



The Louisiana Regional Restoration Planning Program

DRAFT
Programmatic Environmental Impact Statement

May 2003

Louisiana Department of Environmental Quality
Louisiana Department of Natural Resources
Louisiana Department of Wildlife and Fisheries
Louisiana Oil Spill Coordinator's Office, Office of the Governor
National Oceanic and Atmospheric Administration
U.S. Department of the Interior



UNITED STATES DEPARTMENT OF COMMERCE
Office of the Assistant Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

APR 25 2003

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act of 1969 (NEPA), we enclose for your review the Draft Programmatic Environmental Impact Statement (DPEIS) for the Louisiana Regional Restoration Planning Program (RRP Program). This document is both a DPEIS and the RRP Program description (40 CFR Part 1506.4¹). The proposed action is to establish and implement the RRP Program. The DPEIS is being developed pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 et seq., and its implementing regulations, 40 CFR Parts 1500-1508.

Federal and Louisiana natural resource trustees have developed a statewide comprehensive RRP Program to assist the natural resource trustees in carrying out their responsibilities for discharges or substantial threats of discharges of oil (referred to as an "incident"). The RRP Program is described in this DPEIS and further defined in individual Regional Restoration Plans (RRPs) that will be prepared for each of nine regions in the State of Louisiana. The goals of this statewide program are to: expedite and potentially reduce the cost of the natural resource damage assessment (NRDA) process; provide for consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and, increase restoration of lost natural resources and services.

This document reflects the work of the RRP Program workgroup made up of federal and state trustee which include the: National Oceanic and Atmospheric Administration; U.S. Department of the Interior (cooperating agency); Louisiana Oil Spill Coordinator's Office, Office of the Governor (cooperating agency); Louisiana Department of Natural Resources; Louisiana Department of Environmental Quality; and Louisiana Department of Wildlife and Fisheries. It also reflects the input and comments that were received during both informal and formal scoping process.

The DPEIS is also available at the following website: <http://www.darp.noaa.gov/>. Two public meetings to receive comments on the DPEIS will be held in June. Public notice will be provided as to the date, time and location for the meetings.

¹ 40 CFR 1506.4 Combining documents. Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork.



Any written comments or questions should be submitted by close of business on July 9, 2003 to:

William Conner, Chief
Damage Assessment Center,
Office of Response and Restoration/NOS
National Oceanic and Atmospheric Administration
1305 East-West Highway, SSMC#4, 10th Floor,
Silver Spring, MD 20910
or faxed to (301) 713-4389

Also, one copy of your comments should be sent to me at the U.S. Department of Commerce,
NOAA/SP, Room 6121, 14th and Constitution, NW, Washington, DC 20230.

Sincerely,

A handwritten signature in cursive script that reads "James P. Burgess III". The signature is written in black ink and includes a small flourish at the end.

James P. Burgess III
NEPA Coordinator

Enclosure

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EXECUTIVE SUMMARY

This document is both a Draft Programmatic Environmental Impact Statement (DPEIS) and the Louisiana RRP Program (RRP Program) (40 CFR Part 1506.4¹). The proposed action is to establish and implement the RRP Program. The PEIS is being developed pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 et seq., and its implementing regulations, 40 CFR Part 1500.

1.0 Introduction

Federal and Louisiana natural resource trustees have developed a statewide comprehensive RRP Program to assist the natural resource trustees in carrying out their responsibilities for discharges or substantial threats of discharges of oil (referred to as an “incident”). The RRP Program is described in this DPEIS and further defined in individual Regional Restoration Plans (RRPs) that will be prepared for each of nine regions in the State of Louisiana. The goals of this statewide program are to: expedite and potentially reduce the cost of the natural resource damage assessment (NRDA) process; provide for consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and, increase restoration of lost natural resources and services.

The Oil Pollution Act of 1990 (OPA), 33 USC 2701 et seq., and the Louisiana Oil Spill Prevention and Response Act of 1991 (OSPRA), La. Rev. Stat. 30:2451 et seq. are the principal federal and state statutes, respectively, authorizing federal and state agencies and tribal officials to act as natural resource trustees for the recovery of damages for injuries to natural resources and services resulting from incidents in Louisiana. The RRP Program is being established to address incidents under OPA and OSPRA. The RRP Program does not address injuries from releases of hazardous substances under the Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA), 42 USC 9601 et seq., the Park System Resources Protection Act, 16 USC § 19jj et seq., or physical injuries to resources under the National Marine Sanctuaries Act, 16 USC 1431 et seq., should a sanctuary be designated in the State of Louisiana.

The development of the RRP Program has been a coordinated effort between state and federal natural resource agencies, local governments, and the public. The RRP Program will be jointly administered and used by the trustees to assist in carrying out their natural resource trust mandates under OPA and OSPRA.

Legal Mandates and Authorities

The RRP Program is required to be established in accordance with La. Rev. Stat. 30:2480.1, which states that:

“To assist in making the natural resource damage assessment process more efficient, the Regional Restoration Planning Program encompassing the entire geographic area of the state, is established in the office of the oil spill coordinator. The office of the oil spill coordinator shall develop and implement the program in coordination with the state natural resource trustees.”

