba-Geigy at the McIntosh facility were disposed of on-site and discharged into the Tombigbee River. Production wastes were released in floodplain habitats on the Ciba-Geigy site, as well as into floodplain habitats on neighboring properties, as a result of periodic flooding of a ditch that transmitted untreated plant wastes into several unlined pits. Hazardous substances released into Tombigbee River floodplain habitats were distributed downstream into the Tombigbee River. Over the years these releases were occurring, the facility was owned and/or operated by Ciba-Geigy, a subsidiary of Ciba-Geigy and/or its successor, the BASF Corporation (BASF). Ciba-Geigy (including its McIntosh facility) was acquired by BASF in 2009.

Elevated concentrations of DDT and DDT-isomers were documented in biota on-site and in sediment and biota samples collected from the Tombigbee River. Concentrations of DDT and DDT-related compounds were documented as frequently exceeding levels potentially toxic to fish, wildlife, and humans. Resources of concern in these ecologically important areas include water, fish, shellfish, resident wildlife, including migratory birds, and several federally-protected threatened or endangered species.

Investigation of the nature and extent of contaminant releases from the McIntosh facility (Site) by the Environmental Protection Agency (EPA) resulted in the proposed addition of the Site to the National Priorities List (NPL) in 1983. The listing was finalized in 1984. Several Records of Decision (RODs), completed between 1989 and 1995, required a variety of remediation or removal actions to address releases of hazardous substances at the Site. Following remedial activities, EPA determined the remedy within Operable Unit 3 (OU3) of the Site, which includes the effluent ditch and areas in the Tombigbee River floodplain in close proximity, was not achieving performance goals and that additional remedial action was warranted. EPA, in coordination with Ciba-Geigy, completed supplemental remedial activities in OU3 in 2008.

In addition to the response and clean-up effort by EPA and Ciba-Geigy, the State and Federal Trustees for potentially affected natural resources initiated a Natural Resource Damage Assessment (NRDA) under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§1906 *et seq.* (CERCLA) to assess and quantify the natural resource injuries and losses from Site releases and the natural resource damages appropriate to compensate for such injuries. Ciba-Geigy, as the party responsible for these releases, was liable under CERCLA for such damages. The Trustees for these natural resources are the United States Fish and Wildlife Service (USFWS) on behalf of the Department of the Interior, the National Oceanic and Atmospheric Administration (NOAA), the Alabama Department of Conservation and Natural

Resources (ADCNR), and Geological Survey of Alabama (GSA) (collectively, "Trustees"). As a designated Trustee, each of these agencies is authorized to act on behalf of the public under CERCLA and/or other applicable state laws to assess and recover natural resource damages and to plan and implement actions to restore, rehabilitate, replace, or acquire the equivalent of the natural resources and resource services injured as a result of a release of hazardous substances.

Subsequently, BASF and the Trustees agreed to terms for settlement of Ciba-Geigy's liability for natural resource damages under CERCLA. A Consent Decree setting forth the terms of this settlement was signed by the parties and lodged with the U.S. District Court for the Southern District of Alabama, Southern Division[1] in July 2013. Following notice of and opportunity for public review and comment on the proposed settlement, the Court approved that Consent Decree on October 2, 2013. Under that settlement, the Trustees jointly recovered $3,200,000 for use to plan, implement, conduct, finance and oversee one or more restoration actions or projects within the Mobile Bay Watershed appropriate to restore, replace or acquire the equivalent of natural resources or services like those injured or lost to bottomland hardwood forest habitat and biota dependent on that habitat.

This Draft Restoration Plan (RP)/Programmatic Environmental Assessment (PEA) (Draft RP/PEA) was prepared by the Trustees to address natural resources, including ecological services, believed to have been injured, lost or destroyed due to releases of hazardous substances at or from the Site. The purpose of the restoration outlined and proposed in this Draft RP/PEA, is to address natural resource losses through restoration actions that would help return injured natural resources to baseline conditions and/or compensate for interim losses.

The Trustees are providing a 45 day public notice and comment period on this Draft RP/PEA. During that period, the Trustees will also conduct a public meeting to facilitate public input on the proposed restoration alternative. Public comments received during the comment period will be considered before finalizing a RP/PEA.

Restoration Plan/Programmatic Environmental Assessment

The Trustees have cooperatively prepared this Draft RP/PEA in accordance with the CERCLA NRDA regulations, 43 C.F.R. Part 11. This document describes the likely injuries resulting from releases of hazardous substances and the restoration project types intended to compensate the public for those injuries. This document is also a Programmatic Environmental Assessment (PEA) intended to satisfy the Federal Trustees' requirement to evaluate the environmental impacts of the selected restoration alternatives under the National Environmental Policy Act (NEPA). This document is therefore called a RP/PEA. Following the public review and comment period for this Draft RP/PEA and the public meeting the Trustees will review and respond to comments and prepare a Final RP/PEA.

[1] United States et al v. BASF Corporation, Case 1:13-cv-00372-KD-M (filed July 19, 2013).

The Trustees intend to prepare future restoration plans supported by NEPA analyses tiered to this PEA or similar relevant programmatic NEPA analyses (40 C.F.R. § 1508.28). Programmatic analysis can streamline future restoration planning by evaluating broad programmatic issues and impacts, thereby allowing the Trustees to tier future project-specific analyses from prior programmatic analyses. Tiering future project-specific analyses would reduce or eliminate duplicative documentation by focusing future project analyses on project specific issues, and incorporating by reference the relevant issues evaluated by the broad programmatic analyses. When the Trustees propose future restoration activities or projects for consideration, they will determine if additional NEPA consideration is necessary for proposed projects that tier from the programmatic, and whether the conditions and environmental effects described in the programmatic are still valid. If additional NEPA analysis is required the public will have an opportunity to review and comment on those future restoration activities or plans. Additionally, and regardless of whether additional NEPA analysis is required, the public will be notified of the Trustee's intent to move forward with future restoration activities.

What was injured?

The Trustees' assessment of natural resource injuries for this Site focused on identifying the injury likely or known to have resulted from contamination residing in Tombigbee River floodplain habitats and the migration of contamination into the Tombigbee River. The pesticide DDT and its degradation products likely or potentially caused adverse effects to natural resources of concern in these areas, including water, fish, shellfish and other benthic biota, resident wildlife, migratory birds, and federally-protected threatened or endangered species.

What actions are being proposed and evaluated in the RP/PEA?

The Trustees considered several restoration alternatives, including a no action alternative. After evaluating the alternatives, and based on the anticipated ecological benefits to the Upper Mobile-Tensaw River Delta, including fish, shellfish, and migratory bird habitat, project cost-effectiveness and the overall need for restoration within the watershed, the Trustees identified 1) Habitat Enhancement and Restoration on Newly Acquired Lands and 2) Habitat Enhancement and Restoration of State-Owned Lands, as the Proposed Action.

What potential impacts have been identified?

Summary of the impacts anticipated from the proposed restoration alternatives in the Upper Mobile-Tensaw River Delta.
Alternative 1 = No Action
Alternative 2 = Habitat Enhancement and Restoration of Newly Acquired Lands
Alternative 3 = Habitat Enhancement and Restoration of State-Owned Lands

Resource Topics	Alternative 1	Alternative 2	Alternative 3
Physical Environment	Unknown	Minor to Moderate benefits	Minor to Moderate benefits
Habitat Resources	Negligible benefits	Moderate benefits	Moderate benefits
Fish and Wildlife	Negligible benefits	Moderate benefits	Moderate benefits
Socioeconomics	No effect	Minor benefits	Minor benefits
Cultural Resources	No effect	Minor benefits	No effect

What restoration projects will compensate the public for these injuries?

The Trustees will consider and select future restoration projects that are designed to address the various natural resources impacted by the releases of hazardous substances. These projects would be consistent with the Alternative 2 – Habitat Enhancement and Restoration of Newly Acquired Lands and/or Alternative 3 – Habitat Enhancement and

Restoration of State-Owned Lands. Projects likely considered under these alternatives could include acquisition of habitat similar to those impacted by the hazardous substance releases and enhancement of habitats similar to those impacted through hydrological modification, non-native species management, and/or revegetation of previously disturbed or logged forested wetlands. Projects may be completed in areas where potential or known injuries occurred or in areas in proximity to the Site, as long as there is no potential for additional release or recontamination of the projects. The restoration type alternatives presented in this Draft RP/PEA are designed to restore, replace, or acquire the equivalent of the lost resources and/or their services through on-the-ground restoration. The proposed restoration type alternatives are based upon the biological needs of the injured natural resources and the feasibility of restoring the resources. Restoration type alternatives that are capable of being completed successfully within close proximity to natural resources that were likely affected by the hazardous substance releases were given priority. Other considerations included the cost-effectiveness of the restoration type projects and the overall need for restoration within the watershed.

How are future restoration projects being funded?

Under CERCLA, the responsible party is liable for the cost of implementing restoration projects, as well as the costs incurred by the Trustees to undertake the NRDA. As stated above, on October 2, 2013, the Trustees settled a claim for natural resource damages with BASF, providing3,200,000 for the Trustees to plan for, implement, conduct, finance, and oversee future restoration projects that will be selected consistent with the Proposed Action as described in this document.

How can you get involved?

The Trustees will hold a public meeting at the McIntosh Town Hall on January 31st, 2017 at 6:00 pm. The McIntosh Town Hall is located at 206 Commerce Street, McIntosh, Alabama 36553. Directions can be obtained by calling the agency contact below. At this meeting the Trustees will present a brief overview of this Draft RP/PEA and will receive public comments, which will be considered in finalizing this document.

Further information on this public meeting and other activities of the Trustees will be distributed to those on our mailing list and will be announced at http://www.cerc.usgs.gov/orda_docs/CaseDetails?ID=870 and through press releases. Please call the agency contact below if you wish to be added to the mailing list.

Written comments can be submitted to the agency contact below by February 27th, 2017.

Abbreviations and Acronyms

ADCNR	Alabama Department of Conservation and Natural Resources
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DDTr	Dichlorodiphenyltrichloroethane and degradates, DDD and DDE
DSAY	Discounted Service Acre-Years
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
HEA	Habitat Equivalency Analysis
MBTA	Migratory Bird Treaty Act
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NRDAR	Natural Resource Damage Assessment and Restoration
PRPs	Potentially Responsible Parties
ROD	Record of Decision
RP	Restoration Plan
RP/PEA	Restoration Plan and Programmatic Environmental Assessment
Site	Ciba-Geigy NPL Site
USC	United States Code
USFWS	United States Fish and Wildlife Service

Table of Contents

List of Maps/Figures

List of Tables

1.0 INTRODUCTION

This Draft Restoration Plan (RP)/Programmatic Environmental Assessment (PEA) (Draft RP/PEA) has been developed by State and Federal Natural Resource Trustees to provide for the restoration of natural resources, including ecological services, that are known or likely to have been injured or lost due to releases of hazardous substances at the Ciba-Geigy McIntosh National Priority List (NPL) Site (Site) in McIntosh, Washington County, Alabama. The Trustees for these natural resources involved in development of this document are the United States Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), the Alabama Department of Conservation and Natural Resources (ADCNR), and Geological Survey of Alabama (GSA) (collectively, "Trustees").

In keeping with its purpose, this Draft RP/PEA:

- Describes the natural resource injuries and losses that are known or likely to have occurred as a result of the release of hazardous substances at or from the Site,
- Identifies the objectives and strategy applied in planning for restoration of these injuries and losses,
- Identifies and evaluates a reasonable number of restoration type alternatives considered for achieving the restoration objectives, including a No Action alternative,
- Identifies the restoration alternative that the Trustees are proposing to use in implementing restoration to compensate for the natural resources injuries and losses that are known or likely to have occurred,
- Identifies the framework and criteria that the Trustees propose to apply in making future project decisions, including in selecting specific sites and/or in further planning of site specific restoration activities;

The Draft RP/PEA includes information regarding the affected environment, the Trustees' assessment of natural resource injuries and losses resulting from the release of hazardous substances at the Site, and the type of restoration actions being proposed to compensate for those injuries and losses. The Draft RP/PEA is being released for public review.

1.1 Background

The Site is located approximately 50 miles north of Mobile, Alabama, adjacent to the Tombigbee River, near the town of McIntosh in southern Washington County, Alabama. The Site is comprised of a production facility, now owned and operated by BASF Corporation (BASF), encompassing approximately 1,500 acres, of which approximately 400 acres are developed for facility operations and approximately 370 acres are undeveloped swamp and bottomlands within the Tombigbee River floodplain. Plant

facilities are bounded by pine forest to the west and north, the Tombigbee River to the east, and the Olin-McIntosh facility to the south[2].

Production of the pesticide DDT at the Site was initiated in 1952 by the Geigy Chemical Corporation[3]. Production is believed to have continued until 1963. Facility operations were expanded in the 1960's to include production of other insecticides, herbicides, and various agricultural and industrial products. Wastes generated during operations at the McIntosh facility were disposed of on-site and discharged into the Tombigbee River. On-site disposal included the discharge of wastes to several unlined pits. Additionally, during the 1950's and mid-1960's, untreated wastes were discharged to the Tombigbee River via an unlined ditch crossing a floodplain of the Tombigbee River. During periods of flooding, the ditch was inundated and production wastes were dispersed in floodplain habitats that were part of the McIntosh plant property, as well as into floodplain habitats on neighboring properties.

Beginning in 1965, effluents were routed through additional treatment impoundments prior to discharge to the effluent ditch. In 1973, a biological treatment facility was constructed to treat wastes prior to discharge to the ditch. The quantities of contaminants of concern discharged from this facility are uncertain. However, quantities were sufficient to cause elevated levels of DDT and its degradation products (collectively termed DDTr[4]), including isomers such as dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethylene (DDE), in water, sediment, soils, and biota, including in sediment and biota samples collected from the Tombigbee River. Resources of concern in affected areas include water, fish, shellfish, resident wildlife, including migratory birds, and several federally-protected threatened or endangered species.

DDT is an organochlorine insecticide of the class dichlorodiphenylethanes that was used to combat insect-borne human diseases among military and civilian populations and for insect control in agricultural and residential applications. DDT and its breakdown products are highly persistent in the environment, bioaccumulative in fish and wildlife species, and most widely known for their reproductive toxicity in fish and wildlife. Most significantly, DDE causes the eggshells of birds to be thinner than normal, resulting in egg breakage and population decline as a result of lower hatching rates of chicks. (NPIC 2000). DDTr also biomagnifies, meaning that when fish and wildlife are eaten by

[2] The Olin-McIntosh facility, owned and operated by the Olin Corporation, is also an NPL Site (Olin-McIntosh NPL Site). Contaminants of primary concern in the floodplain of the Olin-McIntosh NPL Site include mercury, hexachlorobenzene, and DDT and its breakdown products.

[3] The Geigy Chemical Corporation merged with Ciba ("Ciba" stood for "Chemische Industrie Basel" (Chemical Industries Basel)) to form the Ciba-Geigy Chemical Corporation in 1970. The Ciba-Geigy Corporation merged with Sandoz in 1996 to form Novartis, which specialized in the production of pharmaceuticals, agricultural chemicals, and health care products. The industrial divisions of Novartis, including the McIntosh facility, were spun off as Ciba Specialty Chemicals Corporation. The BASF Corporation acquired Ciba Specialty Chemicals Corporation in 2009.

[4] DDTr is the summation of: p,p'-DDT; o,p'-DDT; p,p'-DDD; o,p'-DDD; p,p'-DDE; o,p'-DDE

predators the amount of DDTr increases in the tissues as it migrates up through the food web. For these and other reasons, the further use of DDT was banned in the United States in 1972.

The Environmental Protection Agency (EPA) added the Site to the NPL in 1984. Investigations into the nature and extent of the contaminant releases documented concentrations of DDT and DDT-related compounds as frequently exceeding levels potentially toxic to fish, wildlife, and humans. EPA issued several Records of Decision (RODs) between 1989 and 1995 that required a variety of removal and remedial actions to address the hazardous substances present at the Site. During monitoring of the effectiveness of these remedial activities, EPA determined the remedy undertaken in Operable Unit 3 (OU3), which includes the effluent ditch and areas of the Tombigbee River floodplain in close proximity, was not achieving its performance goals and that additional remedial action was warranted. EPA, in coordination with Ciba-Geigy, completed supplemental remedial activities in OU3 in 2008.

In 2005, the Trustees initiated a NRDA under CERCLA , 42 U.S.C. §§1906 *et seq.* to assess and quantify the natural resource injuries and losses from Site releases and the natural resource damages appropriate to compensate for such injuries. Subsequently, BASF and the Trustees agreed to terms for settlement of Ciba-Geigy's liability for natural resource damages under CERCLA. A Consent Decree setting forth the terms of this settlement was signed by the parties and lodged with the U.S. District Court for the Southern District of Alabama, Southern Division[5] in July 2013. Following notice of and opportunity for public review and comment on the proposed settlement, the Court approved that Consent Decree on October 2, 2013. Under that settlement, the Trustees jointly recovered $3,200,000 for use to plan, implement, conduct, finance and oversee one or more restoration actions or projects within the Upper Mobile-Tensaw Delta watershed appropriate to restore, replace or acquire the equivalent of natural resources or services like those injured or lost.

1.2 Purpose and Need for Restoration

Since the listing of the Site on the NPL, and as described above, numerous investigations have been undertaken to identify, characterize, and assess the risks posed by the levels of hazardous substances present at the Site for the purpose of determining appropriate removal and clean up actions. A number of such actions have been undertaken to date under EPA supervision. Further, EPA continues monitoring the effectiveness of these actions at the Site, including in OU3. Such response actions, however, are not intended nor are they sufficient to restore the local floral and faunal communities impacted by the releases or to compensate the public for the ecological services lost in the interim under CERCLA. As a result, the natural resources trustees[6] are undertaking this restoration planning effort.

[5] United States et al v. BASF Corporation, Case 1:13-cv-00372-KD-M (filed July 19, 2013).
[6] The state and federal natural resources trustees for the Site are ADCNR, GSA, USFWS and NOAA.

Specifically, this Draft RP/PEA represents the Trustees' proposed plan for use of the funds recovered under the 2013 settlement with BASF Corporation to implement restoration appropriate to aid in the recovery of affected resources and to compensate the public for ecological services lost in the interim.

In this Draft RP/PEA, the Trustees evaluate a range of alternatives in order to identify the alternative(s) that best meets the responsibilities of the Trustees under CERCLA and the NRDA regulations to meet restoration objectives while minimizing any adverse impacts from the implementation of restoration projects themselves.

The Restoration Goals, Objectives, and Criteria discussed in Sections 2.1 through 2.3 were developed to ensure the direct relationships between the resources identified and described in Sections 1.3 and 1.4 and the resources to be restored by each proposed restoration type alternative described in Section 3.0. Further, the Restoration Criteria ensure that the selection of the Proposed Alternative meets the guidance provided in NRDA regulations.

1.3 Status of Remedial Action under CERCLA

EPA added the Site to the NPL in 1984 and, in the intervening years, has undertaken and/or coordinated (1) numerous investigations to identify, characterize, and assess the risks posed by hazardous substances released at the Site and (2) a number of removal and remedial actions at the Site. During this process, the Site was divided into four operable units (OU) for the purposes of remediation: Groundwater (OU1), soils at ten of eleven Former Waste Management areas (OU2), the Tombigbee River Floodplain on and near the facility property (OU3), and the Bluff Line area (OU4).

EPA's second Five-Year Review Report evaluating the effectiveness of the remedy, finalized in September 2006, found that the remedial actions for OUs 1, 2 and 4 were functioning as intended and protective of human health and the environment. However, that report concluded that OU3 was not achieving its performance goals and additional remedial action was required. In October 2008, EPA issued an Explanation of Significant Differences for the Record of Decision for OU3. The original remedy for OU3 required excavation of soils in the OU3 floodplain containing concentrations above 15 ppm DDT and/or the sum of its metabolites (DDTr). EPA's Explanation of Significant Differences then required the application of a clean sand cover to prevent exposure to DDTr left in place near sensitive wetland habitat. Specifically, the additional remedial action required placement of 12 inches of sand over surface sediment areas with DDTr concentrations greater than 50 ppm, 9 inches of sand over areas with DDTr concentrations between 15-50 ppm, and 6 inches of sand over the previously remediated area and other contaminated areas in the vicinity. Sand coverage was applied to approximately 40 acres, with work completed in October, 2008 (USEPA 2011).

The third and most recent Five Year Review Report concluded that the onsite remedial actions were performing as expected and the surface contamination levels are approaching the remedial goals established for the action (USEPA 2011).