¹ 40 CFR 1506.4 Combining documents. Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork.

Broad guidelines and the basic requirements of OPA provide the necessary direction for developing RRP. These guidelines and requirements are contained in 15 CFR 990.

NRDA Trustees

Under OPA, 33 USC 2706(b), and the National Contingency Plan (NCP), 40 CFR 300.600, certain federal and state agencies and tribal authorities are designated natural resource trustees for natural resources and services injured by an incident. Additional authority was granted to the state trustees under Louisiana's OSPRA, La. Rev. Stat. 30:2451 *et seq.* As a designated trustee, each trustee is authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages, and to plan and implement actions to restore natural resources and resource services injured or lost as the result of an incident.

The federally designated natural resource trustees include the U. S. Department of Commerce (NOAA), U.S. Department of the Interior (DOI), U.S. Department of Agriculture (USDA), U.S. Department of Energy (DOE), U.S. Department of Defense (DOD), and the federally recognized tribes. On the state level, the natural resource trustees include: LOSCO; Louisiana Department of Natural Resources (LDNR); Louisiana Department of Environmental Quality (LDEQ); and Louisiana Department of Wildlife and Fisheries (LDWF) have been entrusted with this responsibility.

Setting

Louisiana is bordered by Texas to the west, Arkansas to the north, Mississippi to the east, and the Gulf of Mexico to the south. The statewide comprehensive RRP Program will encompass the State of Louisiana and state and federal waters extending offshore Louisiana, from the 1981 shoreline determined by the U.S. Supreme Court to the boundaries of the Federal/Louisiana territorial seas and the extent of the EEZ.

2.0 Purpose and Need for Action

Louisiana's economy traditionally has been based on the State's natural resources. Both renewable (e.g., fishing, forest products) and non-renewable (e.g., oil, natural gas) resources are important, and the industries associated with each have co-existed for years. Louisiana, and in particular its coastal and wetland regions, is of significant value to the Nation -- contributing greatly to the Nation's fisheries, wild fur and hide harvest, providing wintering grounds for migratory bird populations, and buffering the destructive impacts of hurricanes, storms, and floods. At the same time, 18% of the Nation's oil production and 24% of the gas production comes from coastal Louisiana (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation Authority of 1998, 16 USC 3951 *et seq.*).

Although Louisiana's oil and gas industry tries to avoid adverse impacts on renewable natural resources, injuries do occur as a result of incidents. Between 1991 and 2000, Louisiana had 18.65% of the total incidents in the nation and 21.1% of the volume. (U.S. Coast Guard [USCG] Spill Release Compendium at <http://www.uscg.mil/hq/g-m/nmc/response/stats/aa.htm>) The cumulative impact of these incidents on fish, wildlife and the environment can be significant and adversely affect the industries and communities depending on natural resources for commerce and recreation.

The high spill probability, both in frequency and magnitude, and wide expanse of fragile and sensitive resources that could be impacted present a true challenge to the federal and Louisiana trustees when it comes to restoring natural resources held in public trust

Purpose of the Proposed Action/Regional Restoration Planning Program

The objective of the statewide comprehensive RRP Program including RRP is to establish an institutional framework and procedures that will enable the trustees to select and implement projects that compensate the public and environment for losses of natural resources and services from incidents in an efficient and predictable manner. In addition, the RRP Program seeks to provide increased flexibility to the trustees and the Responsible Parties (RPs) relative to the mechanisms through which NRDA cases are settled. The use of RRP will help expedite the assessment, settlement and/or restoration implementation, while simultaneously minimizing associated costs. In addition, development of RRP requires the examination of restoration alternatives across an entire region and may facilitate linkages with other regional or watershed objectives. The benefits of comprehensive, region-wide planning will accrue not only to the parties involved in the assessments, but also to the communities depending on natural resources for commerce and recreation.

Specifically, the RRP Program identifies the statewide RRP Program structure, the decision-making process, and the criteria that will be used to select the restoration project(s) that restore the natural resources injured by a given incident.

As part of the RRP Program development, the trustees: 1) conducted a nexus analysis to identify one or more appropriate restoration types for each of the “potentially injured resources/services”, 2) developed restoration type screening criteria to assist in the selection of the most appropriate restoration type(s) to restore resources/services injured during a given incident, and 3) developed screening criteria to select the most appropriate restoration project(s) during a given incident.

To further streamline the NRDA process, the trustees conducted an analysis of the environmental impacts associated with the implementation of the restoration types identified in the RRP Program by evaluating the impacts of the restoration techniques commonly used to implement the restoration types. The document provides an environmental analysis of the RRP Program restoration types. The discussion is necessarily broad and generalized to the technique on which the analysis has been performed, but provides the level of detail necessary to allow “tiering” from this document to subsequent environmental documentation under NEPA concerning the environmental impacts of implementing certain restoration types. The environmental impacts of specific restoration projects will be addressed specifically in subsequent NEPA documents when the projects are known.

There will be circumstances in which the trustees may do restoration planning outside of the context of the RRP Program due to the specific conditions of the incident. Additionally, there may be cases in which restoration types and the attending analysis from the RRP Program, as well as restoration projects from the RRP, will be used to address certain injuries from an incident; and restoration planning outside of the context of the RRP Program will be carried out for other injuries from the incident.

The state will be divided into nine planning regions and a RRP will be prepared for each region. The RRP will be consistent with this programmatic EIS but also will identify the natural resources and/or services that could potentially be impacted by an incident and the restoration projects that are available for implementation within a given region.

The RRP Program will be jointly administered and used by the state and federal trustees to assist in carrying out their natural resource trust mandates under OPA and OSPRA.

The first RRP will be done for Region #2.

3.0 Alternatives

The “No Action Alternative” is to continue to carry out NRDA in the State of Louisiana using the NRDA process and current practices below. The “Environmentally Preferred Alternative” is the statewide comprehensive RRP Program and its components are described in relation to the NRDA process and the goals and objectives of establishing the RRP Program.

The NRDA process as described by implementing regulations and guidance both under OPA and OSPRA will not change as a result of the RRP Program. The trustees are proposing to further institutionalize an existing process, as well as identify ways to expedite and further define the specific steps of that process, within the requirements of the OPA and OSPRA NRDA regulations.

No Action Alternative

Both state and federal NRDA regulations provide for a step-by-step process for trustees to determine injuries, assess damages, and develop and implement restoration projects that compensate the public for injuries to natural resources harmed by an incident.

The No Action Alternative is defined as continuing to implement the NRDA process without the institution of the RRP Program. The No Action Alternative is used as a basis for comparison with the RRP Program. The following are the major phases of the NRDA process:

- ♦ Pre-assessment phase;
- ♦ Restoration planning phase; and
- ♦ Restoration implementation phase.

The description below of the NRDA process is intended to provide the context for the comparison of the No Action Alternative and the RRP Program Alternative.

Pre-assessment Phase – The purpose of the Pre-assessment Phase is to determine if trustees have the jurisdiction to pursue restoration under OPA, and, if so, whether it is appropriate to do so.

Restoration Planning Phase – The purpose of the Restoration Planning Phase is to evaluate potential injuries to natural resources and service losses and use that information to determine the need for and scale of restoration actions. The Restoration Planning Phase provides the link between injury and restoration. The Restoration Planning Phase has two basic components: injury assessment, and restoration selection.

Restoration Implementation Phase – The Restoration Implementation Phase occurs after the DARP is presented to the RPs to implement or fund the trustees’ costs of implementing the DARP, therefore providing the opportunity for settlement of the damage claim without litigation. Should the RPs decide to decline to settle the claim, trustees are authorized to bring a civil action for damages in court or to present the claim² to the Federal OSLTF or the State OSCF for such damages. If the RPs choose to implement the restoration actions

² In the absence of a viable RP (e.g., where the RP is unknown, bankrupt or is not responsible due to a valid defense) or when a viable RP fails to respond to a demand letter after 90 days, the trustees have the option of going to the OSLTF and/or OSCF to seek monies to implement the restoration actions required for that case.

detailed in the DARP, then the trustees provide project oversight that is funded by the RPs. Otherwise the trustees will implement the project.

RRP Program/Environmentally Preferred Alternative

The RRP Program will define, expand, and/or refine several important components beyond the existing NRDA process. The following are the major components:

- ◆ Potentially injured resources/services;
- ◆ Restoration types (including nexus analysis, and environmental consequences analysis of implementation);
- ◆ Settlement alternatives;
- ◆ Screening criteria; and
- ◆ Regional boundaries of the RRs.

The descriptions below of the program components are programmatic and are not intended to define the case-specific actions or outcomes that may be implemented under the RRP Program.

Potentially Injured Resources/Services – The RRP Program defines those natural resources and services in Louisiana that are likely to be or are anticipated to be injured (i.e., at risk) by incidents as “potentially injured resources/services.” Identification of these “potentially injured resources/services” will facilitate the development of the RRs, provide more timely detail to the pre-assessment phase and facilitate the expedient development of restoration alternatives during the restoration planning phase. The “potentially injured resources/services” are listed under three broad categories: coastal, inland, and statewide:

- ◆ Coastal
 - ◆ Herbaceous Wetlands
 - ◆ Forested Wetlands
 - ◆ Beaches/Shorelines/Streambeds
 - ◆ Oyster Reefs (and other reefs)
 - ◆ Water Column Organisms
- ◆ Inland
 - ◆ Herbaceous Wetlands
 - ◆ Forested Wetlands
 - ◆ Beaches/Shorelines/Streambeds
 - ◆ Oyster Reefs (and other reefs)
 - ◆ Water Column Organisms
- ◆ Statewide
 - ◆ Birds
 - ◆ Wildlife
 - ◆ Recreational
 - ◆ Cultural

Restoration Types – The RRP Program identifies restoration types that are appropriate for the restoration of injuries for each identified “potentially injured resources/services” in the RRP Program. These restoration type categories are:

- ◆ Creation/Enhancement
- ◆ Physical Protection of Habitat
- ◆ Acquisition/Legal Protection

- ◆ Stocking of Fauna
- ◆ Physical Protection of Fauna
- ◆ Restoration of Recreation Resources
- ◆ Restoration of Cultural Resources

The RRP Program describes the specific restoration type(s) in each restoration type category that is appropriate for the restoration of injuries to each identified “potentially injured resources/services” in the RRP Program. This determination of the range of appropriate restoration types is based on the nexus analysis. The trustees have also conducted an environmental consequences analysis on the restoration types. Carrying out both analyses in the PEIS will result in both technical, process and NEPA compliance efficiencies at the case level during the restoration planning phase. The trustees will be able to “tier” the case specific DARPs and environmental assessments off of the PEIS.