1.4 Natural Resource Injuries Associated with the Site

CERCLA provides natural resource trustees the authority to assess injuries to natural resources resulting from a release of hazardous substances associated with a CERCLA site and to seek to recover damages for those injuries. The goal of a NRDA is to determine the nature and extent of injuries to natural resources and to quantify the resulting resource and service losses, thus providing a technical basis for evaluating the need for, type of, and scale of restoration actions.

The Trustees' assessment of natural resource injuries focused on identifying the injury or losses of natural resources which were likely or known to have resulted from contamination residing in Tombigbee River floodplain habitats at the Site (the majority of which were bottomland hardwood forests), and the migration of contamination into the Tombigbee River in close proximity to the Site. DDTr was the primary contaminant of concern at the Site. Elevated DDTr concentrations have been documented in biota on the Site and from the Tombigbee River. Resources of concern that were likely to have been injured in these ecologically and economically important areas include water, fish, shellfish, resident wildlife, migratory birds, and at least five federally-protected species, including endangered wood stork (*Mycteria americana*),endangered piping plover (*Charadrius melodus*), threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*), endangered Alabama red-bellied turtle (*Pseudemys alabamensis*), and threatened inflated heelsplitter (*Potamilus inflatus*). These resources are dependent on floodplain habitats, such as the bottomland hardwood forests impacted by the releases of hazardous substances at the Site. .

1.5 Summary of Settlement

On October 2, 2013, the Trustees and responsible party, BASF Corporation, entered a Consent Decree that provided funds for restoration in compensation for damages to the natural resources from the DDT and DDTr releases (District Court 2013). The Consent Decree required BASF Corporation to pay the sum of $3,200,000 into the Ciba-Geigy Site Restoration Account maintained by the DOI Natural Resource Damage Assessment and Restoration Fund. The funds will be used by the Trustees to plan for, implement, conduct, finance and oversee one or more restoration actions or projects within the Mobile Bay watershed, which includes the Tombigbee River and Upper Mobile-Tensaw Delta, that are appropriate to restore, replace or acquire the equivalent of natural resources or services similar to those injured or lost due to releases of hazardous substances at or from the Site. BASF Corporation was also required to pay a total of $500,000 to ACDNR, Game and Fish Fund for the purpose of ecosystem restoration in the Mobile Bay watershed through support of the Aquatic Biodiversity Center. DOI and NOAA were also reimbursed $1,300,000 for past damage assessment costs.

1.6 Authorities and Legal Requirements

This Draft RP/PEA was prepared jointly by the Trustees pursuant to their respective authority and responsibilities as natural resource trustees under CERCLA (42 U.S.C. § 9601, *et seq.*), the Federal Water Pollution Control Act (33 U.S.C. § 1251, *et seq.*) (also known as the Clean Water Act [CWA]), and other applicable federal or state laws, including Subpart G of the National Oil and Hazardous Substances Contingency Plan (NCP) (40 C.F.R. §§ 300.600 through 300.615) and CERCLA NRDA regulations (43 C.F.R. Part 11), which provide guidance for this restoration planning process under CERCLA. As a designated Trustee, each agency is authorized to act on behalf of the public to restore natural resources and resource services injured or lost due to releases of hazardous substances at the Site.

CERCLA provides authority for the Trustees to seek compensation for "damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss" caused by releases of hazardous substances into the environment. The process is known as NRDA. The goal of the NRDA process is to make the environment and public whole for injury to or loss of natural resources and services as a result of a release of oil or hazardous substances. Compensation is achieved through restoration, replacement or acquisition of equivalent natural resources.

Under the National Environmental Policy Act (NEPA) (42 U.S.C. §§ 4320 *et seq.*), and the regulations guiding its implementation (40 C.F.R. §§ 1500 *et seq.*), Federal agency actions must be evaluated to determine their potential impacts on the human environment. NEPA requires agencies to assess the magnitude of potential impacts to determine if an Environmental Impact Statement is required to comply with NEPA. This Programmatic Environmental Assessment (PEA) is being prepared to evaluate the magnitude of potential impacts of the restoration type actions proposed by the Trustees to restore the natural resources and services injured or lost due to the release of DDTr into the environment. The PEA is not an evaluation of the damages caused by the release since that process has been completed, as described above.

This RP/PEA is intended to comply with both CERCLA and NEPA.

1.7 Public Participation

The process of controlling the contamination at the Site, preventing further off-site releases, and mitigating the effects of the contamination has been ongoing since discovery of the contamination in 1983. The process has included and coordinated the requirements of CERCLA, NRDA and CWA to ensure that public health is protected and damages to biological resources are minimized, accounted for, and compensated for. The Consent Decree entered in October 2013 provides funding for executing the efforts to compensate the public for these damages.

This Draft RP/PEA provides the public with information on the estimated natural resource injuries resulting from the release of hazardous substances at the Site, the Trustees' restoration objectives, and conceptual restoration alternatives that would provide the public fair and adequate compensation for the injuries. Selection of specific

restoration project(s) will largely depend on the alternatives selected as a result of this assessment and the feasibility of executing the selected restoration types due to factors such as availability of land for acquisition and specific restoration needs for the acquired property. In accordance with NEPA and the CERCLA regulations, this Draft RP/PEA is being made available for review and comment by the public for a period of 45 days. The Trustees seek comments on the proposed alternatives presented in this Draft RP/PEA. **Comments may be submitted by any of the following methods:**

In writing to:

U.S. Fish and Wildlife Service
4980 Wildlife Drive NE
Townsend, GA 31331

By email to: anthony_sowers@fws.gov

The Trustees will hold at least one public meeting in McIntosh, Alabama to provide information on the injury and restoration plan. The meeting will be held at the McIntosh Town Hall at 206 Commerce Street in McIntosh, Alabama 36553 on January 31st at 6:00 pm. At the meeting, the Trustees will accept written comments and will provide an opportunity for the public to record oral comments. The Trustees' will provide responses to the written and recorded oral comments received in the final RP/PEA.

1.8 Organization of This Document

The Draft RP/PEA identifies the conceptual restoration and resource replacement actions the Trustees propose to implement as part of the restoration for natural resource injuries on or in the vicinity of the Site.

Actions undertaken by the federal Trustees to restore natural resources or services under CERCLA and other federal laws are subject to NEPA (42 U.S.C. § 4321 *et seq).* In compliance with NEPA, this Draft RP/PEA summarizes the current environmental setting, describes the purpose and need for restoration actions, and identifies alternative actions and their potential environmental consequences and provides an environmental analysis of the conceptual restoration actions. This information is used to make a threshold determination as to whether preparation of an environmental impact statement (EIS) is required prior to selection of the final restoration actions because significant environmental impacts are likely to be caused by a Proposed Action. If the EA does not identify significant impacts, a Finding of No Significant Impacts (FONSI) is prepared to document the decision maker's determination and to approve the Proposed Action.

This PEA provides a programmatic-level assessment of the potential alternatives to achieve restoration. A programmatic approach takes a broad look at issues and restoration type alternatives (compared to in-depth document preparation for a specific project or action), and provides policy guidance for future management actions. Subsequent NEPA evaluation can "tier" from an approved programmatic NEPA compliance document, as

long as the future activity/program being assessed is within the range of alternatives and nature of potential environmental consequences considered in the programmatic document. As specific restoration projects are identified, with public participation, project-specific NEPA environmental evaluation documents, such as an additional EA or categorical exclusion, will be prepared.

The chapters that follow describe the proposed restoration actions (i.e., restoration types) and potential alternatives considered (Chapter 3), the affected environment as it currently exists, as required by NEPA (Chapter 4), the probable consequences on the human environment that may result from the implementation of the proposed restoration types and their alternatives, as required by NEPA (also in Chapter 4), and the potential cumulative impacts from the proposed activities and their alternatives, as required by NEPA (also Chapter 4).

2.0 OVERVIEW OF RESTORATION PLAN - PROPOSED ACTION, ALTERNATIVES CONSIDERED AND PROPOSED PROGRAMMATIC APPROACH

The Trustees' Proposed Action encompasses two preferred restoration alternatives as well as a programmatic approach. To meet the programmatic approach, the proposed action also establishes Restoration Criteria and Project Objectives that the Trustees would apply in the future to identify specific restoration sites and to plan and implement future projects at selected sites, consistent with the proposed restoration alternatives. This Proposed Action would, in essence, establish the types of restoration that may be undertaken to meet the restoration goals for Site-related natural resource injuries and losses while also affording flexibility that will be essential to the Trustees' ability to identify and secure appropriate restoration sites at reasonable cost, and to plan and undertake restoration as may be appropriate at these sites ("projects") on behalf of the public to maximize restoration benefits.

This Chapter describes the restoration goals and criteria the Trustees used in developing this plan, including those used to identify and evaluate the potential restoration alternatives considered herein. This Chapter also describes a set of project objectives and the programmatic approach being proposed to guide future selection of restoration sites and project-level planning by the Trustees.

2.1 Restoration Goals

Based on the nature of the Site-related natural resource injuries and losses, the following restoration goals were identified by the Trustees and guided development of this plan:

Goal 1: Restore, create, or enhance bottomland hardwood forest habitat and other habitat types in the Upper Mobile-Tensaw River Delta and Tombigbee River to benefit injured fish and wildlife, including federally listed species.

Goal 2: Restore or enhance disturbed habitats in the Upper Mobile-Tensaw River Delta and Tombigbee River to provide for greater ecological functions and services.

Goal 3: Maximize the long-term beneficial effects and cost-effectiveness of restoration activities.

2.2 Restoration Objectives

To meet the above Restoration Goals, the Trustees identified a set of Restoration Criteria (described further in section 2.3) and intend to identify restoration project objectives for each specific restoration project.

With the Restoration Goals in mind, the Trustees also identified four types of restoration ("restoration type alternatives") that would potentially benefit the Upper Mobile-Tensaw River Delta and Tombigbee River habitat and those species that were injured by releases of hazardous substances from the Site. The Trustees considered the following list of restoration alternatives in developing this proposed plan:

- Alternative 1 - No Action
- Alternative 2 (Preferred Alternative) - Habitat Enhancement and Restoration on Newly Acquired Lands
- Alternative 3 (Preferred Alternative) - Habitat Enhancement and Restoration of State-Owned Lands
- Alternative 4 - Benthic Restoration

Restoration project objectives will be identified for specific restoration projects that will be developed at a later time. Restoration objectives are essential for guiding the development and implementation of restoration efforts and for establishing a means to measure progress and evaluate success. Objectives will be selected with the anticipation that their completion will allow the fulfillment of project goals.

2.3 Restoration Criteria

The CERCLA NRDA Regulations at 43 CFR Part 11 list a number of factors that Trustees must evaluate and consider in selecting a restoration alternative or project to pursue. Alternatives or projects that do not meet required restoration criteria (described below) are not to be given further consideration by the Trustees; alternatives or projects that meet these threshold (a.k.a. required) criteria may be evaluated further in relation to additional restoration criteria. Thus, these factors may be applied in restoration planning to identify a range of alternatives for consideration as well as to identify the restoration alternative or project that is best to pursue. In post-settlement planning involving the use of recovered funds, compatibility with these criteria does not necessarily mean an alternative or project will be funded; it only means that the Trustees may consider the alternative or project for possible funding. Further, the sums recovered and available for

restoration are also a factor to be weighed by Trustees in choosing a restoration alternative or project for implementation. The CERCLA NRDA Regulations also require the Trustees to evaluate possible alternatives based on other "relevant considerations".

The Trustees have used both types of factors (required and additional restoration criteria) in identifying and evaluating the restoration type alternatives proposed for implementation under this plan. The same criteria would be used to evaluate specific restoration sites and projects in the future, consistent with the proposed programmatic approach (described in Section 1.8) and, where required, in subsequent restoration plans. Consistent with its programmatic nature, project-level costs have not been considered in development of this plan but will be relevant later and will be considered by the Trustees in the future.

The following subsections identify the Restoration Criteria applied in developing this plan, and that would be applied to in the future under this plan:

2.3.1 Required Restoration Criteria (43 CFR 11.82(d))

In selecting the restoration type alternatives to pursue, the authorized official shall evaluate each of the possible alternatives based on all relevant considerations, including the following factors:

Relationship to Injured Resources and Services:
Restoration type alternatives that restore, replace, enhance, or acquire the equivalent of the resources and services injured by the release are preferred to restoration types that benefit other comparable resources or services. The Trustees considered the types of resources or services injured, the location of the resources, and the connection or nexus of the restoration type benefits to those injured resources.

Technical Feasibility (43 CFR 11.82(d)(1):
The restoration type must be technically sound. The Trustees considered the level of risk or uncertainty involved in implementing the restoration type alternatives. A proven track record demonstrating the success of projects utilizing similar or identical restoration techniques can be used to satisfy this evaluation criterion.

Consistency with the Trustees Restoration Goals:
The proposed alternative must meet the Trustee's intent to restore, replace, enhance, or acquire the equivalent of the injured resources or the services those resources provided.

Compliance with Laws and Policies (43 CFR 11.82(d)(9-10):
The proposed restoration type alternatives must comply with all applicable federal, state, and local laws, policies, and regulations.

Public Health and Safety (43 CFR 11.82(d)(8) :
The proposed alternatives cannot pose a threat to the health and safety of the public.

2.3.2 Additional Restoration Criteria

The following are also "relevant considerations", consistent with the CERCLA NRDA Regulations:

Avoidance of Further Injury (43 CFR 11.82(d)(5):
Proposed restoration type alternatives should avoid or minimize adverse impacts to the environment and the associated natural resources. The Trustees considered the future short- and long-term injuries, as well as mitigation of past injuries, when evaluating restoration types.

Likelihood of Success (43 CFR 11.82(d)(4):
The Trustees considered the potential for success and the level of expected return of resources and resource services. The Trustees also considered the ability to monitor and evaluate the performance of future projects; the ability to correct any problems that arise during the course of projects; and the capability of individuals or organizations expected to implement projects. Success criteria were expected to be clear and measurable, such as those criteria listed in Table 8.

Multiple Resource Benefits:
The Trustees considered the extent to which the proposed alternative benefits more than one natural resource or resource service in terms of quantity and quality of the types of natural resources or services expected to result from future projects.

Time to Provide Benefits:
The Trustees considered the time expected for future projects to begin providing benefits to the target ecosystem and/or public. A more rapid time to delivery of benefits was favorable.

Duration of Benefits:
The Trustees considered the expected duration of benefits from the proposed restoration type alternatives. Project types expected to provide longer-term benefits were regarded more favorably.

Opportunities for Collaboration:
The Trustees considered the possibility of enhancing benefits to natural resources or services by coordinating future restoration projects with ongoing or proposed projects or programs.

Benefits Relative to Costs (43 CFR 11.82(d)(2):
The Trustees considered the relationship of resource and service benefits to expected costs for each alternative.

2.4 Existing Management Plans and Conservation Programs

The Trustees recognize that a number of other agencies and organizations have previously developed conservation plans, programs or initiatives and are using various strategies to accomplish conservation goals in the Mobile-Tensaw Delta, with goals similar to those outlined in this proposed plan. These include but are not limited to:

- The Mobile Bay Initiative of the North American Waterfowl Management Plan, Gulf Coast Joint Venture – This Initiative seeks to maintain and restore wetland habitat throughout the Mobile-Tensaw Delta (Manlove et al. 2002). It is focused on three major waterfowl habitats: coastal marshes, submerged aquatic vegetation beds, and forested wetlands, including those within the Proposed Action Area.
- The Alabama Forestry Commission's Forest Legacy Program - This voluntary program strives to prevent conversions of forests to other uses. The Lower Southwest Forest Legacy Area, which includes Mobile River Basin, is a Priority 1 county for application of this program because of threats posed by coastal development, urban sprawl and road infrastructure. See http://www.forestry.state.al.us/forest_legecy_program.aspx?bv=2&s=3.
- The U.S. Fish and Wildlife Service's Northern Gulf Coastal Program - The Mobile River is a focus area within this program. The primary goals of the Northern Gulf Coastal Program are 1) to restore or enhance degraded coastal wetlands and uplands, estuaries, and riparian corridors along the coasts of Alabama, Mississippi and Louisiana, and within the context of climate change and sea level rise; and 2) to establish living shorelines as the primary means for protecting eroding shorelines in coastal areas where appropriate. Species that may benefit from habitat restoration in aquatic and upland areas adjacent to aquatic areas include red-cockaded woodpecker (*Picoides borealis*), gopher tortoise (*Gopherus Polyphemus*), black pine snake (*Pituophis melanoleucus lodingi*), eastern indigo snake (*Drymarchon couperi*), Alabama red bellied turtle (*Pseudemys alabamensis*), West Indian manatee (*Trichechus manatus*), migratory birds and anadromous fish (e.g., Gulf sturgeon, Alabama shad, and striped bass), as well as submerged aquatic vegetation. See http://www.fws.gov/daphne/Coastal/Coastal.html.
- State of Alabama's Alabama Wildlife Action Plan – The acquisition of high quality floodplain forested wetland habitat in the Mobile River Basin by fee-title or conservation easements and avoiding and discouraging conversion of floodplain forest to other forest types or agriculture are high priorities of this plan. The plan also encourages restoration of altered floodplain forested habitats. See http://teaming.com/sites/default/files/Alabama%20Wildlife%20Action%20Plan.pdf.
- The Mobile Bay National Estuary Program – This program identifies watershed restoration and conservation issues and needs in the lower Mobile Bay area and strives to identify those habitats and areas that are the most important to conserve and protect to achieve watershed goals. (http://www.mobilebaynep.com/what_we_do/ccmp/)
- The Partnership for Gulf Coast Land Conservation's Vision "A Land Conservation Vision for the Gulf of Mexico Region: An Overview" – This plan identifies high priority conservation lands throughout the Gulf Coast Region including within the Upper Mobile-Tensaw Delta.

Future restoration projects developed under the proposed programmatic approach, as described in this Draft RP/PEA, may build on these prior plans, programs and initiatives

and/or involve partnerships with these other agencies and organizations to achieve the restoration goals and objectives outlined in this plan.

3.0 PROPOSED ACTION (& OTHER ALTERNATIVES CONSIDERED)

This Chapter describes the restoration type alternatives identified by the Trustees for consideration, as described in Chapter 2, summarizes the Trustees' evaluation of those alternatives based on the restoration goals and criteria for compensating for the Site-related natural resource losses, and identifies the restoration type alternatives preferred for use to meet those restoration goals. Along with the programmatic approach, described above, the Trustees identified both 1) Habitat Enhancement and Restoration on Newly Acquired Lands and 2) Habitat Enhancement and Restoration of State-Owned Lands, as preferred types of restoration for inclusion in the Proposed Action. A comparative analysis of Alternatives 1 – 4 using required and additional restoration criteria is presented in Table 1.

3.1 Alternative 1: No Action

Under the No Action alternative, no restoration, rehabilitation, replacement, or acquisition actions would occur. If the No Action alternative is selected, there would be no restoration or replacement of the lost resources or their services and the public would not be made whole for past injuries from releases from the Site. The No Action Alternative would not meet the Restoration Criteria.

The No Action alternative is considered in this Draft RP/PEA as required by NEPA, including as a basis for comparison of the impacts of the other alternatives to the status quo in the Programmatic Environmental Analysis found in Chapter 5. The Trustees found that the No Action alternative would not meet the purpose and need for restoration under either this Draft RP/PEA or the responsibilities of the Trustees under CERCLA, including as defined by NRDA processes under CERCLA.

3.2 Alternative 2 - Proposed: Habitat Enhancement and Restoration on Newly Acquired Lands

The Habitat Enhancement and Restoration on Newly Acquired Lands alternative would not restore areas directly impacted by releases, but would encompass actions to protect and enhance riparian habitats in close proximity to the Site to improve the ecological productivity of these habitats and the biological resources within them. Restoration projects consistent with this alternative would include (1) Land Acquisition, and one or more of the following activities: : (2) Hydrological Restoration, and (3) Invasive Species Management and Revegetation, based on the restoration needs the Trustees identify in the Upper Mobile-Tensaw River Delta. Each of these restoration actions is capable of

providing broad ecosystem benefits, including to natural resources known or likely to have been injured due to hazardous substances released from the Site. Each of these restoration actions are described and evaluated separately here but, under Alternative 2, could be implemented independently or in combination with other proposed restoration actions, including those identified for state-owned lands in Alternative 3, based on the availability of land for purchase or use as a restoration site and on the needs or opportunities at these sites to restore or enhance ecological productivity. Each of the restoration actions is described further below.