The trustees also have developed restoration type selection criteria that will further assist in determining which of the various restoration types identified will be most appropriate to restore the injured resources/services during a given incident. It is anticipated that the criteria will also provide a level of predictability to the public and affected parties regarding restoration project selection. Projects in each RRP will be classified by restoration type in order to facilitate the determination of the nexus between injuries and selection of specific restoration projects, thereby allowing the process of evaluating and selecting preferred restoration projects to be streamlined.

Settlement Alternatives – The RRP Program describes a number of additional case settlement alternatives that will assist the trustees and RPs in negotiations to resolve RP liabilities for incidents at the end of the restoration planning phase. These additional settlement alternatives generally represent different ways of resolving liability from an incident under one or the other (or both) of the two options: RP implemented restoration; or RP cash out and trustee implemented restoration. These settlement alternatives also may provide opportunities for implementing restoration projects more quickly and cost-effectively; pooling settlements to implement larger projects than could be accomplished by using individual settlements, and potentially encompassing landscape scale efforts.

Screening Criteria – In order to improve consistency, predictability, and accountability to the NRDA decision-making process, the trustees identified and defined project selection and other screening criteria to be used in implementing the RRP Program. These criteria are for:

- ◆ Selection of restoration projects to be incorporated into each RRP;
- ◆ Selection of projects for implementation under the Non-Project-Specific Cash Out alternative; and
- ◆ Project selection/screening of specific restoration actions required for a case.

Regional Boundaries of the RRPs – The RRP Program establishes nine regions for which regional plans will be developed. There will be four coastal regions based on the Coast 2050 Plan regions and five inland regions based on LDEQ’s defined watersheds. For each region, an individual RRP will be produced. Each RRP will identify the resources and/or services that could potentially be affected by an incident and the restoration projects that are available for implementation within that region. The first RRP will be done for Region 2. Establishing regions will also provide an

administrative tool to, among other things, facilitate tracking of cases, settlement accounting, restoration, monitoring, etc.

4.0 Evaluation of Alternatives

In evaluating the programmatic aspects of the “RRP Program/Environmentally Preferred Alternative” versus the “No Action Alternative,” a comparative analysis has been done determining the relative programmatic consequences of implementing the RRP Program or not.

RRP Program/Environmentally Preferred Alternative

As described above, it is anticipated that the RRP Program will achieve the following:

- ◆ Expedite and potentially reduce the cost of the NRDA process;
- ◆ Provide greater consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and
- ◆ Increase restoration of lost natural resources and services.

To expedite and make the NRDA process more cost-effective, the RRP Program proposes to shorten the restoration planning phase of the NRDA process through the development of individual RRP, which will identify appropriate restoration projects subjected to public review prior to incidents occurring. In addition, the RRP Program will help to inform the selection of restoration projects by identifying in advance the types of restoration that may be suitable to restore those resources and services likely to be injured by incidents in Louisiana. Further, through the development of a PEIS for the RRP Program and “tiering” the RRP and case specific DARPs from the information and analysis provided in the PEIS, the NEPA process for the NRDA cases will be streamlined significantly. It is also anticipated that model documents (including DARPs, consent decrees, Notice of Intents (NOIs), etc.) will be developed under this program, to provide more efficiencies and lower the costs of carrying out NRDA. Although the RRP Program will require upfront costs to identify restoration projects in advance and develop planning documents, economies of scale will allow overall implementation costs to be lower.

Consistent application of the RRP Program project selection criteria will enhance the predictability, consistency, and accountability of the decision-making process. Flexibility will be increased through the introduction of additional settlement alternatives.

It is anticipated that describing the NRDA process in greater detail will enable the public and affected entities to participate more fully in restoration planning for incidents. First, the RRP Program identifies resources that are likely to be injured from an incident and what restoration type is appropriate to restore the resources/services that were injured or lost. It also provides the rationale for how those decisions were made. The public and affected parties will have an opportunity to review the restoration projects by restoration type that are available in a specific region to restore resources/services injured in that region prior to an incident occurring. By describing in detail each step and the criteria used in the NRDA process, the public and affected parties will understand the trustees’ roles and rationale for their decisions, thereby improving the ability of interested parties to participate in the process.

Finally, by streamlining the NRDA process and making it more efficient the costs to both the trustees and RPs will be lowered, restoration of injured resources will be increased, and most importantly, the public will be made whole more quickly.

Summary of Benefits

The RRP Program, including the RRP, will benefit the public, industry, and natural resource trustees by:

- ◆ Providing greater opportunities to make the public and the environment whole for injuries to trust resources/services;
- ◆ Expediting restoration of injured resources/services from oil incidents;
- ◆ Reducing the cost of restoration planning and implementation;
- ◆ Pooling of individual case recoveries to provide for implementation of larger, more ecologically significant restoration projects;
- ◆ Providing for more consistency and predictability through detailing the NRDA process, thereby reducing uncertainty to the public and industry;
- ◆ Improving coordination between restoration activities under the NRDA mandates and other restoration efforts in the State;
- ◆ Enhancing the capability for trustees to restore resources/services injured by oil incidents for which there is no viable RP;
- ◆ Maximizing opportunities for partnering among RPs, trustees, and other public and private restoration efforts; and
- ◆ Increasing opportunity for public participation in the NRDA process through pre-incident planning.

5.0 Environmental Consequences

The description of environmental consequences of the “No Action Alternative” compared to the “RRP Program/Environmentally Preferred Alternative” is based on the description of the programmatic benefits described above and is necessarily generalized. The exact manner in which the implementation of the “RRP Program/Environmentally Preferred Alternative” will affect the environment will be determined largely by the implementation of the program as it applies to specific cases. This analysis does not attempt to distinguish between all possibilities as to how the trustees may implement the “RRP Program/Environmentally Preferred Alternative” as it applies to specific cases. Instead this analysis simply assesses likely impacts at a statewide scale.

Under OPA and OSPRA, the selection of restoration projects to be implemented as part of a specific case is subject to NEPA and all relevant laws, regulations, etc., that are applicable. This is the case whether the No Action Alternative or the RRP Program is selected.

The number of cases and speed of their resolution through implementation of restoration will determine the actual beneficial impact of the program. On a statewide, landscape scale, substantial impacts cannot be expected for a number of years, but locally, landscape impacts may be evident sooner. In a geographic sense, the impact of the RRP Program can be expected to be most prominent and most quickly realized in Region 2 which is the region with the highest frequencies of incidents.

Direct and Indirect Impacts

The environmental resource impacts and social and economic impacts are presented below on a programmatic level. The major differences between the impacts of the No Action Alternative and the “RRP Program/Environmentally Preferred Alternative” are ones

of degree or proportion. Therefore, the beneficial environmental impacts and lack of potentially significant adverse environmental impacts and economic and social impacts are similar.

Beneficial Impacts

Compared to the No Action Alternative, it is anticipated that the amount of restoration accomplished under the “RRP Program/Environmentally Preferred Alternative” will be larger, accomplished more quickly and generally at a larger scale, with more public participation, and at a lower cost to the trustees and RPs. The “RRP Program/Environmentally Preferred Alternative” will also improve coordination with other restoration efforts in the state and maximize opportunities for partnering. Therefore the trustees expect that the beneficial impacts of the “RRP Program/Environmentally Preferred Alternative” will be greater than those of the No Action Alternative.

Direct

Both alternatives share the goal of making the public and the environment whole for injuries to trust resources/services from incidents. Restoration actions taken by the trustees to return injured resources and habitats to baseline and compensate the public for interim losses will have long-term and significant beneficial impacts on both the physical environment and biological resources impacted by incidents. Whether restoration occurs at the site of the incident or off-site, restoration under NRDA is required to create, protect, or enhance resources and habitats, and therefore it serves to directly benefit those types of resources and habitats that are the focus of restoration actions.

Restoration of resources/services that are of cultural value or support economic activities, such as recreation, tourism, commercial fishing, etc., will also be impacted in a beneficial way by the restoration of those resources/services on which they depend.

Indirect

The restoration of resources/services injured by incidents will have foreseeable indirect beneficial impacts to the other parts of the physical environment, biological resources, cultural resources, or related economic activities. For example, when addressing an injury related to one type of service flow from a resource by restoring that resource, usually all service flows related to that resource are restored or enhanced.

Potentially Significant Adverse Environmental Impacts

At a programmatic level, it is anticipated that under the “RRP Program/Environmentally Preferred Alternative” there will be more restoration of injured resources/services and restoration will be accomplished more quickly. Therefore, there appears to be less of a potential for significant adverse environmental impacts under the “RRP Program/Environmentally Preferred Alternative” as compared to the no action alternative. Under implementation of either alternative, mitigation measures are available to avoid or reduce any potentially significant adverse impacts to a less than significant level as individual restoration project(s) are reviewed and implemented. The project(s) will be scaled in such a way that the net benefits of the project compensate for injury(s) resulting from the incident(s) and collateral injury(s) (if any) from the implementation of the

compensation project(s). Specific analysis of environmental impacts, their significance, and the availability and choice of specific mitigation measures will be developed and presented in future second or third tier environmental documents prepared, as necessary, prior to the implementation of specific restoration projects.