3.2.1 Land Acquisition

The Trustees would pursue the fee-simple purchase of lands suitable for the described Habitat Enhancement and Restoration on Newly Acquired Lands Alternative in the Upper Mobile-Tensaw River Delta. In addition to proximity to the injury site and a clear nexus to injury, tract selection may take into account such factors as proximity to tracts currently under public ownership or management, proximity to tracts currently under private ownership and managed for natural resource conservation purposes, tracts previously identified for priority acquisition under conservation plans or programs, the risk of development and/or the needs of restoration and management of tracts. The number of acres that would be acquired would also depend on factors such as the availability of tracts, willingness of the seller, and the costs of acquisition. Funds available for acquisition could be leveraged by using other funding sources to the extent available for this purpose. Any acquired lands would be deeded to ADCNR to be managed in perpetuity as part of the Mobile-Tensaw River Delta Wildlife Management Area complex. After acquisition, and any associated restoration actions, such land(s) would be managed to protect, conserve and allow for minimal disturbance to their ecological productivity and services but could be made available for low impact recreational activities consistent with the restoration goals of this Draft RP/PEA, such as bird watching, boating and fishing.

3.2.2 Hydrological Restoration

Past logging practices in areas of the Mobile-Tensaw River Delta have resulted in the creation of a network of ditches and logging roadways that drain seasonally isolated swamps and other water bodies and block natural hydrological flow in portions of the Delta. These hydrologic modifications have resulted in the degradation and loss of seasonal bottomland hardwood swamp habitats and their associated ecosystem services. Under this alternative, the Trustees would pursue projects that could repair hydrological impairments on publically owned lands in the Upper Mobile-Tensaw River Delta, including on lands that may be acquired under this plan. This could include filling drainage ditches, repairing breaches in the natural flood levee and closing “pull ditches” remaining from historic logging operations. Additionally, hydrological impairments along existing roadways could be repaired through the placement of culverts, low-water crossings and other similar projects.

Restoration actions of this nature could require use of heavy machinery such as backhoes, bulldozers, and loaders or could be limited to hand tools and lightweight power tools such as chain saws, tillers and augers. Access to some sites may require construction of temporary roads that would be restored /removed after project completion. The number of projects, the nature of projects and the scale of restoration would depend on a number of factors, including, the nature and extent of a site's hydrological impairments, the cost of the hydrologic restoration, and the funding available after acquisition.

3.2.3 Invasive Species Management and Revegetation

The encroachment of exotic and invasive plant species into wetland forests has resulted in the alteration of ecosystem services and habitat quality throughout south Alabama, including in areas of the Mobile-Tensaw River Delta. Changes such as altered hydrology, biogeochemical changes, loss of habitat structure, reduced wildlife forage, and reduced wildlife productivity have reduced habitat values and diminished ecosystem services. Similarly, non-native animal species, such as feral hogs, also damage large vegetated areas resulting is degraded habitat quality.

Under this alternative, the Trustees would pursue projects to remove, control and manage invasive species, including Chinese tallow tree (*Triadica sebifera*), cogon grass (*Imperata cylindrical*) and similar species, on publicly owned tracts in the Upper Mobile-Tensaw River Delta, including on lands that may be acquired under this plan. This could include using selective application of herbicides, physical removal and prescribed fire management. Replanting of native vegetation would follow these activities, where appropriate. Native plants appropriate for planting are listed in Tables 9, 10, and 11.

Vegetation control actions could require use of hand tools or lightweight power tools, such as chain saws or tillers. Replanting native vegetation could require use of lightweight power tools such as tillers and augers. The number of projects of this type, the nature of such projects and the scale of the vegetation control actions would depend on a number of factors, including the nature of the action or and/or management activities, the coverage of the species targeted, the incremental cost of each restoration/management activity and the funding available after acquisition.

3.2.4 Conclusion on Alternative 2

The Trustees found the Habitat Enhancement and Restoration on Newly Acquired Lands alternative, including all three restoration actions and potential methodologies, to meet all of the required Restoration Criteria and identified the acquisition and restoration of degraded lands in the Upper Mobile-Tensaw River Delta consistent with this alternative as acceptable for use to restore and compensate for Site-related natural resource injuries and losses. This alternative is, therefore, included in the Proposed Action in this Draft RP/PEA.

3.3 Alternative 3 - Proposed: Habitat Enhancement and Restoration of State-Owned Lands

This alternative would focus on enhancing Alabama state-owned lands within and adjacent to the Upper Mobile-Tensaw Delta to improve floodplain and bottomland hardwood forest habitats and increase the ecological productivity of those habitats and the biological resources within them. Habitats of this type on the Site experienced loss of ecological function due to releases of hazardous substances. Under this proposed alternative, the two types of restoration actions described in Sections 3.2.2 (Hydrological Restoration) and 3.2.3 (Invasive Species Management and Revegetation) could also be proposed as part of a future project to occur on lands in the Upper Mobile-Tensaw River Delta that are already owned and managed by the State of Alabama.

3.3.1 Conclusion on Habitat Enhancement and Restoration of State-Owned Lands

The Trustees found that the Habitat Enhancement and Restoration of State-Owned Lands alternative also meets all of the required Restoration Criteria and identified that habitat enhancement and restoration using Hydrological Restoration and Invasive Species Management and Revegetation projects and methods on state-owned lands, within and adjacent to the Upper Mobile-Tensaw Delta, consistent with this alternative, as also acceptable for use to restore and compensate for Site-related natural resource injuries and losses. In addition, use of existing lands would avoid acquisition costs and allow for enhancement or restoration of more acreage. This alternative is, therefore, also included in the Proposed Action in this Draft RP/PEA.

3.4 Alternative 4: Benthic Habitat Restoration

This alternative would involve restoration of benthic areas by dredging of river sediments to remove existing sources of contamination. Although specific areas requiring dredging are not currently known, such actions could be taken immediately downstream of the Site in the Tombigbee River, or further downstream in the Mobile-Tensaw Delta areas that are fed, in whole or in part, by the Tombigbee River. Dredging of these sediments would disrupt and result in impacts to existing benthic communities and species using the riverine habitat, such as freshwater mussels (see Table 3 and 4, below). It would also be extremely expensive to execute, would require extensive sampling to determine exact locations of sufficient contamination requiring dredging, and would require disposal of dredged sediments in upland areas that would have to be maintained to prevent future re-release of sediment contaminants into the environment.

The Trustees found that benthic habitat restoration in the Tombigbee River and Upper Mobile-Tensaw Delta areas will likely cause direct adverse impacts to benthic biota and other species using the riverine habitat, during dredging. In addition, the alternative is not cost-effective, has an unknown likelihood of success, and does not meet the

responsibilities of the Trustees under CERCLA. For these reasons, the Benthic Restoration Alternative was not carried forward for additional evaluation in this RP/PEA.

Table 1. Comparative analysis of Alternatives using required and additional restoration criteria.

Required Restoration Criteria	**Alternative 1: No Action**	**Alternative 2 – PROPOSED ACTION: Habitat Enhancement and Restoration on Newly Acquired Lands**	**Alternative 3 -- PROPOSED ACTION: Habitat Enhancement and Restoration of State-Owned Lands**	**Alternative 4: Benthic Habitat Restoration**
Relationship to Injured Resources	The No Action alternative would not provide for restoration, replacement, enhancement or acquisition of resources that were injured from releases of hazardous substances from the Site.	This alternative would encompass actions to protect and enhance riparian habitats in close proximity to the Site. Such actions would improve the ecological productivity of these habitats and biological resources similar to those injured by hazardous substance releases.	This alternative will focus on improving floodplain and bottomland hardwood swamp habitats and increasing the ecological productivity of those habitats and the biological resources within and adjacent to the Upper Mobile-Tensaw Delta. Projects would be focused on restoring and compensating for impacts similar to the Site-related natural resource injuries and losses.	Benthic habitat restoration would involve dredging of contaminated river sediments to remove sources of continuing environmental impacts in the vicinity of the Site in the Tombigbee River, or river habitats further down in the Mobile-Tensaw Delta that were exposed to source contaminants from the Site. If successfully completed, benthic biota, fish, and other river aquatic organisms would have reduced exposure to Site contaminants.
Technical Feasibility	The No Action alternative is technically feasible.	The State of Alabama and some of its restoration partners have substantial experience successfully implementing this alternative in the Upper Mobile-Tensaw Delta and other similar habitats in the state of Alabama. Such experience and successful completion of projects demonstrates proposed project types are technically feasible.	The State of Alabama and some of its restoration partners have substantial experience successfully implementing hydrological restoration, invasive species management, and revegetation projects in the Mobile-Tensaw Delta and similar habitats in the state of Alabama. Such experience and successful completion of projects demonstrates proposed project types are technically feasible.	Benthic habitat restoration is technically feasible, but the successful removal of all contaminated sediment through dredging activities may not be possible and residual contamination may be remobilized causing further injury.
Consistency with Trustee Restoration Goals[7]	The No Action alternative would not provide for restoration, replacement, enhancement or acquisition of injured natural resources, making this alternative inconsistent with Trustee restoration goals.	The Proposed Actions are consistent with Trustee restoration goals listed in Section 2.1.		Benthic habitat restoration does not maximize the short-term or long-term beneficial effects (due to potential recontamination of sediments and direct impacts to sediment biota during dredging) and is not cost-effective. Therefore, this alternative does not meet the Trustees restoration criteria.
Compliance with Laws and Policies	The No Action alternative does not meet the requirements and goals of CERCLA and the NRDA process under CERCLA to provide for restoration that compensates the public for the injury and loss of the natural resources and services caused by releases of hazardous substances from the Site.	The Proposed Action meets the requirements and goals of CERCLA and the NRDA process under CERCLA to provide for restoration that compensates the public for the injury and loss of the natural resources and services caused by releases of hazardous substances from the Ciba-Geigy NPL Site. Future proposed activities under this restoration plan will be subject to requirements of other laws, regulations, and statutes mentioned in Section A.1.		Since this alternative would not provide net benefits to biological resources, the requirements and goals of CERCLA and the CERCLA NRDA process to compensate the public would not be met.

[7] Restoration goals are listed in Section 2.1

Public Health and Safety **Table 1 Continued.**	Any potential public health and safety issues or concerns that exist under current and future natural resource management activities would likely remain the same.	Effects on public health and safety are most effectively evaluated at the project-specific level. Thus, this criterion was not used to compare alternatives in this plan.		This alternative would require disposal of dredge spoils in upland areas that would have to be maintained over time to prevent re-release of the sediment contaminants into adjacent areas. Such activities pose elevated exposure risk to workers and adjacent habitats.
Additional Restoration Criteria				
Avoidance of Further Injury	The No Action alternative would not cause further injury, but will also provide no benefit to offset interim losses.	The potential for preventing future injury and for avoiding collateral injury depends on the specific projects and project locations proposed in subsequent restoration plans; this criterion is not evaluated at this time.		Dredging of contaminated river sediments would disrupt existing benthic communities in the Upper Mobile-Tensaw Delta and has the potential to cause further hazardous substance-related injury.
Likelihood of Success	The No Action alternative has a low likelihood of success of restoring, replacing, or enhancing injured natural resources since natural recovery would be the only mechanism providing for ecological benefits. Natural recovery does not provide for compensation of interim natural resource losses that occurred as result of hazardous substance releases.	The State of Alabama and some of its restoration partners have substantial experience successfully acquiring lands and then implementing hydrological restoration, invasive species management, and revegetation projects in the Mobile-Tensaw Delta and other similar habitats in the state of Alabama, indicating a strong likelihood of success.		Removal or reduction of benthic sediment contaminants in the Upper Mobile-Tensaw Delta would reduce exposure to benthic biota, fish and other organisms. It is unlikely that all areas requiring sediment removal will be successfully identified and addressed without significant additional studies (such as sub-aqueous soil testing). Therefore, without knowledge of the extent of contaminated sediments, the Trustees do not have information to determine the likelihood that this type of project will successfully enhance benthic populations.
Multiple Resource Benefits	The No Action alternative would provide for multiple resource benefits; however, recovery rates of multiple resources would be less than if Trustees pursued active restoration activities included in the Proposed Actions.	This alternative includes land acquisition, hydrological restoration, invasive species management and revegetation activities that will achieve minor to moderate benefits for the physical environment, habitat resources, fish and wildlife, socioeconomics, and cultural resources.	The Habitat Enhancement and Restoration alternative includes hydrological restoration, invasive species management, and revegetation activities that will achieve minor to moderate benefits for the physical environment, habitat resources, fish and wildlife, socioeconomics, and cultural resources.	Benthic Habitat Restoration has the potential to improve sediment quality and reduce contaminant exposure to Upper Mobile-Tensaw Delta biota in areas where sediments are dredged. The variety of natural resource benefits resulting from the Proposed Actions are greater than benefits anticipated from Benthic Habitat Restoration.

Table 1 Continued.

Time to Provide Benefits	The time to provide natural resource benefits under the No Action alternative is greater than if the Trustees were to pursue restoration under the Proposed Actions. Under the No Action alternative, natural recovery would be relied upon to improve ecological services in the Action Area.	The time to provide natural resource benefits depends on the specific projects and project locations proposed in subsequent restoration plans; this criterion is not evaluated at this time.		
Duration of Benefits	The duration of benefits under the No Action alternative is unknown. Perpetual conservation easements and other mechanisms to conserve habitat would not occur under this alternative.	The acquisition of high quality floodplain forested wetland habitat in the Upper Mobile-Tensaw Delta by fee-title or conservation easement, along with natural resource restoration and enhancement activities, monitoring, corrective actions, and adaptive management, will ensure long-term benefits are being provided by restoration projects.	Natural resource restoration and enhancement activities, monitoring, corrective actions, and adaptive management in the Upper Mobile-Tensaw Delta on state-owned lands, which will be protected from development and other similar direct impacts, will ensure long-term benefits are being provided by restoration projects.	Benthic habitat restoration does not maximize the short term or long-term beneficial effects due to potential recontamination of sediments and direct impacts to sediment biota (including rare freshwater mussels) during and post dredging. Therefore, this alternative does not meet the Trustees restoration criteria.
Opportunities for Collaboration	The No Action alternative would not allow for opportunities for collaboration.	In addition to partnership opportunities identified in Section 2.5, additional opportunities for collaboration may exist with other non-governmental organizations, private corporations, or state and federal programs.		This restoration alternative provides little opportunity for collaboration. State and/or federal agencies would likely work with an experienced contractor to complete dredging in targeted areas of the Upper Mobile-Tensaw Delta.
Benefits Relative to Costs	The benefit to cost ratio of the No Action alternative is assumed to be lower than if the Trustees were to pursue restoration under the Proposed Actions; however, the Proposed Actions would address interim losses of natural resources and services, whereas the No Action alternative does not.	An assessment of the benefits relative to costs will be more effectively developed and compared in subsequent project-specific restoration plans and are thus not discussed here. However, the Trustees anticipate favorable benefit to cost ratios given the successful track-record of the State of Alabama and some of its restoration partners implementing many similar riparian restoration activities in the Mobile-Tensaw Delta and other similar habitats in the state of Alabama.		Significant costs are expected in identifying and removing contaminated sediments over a large area under the Benthic Habitat Restoration alternative. The potential for further injury may also offset any realized benefits. This alternative is expected to provide low benefits compared to costs.

4.0 PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

This Chapter presents the Trustees' analysis of the environmental consequences of the Proposed Action. Because the Proposed Action encompasses two preferred restoration type alternatives that would be applied, programmatically, in the future to identify specific restoration sites and plan future site-specific projects consistent with the proposed alternatives, the environmental consequences of the Proposed Action are evaluated in this Chapter at "programmatic" level. As a "Programmatic Environmental Assessment", this document is intended to frame and help inform the identification and evaluation of future project-specific restoration actions. In addition to informing present decisions, this approach would allow the Trustees in their future planning to "tier" subsequent, project-specific NEPA evaluations from the environmental review and analysis as approved in a final RP/PEA. Tiering is permissible under NEPA provided that the future proposed activity is within the range of alternatives and nature of potential environmental consequences considered in the programmatic document.

Section 4.1 describes the Affected Environment and Section 4.2 presents the Trustees' analysis of the environmental consequences of the Proposed Action.

4.1 AFFECTED ENVIRONMENT

This section presents a description of the physical, biological, and cultural environment for the waterways and ecosystems adjacent to and in the vicinity of the Site as required by NEPA (42 U.S.C. Section 4321, et seq.). The information in this section, together with other information in this document, provides the basis for the evaluation of the potential environmental impacts of the Proposed Action (Alternatives 2 and 3). Natural resources injuries and losses occurred within the Tombigbee River and floodplain. Restoration activities under this Draft RP/PEA would occur in proximity to the same areas.

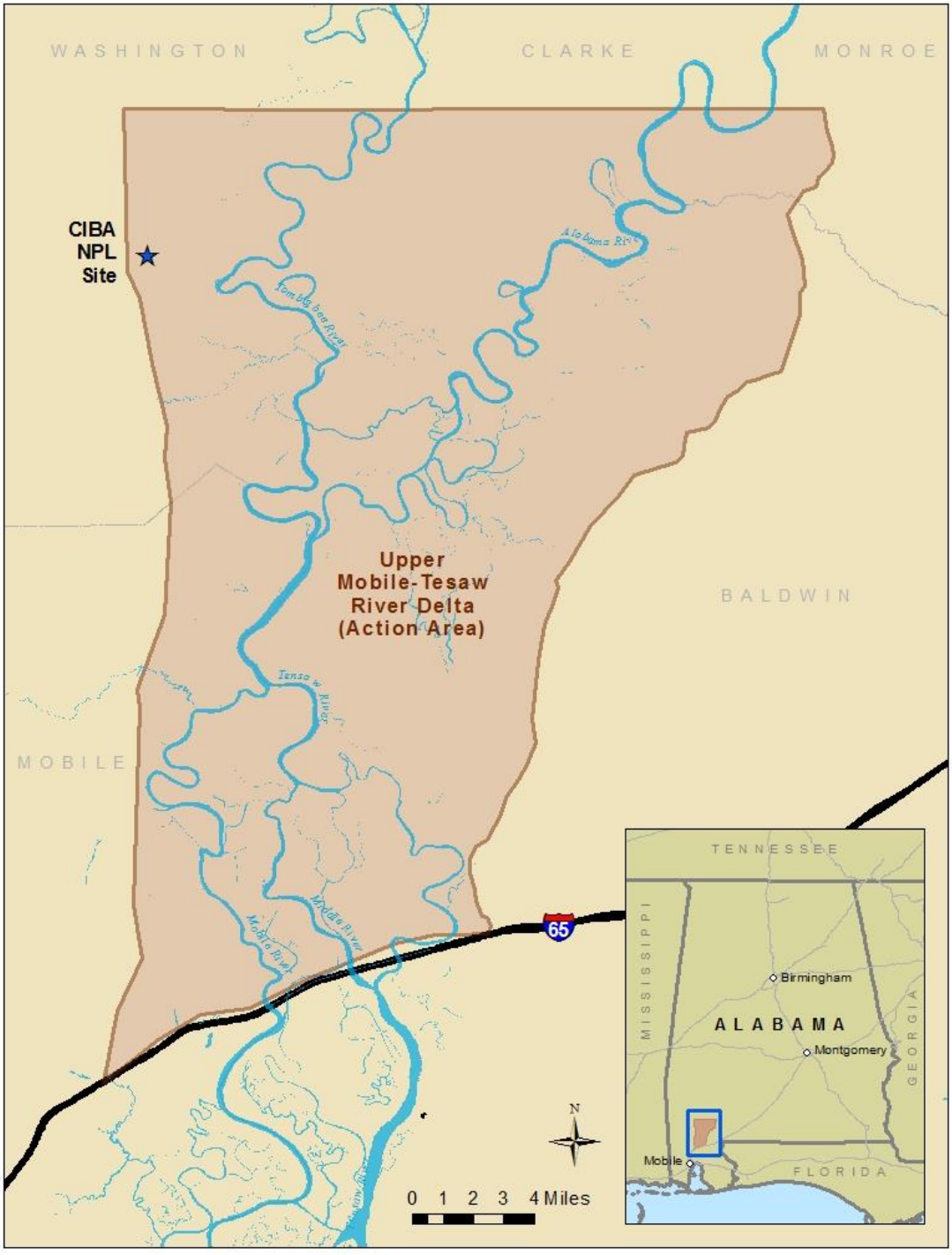

Figure 1. Map of the Upper Mobile-Tensaw River Delta in southwestern Alabama showing the location of the Ciba-Geigy NPL Site. The Action Area is outlined in brown.