Economic and Social Impacts

Both alternatives result in beneficial socioeconomic impacts to the public and the industries and communities that depend on the state's resources for commerce and recreation as a result of the restoration of resources/services on which they depend. At the same time, under "RRP Program/Environmentally Preferred Alternative", RPs for incidents will have a predictable and efficient way of resolving their liabilities. By implementing restoration more quickly, the time between an incident and full recovery of lost resources/services will be reduced, thereby reducing the RPs' liability.

Cumulative Impacts

The restoration of resources/services injured by incidents will contribute to avoidance or mitigation of the adverse environmental impact to those resources/services and other parts of the physical environment, biological resources, cultural resources, and related economic activities. Both alternatives will contribute to the cumulative beneficial impacts of restoration efforts that have previously been constructed and are being constructed under separate Federal and State authorities and by local and private entities.

Compared to the No Action Alternative, it is anticipated that the amount of restoration accomplished and therefore the cumulative beneficial impacts under the "RRP Program/Environmentally Preferred Alternative" will be significantly greater, will be accomplished more quickly and generally will be at a larger scale. At the same time, the "RRP Program/Environmentally Preferred Alternative" will also improve coordination with other restoration efforts in the state and maximize opportunities for partnering which will also have a cumulative beneficial impact.

Short-Term Uses vs. Long-Term Productivity

At a programmatic level under both alternatives, overall benefits to long-term productivity related to the state's physical environment, biological resources, cultural resources, and resource-dependent industries outweigh the limited short-term adverse impacts. Under the "RRP Program/Environmentally Preferred Alternative", it is anticipated that the overall long-term productivity will be greater than under the No Action Alternative.

Both alternatives may have short-term construction related impacts as a result of implementing restoration projects. However, these impacts would usually be minor and would cease when construction is complete. Avoidance and mitigation measures will be implemented to lessen the adverse impacts of any construction activities.

Irreversible and Irretrievable Commitments

As part of implementation, irreversible commitments of resources could result from restoration actions that involve construction or land conversion under either of the alternatives. Committed resources could include construction materials, labor and energy necessary for construction, operation and maintenance. Potential land conversion would commit habitat, agriculture, or other land uses to other uses, however, in many cases these land conversions could be undone if there were any unanticipated adverse impacts.

Avoidance and mitigation measures will be implemented to lessen the adverse impacts of any construction or land conversion activities to lessen impacts under either alternative.

5.0 Coordination with Other Programs, Regulatory Authorities

As a cooperative interagency effort, the RRP Program is required to comply with various state and federal environmental laws, regulations and policies. In addition to laws and regulations, the trustees must also consider existing environmental programs or plans in developing and implementing the RRP Program. Through coordination with other established programs, the trustees can ensure that the RRP Program does not duplicate other efforts, but instead leads to more effective and cost-efficient NRDA procedures. This, in turn, will add to the overall effort to protect, enhance and restore the natural resources of Louisiana.

6.0 RRP Program Development Process

The RRP Program development process included a series of RRP Program Workgroup planning meetings, informal scoping and formal scoping to develop the RRP Program/Draft PEIS.

Formal scoping for the RRP program and EIS began on June 19, 2001 with the publication and distribution of the PRD and publication of the Notice of Intent (NOI) to develop a PEIS. As part of the NOI, an Administrative Record (AR) was established. The AR is maintained at NOAA in Silver Spring, MD and duplicate copies are maintained at LOSCO, Baton Rouge, LA and on a website at <http://www.darp.noaa.gov>. Formal solicitation for appropriate restoration projects for potential inclusion in the RRP began on that date also.

Based on input from the public and further consideration by the RRP Program Workgroup, the RRP Program/Draft PEIS was completed for public review pursuant to NEPA.

7.0 NEPA Requirements

To comply with NEPA, the DPEIS includes a description of the purpose and need for action, the affected program and environment, and the proposed program action, alternatives, and their environmental consequences. To assist NEPA reviewers, the following provides a list of the NEPA requirements typically covered in a PEIS and the chapters and pages in the DPEIS where these requirements are addressed.

NEPA Requirement	Location	
	Chapter Number	Page Numbers
Purpose and Need (40 CFR 1502.14)	1.0	1-9
Affected Program and Environment (40 CFR 1502.15)	2.0 and App. B	10-25 and B1-B58
Proposed Action (40 CFR 1502.14)	3.0 and 4.0	26-85
Alternatives (40 CFR 1502.14)	5.0	86-91
Environmental Consequences (40 CFR 1502.16)	6.0	92-94
Coordination/Consultation [40 CFR 1502.25 and 1506.2 (d)]	7.0	95-106
RRP Program Development Process [40 CFR 1502.10 (i)] – Scoping	8.0	107-108
References	9.0	109-110
List of Preparers (40 CFR 1502.17)	10.0	111
List of Agencies	11.0	112

8.0 Reader's Guide to Document

The following is a guide to this document

Chapter 1, Purpose and Needs, (40 CFR 1502.14) includes an introduction to the RRP Program and its goals, including the legal mandates and authorities under which it was developed, as well as, an identification of the natural resource trustees (trustees) and their mandates. The setting is defined. Then the purpose and need for the establishment and implementation of the RRP Program and the purpose of the proposed action is described, including its goals and benefits. NEPA requirements typically covered in a PEIS and the chapters and pages in this document where these requirements are addressed are identified.

Chapter 2, Affected Program and Environment, (40 CFR 1502.15) provides a summary description of the affected program and the NRDA process, including; a definition of natural resources and services, the natural resource trustee jurisdictions, and RP liability. A summary description of the environment that is likely to be affected is provided. References to more detailed information on the affected environment in Appendix B are made.

Chapter 3, Proposed Action; Regional Restoration Planning Program, (40 CFR 1502.14) reiterates the goals of the RRP Program and describes the specific legal authorities under state and federal law for establishing it. A detailed description of the RRP Program is provided, including: the components; management structure; case implementation process; sources of restoration funding and use of the RRP Program.

Chapter 4, Regional Boundaries, provides a description of the boundaries for the nine RRP's that will be developed as part of the RRP Program.

Chapter 5, Alternatives, (40 CFR 1502.14) provides summary descriptions of the no action, preferred, and other alternative considered as part of the development of the RRP Program. An evaluation of the environmentally preferred alternative and summary of benefits is also provided.

Chapter 6, Environmental Consequences, (40 CFR 1502.16) describes for both the no action and environmentally preferred alternative the following: direct and indirect impacts, cumulative impacts and short-term uses vs. long-term productivity.

Chapter 7, Coordination with Other Programs, Regulatory Authorities, [40 CFR 1502.25 and 1506.2 (d)] describes compliance with federal and state laws and coordination and compatibility with existing federal, state and joint federal – state programs.

Chapter 8, RRP Program Development Process, [40 CFR 1502.10 (j)] describes the development process including RRP Program workgroup meetings, informal scoping and formal scoping notice and meetings that were conducted to develop the RRP Program and draft PEIS.

Chapter 9, References, Chapter 10, List of Preparers (40 CFR 1502.17) and Chapter 11, List of Agencies are self-explanatory.

There are 4 appendices (40 CFR 1502.18): **Appendix A - Acronyms and Definitions; Appendix B - Affected Environment; Appendix C - Threatened & Endangered Species and Essential Fish Habitat; Appendix D- Project Solicitation Form; Appendix E- NRDA Preliminary Assessment Worksheet; and Appendix F – Compliance.**



UNITED STATES DEPARTMENT OF COMMERCE
Office of the Assistant Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

APR 25 2003

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act of 1969 (NEPA), we enclose for your review the Draft Programmatic Environmental Impact Statement (DPEIS) for the Louisiana Regional Restoration Planning Program (RRP Program). This document is both a DPEIS and the RRP Program description (40 CFR Part 1506.4¹). The proposed action is to establish and implement the RRP Program. The DPEIS is being developed pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 et seq., and its implementing regulations, 40 CFR Parts 1500-1508.

Federal and Louisiana natural resource trustees have developed a statewide comprehensive RRP Program to assist the natural resource trustees in carrying out their responsibilities for discharges or substantial threats of discharges of oil (referred to as an "incident"). The RRP Program is described in this DPEIS and further defined in individual Regional Restoration Plans (RRPs) that will be prepared for each of nine regions in the State of Louisiana. The goals of this statewide program are to: expedite and potentially reduce the cost of the natural resource damage assessment (NRDA) process; provide for consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and, increase restoration of lost natural resources and services.

This document reflects the work of the RRP Program workgroup made up of federal and state trustee which include the: National Oceanic and Atmospheric Administration; U.S. Department of the Interior (cooperating agency); Louisiana Oil Spill Coordinator's Office, Office of the Governor (cooperating agency); Louisiana Department of Natural Resources; Louisiana Department of Environmental Quality; and Louisiana Department of Wildlife and Fisheries. It also reflects the input and comments that were received during both informal and formal scoping process.

The DPEIS is also available at the following website: <http://www.darp.noaa.gov/>. Two public meetings to receive comments on the DPEIS will be held in June. Public notice will be provided as to the date, time and location for the meetings.

¹ 40 CFR 1506.4 Combining documents. Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork.



Any written comments or questions should be submitted by close of business on July 9, 2003 to:

William Conner, Chief
Damage Assessment Center,
Office of Response and Restoration/NOS
National Oceanic and Atmospheric Administration
1305 East-West Highway, SSMC#4, 10th Floor,
Silver Spring, MD 20910
or faxed to (301) 713-4389

Also, one copy of your comments should be sent to me at the U.S. Department of Commerce,
NOAA/SP, Room 6121, 14th and Constitution, NW, Washington, DC 20230.

Sincerely,

A handwritten signature in cursive script that reads "James P. Burgess III". The signature is written in dark ink and includes a small flourish at the end.

James P. Burgess III
NEPA Coordinator

Enclosure

DRAFT ENVIRONMENTAL IMPACT STATEMENT

1.0 Purpose and Needs

This document is both a Draft Programmatic Environmental Impact Statement (DPEIS) and the Louisiana RRP Program (RRP Program) (40 CFR Part 1506.4³). The proposed action is to establish and implement the RRP Program. The PEIS is being developed pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 *et seq.*, and its implementing regulations, 40 CFR Part 1500.