4.1.1 Physical Environment

4.1.1.1 Water Resources

4.1.1.1.1 Surface Water

The Tombigbee and Alabama Rivers join to form the Mobile River approximately 15 miles downstream of the Site. Within all three of these major Alabama basins are numerous smaller rivers and streams. These three major rivers drain to and support the Mobile Bay Estuary, which includes the Mobile-Tensaw River Delta and Mobile Bay. The Delta was designated as a National Natural Landmark by the U.S. Congress in 1974. This 260,000 acre wetland complex provides ecologically important habitats for a highly diverse assemblage of fish and wildlife. The Delta, providing critical fish and shellfish production and nursery habitats and supporting the downstream estuary, is also critically important to local and regional economies. The recognition of the ecological and economic importance led to the initiation of efforts to protect the Delta. Currently, the State of Alabama, led by ADCNR, and the federal government are involved in efforts to conserve the resources of the Delta through land acquisition and habitat restoration.

The Tombigbee River Basin begins at the confluence of the upper Tombigbee River and Black Warrior Rivers and continues to the confluence with the Alabama River. The Tombigbee River Basin drains 13,756 square miles, of which 7,660 square miles are in Alabama. Most (78%) of land in the Tombigbee River Basin is forested while 16% is agriculture and pasture and 2% is urban. The Basin is environmentally degraded and numerous environmental problems contribute to this condition, including impoundment of the Tombigbee River, water quality degradation, channelization, and non-native species. The lower Tombigbee River is identified as a priority area for conservation action (ADCNR 2005). One of the highest priority conservation actions highlighted by the Alabama Comprehensive Wildlife Conservation Strategy calls for improved water quality and habitat quality throughout the Tombigbee River Basin and support for habitat and riparian restoration, where needed (ADCNR 2005).

The Coosa and Tallapoosa Rivers combine north of Montgomery, Alabama to form the Alabama River. The Alabama River is contained within the Southeastern Plains EcoRegion and covers 315 miles before its confluence with the Tombigbee River. The Alabama River Basin drains an area of 5,956 square miles entirely within Alabama. Sixty-eight percent of the basin is forested, 26% is agriculture and pasture, and 4% is urban. Impoundment and water quality impairment due to nutrient and organic enrichment are the two major problems affecting habitat conditions. The lower Alabama River and Pine Log Creek are identified as priority areas for conservation action (ADCNR 2005). Like the Tombigbee River, one of the highest priority conservation actions is to improve water quality and habitat quality throughout the Alabama River Basin and support for habitat and riparian restoration (ADCNR 2005).

The Mobile River is the major drainage basin downstream of the confluence of the Tombigbee and Alabama Rivers (See Figure 1). Included in the Mobile River Watershed (Figure 2) are the Mobile and Tensaw Rivers and drainages of Mobile Bay and Mississippi Sound. More than 40,000 square miles is drained by the Mobile River Watershed, including much of Alabama and portions of Mississippi, Georgia, and Tennessee. The majority (63%) of the Watershed is forested, while 18% is urban and 14% is agriculture and pasture. A relatively high percentage of waters within the Mobile River Watershed are impaired compared to other Alabama basins as a result of urbanization and industrial development in and near Mobile Bay. More than half of the stream impairments are due to mercury contamination; however, pathogens, organic enrichment, and nutrients are also significant water quality impairments. Agriculture, silviculture, and urbanization are the primary causes of sedimentation and nutrient enrichment of the watershed. The Mobile-Tensaw River Delta is identified as a priority area for conservation action (ADCNR 2005). Like the Tombigbee and Alabama Rivers, one of the highest priority conservation actions is to improve water quality and habitat quality throughout the Mobile River Basin and support for habitat and riparian restoration (ADCNR 2005).

4.1.1.1.2 Groundwater

Most of the groundwater aquifers in the Mobile River Watershed, which contains the Alabama and Tombigbee River Basins, are used for domestic purposes. The Black Warrior aquifer provides the majority of groundwater for domestic uses. Groundwater in the Mobile River Basin generally meets federal and state drinking water standards; however, isolated areas in the vicinity of intensive land use can have diminished groundwater quality. The Cretaceous and Tertiary aquifer systems make up the Southeastern Coastal Plain aquifer system, with the Cretaceous system being the most widespread (Johnson et al. 2002). Locally, the aquifers within the Cretaceous system are referred to as the Chattahoochee River and Black River aquifers. The Tertiary sedimentary aquifer system is comprised of sand, sandstone, gravel, and limestone beds. The upper part of the Tertiary system is locally known as the Lisbon aquifer and the lower part is known as the Nanafalia-Clayton aquifer.

Figure 2. Map of the Upper Mobile-Tensaw River Delta Action Area and Ciba-Geigy NPL Site in relation to the Mobile River Watershed.

4.1.1.2 Regional Geology and Soils

The Alabama River and Tombigbee Basins are located within the geologic region known as the Coastal Plain, which generally consists of Cretaceous chalk, and Oligocene, Eocene, Paleocene clastic sediments with porous limestone (ACWP 2005a; ACWP 2005b). The Coastal Plain formed in shallow waters that covered most of the central North American continent throughout geologic history.

Bama soils are the official soils of the state of Alabama. A typical Bama soil profile consists of a five inch topsoil of dark brown fine, sandy loam; a six inch subsurface of fine sandy loam; and a red clay loam and sandy clay loam subsoil to sixty inches or more. Bama soils are found throughout the majority of the Alabama and Tombigbee River Basins and generally parallel major river systems. Soils of the Alabama River Basin are dominated by soils typical of the Coastal Plain, which are derived from marine and fluvial sediment eroded from the Appalachian and Piedmont plateaus.

Alluvial and terrace deposits of gravel, sand, and clay comprise the Southeastern Coastal Plain aquifer system which sits beneath most of the Alabama and Tombigbee River Basins (Johnson et al. 2002). Many minerals, including sand, gravel, clay, and bentonite, are mined in the Alabama River and Tombigbee River Basins. In addition, coal is found in abundance and mined from the Warrior Coal Field in the Tombigbee Basin. Many minerals, including sand, gravel, clay, and bentonite, are mined in the Alabama River Basin, but not within the Action Area

4.1.1.3 Climate

Like the rest of Alabama, the Upper Mobile-Tensaw Delta has a humid and subtropical climate with mild winters and hot, humid summers. The average annual temperature for the Tombigbee River Basin ranges from 60° F in Franklin County to 66° F in Marengo County. Typical annual rainfall of the Tombigbee River Basin is approximately 60 inches per year. The Alabama River Basin has a similar temperature range as the Tombigbee River Basin. The average annual rainfall for the Alabama River Basin ranges from 50 to 56 inches per year, with southern portions of the watershed being wetter than the northern parts.

The USFWS climate change strategy, titled “Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change,” establishes a basic framework within which the Service will work as part of the larger conservation community to help ensure the sustainability of fish, wildlife, plants and habitats in the face of accelerating climate change (See: http://www.fws.gov/home/climatechange /pdf/CCStrategicPlan.pdf). In addition, the National Wildlife Federation, supported by USFWS and other federal agencies, recently published a report to help practitioners and policy-makers understand what constitutes “good” climate adaptation, how to recognize those characteristics in existing work, as well as how to design new interventions when necessary (Stein et al. 2014). USFWS policy requires its offices to evaluate and address the impacts of climate change; by incorporating climate change adaptation measures in

planning and decision-making so that the agency can more effectively manage fish, wildlife, plants, and associated ecological processes to achieve its mission.

The Trustees used the U.S. Geological Survey National Climate Change Viewer (accessed December 19, 2014) to project changes in climate and water balance for the Mobile-Tensaw Delta. Seasonal maximum and minimum air temperatures in the region are anticipated to increase approximately 2 to 4° F by 2050 depending on the emissions scenario (Alder and Hostetler 2013). Seasonal averages of precipitation by 2050 are anticipated to be within historical variation; however, there is significant uncertainty associated with these projections. Runoff, particularly during summer months, is anticipated to decrease slightly by 2050 and continue to decrease into the next century. The most significant change projected is a reduction in soil water storage by 2050, with as much as a 50% reduction during summer, depending on the emissions scenario (Figure 3). The Trustees intend to take this information, as well as other climate-related information, into consideration throughout restoration planning, implementation, and monitoring phases and adjust course of action where feasible and practicable. Feasible actions may include using wetland management practices that promote a high diversity of wetland and riparian species since high plant diversity potentially increases resiliency in response to climate change. Genetically diverse populations of wetland and riparian species may also increase the potential for species to adapt to climate and its impacts on both biotic and abiotic variables, thereby enhancing ecosystem resilience.

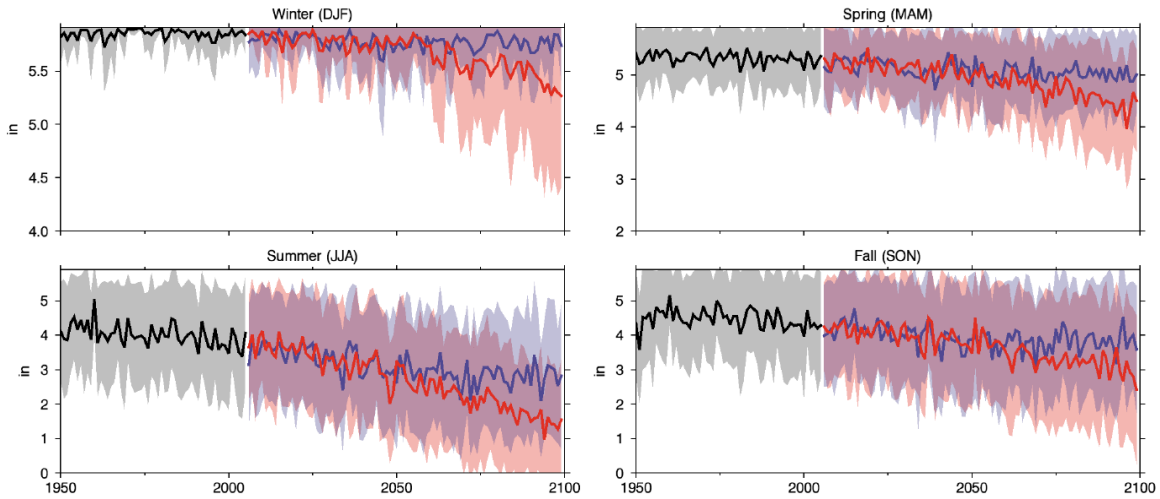

Figure 3. Seasonal average time series of soil water storage for historical (black), RCP4.5 (blue) and RCP8.5 (red) in the Mobile-Tensaw Delta. Historical period ends in 2005 and the future periods begin in 2006. The average of 30 CMIP5 models is indicated by the solid lines and their standard deviations are indicated by the respective shaded envelopes. (See http://www.usgs.gov/climate_landuse/clu_rd/apps/nccv_documentation_v1.pdf for information about the tutorial and emissions scenarios)

4.1.2 Biological Environment

4.1.2.1 Terrestrial and Aquatic Habitat

Uplands surrounding the Site largely consist of xeric and mesic pine forests. Much of the area surrounding the Ciba-Geigy plant has been cleared and supports large grass fields and at least one surface water reservoir. The Tombigbee River floodplain in the vicinity of the Site is forested and dominated with tree species typical of bottomland hardwood swamps including bald cypress *Taxodium distichum*), tupelo gum (*Nyssa sylvatica*), hickory (*Carya* spp.), oak (*Quercus* spp.), elm (*Ulmus* spp.), and American sycamore (*Platanus occidentalis*).

The Tombigbee River, in the vicinity of the Site, is characterized by broad meanders and numerous oxbow lakes (e.g., Round Pond and Olin Basin). High river flows, characteristically occurring in the winter and spring, inundate the floodplain across the Ciba and Olin NPL Sites. During periods of low river flows, typically in summer and fall, cypress/tupelo swamps persist on the Site and both open water (Round Pond and the Olin Basin) and cypress/tupelo swamps occur on the Olin-McIntosh NPL Site. Johnson Creek enters the floodplain on the adjacent property to the north of the Site.

The Mobile River Basin is in the Southeastern Plains Ecoregion, which consists of irregular plains with broad inter-stream areas comprised of a mixture of cropland, pasture, woodland, oak-hickory-pine forests, and Southern mixed forests (USEPA 2000). Specifically, the Action Area sits within the Southeastern Floodplains and Low Terraces sub-region of the most upstream portion of the Floodplains and Low Terraces subregion of the Southern Coastal Plain Ecoregion. Once covered by a variety of forest communities that included trees of longleaf pine (*Pinus palustris*), slash pine (*Pinus elliottii*), pond pine (*Pinus serontina*), beech (*Fagus* spp.), sweetgum (*Liquidambar styraciflua*), southern magnolia (*Magnolia grandiflora*), white oak (*Quercus alba*), and laurel oak (*Quercus laurifolia*), land cover in the Southern Coastal Plain Ecoregion is now mostly characterized by slash and loblolly pine (due to silviculture), oak-gum-cypress forest in some low lying areas, citrus groves, pasture for beef cattle, and urban land.

4.1.2.2 Fish and Wildlife

The Mobile River Basin contains some of the most unique assemblages of aquatic organisms in North America. The Mobile River Basin contains 40 percent of North America's aquatic turtle species (17 species); provides habitat for 160 species of fish; provides habitat for 120 species of snail and ranks in the top ten river basins in the world in terms of freshwater mussel diversity (75 species). Many of these species are endemic to the Mobile River Basin. As of 2000, 100 imperiled species were found in the Mobile River Basin (ACWP 2005a).

In addition to the diverse aquatic assemblages within the Mobile River Basin, the region also provides habitat for mammals, reptiles, and migratory birds. Examples of mammals

include the largest population of black bears (*Ursus americanus*) in Alabama, raccoon (*Procyon iotor*), opossum (*Didelphis virginiana*), grey squirrel (*Sciurus carolinensis*), flying squirrel (*Glaucomys volans*), several bat species, and swamp rabbit (*Sylvilagus aquaticus*). Examples of reptiles include mud snake *(Farancia abacura)*, rainbow snake (*Farancia erytrogramma*), green anole (*Anolis carolinensis*), common snapping turtle (*Chelydra serpentina*), and American alligator (*Alligator mississippiensis*). Among the many migratory bird species occurring in the Upper Mobile-Tensaw Delta are 14 species which are Birds of Conservation Concern (Table 2).

Table 2. List of migratory Birds of Conservation Concern[8] potentially occurring at or in the vicinity of the proposed Action Area in the Upper Mobile-Tensaw Delta.

Common Name	Scientific Name	Seasonal Occurrence in Action Area
American kestrel	*Falco sparverius ssp. paulus*	Year-round
American oystercatcher	*Haematopus palliates*	Year-round
Brown-headed nuthatch	*Sitta pusilla*	Year-round
Common ground dove	*Columbina passerine ssp. Exigua*	Year-round
Least bittern	*Ixobrychus exilis*	Breeding
Marbled godwit	*Limosa fedoa*	Wintering
Mississippi kite	*Ictinia mississippiensis*	Breeding
Prothonotary warbler	*Protonotaria citrea*	Breeding
Rusty blackbird	*Euphagus carolinus*	Wintering
Sedge wren	*Cistothorus platensis*	Wintering
Swainson's warbler	*Limnothlypis swainsonii*	Breeding
Wood thrush	*Hylocichla mustelina*	Breeding
Worm-eating warbler	*Helmitheros vermivorum*	Breeding
Yellow rail	*Coturnicops noveboracensis*	Wintering

[8] The 1988 amendment to the Fish and Wildlife Conservation Act mandates the U.S. Fish and Wildlife Service to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973." The overall goal of the Birds of Conservation Concern (USFWS 2008) is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent FWS' highest conservation priorities.

4.1.2.3 Rare, Threatened, Endangered, and Special Concern Species

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §§1531, et seq.) requires federal agencies to conserve endangered and threatened species and to conserve the ecosystems upon which these species depend. The ADCNR also identifies species that are of special concern to the state. The habitat of endangered, threatened, and rare species takes on special importance because of state and federal laws, and the protection and conservation of these species requires diligent management.

Many federally and state listed threatened or endangered species potentially occur in the vicinity of the Site or in areas affected by past discharges (see Table 3 and Table 4, respectively)." Additionally, the Alabama River provides critical habitat for the endangered Alabama sturgeon (*Scaphirhynchus suttkusi*), which is the only designated critical habitat in the action area. Critical habitat is a specific geographic area that contains features essential for the conservation of a threatened or endangered species. The critical habitat unit encompasses 524 km (326 mi) of river channel. The portion of river channel in the Alabama River extends 394 km (245 mi) from its confluence with the Tombigbee River, Baldwin and Clarke Counties, Alabama, upstream to R.F. Henry Lock and Dam, Autauga and Lowndes Counties, Alabama; and the portion of river channel in the Cahaba River extends 130 km (81 mi) from its confluence with the Alabama River, Dallas County, Alabama, upstream to U.S. Highway 82, Bibb County, Alabama (50 CFR Part 17**).** Future restoration plans will provide an evaluation of Alabama sturgeon critical habitat and its primary constituent elements depending on the specific project detail and location.

Table 3. List of federally protected species potentially occurring at or in the vicinity of the Action Area in the Upper Mobile-Tensaw Delta. Data from U.S. Fish and Wildlife Service Information, Planning, and Conservation System (http://ecos.fws.gov/ipac) generated on March 25, 2016. Key: E – Federally Endangered, T –Federally Threatened, C - Federal Candidate, CH – Federal Critical Habitat

Common Name	Scientific Name	Status
Alabama beach mouse	*Peromyscus polionotus ammobates*	E
Alabama heelsplitter	*Potamilus inflatus*	T
Alabama pearlshell	*Margaritifera marrianae*	E
Alabama red-belly turtle	*Pseudemys alabamensis*	E
Alabama sturgeon	*Scaphirhynchus suttkusi*	E, CH
American chaffseed	*Schwalbea americana*	E
Atlantic sturgeon (Gulf subspecies)	*Acipenser oxyrinchus*	T
Black pine snake	*Pituophis melanoleucus lodingi*	T
Choctaw bean	*Villosa choctawensis*	E
Dusky gopher frog	*Lithobates sevosus*	E
Eastern indigo snake	*Drymarchon corais couperi*	T
Georgia rockcress	*Arabis georgiana*	T
Gopher tortoise	*Gopherus Polyphemus*	T[9], C
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T
Heavy pigtoe	*Pleurobema taitianum*	E
Louisiana quillwort	*Isoetes louisianensis*	E
Narrow pigtoe	*Fusconaia escambia*	T

[9] Threatened west of Mobile and Tombigbee River; Candidate species in all other locations

Table 3 Continued

Common Name	Scientific Name	Status
Orangenacre mucket	*Lampsilis perovalis*	T
Ovate clubshell	*Pleurobema perovatum*	E
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	E
Piping plover	*Charadrius melodus*	T
Red Hills salamander	*Phaeognathus hubrichti*	T
Red knot	*Calidris canutus rufa*	T
Reticulated flatwoods salamander	*Ambystoma bishopi*	E
Smalltooth sawfish	*Pristis pectinata*	E
Southern clubshell	*Pleurobema decisum*	E
Tulotoma snail	*Tulotoma magnifica*	T
West Indian manatee	*Trichechus manatus*	E
Wood stork	*Mycteria Americana*	T

Table 4. List of state-protected species that may occur in the Action Area. Some species listed below may also be protected under federal law (Table 3).

Common Name	Scientific Name
Alabama heelsplitter	*Potamilus inflatus*
Alabama map Turtle	*Graptemys pulchra*
Alabama red-bellied turtle	*Pseudemys alabamensis*
Alabama shad	*Alosa alabamae*
Alabama sturgeon	*Scaphirhynchus suttkusi*
Alligator snapping turtle	*Macrochelys temminckii*
American alligator	*Alligator mississipiensis*
American chaffseed	*Schwalbea americana*
Atlantic sturgeon	*Acipenser oxyrinchus*
Black bear	*Ursus americanus spp.*
Black pine snake	*Pituophis melanoleucus lodingi*
Black-knobbed map turtle	*Graptemys nigrinoda*
Blackmouth shiner	*Notropis melanostomus*
Brighteye darter	*Etheostoma lynceum*
Coal skink	*Plestiodon anthracinus*
Crystal darter	*Crystallaria asprella*
Dusky gopher frog	*Lithobates sevosa*
Eastern coachwhip	*Coluber flagellum*
Eastern indigo snake	*Drymarchon couperi*
Eastern king snake	*Lampropeltis getula getula*
Eastern spotted skunk	*Spilogale putorius*
Florida pine snake	*Pituophis melanoleucus mugitus*
Gopher frog	*Lithobates capito*
Gopher tortoise	*Gopherus polyphemus*
Gulf salt marsh snake	*Nerodia clarkii clarkii*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*
Coral snake	*Micrurus fulvius*
Hawksbill sea turtle	*Eretmochelys imbricata*
Heavy pigtoe	*Pleurobema taitianum*
Ironcolor shiner	*Notropis chalybaeus*
Kemp's Ridley sea turtle	*Lepidochelys kempii*
Leatherback sea turtle	*Dermochelys coriacea*
Loggerhead sea turtle	*Caretta caretta*
Long-tailed weasel	*Mustela frenata*
Mimic glass lizard	*Ophisaurus mimicus*
Mississippi diamondback terrapin	*Malaclemys terrapin pileata*

Table 4 Continued.

Common Name	Scientific Name
One-toed amphiuma	*Amphiuma pholeter*
Paddlefish	*Polyodon spathula*
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*
Pine Barrens tree frog	*Hyla andersonii*
Piping plover	*Charadrius melodus*
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*
Rainbow snake	*Farancia erytrogramma*
Red-cockaded woodpecker	*Picoides borealis*
Reticulated flatwoods salamander	*Ambystoma bishopi*
River frog	*Lithobates heckscheri*
Smalltooth sawfish	*Pristis pectinata*
Southeastern bat	*Myotis austroriparius*
Southeastern five-lined skink	*Plestiodon inexpectatus*
Southeastern pocket gopher	*Geomys pinetis*
Southern clubshell	*Pleurobema decisum*
Southern dusky salamander	*Desmognathus auriculatus*
Southern hognose snake	*Heterodon simus*
Speckled kingsnake	*Lampropeltis getula holbrooki*
West Indian manatee	*Trichechus manatus*
Wood stork	*Mycteria americana*

Notes:

- Not all species are known to occur in the Action Area, but might be found within Mobile, Baldwin and Washington Counties, Alabama.
- Birds: The Nongame Species Regulation 220-2-.92 (1)(d) of the Alabama Administrative Code states: All nongame birds are protected under the provisions of this regulation except crows, starlings, blackbirds, house sparrows, Eurasian collared doves, rock doves, and other non-native species.
- The Bald Eagle (*Haliaeetus leucocephalus)* has been delisted. This species is still protected by the Nongame Species Regulation, the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act. This species is distributed statewide, but it is most likely to be observed near large rivers and reservoirs.
- Black Bear (*Ursus americanus* ssp.) may occur statewide.

4.1.3 Socioeconomic and Cultural Environment

4.1.3.1 Demographics

The estimated human population within the Action Area, was 10,920 based on the 2010 U.S. Census. The median household income for Washington County from 2008 – 2012 was $42,256.

A wide range of industry is represented in the Tombigbee and Alabama River Basins, including the education, health, social services, and manufacturing sectors. Natural resource-based industries such as agriculture, forestry, and mining, provide many job opportunities in the two basins (ACWP 2005a; ACWP 2005b). Forestry is Alabama's largest industry, generates approximately $13 billion of revenue in Alabama each year (2000 estimate), and employs approximately 10% of the state's total work force. Most of the forest acreage in the Alabama and Tombigbee River Basins is privately-owned. Wood harvested from Washington County is primarily used for lumber and pulp, but a small percentage is used for poles and pilings. According to 2000 statistics, approximately 33.2 million cubic feet of live trees were removed annually in Washington County. In addition to forestry products, Alabama and Tombigbee River Basins are also leading producers of peanuts, cotton, cattle, hogs, and aquaculture (catfish).

Table 5. Action Area demographics*.

Demographic Category	
Population	10,920
Minority Population	4,358
Percent Minority	40%
Percent Persons in Poverty (estimate)**	18.5%
Males	5,394
Females	5,526

* Statistics generated using 2010 U.S. Census Bureau data and EPA's Environmental Justice Screening and Mapping Tool (Version 2016) https://ejscreen.epa.gov/mapper/
** Estimate for Washington County using U.S. Census Bureau statistics.

Environmental Justice
The relevant demographic data were obtained from the U.S. Census Bureau and the State of Alabama. Data are presented at the county level to accommodate the geographic size of each portion of the study area.

In this analysis, a county is considered to have a minority population if its non-white population is greater than 50 percent or is meaningfully larger than the general (statewide) non-white population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50 percent, or is meaningfully greater than the general population (average statewide poverty level).

To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

Based on the census data, the minority population in the Action Area does not meet the condition of being classified having a minority population since the minority population comprises only 40% of the action area's population. The Action Area is not considered a low-income area because the percentage of persons in poverty is below 50 percent and is similar to the statewide poverty level (estimate of 19.3%).

4.1.3.2 Recreation

The Lower Tombigbee River and the Upper Mobile-Tensaw River Delta offer a variety of recreational activities for residents and visitors, including the Mobile-Tensaw Delta Wildlife Management Area (WMA), W. L. Holland WMA, ADCNR Five Rivers Delta Resource Center, and Blakely State Park. Popular activities include hunting, fishing, boating, canoeing, kayaking, water sports, bird watching, and photography.

4.1.3.3 Cultural and Historic Resources

Approximately 700 years ago, Native Americans were known to have settled in the Mobile-Tensaw Delta, including the Mississippians, Alabamas, Mauvillas, Taensas, Creeks, and Choctaws (Mobile Bay National Estuary Program 2013). The Alabama River is named for the Alabama people, and the Mobile and Tensaw Rivers are named after the respective tribes. Abundant natural resources, such as fish, shellfish, plant materials, and clay, provided early inhabitants with abundant resources essential for survival.

A French expedition led by Pierre Le Moyne d'Iberville resulted in the initial settlement of the town of Mobile in 1702. At that time, Mobile was located upstream from its present-day location and was occupied by the Mobilian Indians. In 1711, the town of Mobile was relocated downstream to its present location due to its frequent flooding. In addition to the settlement of Mobile, the Mobile-Tensaw Delta is also known for being the setting for the last major battle of the Civil War, which took place in the town of Blakely in 1865 (Mobile Bay National Estuary Program 2013).

Several landmarks or other federal or state designated areas of historical significance occur within the Upper Mobile-Tensaw River Delta. The Fort Mims site and Bottle Creek Indian Mounds are the only historic sites that occur within the Action Area. Fort Mims covers approximately five acres and is located seven miles west of Tensaw in Baldwin County. Fort Mims site commemorates the battle of Fort Mims which took place in 1813. The site is owned and operated by the Alabama Historical Commission and the Fort

Mims Restoration Association. Bottle Creek Indian Mounds served as the focal point for interactions among the Mississippian culture occupying areas along the coast and interior of the southeastern U.S. Bottle Creek was declared a National Historic Landmark in 1995 and it is administered by the Alabama Historical Commission.

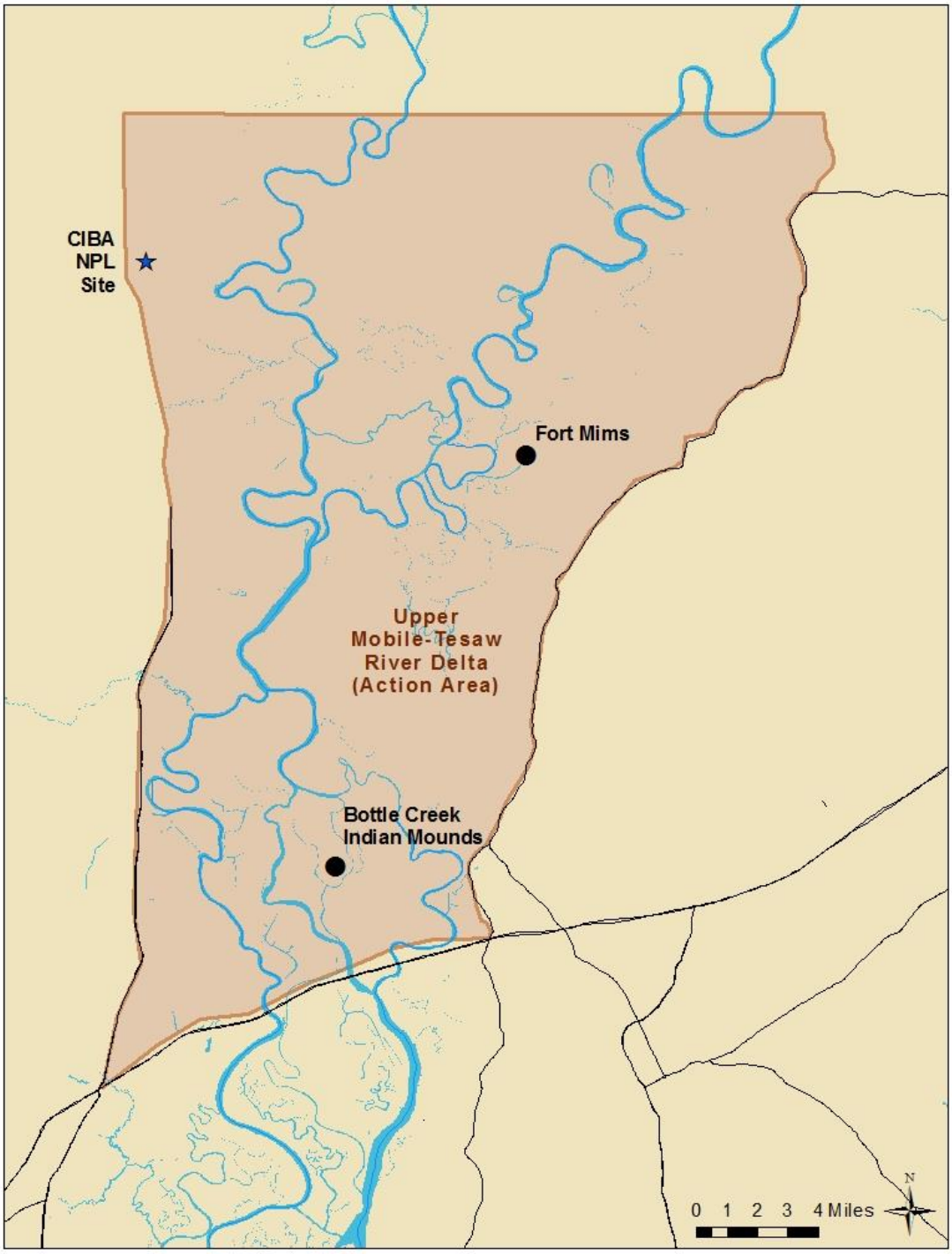

Figure 4. Landmarks or other federal or state designated areas of historical significance within the Action Area.

4.2 ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION

NEPA requires that the Trustees evaluate the potential impacts of their proposed actions. This includes evaluation of what would happen if the Trustees did nothing further, referred to as the "No Action Alternative". This section of the Draft RP/PEA sets out the potential impacts of both the No Action Alternative and the two restoration type alternatives evaluated and proposed in Chapter 3 as meeting the Trustees' Restoration Goals and Evaluation Criteria. The programmatic analysis presented here considers the range of potential environmental consequences that may be anticipated to occur as a result of implementation of activities within the scope of the Proposed Action. If the Proposed Action is selected by the Trustees, this analysis would also frame and help inform the identification and evaluation of specific restoration projects proposed in the future, consistent with the Final RP/PEA.

The following definitions will be used to characterize the nature of the various impacts evaluated in this Draft RP/PEA:

- *Short-term or long-term impacts.* These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.

- *Direct or indirect impacts.* A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.

- *Minor, moderate, or major impacts.* These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

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

- *Cumulative impacts.* CEQ regulations implementing NEPA define cumulative impacts as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 CFR 1508.7) Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time within a geographic area.

Table 6. Summary of the impacts anticipated from the proposed restoration alternatives in the Upper Mobile-Tensaw River Delta.
Alternative 1 = No Action
Alternative 2 = Habitat Enhancement and Restoration on Newly Acquired Lands
Alternative 3 = Habitat Enhancement and Restoration of State-Owned Lands

Resource Topics	Alternative 1	Alternative 2	Alternative 3
Physical Environment	Unknown	Minor to Moderate benefits	Minor to Moderate benefits
Habitat Resources	Negligible benefits	Moderate benefits	Moderate benefits
Fish and Wildlife	Negligible benefits	Moderate benefits	Moderate benefits
Socioeconomics	No effect	Minor benefits	Minor benefits
Cultural Resources	No effect	Minor benefits	No effect

4.2.1 Physical Environment Impacts

4.2.1.1 Air Quality Impacts

4.2.1.1.1 No Action Alternative

The No Action Alternative would not result in any air quality impacts since no restoration actions would be undertaken.

4.2.1.1.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land acquisition is not expected to adversely affect local or regional air quality. Since land acquisition only provides for passive management of acquired land with no restoration actions, there would be no adverse impacts to air quality. Minor, long-term indirect, beneficial impacts to air quality would result from the sequestration of carbon dioxide via the trees and plants that will be allowed to grow and not be removed from the protected area.

Hydrological Restoration - Restoration activities that may have short-term, adverse effects to air quality include mechanical clearing, dredging, canal/ditch fill, clearing of invasive species, and other similar activities. Construction equipment anticipated to be used for the types of restoration activities proposed (e.g., levee breaching, forest thinning, ditch filling) and equipment-associated emissions are presented in Table 7. Construction equipment (e.g., diesel backhoe, bulldozer, small diesel tugboat, and chainsaws) would likely be used for one to several weeks and, in some cases, up to one month at a time. Temporary and minor increases in emissions, such as smoke, fuel vapors, or herbicide aerosols from construction equipment or habitat management activities would occur during restoration activities. However, no air quality permits are required for these types of projects and no violations of state air quality standards would be expected from a project of this type and scope. All equipment used for restoration activities would be compliant with EPA emission standards (Table 7).

Emissions generated from potential hydrological restoration activities would not generate a noticeable increase in levels of emissions outside of normal environmental conditions or have direct or indirect adverse impacts to humans in the urban and rural areas within or beyond the Action Area. Impacts to air quality would be short-term, direct, adverse and minor. Long-term, indirect, minor beneficial impacts from the proposed hydrological restoration include carbon sequestration in the riparian and wetland areas via the trees and plants that will be allowed to grow and not be removed from the protected area.

Invasive Species Control – Control of invasive species is not expected to include use of heavy construction equipment. Emissions from lightweight power tools such as chain saws would be negligible and occur only during the periods of active vegetation control. Prescribed burns would be limited in size and duration, timed to avoid conditions that would result in unacceptable localized air quality conditions, and subject to fire management techniques. The Alabama Cooperative Extension states that prescribed burns generate fewer emissions than uncontrolled wildfires (ANR-331, www.aces.edu/pubs/docs/A/ANR-0331/ANR-0331.pdf*).* Prescribed burns will be conducted under an Alabama Forest Commission permit and in accordance with the Code of Alabama, Section 9-13-270. In general, impacts to air quality from invasive species control activities are expected to be short-term, direct, adverse and minor.

4.2.1.1.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as the actions that are proposed for use on lands that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts of those actions on state-owned lands would be the same as identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

Table 7. U.S. Environmental Protection Agency emissions standards (g/kW-hr) for chainsaws, compression ignition, spark ignition commercial boats, and commercial off-road equipment. PM = particulate matter; NOx = nitric oxide + nitrogen dioxide; HC = hydrocarbons; NMHC = non-methane hydrocarbons; CO = carbon monoxide

Equipment Type	Displacement	PM	NO_x	NO_x+ HC	NMHC	CO	Website Source*
Chainsaws (Class 4)	< 50 cc	-	-	50	-	805	http://www.epa.gov/otaq/standards/nonroad/smallsi-exhaust.htm
New and in-use non-road compression-ignition engines (diesel)	All	0.02	0.4	-	0.19	3.5	http://www.ecfr.gov/cgi-bin/text-idx?SID=4009f7e5988920663bcc51e9ada834b0&node=pt40.33.1039&rgn=div5#se40.33.1039_111
Federal marine compression-ignition engines (Diesel)	≥ 2.5 L/cylinder	-	45	-	-	-	http://www.epa.gov/otaq/standards/nonroad/marineci.htm
Commercial marine engines with kW/L > 35 and all recreational engines (Category 1 and 2 engines).	0.9 < disp. < 1.2	0.14	-	5.8	-	-	http://www.ecfr.gov/cgi-bin/text-idx?SID=bad225844d8e906e77ac7ae5e291f3ad&node=se40.33.1042_1101&rgn=div8
Stern drive/inboard boat engines	P ≤ 485 kW	-	-	20	-	350	http://www.epa.gov/otaq/standards/nonroad/marinesi-exhaust.htm

* Accessed December 22, 2014

4.2.1.2 Hydrology

4.2.1.2.1 No Action Alternative

The No Action Alternative would not result in any hydrology impacts since no restoration actions would be undertaken.

4.2.1.2.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition in the Action Area would not result in any adverse impacts on hydrology. Acquisition of land would allow a public land manager, such as ADCNR, to implement monitoring and long-term stewardship activities that would be intended to ensure existing natural resource services are not disturbed and are available into the future. Additionally, although the exact time for these processes is unknown, passive management of acquired lands is expected to allow natural processes such as stormwater runoff, sheetflow, and flooding to return the action area to natural conditions over time. Therefore, the impacts of this alternative are expected to be long-term, indirect, minor and beneficial.

Hydrological Restoration - Restoration activities focused on hydrological modification could include filling drainage ditches, repairing breaches in the natural flood levees and closing "pull ditches" remaining from historic logging operations. Additionally, hydrological impairments along existing roadways could be repaired through the placement of culverts, low-water crossings and other similar actions. These types of restoration activities would provide a variety of ecosystem benefits, including the restoration of natural sheetflow across plant communities, restoration of natural infiltration within wetlands, and reduction of water runoff velocities. The State of Alabama has substantial experience implementing this type of restoration in other areas of the Delta. Implementation of these types of activities would be expected to result in temporary and minor impacts to hydrology processes during periods of construction and management from the use of various types of construction equipment.

Implementation of such actions may require creation of temporary access roads. Where required, routes would be selected to minimize potential impacts to hydrological features and the area would be restored at completion of construction in accordance with the goals of the restoration action.

During hydrological restoration activities, best management practices (BMPs) would be utilized to ensure that any temporary negative impacts are minimized. This would include, as appropriate, such BMPs as:

1. Restricting heavy equipment use to the minimum time needed to achieve restoration objectives;

2. Requiring the use of low-ground pressure tracked and/or wheeled vehicles to avoid rutting soils;
3. Flagging authorized restoration areas to prevent impacts outside of designated areas;
4. Restricting equipment access to designated corridors.

Therefore, impacts of hydrological restoration activities are expected to include both short-term, direct, minor adverse impacts and long-term, direct, moderate, beneficial impacts.

Invasive Species Management and Revegetation - Riparian vegetation influences hydrological processes through effects on runoff and control of uptake, storage, and return of water to the atmosphere. Native plant restoration has the potential, in combination with other restoration activities, to return the vegetation-hydrology interactions to a reference ecological condition. Invasive species management and revegetation under this alternative would not involve the use of heavy construction equipment and the methods proposed for use are not anticipated to have any adverse impacts on the Action Area hydrology. Invasive species management activities are expected to result in long-term, indirect, minor to moderate beneficial impacts to local hydrology.

4.2.1.2.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as actions that are proposed for use on land that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.1.3 Water Quality Impacts

4.2.1.3.1 No Action Alternative

The No Action Alternative would not result in any water quality impacts since no restoration actions would be undertaken.

4.2.1.3.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition would allow the public land manager to implement monitoring and long-term stewardship activities intended to ensure existing natural resource services are not disturbed and are available into the future. Additionally, although the exact time for these processes is unknown, passive management of acquired lands is expected to allow natural processes such as stormwater runoff, sheetflow, and flooding to return the action area to more natural conditions, and thus to provide beneficial impacts to water quality

over time. Therefore, the impacts of this alternative are expected to be long-term, indirect, minor and beneficial.

Hydrological Restoration activities included in the Proposed Action could involve some localized soil/sediment disturbance that could temporarily affect ambient water quality adjacent to the restoration areas. BMPs would be implemented, as appropriate, to minimize the disturbance and/or local effect. These may include:

1. Halting use of heavy construction equipment during heavy rains;
2. Flagging authorized restoration areas to prevent impacts outside of designated areas;
3. Monitoring of vegetation regrowth to prevent excessive erosion in restored areas and implementation of corrective actions in areas identified as experiencing excessive erosion by installation of straw bale barriers, straw wattles, or silt fence.

The impacts of this alternative on water quality are expected to be short-term, direct, minor and adverse.

Invasive Species Management and Revegetation activities also have the potential to disturb soil/sediment during project implementation and could temporarily affect ambient surface water quality in the vicinity of restoration areas. If herbicide application was used for invasive removal, BMPs, such as use of a certified applicator, herbicides approved for use within wetlands, and straw wattles to trap sediment, would be employed.

Prescribed fire management may result in minor elevated concentrations of nutrients and organic compounds in burned areas as a result mobilizing soil-bound nutrients and releasing nutrients, such as nitrogen, from plants. However, these adverse impacts would be minimized by compliance with Code of Alabama, Section 9-13-270 and direction of burns by a Certified Prescribed Burner. Sediment controls such as straw wattles or straw bale barriers would be used in burn areas, if needed to control sediment transport.

Project-specific environmental analyses would be completed for future proposed restoration projects with the potential to affect water quality in the vicinity of the Action Area. In the long-term, restoration actions included in the Proposed Action that improve hydrology are expected to have a long-term minor to moderate benefit to water quality. Water quality improvements, however, would be ancillary to other habitat improvements.

4.2.1.3.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as actions that are proposed for use on land that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.1.4 Sediment Quality Impacts

4.2.1.4.1 No Action Alternative

The No Action Alternative would not result in any sediment quality impacts since no restoration actions would be undertaken.

4.2.1.4.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition would allow the public land manager to implement monitoring and long-term stewardship activities which are intended to ensure existing natural resource services are not disturbed and are available into the future. Additionally, although the exact time for these processes is unknown, passive management of acquired lands is expected to allow natural processes such as stormwater runoff, sheetflow, and flooding to return the action area to more natural conditions over time This may reduce sediment transport, and reduce the runoff of industrial or agricultural contaminants into the Action Area. Therefore, the impacts of this alternative are expected to be long-term, indirect, minor and beneficial.

Hydrological Restoration activities included in the Proposed Action would result in some localized disturbance of sediments during ground disturbing restoration actions. As described in Section 4.2.1.3 Water Quality Impacts, BMPs would be implemented where appropriate to minimize sediment transport from restoration project areas, including monitoring of erosion in restored areas and implementation of corrective actions in areas identified as experiencing excessive erosion by installation of straw bale barriers, straw wattles, or silt fence. There would be long-term direct beneficial impacts to sediment at restoration sites because the improved hydrology at these sites would mitigate sediment scour during storm or flooding events and reduce instream transport of sediment into nearby waterways. Hydrological restoration activities as proposed in this Draft RP/PEA would provide a variety of ecosystem benefits, including enhancement of sediment quality and quantity. The State of Alabama has substantial experience implementing this type of restoration actions. The Trustees anticipate localized, temporary and minor impacts to sediments during periods of construction and management. Therefore, implementation of these types of activities would be expected to result in short-term impacts that would be direct, minor and adverse, and whereas long-term impacts are expected to be both direct and indirect, minor and beneficial.

Invasive Species Management and Revegetation – Physical removal of invasive species and prescribed burns and fire management activities may result in minor to moderate temporary changes in sediment quality. Soil and sediment will be disturbed during physical removal of undesired vegetation, and vegetation burning may result in changes to soil and sediment composition. Disturbed areas at restoration sites would, however, be re-contoured similar to the surrounding surface conditions following management activities of this nature. Therefore, short-term impacts of these actions would be expected

to be direct, minor and adverse, whereas long-term impacts would be anticipated to be both direct and indirect, minor and beneficial.

4.2.1.4.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as actions that are proposed for use on land that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative Accordingly, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.1.5 Prime Agricultural Lands

There are no known prime agricultural lands in the Action Area.

4.2.2 Biological Impacts

4.2.2.1 Vegetation

4.2.2.1.1 No Action Alternative

The No Action Alternative would not result in any impacts to vegetation since no restoration actions would be undertaken.

4.2.2.1.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition - Acquisition of existing wetland habitat would protect significant area(s) of swamp and bottomland hardwood forest that have been impacted by past forestry, agricultural, and fire exclusion activities and practices. Acquisition of this type of land would allow the public land manager to implement monitoring and long-term stewardship activities intended to ensure existing natural resource services are not disturbed and available into the future. Additionally, although the exact time for these processes is unknown, passive management of acquired lands is expected to allow natural processes such as stormwater runoff, sheetflow, and flooding to return the action area to hydrologically normal conditions over time, which would result in ideal conditions for native vegetation populations. Most invasive species are aggressive, however, and without active control will expand within and beyond areas they occupy potentially to the detriment of native species. Therefore, land acquisition and associated passive management activities would be expected to result in long-term, indirect, minor benefits to vegetation. Even where invasive species are present on acquired properties, land acquisition will still result in a long-term minor benefit since the acquired properties have

been removed from development pressure and active management can be implemented by land managers to control invasive species.

Hydrological Restoration activities of existing wetland and riparian habitat would restore significant area(s) of swamp and bottomland hardwood forest that have been impacted by past forestry, agricultural, and fire exclusion activities and practices. Construction activities such as clearing and earth moving to reconnect waterways, fill ditches or recontour areas would directly impact plant communities in those areas. Once construction is completed, vegetation would be restored by planting with species native to the Upper Mobile-Tensaw Delta, followed by management activities to reduce potential occurrence of invasive plant species. Areas would be monitored after construction to identify and correct erosion that threatens revegetation. Activities to restore or improve habitat conditions could also potentially result in localized removal of existing trees and understory plants as well as loss of vegetation due to flooding or desiccation resulting from the modified hydrological regime. Impacts to vegetation in existing habitats would be short-term, direct, minor and adverse, and long-term, direct and indirect, minor and beneficial.

Invasive Species Management and Revegetation – Actions proposed under the Habitat Enhancement and Restoration on Newly Acquired Lands alternative would impact swamp and bottomland hardwood forested areas, including removal of vegetation and movement and/or removal of soil and sediment during construction activities. Once construction is completed, vegetation would be restored by planting with species native to the Upper Mobile-Tensaw Delta, followed by management activities to reduce potential occurrence of invasive plant species. Removal of invasive species would impact interrelated native vegetation in the treated areas. Application of herbicides and prescribed burns could impact native vegetation as well as invasive vegetation. Proper herbicide application and control of burns, however, would result in long-term benefits to native vegetation because these activities reduce competition by invasive vegetation. Habitat enhancement, through management of invasives and revegetation with native vegetation, is anticipated to have a positive effect on biodiversity at restoration sites within the Action Area. Therefore, adverse impacts would be short-term, direct, and minor. Benefits are anticipated to be long-term, both direct and indirect, and moderate.

4.2.2.1.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as actions that are proposed for use on land that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.2.2 Fish and Wildlife Resources

4.2.2.2.1 No Action Alternative

The No Action Alternative would not result in any impacts to fish and wildlife resources since no restoration actions would be undertaken.

4.2.2.2.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition would allow the public land manager, such as ADCNR, to implement monitoring and long-term stewardship activities to ensure existing natural resource services are not disturbed and are available into the future. Land acquisition also has the potential to reduce habitat fragmentation and adverse effects on fish and wildlife that can result from logging and development activities within habitats upon which these resources depend for all or part of their life histories. Through passive management of acquired lands, it is expected that natural processes such as stormwater runoff, sheetflow, and flooding would improve the ecological services of acquired lands for native species and to enhance natural fish and wildlife populations over time. The exact time to return the action area to more normal conditions is unknown, however., The spread of invasive species onto acquired lands under a passive management approach is likely and would be detrimental to native species in the action area Therefore, impacts to fish and wildlife species would be expected to be long-term, indirect, minor to moderate and beneficial. Even where invasive species are present on acquired properties, land acquisition will still result in a long-term minor benefit to fish and wildlife since the acquired properties have been removed from development pressure and active management can be implemented by land managers to control invasive species that may be a detriment to fish and wildlife habitat.

Hydrological Restoration

Fish and Other Aquatic Biota

Hydrological restoration activities completed as part of the Proposed Action, such as filling drainage ditches, are anticipated to have adverse impacts to fish and other aquatic biota during construction. Increased turbidity and sedimentation from excavation could potentially cause gill-smothering that may suffocate individual fish and other aquatic biota at or in the vicinity of restoration sites in the Action Area, as well as cause temporary changes in animal behavior. Fish, however, are generally mobile and would be able to avoid direct impacts from construction activities. Increased turbidity and sedimentation from construction activities may affect the ability of nearby shellfish to feed. Immobile benthic organisms, such as mussels, would be buried or crushed by construction activities. Where applicable and feasible, BMPs, including erosion and sedimentation controls, as described in Section 4.2.1.3.2 and in Appendix B , would be used to minimize sediment impacts to biota to the maximum extent practicable. Use of seasonal restrictions during restoration activities would also occur where applicable to avoid impacts to species during sensitive life stages (e.g., spawning, occupancy of larval

habitat, colonial nesting birds). Deployment of sediment barriers and sheet piling to minimize effects to sensitive aquatic species would also occur where applicable. Turbidity and sedimentation caused by construction activities should be minimal, localized and of short duration as particulates would settle out of the water column.

Removal of benthic biota and dispersion of other local food resources could temporarily impact food sources for aquatic biota in the restoration area during construction. Fish species using restoration areas prior to and during construction are expected to disperse to and feed in nearby areas of the Upper Mobile-Tensaw Delta.

The Upper Mobile-Tensaw Delta provides a migratory pathway for fish as they travel to spawning grounds in upstream portions of the Alabama and Tombigbee Rivers. BMPs would be used to limit impacts from increased turbidity and sedimentation resulting from construction activities and to minimize impediments to fish migrations. Short-term, direct and indirect, minor, adverse impacts would be expected, but long-term, direct and indirect, moderate, beneficial impacts would be expected from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

Reptiles and Amphibians

Habitat for several species of reptiles and amphibians occurs within the Action Area. Enhancement of swamp and bottomland hardwood forest through hydrological restoration has the potential to benefit reptile and amphibian nesting and foraging within the Upper Mobile-Tensaw Delta. All species in the Action Area are mobile and can relocate during construction activities. BMPs would be followed to ensure a minimal number of individuals are impacted during construction. As part of hydrological restoration, some habitats within the Action Area that are currently terrestrial may become entirely aquatic following flooding, , therefore reducing overall terrestrial habitat for reptiles and amphibians within the Action Area. This shift in habitat availability would mimic historical conditions, however, and improve landscape scale habitat mosaics enhancing habitat suitability for many reptiles and amphibians. As a result, short-term, direct and indirect, minor, adverse impacts would be expected. Additionally, long-term, direct and indirect, moderate, beneficial impacts would be expected from the enhanced wetland and riparian habitat, and improved water quality.

Birds

Hydrological restoration activities have the potential to provide enhanced habitat to aquatic or semi-aquatic avian species over the long-term. Short-term and minor impacts to migratory birds during construction activities, such as disturbance due to construction noise, are possible. Direct mortality to birds is not anticipated since birds are mobile and generally avoid human activities. All work areas would be inspected to ensure that migratory birds are not nesting in active work areas. The following guidelines would be used to ensure ground-disturbing activities do not result in the “take” of an active nest or migratory bird protected under the Migratory Bird Treaty Act:

a. Any ground-disturbing activities or vegetation treatments would be performed before migratory birds begin nesting or after all young have fledged to avoid incidental take;

b. If activities must be scheduled to start during the migratory bird breeding season, appropriate steps would be taken to prevent migratory birds from establishing nests in the potential impact area. These steps could include covering equipment and structures and use of various excluders (e.g., noise).

c. A site-specific survey for nesting birds would be performed starting at least two weeks prior to groundbreaking activities or vegetation treatments if activities need to be scheduled during the migratory bird breeding season.

d. If nesting birds are found during the survey, appropriate spatial buffers would be established around nests. Vegetation treatments or ground-disturbing activities within the buffer areas would be postponed until the birds have left the nest. Confirmation that all young have fledged would be made by a qualified biologist.

Therefore, short-term, direct and indirect, minor, adverse impacts would be expected during construction activities. Long-term, direct and indirect, moderate, beneficial impacts would be expected from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

Mammals

Mammals such as raccoons, muskrats, and bats occupying restoration areas may be temporarily affected by construction or other hydrological restoration activities. Heavy machinery, sediment excavation, vegetation clearing, and other human disturbance may displace individuals or potentially even cause mortality. Direct impacts to mammal populations in restoration areas would likely be negligible or minor since mammals are mobile. Furthermore, mammals are typically terrestrial or semiaquatic so restoration crews would be expected to encounter relatively few terrestrial and semi-aquatic mammals, such as raccoons, in habitats where hydrological restoration activities would occur since restoration activities will primarily occur in aquatic habitats.

Beneficial indirect impacts to mammals, such as through improving food chain dynamics, would result from bottomland hardwood habitat enhancement. The proposed habitat restoration activities would improve habitat quality and potentially increase the habitat suitable for mammals that forage and rest in the Upper Mobile-Tensaw Delta. The Proposed Action would result in short-term, direct and indirect, minor, adverse impacts to mammals within restoration areas. The Proposed Action would also be expected to result in long-term, direct and indirect, moderate, beneficial impacts from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

Invasive Species Management and Revegetation - Invasive species have the potential to degrade habitat function, adversely alter hydrology, and restrict free movement of aquatic biota. Herbicide application has the potential to temporarily affect ambient water quality

in the Action Area as a result of elevated water concentrations of herbicides. However, these adverse impacts to fish and wildlife would be short-term in nature and would be minimized by use of BMPs such as erosion control, the use of a certified pesticide applicator or the use of herbicides approved for use within wetlands. Excavation, reseeding and replanting of appropriate vegetation, and improvement of the local hydrology would replace non-native plants with native and beneficial plant species and promote inundation of the river floodplain. Long-term improvements to native habitat would benefit native fish and wildlife by expanding the available food supply, cover, and sites available for nesting, foraging and mating. Therefore, short-term, direct and indirect, minor, adverse impacts would be expected. Long-term, direct and indirect, moderate, beneficial impacts would be expected from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

4.2.2.2.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as actions that are proposed for use on land that would be acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, for fish and wildlife resources, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.2.3 Rare, Threatened, Endangered, and Special Concern Species

4.2.2.3.1 No Action Alternative

The No Action Alternative would not result in any impacts to rare, threatened, endangered and special concern species (from here forward referred to as special status species) since no restoration actions would be undertaken.

4.2.2.3.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition would allow the public land manager, such as ADCNR, to implement monitoring and long-term stewardship activities which are intended to ensure existing natural resource services are conserved and are available into the future. Land acquisition also has the potential to reduce habitat fragmentation and adverse effects on fish and wildlife, including those with special status under other laws, which can result from logging and development activities within habitats upon which these resources depend for all or part of their life histories. Through passive management of acquired lands, it is expected that natural processes such as stormwater runoff and flooding would improve the ecological services of acquired areas on which special status species depend, which may improve conditions for special status species over time. The exact time for this improvement in ecological services is unknown. The spread of invasive species onto

acquired lands under a passive management approach is likely and would be detrimental to special status species in the action area. Therefore, impacts to special status species would be expected to be long-term, indirect, minor to moderate and beneficial. Even where invasive species are present on acquired properties, land acquisition will still result in a long-term minor benefit to special status species and their habitats since the acquired properties have been removed from development pressure and active management can be implemented by land managers to control invasive species that may be a detriment to these species and their habitats.

Hydrological Restoration - As noted in Sections 4.1.2.3, many federal and state protected species have the potential to be present within the Action Area. Similar potential impacts as described previously in Section 4.2.2.2.2 would be anticipated for special status species occurring in the Action Area.

Based on the analysis in 4.2.2.2 Fish and Wildlife Resources, hydrological restoration activities under the Proposed Action may result in short-term, direct and indirect, minor, adverse impacts. Long-term, direct and indirect, moderate, beneficial impacts, however, would be expected from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

The Trustees' recognize it is not possible at programmatic level alone to identify and fully evaluate the potential environmental consequences of the Proposed Action on special status species that may occur as a result of potential future, project-specific construction activities associated with hydrological restoration. To ensure that the actions proposed may be undertaken consistent with the Endangered Species Act and state regulations, each future restoration project proposed by the Trustees will be evaluated and the potential impacts of the specific activities proposed on the special status species and conditions that are relevant to those species in each project area will be analyzed. Additional reviews and documentation will be completed to assess these impacts under NEPA and pursuant to Section 7 of the ESA, thus ensuring that proposed actions will have no effect on listed species or that such effects are mitigated consistent with federal and state laws.

Invasive Species Management and Revegetation - Minor, temporary adverse impacts for special status species within the Action Area may result from actions involved in management of invasive species and native species revegetation. Potential impacts include those generally described for Fish and Wildlife Resources above (See Section 4.2.2.2.2). Additional impacts may also occur as a result of the future, project-specific activities proposed. Accordingly, areas identified for vegetation removal would be surveyed for protected species and trained biologists would be consulted to identify invasive species to be removed and methods or practices that can be used to avoid inadvertently impacting protected species. Short-term, direct and indirect, minor, adverse impacts would be expected. Long-term, direct and indirect, moderate, beneficial impacts would also be expected from the improved aquatic interconnections, enhanced wetland and riparian habitat, and improved water quality.

4.2.2.3.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands owned by the state are the same as actions that are proposed for use on land acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, for protected species, the potential impacts of those actions on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3 Socio-Economic Impacts

4.2.3.1 Aesthetics Impacts

4.2.3.1.1 No Action Alternative

The No Action Alternative would not result in any impacts to aesthetic or scenic qualities and values in the Action Area as no restoration actions would be undertaken.

4.2.3.1.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition would allow the public land manager to implement monitoring and long-term stewardship activities to ensure existing natural resource services and aesthetic values are conserved and are available into the future. Land acquired under this alternative would be passively managed, so there may be a minor long-term benefit to aesthetic and scenic qualities and values associated with acquired lands.

Hydrological Restoration - Adverse effects to aesthetic and scenic qualities and values within the Action Area as a result of hydrological restoration activities are anticipated to be minor. Aesthetic and scenic qualities and values that are important to recreationists would be reduced during active construction due to the presence of construction equipment and for the duration of activities undertaken for the purpose of mechanical clearing, and dredging filling canals/ditches. These impacts would be temporary and, in the long-term, aesthetic and scenic qualities and values at restoration sites would likely be enhanced as a result of the Proposed Action.

Invasive Species Management and Revegetation - Temporary adverse effects to the aesthetic and scenic qualities and values at restoration sites in the Action Area would occur as a result of invasive species management activities. Aesthetic and scenic qualities and values associated with active restoration sites would be reduced due to the presence of equipment, for the duration of activities such as clearing of invasive species, and during and following prescribed burns. Changes in vegetation and other topographical features at these sites may also temporarily reduce aesthetic and scenic values. These adverse impacts may vary in duration and intensity, but all would be temporary. These

same qualities and values would, over time, however, be enhanced as a result of the Proposed Action. Beneficial effects would result from invasive species management activities that contribute to the restoration or enhancement of riparian areas, swamp, and other wetland areas. Such effects would extend to potential improvement in wildlife viewing opportunities and the overall recreational experience for users of restored Upper Mobile-Tensaw Delta habitats. The Proposed Action may also result in expanding or reopening areas with high aesthetic and scenic qualities to recreational users. Accordingly, implementation of invasive species management activities would result in temporary adverse effects, but would have no long-term adverse impacts on aesthetic and scenic qualities or values in the Action Area. Long-term effects would be beneficial.

4.2.3.1.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands owned by the state are the same as those proposed for use on lands acquired under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts to aesthetic and scenic qualities and values on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.2 Noise Impacts

4.2.3.2.1 No Action Alternative

The No Action Alternative would not result in any change in current or ambient noise levels in the Action Area since no restoration actions would be undertaken.

4.2.3.2.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition will not result in a change in current or ambient noise levels within the Action Area. Land acquired under this alternative would be passively managed, which may result in periodic site visits using vessels or vehicles and associated local and temporary changes in noise levels on or in the vicinity of such lands. Such impacts would be minor, periodic and occur in both the short- and long-term.

Hydrological Restoration - There would be a minor increase in noise levels at and in the vicinity of sites where hydrological restoration activities occur, for the duration of these construction activities from equipment, machinery, vehicles and laborers used. Locations proposed for restoration activities would be remote and generally outside of residential areas and areas where no noise ordinances would be applicable. Wildlife in the vicinity of construction activities may be temporarily impacted by increased construction noise, but these impacts would be short in duration. Noise impacts would be short-term, adverse, and limited to active periods of construction between sunrise and sunset.

Invasive Species Management and Revegetation activities are anticipated to have minor, short term noise impacts similar to those identified for the proposed hydrological restoration activities above.

4.2.3.2.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as those proposed for use on acquired lands under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts to noise levels on state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.3 Recreational Impacts

4.2.3.3.1 No Action Alternative

The No Action Alternative would not result in recreational impacts since no restoration actions would be undertaken.

4.2.3.3.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition may result in new or improved access to bottomland hardwood, riparian, and wetland habitats in the Action Area. Depending on the plans for management of an acquired site and other factors, new or improved access to resource-based recreational activities, such as for bird watching, canoeing, kayaking, fishing, and other similar activities, may result from the Proposed Action. Land acquisition and associated passive recreational use on acquired properties could result in long-term minor, beneficial impacts to recreation.

Hydrological Restoration - The noise and increased turbidity of surface waters arising from earth-moving activities during construction phase activities would be expected to discourage and decrease recreational activities in the immediate vicinity of a restoration area. Any such effect would be limited to the period of construction and should be minor. Further, during active construction periods, public use and access to restoration areas may be temporarily restricted. However, these restrictions would be temporary and minor. Additionally, once lands are restored, they would be available for public access and recreational use, in accordance with ADCNR regulations and guidelines. Over the long-term, restoration activities would be expected to increase the quality, productivity and quantity of swamp and bottomland hardwood forests in the Action Area and to generally enhance recreational use and enjoyment of resources associated with the restored areas. The Upper Mobile-Tensaw Delta habitat is a location for many recreational activities (e.g., fishing, hunting, bird watching, etc.) and habitat conservation and improvement in the Action Area would generally enhance these recreational uses. Because there are many

comparable substitute recreation areas readily available within the Upper Mobile-Tensaw Delta, however, changes in usage at any given future project site would likely be minor. Therefore, hydrological restoration would result in long-term, minor to moderate and beneficial impacts.

Invasive Species Management and Revegetation are anticipated to have minor, short-term impacts to recreation opportunities that are similar to those identified for the proposed hydrological restoration activities above. Invasive species manage would also result in similar long-term, minor to moderate beneficial impacts since these activities would be expected to generally enhance the quality of the habitat leading to similar benefits as described for hydrological restoration, above.

4.2.3.3.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands already owned by the state are the same as those proposed for use on acquired lands under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential impacts to recreation activities on or in the vicinity of state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.4 Public Health and Safety

4.2.3.4.1 No Action Alternative

The No Action Alternative would not result in any impacts to public health and safety since no restoration activities would be undertaken.

4.2.3.4.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

The Trustees do not anticipate an increased risk to the public of adverse health and safety effects from implementation of potential restoration activities under this proposed alternative.

Land Acquisition - Lands acquired and proposed for restoration activities would be remote, and generally outside of residential areas. Primary public uses in the vicinity of proposed restoration sites are likely to be industrial (manufacturing, logging, etc.), commercial fishing, and recreational, including fishing and hunting. Implementation of restoration activities on acquired lands could temporarily interfere with such uses in the vicinity of restoration sites, including when boats, barges, and associated equipment are being used for the transport or placement of restoration materials. However, these activities would be accompanied by the use of appropriate safety measures, thus conflicts with public uses and accidents would be avoided or minimized.

Hydrological Restoration -Projects involving construction and construction activities carry short term risks to workers from the operation of heavy equipment and from the transport and handling of project equipment and materials. All restoration activities would be conducted in accordance with applicable occupational and marine safety regulations and laws, including ADCNR health and safety protocols and procedures, so as to ensure the safety of all workers and monitors.

Bottomland hardwood forested habitats provide abundant breeding habitat for mosquitos and other potential biological organisms carrying vector-borne diseases, such as West Nile Virus. Hydrological modifications under this alternative are intended to improve and enhance floodplain habitats for the benefit of fish, wildlife, and other biota, which may also add to the abundance of mosquitos and other nuisance species in the Action Area. The Action Area already contains vast areas of bottomland hardwood forest habitat that currently provides breeding areas for mosquitos and supports nuisance species. Thus, the Trustees do not anticipate that the hydrological restoration activities under this alternative will result in a significant (or even noticeable) increase in mosquito or nuisance species populations within or in the vicinity of the Action Area.

Invasive Species Management and Revegetation activities are anticipated to have minor, short-term impacts to public health and safety. However, all herbicide application will be conducted by, or under the supervision of, staff with appropriate certification, which would limit potential safety issues associated with herbicide application.

4.2.3.4.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands owned by the state are the same as those proposed for use on acquired lands under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential health and safety impacts that would occur as a result of the proposed restoration activities on or in the vicinity of state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.5 Transportation Impacts

4.2.3.5.1 No Action Alternative

The No Action Alternative would not result in any transportation impacts since no restoration actions would be taken.

4.2.3.5.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition in the Action Area may result in new or improved public access to bottomland hardwood, riparian, and wetland habitats in the Action Area in the future.

Depending on the land management plans applicable to these public sites and other factors, the interest and ability of the public to access these areas for bird watching, canoeing, kayaking, and other similar activities may be enhanced and increased, and result in increased traffic in the vicinity of the future restoration site(s). Because of the remote and rural nature of potential restoration sites within the Action Area, however, any increase in site-specific recreational use is expected to be minor. If long-term changes to traffic are anticipated in the future as a result of the Proposed Action, further site- and project-specific NEPA analyses would be completed prior to project selection and implementation. The impacts of the Proposed Action on transportation, therefore, would be long-term, indirect, minor and adverse.

Hydrological Restoration - Additional minor impacts to land-based transportation in the vicinity of restoration sites in the Action Area are expected during the construction phase of hydrological restoration activities. Trucks would be used to transport construction equipment and workers to restoration sites. Other materials necessary to perform hydrological restoration activities would need to be transported over roads and marine waterways. Existing transportation networks and navigational channels would be utilized as much as possible. Hydrological restoration activities under this Draft RP/PEA are not expected to require hauling sediment away from restoration sites. Accordingly, transportation impacts would be short-term, indirect, adverse and minor.

Invasive Species Management and Revegetation activities are anticipated to have impacts to transportation that are similar to those identified for the proposed hydrological restoration activities above.

4.2.3.5.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands owned by the state are the same as those proposed for use on acquired lands under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential transportation impacts that would occur as a result of the proposed restoration activities on or in the vicinity of state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.6 Economic Impacts

4.2.3.6.1 No Action Alternative

The No Action Alternative would not result in any economic impacts within the Action Area since no restoration actions would be undertaken.

4.2.3.6.2 Habitat Enhancement and Restoration on Newly Acquired Lands Alternative

Land Acquisition - Purchases of parcels within the Action Area have the potential to result in minor, short-term, direct, beneficial impacts to the sellers of such lands and thus to the local economy if the sellers live and reside in the Action Area. Permanent public open space areas may also have the effect of increasing nearby residential land values, and increases in recreational activity in the Action Area may result in increased local sales in food service, hospitality, and recreation-related industries. Thus, the economic impacts of proposed land acquisitions under this alternative are expected to be long-term, direct and indirect, minor and beneficial.

Hydrological Restoration - There are sufficient labor resources in the immediate area to support the level of hydrological restoration activities anticipated for any site in the Action Area. Temporary increases in employment to support restoration activities will result in short-term, beneficial, minor impacts to the local economy. Further, hydrological restoration activities would enhance the value of restoration sites as permanent public open space areas, and thus contribute to the potential economic benefits described above from increased recreational activity. Therefore, similar to those that would flow from the purchase of lands, the impacts of hydrological restoration activities to the local economies would be both short- and long-term, direct and indirect, and beneficial.

Invasive Species Management and Revegetation activities are anticipated to have impacts on local economies in the Action Area that are similar to those identified for the proposed hydrological restoration activities.

4.2.3.6.3 Restoration on State Lands

The nature and scope of potential restoration actions proposed for use on lands owned by the state are the same as those proposed for use on acquired lands under the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative. Accordingly, the potential financial impacts that would occur as a result of the proposed restoration activities on or in the vicinity of state-owned lands would be the same as those identified above for the Habitat Enhancement and Restoration on Newly Acquired Lands Alternative.

4.2.3.7 Historic and Cultural Impacts

Historical and cultural resources encompass a wide range of assets or information that are part of or contribute to an understanding and appreciation of practices that define or represent our Nation's historic and cultural heritage. These resources include but are not limited to traditional, archeological, and built assets; historical properties in coastal communities; resources that are offshore including shipwrecks; archeological sites, structures, and districts; Native American resources protected by a U.S. laws and regulations; and land resources protected by federal, state, and/or local governments. Such land resources include: National Wildlife Refuges, National Parks, State Parks, State Wildlife Management Areas, City/County parks, land trusts and/or Marine

Protected Resources, National Estuarine Research Reserve System, National Marine Sanctuaries.

The Trustees recognize that the Action Area includes resources of this nature, which are described in Section 4.1.3.3 Cultural and Historic Resources. The restoration activities described and included in the Proposed Action are feasible to implement in this area without, or with only minimal, effects to any historic or cultural resources. The potential for impacts to historic and cultural resources is very location-dependent, however, and the Trustees recognize that it is not possible to identify and consider these potential impacts at the programmatic level. Accordingly, under the Proposed Action, a Phase I archaeological investigation and evaluation will be completed for each proposed restoration site prior to acquisition, as well as in the development and design of any future habitat enhancement activities that would be proposed under this plan. Under the Proposed Action, future restoration activities will be planned to avoid impacts to identified historical and cultural resources. Additionally, future restoration actions proposed under this plan will be subject to review under Section 106 of the National Historic Preservation Act of 1966 (NHPA) and NEPA, coordinated with the Alabama Historical Commission, and implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources. Coordination would continue, as necessary, during implementation of each future project.

4.2.3.8 Environmental Justice

Executive Order 12898 (Feb 11, 1994) requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. In a memorandum to heads of departments and agencies that accompanied Executive Order 12898, the President specifically recognized the importance of procedures under NEPA for identifying and addressing environmental justice concerns. The memorandum states that "each federal agency shall analyze the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA]." The memorandum also emphasizes the importance of NEPA's public participation process, in particular, directing that "each federal agency shall provide opportunities for community input in the NEPA process."

The Proposed Action includes two restoration alternatives, encompassing a range of activities that are proposed to conserve and restore habitats within the Action Area. The restoration alternatives proposed, in general, do not create a disproportionately high or adverse effect on any minority or low-income populations. Further, the use of restoration funds to implement future restoration projects would include the local expenditure of funds to design, engineer, manage, and carry out proposed projects and for the purchase or lease of equipment and materials. This may result in downstream economic activity in the Action Area and thus be generally beneficial to local economies. The level of benefit would vary by future project site, project-specific activities, the available opportunities

for locally sourcing labor and materials, and the nature of the economies local to the project site.

The Trustees' recognize it is not possible at the programmatic level to fully identify the potential consequences of the Proposed Action on local communities or economies. Accordingly, the Trustees will seek and consider input from local communities in future restoration planning under the Proposed Action. Specifically, the Trustees will provide notice to the public of proposed restoration projects, seek public comments on those proposals, and provide public access to the Administrative Record. Future restoration projects would also be subject to further environmental justice analysis.

4.2.4 Cumulative Impacts

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects, plans, and programs. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 C.F.R. §1508.7). As stated in the CEQ handbook, "Considering Cumulative Effects" (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful.

The cumulative effects analysis of the Proposed Action in this Draft RP/PEA is commensurate with its programmatic nature and the degree of direct and indirect effects anticipated from implementation of the programmatic approach. For the purpose of this analysis, the cumulative impact spatial boundary includes the Action Area (Figure 1) since that is where project types described in each alternative could likely occur. The Proposed Action includes two restoration alternatives, encompassing a range of potential activities intended to conserve and restore habitats within the Action Area in order to compensate the public for past Site-related injuries and losses to trust resources and services. The Proposed Action is anticipated to result in predominantly beneficial impacts to those same resources and services, to help return injured natural resources to baseline conditions, and to compensate for interim losses.

Implementing the alternatives as proposed and analyzed in this Draft RP/PEA would have no major adverse impacts on Upper Mobile-Tensaw Delta habitats, on adjacent lands and waterways, or on the natural resources within each. As described above, specific future projects may result in minor, short term adverse impacts and both short- and long-term beneficial impacts. When considered with other past, present, and reasonably foreseeable future actions within the Action Area, the Proposed Action is not anticipated to have adverse cumulative impacts. Direct and indirect adverse impacts, as discussed previously, are likely to be short term and, with the exception of periodic activities for invasive species management, to occur only during periods of active

construction activities. Periods of active construction will vary (weeks to a few months), but individually and cumulatively, would result in only short term impacts.

The resources or services that may be temporarily impacted during construction activities include air quality (by increased dust, noise, and exhaust fumes from construction equipment and pollution from prescribed burns), soils and sediments (direct disturbance), water quality (from temporary increases in turbidity), and noise (during active restoration implementation). Some short-term, minor impacts to fish, wildlife, and vegetation in the Action Area could occur, but impacts to these and other resources would be minimized by the use of BMPs (see Appendix B). Consequently, the minor and short-term impacts of restoration and habitat enhancement activities on air quality, soils and sediments, water quality, and noise have a low potential to result in cumulative significant impacts to these resources.

The Proposed Action is not expected to result in significant cumulative impacts on the human environment since it alone, or in combination with other current and future activities (described below) in the vicinity, would not change the larger current hydrological patterns of discharge, recreational use, economic activity or land-use in the Upper Mobile-Tensaw Delta. Future activities within the scope of the Proposed Action will enhance habitat that exists naturally in the area.

The Proposed Action is not being undertaken as part of any current comprehensive plan that is providing for the restoration of these habitats in the Mobile-Tensaw Delta. However, as described in Section 2.4- Existing Management Plans and Conservation Programs, other agencies and organizations are pursuing potential restoration actions in the Proposed Action Area. The cumulative impacts of these actions are expected to be moderate, long-term, direct and indirect and beneficial. Moreover, because the various restoration actions are not expected to be executed concurrently, the minor adverse impacts described for future projects developed under this programmatic approach and those expected to result from similar restoration projects are not anticipated to result in adverse cumulative impacts.

Other activities in the Mobile-Tensaw Delta that may be undertaken by other entities, private and public, vary widely. These may include activities on private parcels, such as logging, maintenance of utilities, construction of pile-supported camps, development of housing on adjacent uplands, and/or agriculture practices on adjacent uplands. This category of activity would be expected to result in short- and long-term adverse impacts within the Proposed Action Area. Maintenance of public utilities, such as power lines, and pipelines in easements within state or federally-owned lands will not be impeded as a result of the Proposed Action. Where these actions occur, they would result in adverse short- and long-term impacts within the Proposed Action Area. The ADCNR may undertake wildlife management activities on parcels under their control throughout the Proposed Action Area. This may include restoration activities similar to those proposed under this programmatic approach and others such as game plot planting and road maintenance. These activities would result in both short- and long-term adverse and beneficial impacts.

Outside of the Proposed Action, it is difficult to predict or foresee exactly what, when and where other actions may be undertaken by other entities within the Action Area that could combine with future restoration actions under this plan to produce cumulative impacts. The potential for cumulative impacts in combination with other actions would be evaluated by the Trustees in identifying and developing future site specific restoration projects consistent with this proposed plan.

The following actions related to the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) are known future actions that are both programmatic in nature and would not be expected to contribute to direct or indirect cumulative impacts within the nearterm. Future projects prioritized and selected for implementation under these programmatic plans may result in both short- and long-term adverse and beneficial impacts. Cumulative effects of these future projects would be considered under project specific plans prepared for future actions under this Draft RP/EA.

1. Watershed Restoration Plans
Watershed Management Plans will be developed for 19 coastal Alabama Watersheds, three of which overlap with the Action Area (Cedar Creek, Hall's Creek, and Rain's Creek). The planning processes will be designed to build community partnerships; characterize current conditions in each watershed; identify goals and solutions for reducing pollutants entering the bay, sound, and Gulf waters; and establish implementation programs that include a schedule, interim milestones, criteria to measure progress, a monitoring component, information/education programs, and identification of technical and financial assistance needed to implement the plans. This project involves studies and modeling to assess each watershed. Therefore, the action will not contribute to direct or indirect cumulative impacts when combined with the Proposed Action.

2. Gulf Coast Conservation Reserve Program
The Gulf Coast Conservation Reserve Program (GCCRP) will be established through USDA in Alabama for the purposes of protecting and restoring critical wildlife and improving water quality through the development of wildlife habitat, conservation, and forest management plans. The project activities will identify natural resource concerns on private property throughout the Gulf Coast Region. Wildlife habitat restoration and natural resource conservation opportunities will be prioritized on individual land units and plans will be written based on best available science to strategically target and prioritize conservation activities. Conservation planning and environmental due diligence efforts will be completed during this phase of the project. This project is programmatic in nature and therefore will not result in any direct or indirect cumulative impacts within the Action Area. Future projects implemented under this plan may result in short-term adverse cumulative impacts during implementation, but would be expected to result in long-term beneficial impacts.

In identifying and developing future site specific restoration projects consistent with this proposed plan, the Trustees will continue to take into consideration potential impacts of

climate-driven variables to restoration project success and incorporate methods to alleviate adverse consequences. For example, plans for habitat enhancement activities will consider the potential impacts of reduced soil water storage on project success.

5.0 MONITORING PROGRAM AND ADAPTIVE MANAGEMENT

Under the Proposed Action, project specific monitoring plans will be developed to evaluate the long-term success of each future restoration project. Each monitoring plan will include project specific performance standards and criteria appropriate to the future restoration action, guidelines for implementing corrective actions, and a schedule for the frequency and duration of monitoring. Standards and criteria to be included in those plans will fit within the general success criteria outlined in Table 8. The project specific monitoring plans developed by the Trustees will be made available to the public when completed.

The performance and functioning of specific future restoration projects may be affected by various causative factors, both natural and anthropogenic. Future restoration projects developed in accordance with this programmatic approach would be planned, designed, and implemented to be self-sustaining over time. However, after implementation, some active management or maintenance activities may be necessary to ensure the long-term sustainability of acquired lands and restored habitats. Future restoration projects developed under the Proposed Action would rely on an adaptive management approach that involves the analysis of monitoring results to identify potential problems occurring on acquired lands and restored areas, and the evaluation of those results to identify and implement measures appropriate to rectify those problems, within the constraints of available funding. Such actions may include, but are not limited to, mechanized earth work or supplemental plantings in areas that are not meeting vegetative success criteria. Activities considered for adaptive management would be those that fall within the range of future restoration activities and potential environmental consequences considered in this programmatic plan.

Table 8. General success criteria for restoration, enhancement, or acquisition of Mobile-Tensaw Delta forested wetland habitat (adapted from Allen et al. 2001).

General Success Criteria for Restoration, Enhancement, or Acquisition
Vegetation Successfully restored, enhanced, or acquired project areas shall contain: 1) An approved species composition represented by self-sustaining species population. Acceptable species include those listed in Tables 6, 7, and 8. 2) Adequate tree abundance in terms of overall density and spatial distribution throughout the project site. 3) Well-established trees primarily consisting of native species. 4) An adequate representation of undergrowth vegetation primarily consisting of native species.
Soil A successful restoration, enhancement, or site acquisition will be considered acceptable if it has the physical and chemical properties that are necessary for the successful reestablishment or self-sustainability of the desired forest ecosystem. At a minimum, forested wetland areas will contain hydric characteristics as listed in the definitions of the current U.S. Army Corps of Engineers Wetland Delineation Manual.
Hydrology Restored, enhanced, or acquired sites should have conditions similar to an undisturbed reference ecosystems, particularly in the frequency, duration, and seasonality of the flooding or soil saturation and the source of water.
Water Quality Water quality success will be achieved when measured water quality parameter values are similar to the reference site(s) and water quality is sufficient to sustain ecosystem integrity. Minimally, measured levels of parameters should not violate state or federal water quality standards.
Fish and Wildlife Habitat Because of the long-term nature of forested wetland restoration, the habitat for fish and wildlife will be considered restored or sufficiently enhanced or managed if the success criteria for vegetation, soils, and hydrology are met.

Table 9. Appropriate bottomland hardwood tree species (subcanopy and canopy) for restoration work in the Mobile-Tensaw Delta.

Acer negundo	*Halesia diptera*	*Populus deltoides*
Acer rubrum	*Hamamelis virginiana*	*Populus heterophylla**
Alnus serrulata	*Ilex cassine*	*Quercus falcata* var. *pagodifolia*
*Betula nigra**	*Ilex decidua*	*Quercus laurifolia*
*Carpinus caroliniana**	*Ilex opaca*	*Quercus lyrata*
Carya aquatica	*Juniperus silicola*	*Quercus nigra*
Celtis laevigata	*Liquidambar styraciflua*	*Quercus michauxii*
Chamaecyparis thyoides	*Liriodendron tulipifera*	*Quercus phellos*
Chionanthus virginicus	*Magnolia virginiana*	*Quercus virginiana*
Cornus foemina	*Morus rubra*	*Salix nigra*
Crataegus crus-galli	*Nyssa aquatica*	*Symplocos tinctoria*
Crataegus marshalli	*Nyssa biflora*	*Taxodium ascendens*
Crataegus spathulata	*Ostrya virginiana*	*Taxodium distichum*
Crataegus viridis	*Persea borbonia*	*Ulmus alata**
Cyrilla racemiflora	*Persea palustris*	*Ulmus americana*
Diospyros virginiana	*Pinus ellottii*	*Viburnum dentatum*
Fraxinus caroliniana	*Planera aquatica*	*Viburnum nudum*
Fraxinus pennsylvanica	*Platanus occidentalis*	

** Species only marginally appropriate, as the Mobile district is at the extreme edge of historical distribution.*

Table 10. Appropriate bottomland hardwood shrub species for restoration work in the Mobile-Tensaw Delta.

Alnus serrulata	*Forestiera acuminata*	*Lyonia lucida*
Arundinaria gigantea	*Hypericum galioides*	*Myrica cerifera*
Baccharis glomeruliflora	*Ilex amelanchier*	*Osmanthus americanus*
Callicarpa americana	*Ilex coriacea*	*Sabal palmetto*
Cephalanthus occidentalis	*Ilex glabra*	*Sabal minor*
Cornus amomum	*Illicium floridanum*	*Styrax americana*
Cornus foemina	*Itea virginica*	*Styrax grandifolia**
Crataegus aestivalis	*Leucothoe racemosa*	

** Species only marginally appropriate, as the Mobile district is at the extreme southern edge of historical distribution.*

Table 11. Appropriate herb species for bottomland hardwood restoration work in the Mobile-Tensaw Delta (from Allen et al. 2001).

Common Name	Scientific Name
Aquatic milkweed	*Asclepias perennis*
Small-spike falsenettle	*Boehmeria cylindrical*
Millet beakrush	*Rhynschospora miliacea*
Water pimpernel	*Samolus valerandi* spp. *Parviflorus*
Swamplily	*Crinum americanum*
Bugleweed	*Lycopus* spp.
Lizard's tail	*Saururus cernuus*
Ferns	*Osmunda, Woodwardia, Thelypteris* spp.
Small-fruit beggartick	*Bidens mitis*
Mexican water-hemlock	*Cicuta maculate*
Hairlike mock bishop-weed	*Ptilimnium capillacium*
Pickerl weed	*Pontederia cordata*
Smartweed spp.	*Polygonum* spp.
Bur-reed spp.	*Sparganium* spp.

6.0 BUDGET AND TIMELINE

The timeline for land acquisition and habitat enhancement is dependent on the availability of parcels in the Upper Mobile-Tensaw Delta, land price constraints, restoration feasibility, partnering opportunities, and other various factors. A tentative timeline for additional restoration planning, implementation, and monitoring is provided below. The Trustees anticipate using no more than approximately 10% of the total available restoration funds on restoration planning costs, and the remainder of funds on restoration design, permitting, implementation, project operation and maintenance, and monitoring.

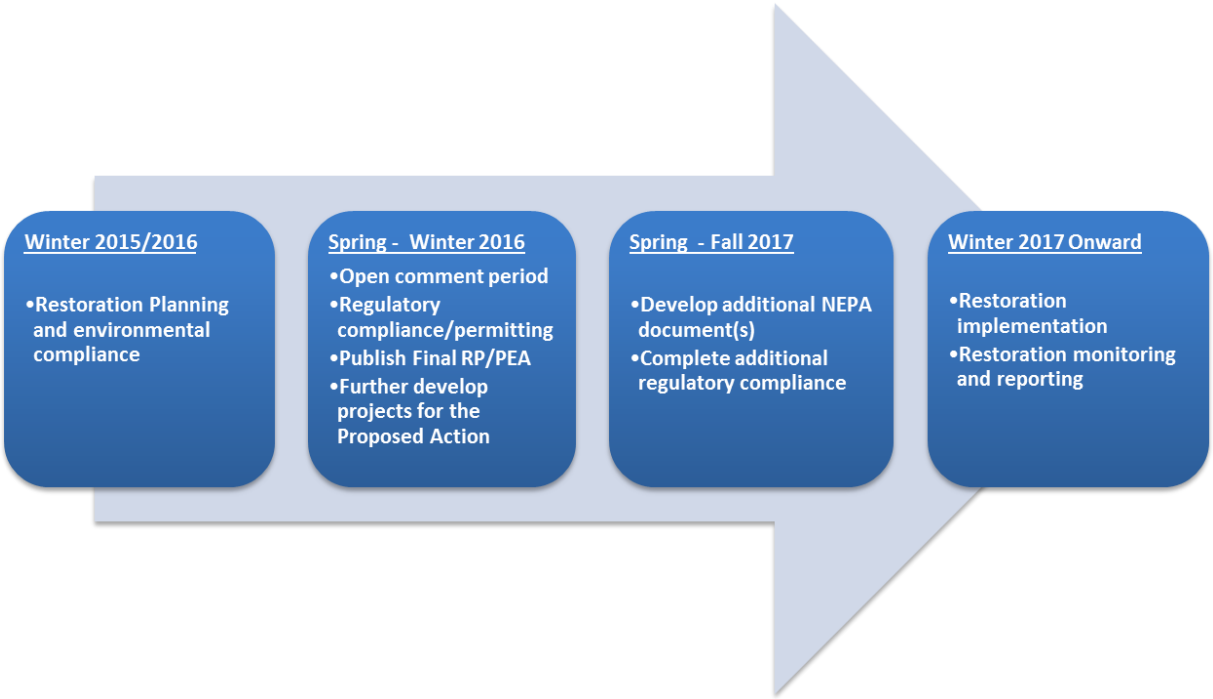

Figure 5. Tentative restoration planning, implementation, and monitoring timeline for the Ciba-Geigy Restoration Plan.

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APPENDIX A: STATUTES, REGULATIONS, AND POLICIES

This Draft RP/PEA was prepared jointly by the Trustees pursuant to their respective authority and responsibilities as natural resource Trustees under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. § 9601, *et seq*and other applicable federal or state laws and regulations, including Subpart G of the National Oil and Hazardous Substances Contingency Plan (NCP) (40 C.F.R. §§ 300.600 through 300.615) and DOI's CERCLA natural resource damage assessment regulations (43 C.F.R. Part 11) which provide guidance for this restoration planning process under CERCLA. As a designated Trustee, each agency is authorized to act on behalf of the public to protect and restore natural resources that have been injured at the Site.

Development of this Draft RP/PEA has also required consideration of a variety of other legal authorities and their potentially applicability to the Proposed Action. As appropriate to the programmatic nature of this plan, coordination and reviews to ensure compliance with other applicable laws and regulations have been initiated. The following summarizes key federal and state laws and the compliance status of the Proposed Action in this Draft RP/PEA. Restoration projects proposed in the future would remain subject to meeting all permitting and other environmental compliance requirements to ensure that all projects would be selected and implemented in accordance with all applicable laws and regulations.

A.1 Federal Statutes, Regulations, and Policies

Anadromous Fish Conservation Act
The Anadromous Fish Conservation Act (16 U.S.C. § 757a, *et seq*.) provides authority to conserve, develop, and enhance anadromous fishery resources.
Compliance: The Proposed Action would conserve and enhance anadromous fishery resources.

Clean Air Act
The Clean Air Act (42 U.S.C. § 7401, *et seq*.) directs EPA to set limits on air emissions to ensure basic protection of health and the environment. The fundamental goal is the nationwide attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Primary NAAQS are designed to protect human health. Secondary NAAQS are designed to protect the public welfare (for example, to prevent damage to soils, crops, vegetation, water, visibility and property).
Compliance: All construction activity would be done with conventional equipment in compliance with all local ordinances and National Ambient Air Quality Standards.

Clean Water Act
The Clean Water Act (33 U.S.C. § 1251, *et seq*.) is the principal law governing pollution control and water quality of the Nation's waterways. Section 404 of the law authorizes a permit program for the beneficial uses of dredged or fill material in navigable waters. The U.S. Army Corps of Engineers (USACE) administers the program.

Compliance: Coordination with the USACE would be completed pursuant to Section 404 of this Act before any site specific restoration action under this proposed plan could be undertaken. All joint federal/state permits would be obtained prior to the start of any site specific construction activities. All construction activity will be done in compliance with Section 404 of the law.

Coastal Zone Management Act

The goal of the federal Coastal Zone Management Act (CZMA) (16 U.S.C. § 1451, *et seq*., 15 C.F.R. Part 923) is to preserve, protect, develop and, where possible, restore and enhance the Nation's coastal resources. The federal government provides grants to states with federally approved coastal management programs. Section 1456 of the CZMA requires any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone to be consistent, to the maximum extent practicable, with the enforceable policies of federally-approved state management programs. Further, no federal license or permit may be granted without giving the State the opportunity to concur that the project is consistent with the State's coastal policies.
Compliance: The Federal Trustees believe the Proposed Action described in this Draft RP/PEA to be consistent with the enforceable policies of the federally-approved Alabama Coastal Area Management Program (ACAMP). The Federal Trustees submitted their determination of consistency with the ACAMP to the Alabama Department of Environmental Management (ADEM) on November 17th, 2016. Additional consistency reviews may be required pursuant to federal regulations (see 15 C.F.R. Part 930) when any site specific restoration action under this plan is proposed and before select actions could be undertaken, as may be required by the ACAMP.

Endangered Species Act

The federal Endangered Species Act (16 U.S.C. § 1531, *et seq*., 50 C.F.R. Parts 17, 222, 224) directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authority to further these purposes. Under the Act, NOAA National Marine Fisheries Service (NMFS) and USFWS publish lists of endangered and threatened species. Section 7 of the Act requires that federal agencies consult with these two agencies to minimize the effects of federal actions on endangered and threatened species.
Compliance*:* The Trustees would conduct necessary Section 7 consultations with NMFS and USFWS prior to implementation of any future restoration project proposed under this plan. Such consultations would be initiated before selection of a specific project, but may be completed and/or updated during a project's design phase.

Estuaries Protection Act

The Estuary Protection Act (16 U.S.C. § 1221-1226) highlights the values of estuaries and the need to conserve natural resources. It authorizes the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, to determine whether such areas should be acquired by the federal government for protection, to assess impacts of commercial and industrial developments on estuaries, to enter into cost-sharing agreements with states and subdivisions for permanent management of estuarine areas in their possession, and to encourage state and

local governments to consider the importance of estuaries in their planning activities related to federal natural resource grants.
Compliance*:* The restoration activities described in this Draft RP/PEA will provide broad scale benefits to estuarine resources.

Fish and Wildlife Conservation Act
The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. § 2901 and 50 C.F.R. § 83) provides for protection and management of non-game fish and wildlife and their habitats.
Compliance: The intent of NRDA restoration is restore, replace, enhance, and/or acquire equivalent natural resources (fish, wildlife, and their supporting habitats) and resource services as were injured by releases of hazardous substances. The Trustees believe the restoration activities described in the Draft RP/PEA will enhance habitats and fish and wildlife, thereby benefiting natural resources.

Fish and Wildlife Coordination Act
The Fish and Wildlife Coordination Act (16 U.S.C. § 661, *et seq*.) states that wildlife conservation shall receive equal consideration with other features of water-resource development. The Act requires federal permitting and licensing agencies to consult with NOAA/NMFS, USFWS, and state wildlife agencies before permitting any activity that in any way modifies any body of water to minimize the adverse impacts of such actions on fish and wildlife resources and habitat.
Compliance: NOAA and USFWS are joint federal natural resource trustees who have worked cooperatively on evaluating various restoration alternatives and in identifying the Proposed Action. For restoration projects to be implemented under this plan, the Trustees would be consulting with agency regulatory staff in the future during the Clean Water Act Section 404 permitting process to minimize any potential impacts to fish and wildlife resources and habitat.

Magnuson-Stevens Fishery Conservation and Management Act
The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. § 1801, *et seq*.) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104297), established a program to promote the protection of essential fish habitat (EFH) in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After EFH has been described and identified in fishery management plans by the regional fishery management councils, federal agencies are obligated to consult with the Secretary of the U.S. Department of Commerce with respect to any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH.
Compliance: The Proposed Action will not affect EFH; therefore, the Trustees are not consulting with NMFS on this Draft RP/PEA. Such consultations would be conducted for any restoration project proposed in the future under this plan that would affect EFH.

Marine Mammal Protection Act
The Marine Mammal Protection Act (16 U.S.C. § 1361, *et seq*.) establishes a moratorium on the taking and importation of marine mammals and marine mammal products, with exceptions for scientific research, allowable incidental taking, subsistence activities by

Alaskan natives, and hardship. The Act provides authority to manage and protect marine mammals, including maintenance of the ecosystem.
Compliance: West Indian manatee has the potential to occur in the Action Area. The Trustees will complete consultation with USFWS in compliance with the Marine Mammal Protection Act as specific restoration projects are identified.

Migratory Bird Treaty Act
The Migratory Bird Treaty Act (16 U.S.C. § 715, *et seq*.) provides for the protection of migratory birds. The Act does not specifically protect the habitat of these birds but may be used to consider time of year restrictions for activities on restoration sites where it is likely migratory birds may be nesting and/or to stipulate maintenance schedules that would avoid the nesting seasons of migratory birds.
Compliance: Consultation with the USFWS constitutes compliance with this Act. If future restoration activities under this plan are deemed to adversely impact migratory birds, appropriate measures will be implemented to avoid impacts.

National Environmental Policy Act
Congress enacted the National Environmental Policy Act (NEPA; 42 U.S.C. § 4321 *et seq*.) in 1969 to establish a national policy for the protection of the environment. NEPA applies to federal agency actions that affect the human environment. Federal agencies are obligated to comply with NEPA regulations adopted by the Council on Environmental Quality (CEQ). NEPA requires that an Environmental Assessment be prepared in order to determine whether the proposed restoration actions will have a significant effect on the quality of the human environment. If an impact is considered significant, then an Environmental Impact Statement (EIS) is prepared. If the impact is considered not significant, then a Finding of No Significant Impact (FONSI) is issued.
Compliance*:* The Trustees have integrated an analysis of the environmental consequences of the Proposed Action into this Draft RP/PEA to comply with NEPA and CEQ processes and requirements. This integrated process allows the Trustees to meet the public involvement requirements of NEPA and CERCLA concurrently. Further NEPA analysis, tiered to the programmatic analysis herein, will occur when specific restoration activities are identified and proposed. Based on the analysis described in this document, the Trustees do not believe an EIS will be required for any projects within the scope of the Proposed Action.

Preservation of Historic and Archeological Data Act
The purpose of the Preservation of Historic and Archeological Data Act of 1974, as amended, 16 U.S.C. § 469, *et seq.*) is to provide for the preservation of historic American sites, buildings, objects and antiquities of national significance, and for other purposes by specifically providing for the preservation of historical of archeological data which might otherwise be lost or destroyed.
Compliance*:* In the area proposed restoration activities could occur, the Trustees do not expect any restoration project to have an interaction with historic sites, buildings, objects and antiques of national significance. However, coordination with the Alabama Historic Commission (AHC) would occur in the future to ensure that specific restoration actions under this plan avoid impacting any such data.

Rivers and Harbors Act
The federal Rivers and Harbors Act (RHA; 33 U.S.C. § 401, *et seq.*) regulates development and use of the Nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the USACE with authority to regulate discharges of fill and other materials into such waters.
Compliance*:* Coordination with the USACE would be completed pursuant to Section 10 of this Act before any site specific restoration action under this proposed plan could be undertaken. Future restoration actions under this plan that require Section 404 Clean Water Act permits are likely to meet the requirements of the USACE's Nationwide and/or General Permits. All joint federal/state permits would be obtained prior to the start of any site-specific restoration activities, including for compliance with Section 10 of the law where applicable.

Information Quality Guidelines issued pursuant to Public Law 106-554
Information disseminated by federal agencies to the public after October 1, 2002, is subject to information quality guidelines developed by each agency pursuant to Section 515 of Public Law 106-554 that are intended to ensure and maximize the quality of such information (i.e., the objectivity, utility and integrity of such information).
Compliance: This Draft RP/PEA is an information product covered by information quality guidelines established by NOAA and DOI for this purpose. The quality of the information contained herein is consistent with the applicable guidelines.

Executive Order 11514 Protection and Enhancement of Environmental Quality, as amended by Executive Order 11911 Relating to Protection and Enhancement of Environmental Quality
Executive Orders 11514 and 11991 require that federal agencies monitor, evaluate and control their activities to protect and enhance the quality of the Nation's environment to sustain and enrich human life; inform the public about these activities; share data gathered on existing or potential environmental problems or control methods; and cooperate with other governmental agencies.
Compliance: Releasing this Draft RP/PEA , and any subsequent proposed site specific plans for restoration for public review and comment is consistent with the intent of this Executive Order.

Executive Order 11990 Protection of Wetlands
Executive Order 11990 (40 C.F.R. § 6392 (a) and Appendix A) requires federal agencies to avoid the adverse impacts associated with the destruction or loss of wetlands, to avoid new construction in wetlands if alternatives exist, and to develop mitigative measures if adverse impacts are unavoidable.
Compliance: The Proposed Action includes alternatives for restoration that will preserve and enhance existing wetlands and restore wetlands degraded by past logging, forestry, agricultural, and fire exclusion activities and practices. No long-term, significant adverse impacts to wetlands are associated with the Proposed Action.

Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and Executive Order 12948 Amendment to Executive Order No. 12898

Executive Orders 12898 and 12948 require each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations.
***Compliance*:** The Trustees have concluded that no low income or ethnic minority communities would be adversely affected by any restoration activities that would occur under the Proposed Action.

Executive Order 12962 Recreational Fisheries

Executive Order 12962 requires that federal agencies, to the extent permitted by law and where practicable, and in cooperation with states and tribes, improve the quantity, function, sustainable productivity, and distribution of the Nation's aquatic resources for increased recreational fishing opportunities.
Compliance: The restoration activities that would occur under the Proposed Action will benefit fish populations in ways that could improve recreational fisheries.

Executive Order 13112 Invasive Species

The purpose of Executive Order 13112 is to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.
Compliance: The Proposed Action includes activities for management of invasive species. Surveys for invasive species and actions to control them, should they be present on acquired or state-owned restoration areas, would be performed.

Executive Order 13653 Preparing the United States for the Impacts of Climate Change

The purpose of Executive Order 13653 is to give federal agencies direction to support community-based preparedness and resilience efforts by establishing policies and prioritizing investments that promote preparedness, protect critical infrastructure and public resources, support science and research needed to prepare for climate impacts, and ensure that federal operations and facilities continue to protect and serve citizens in a changing climate. Specifically, Section 3 and 5 of Executive Order 13653 call for federal agencies to manage their lands and waters for climate preparedness and resilience and plan for climate change related risk.
***Compliance*:** Under the Proposed Action, the Trustees would consider regional climate information in planning and design of future habitat restoration projects that should allow for more resilient habitats in the face of changing climate.

A.2 State of Alabama Statutes, Regulations, and Policies

State permits may be required to implement certain activities within the proposed restoration alternatives, depending upon the exact nature of proposed work. Proposed restoration activities in wetland and floodplain habitats would need to ill meet the

requirements of the USACE Nationwide and/or General Permits. These permits require Coastal Zone Management reviews and Water Quality Certifications from the Alabama Department of Environmental Management (ADEM). Restoration activities of the ADCNR are considered a Permissible Use under the ADEM Division 8 Coastal Program rules.

Local Laws

Local permits are not required for restoration alternatives and activities included in the Proposed Action. .

APPENDIX B: Best Management Practices (BMPs)

The following list of BMPs is a non-exhaustive list of potential BMPs that may be used for certain project types. The exact types of BMPs used for each future project will be evaluated and implemented on a project-by-project basis.

1. Water Quality BMPs

- Restricting heavy equipment use to the minimum time needed to achieve restoration objectives;
- Requiring the use of low-ground pressure tracked and/or wheeled vehicles to avoid rutting soils;
- Flagging authorized restoration areas to prevent impacts outside of designated areas;
- Restricting equipment access to designated corridors;
- Monitoring of vegetation regrowth to prevent excessive erosion in restored areas; and.
- Implementation of corrective actions in areas identified as experiencing excessive erosion by installation of straw bale barriers, straw wattles, or silt fence.

2. Invasive Species Management BMPs

- Use of a certified applicator;
- Use of herbicides approved for use within wetlands; and,
- Deployment of straw wattles to trap sediment.

3. Revegetation BMPs

- Where planting is required, use native plants from local sources.

4. Reptiles and Amphibian BMPs

- Avoid suitable habitat during all construction activities and do not permanently alter hydrology of the area. Avoid eliminating connectivity between suitable ponds.
- Use silt fencing to prevent sedimentation or erosion of the project site into ponds.

5. Noise BMPs

- Limit construction activities to the hours between sunrise and sunset.
- Limit idling vehicles to the maximum extent practicable