1.1 Introduction

Federal and Louisiana natural resource trustees have developed a statewide comprehensive RRP Program to assist the natural resource trustees in carrying out their responsibilities for discharges or substantial threats of discharges of oil (referred to as an “incident”). The RRP Program is described in this DPEIS and further defined in individual Regional Restoration Plans (RRPs) that will be prepared for each of nine regions in the State of Louisiana. The goals of this statewide program are to: expedite and potentially reduce the cost of the natural resource damage assessment (NRDA) process; provide for consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and, increase restoration of lost natural resources and services.

The Oil Pollution Act of 1990 (OPA), 33 USC 2701 *et seq.*, and the Louisiana Oil Spill Prevention and Response Act of 1991 (OSPRA), La. Rev. Stat. 30:2451 *et seq.* are the principal federal and state statutes, respectively, authorizing federal and state agencies and tribal officials to act as natural resource trustees for the recovery of damages for injuries to natural resources and services resulting from incidents in Louisiana. The RRP Program is being established to address incidents under OPA and OSPRA. The RRP Program does not address injuries from releases of hazardous substances under the Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA), 42 USC 9601 *et seq.*, Park System Resources Protection Act, 16 USC § 19jj *et seq.*, or physical injuries to resources under the National Marine Sanctuaries Act, 16 USC 1431 *et seq.*, should a sanctuary be designated in the State of Louisiana.

The development of the RRP Program has been a coordinated effort between state and federal natural resource agencies, local governments, and the public. The RRP Program will be jointly administered and used by the trustees to assist in carrying out their natural resource trust mandates under OPA and OSPRA.

1.1.1 Legal Mandates and Authorities

The RRP Program is required to be established in accordance with La. Rev. Stat. 30:2480.1, which states that:

“To assist in making the natural resource damage assessment process more efficient, the Regional Restoration Planning Program encompassing the entire geographic area of the state, is established in the office of the oil spill coordinator. The office of the oil spill coordinator shall develop and implement the program in coordination with the state natural resource trustees.”

³ 40 CFR 1506.4 Combining documents. Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork.

Broad guidelines and the basic requirements of OPA provide the necessary direction for developing RRP. These guidelines and requirements are contained in 15 CFR 990.

The OPA regulations were promulgated by the U.S. Department of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA), and became effective February 5, 1996. State regulations for the NRDA process under OSPRA were promulgated by the Louisiana Oil Spill Coordinator's Office, Office of the Governor (LOSCO) in March 1999 and can be found at La. Admin. Code 43:XXIX.Chap. 1.

1.1.2 NRDA Trustees

Under OPA, 33 USC 2706(b), and the National Contingency Plan (NCP), 40 CFR 300.600, certain federal and state agencies and tribal authorities are designated natural resource trustees for natural resources and services injured by an incident. Additional authority was granted to the state trustees under Louisiana's OSPRA, La. Rev. Stat. 30:2451 *et seq.* As a designated trustee, each trustee is authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages, and to plan and implement actions to restore natural resources and resource services injured or lost as the result of an incident.

The federally designated natural resource trustees include the U. S. Department of Commerce (NOAA), U.S. Department of the Interior (DOI), U.S. Department of Agriculture (USDA), U.S. Department of Energy (DOE), U.S. Department of Defense (DOD), and the federally recognized tribes. On the state level, the trustees include: LOSCO; Louisiana Department of Natural Resources (LDNR); Louisiana Department of Environmental Quality (LDEQ); and Louisiana Department of Wildlife and Fisheries (LDWF) have been entrusted with this responsibility.

Under the mandates of OPA, responsibility for natural resources is delegated to the federal and state trustees. At 33 USC 2706(c) those responsibilities are defined as follows:

- (1) *"Federal Trustees: The Federal officials designated under subsection (b)(2) (A) shall assess natural resource damages under section 1002(b)(2)(A) for the natural resources under their trusteeship; (B) may, upon request of reimbursement from a State or Indian tribe and at the Federal officials' discretion, assess damages for the natural resources under the State's or tribe's trusteeship; and (C) shall develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent, of the natural resources under their trusteeship.*
- (2) *State Trustees: The State and local officials designated under subsection (b)(3) (A) shall assess natural resource damages under section 1002(b)(2)(A) for the purposes of this Act for the natural resources under their trusteeship; and (B) shall develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent, of the natural resources under their trusteeship."*

Based on the legislative mandates of Louisiana's OSPRA of 1991, responsibility for natural resources is assigned to the state natural resource trustees. At L.R.S. 30:2480(A) those responsibilities are defined as follows:

“In any action to recover natural resources damages, the coordinator, in consultation with any other state trustees, shall make the determination whether to assess natural resource damages and the amount of damages. This assessment will be in accordance with the procedures and plans contained in the oil spill contingency plan of the state, and such determination shall create a rebuttable presumption for the amount of such damages.”

1.2 Setting

Louisiana is bordered by Texas to the west, Arkansas to the north, Mississippi to the east, and the Gulf of Mexico to the south. The statewide comprehensive RRP Program will encompass the State of Louisiana and state and federal waters extending offshore Louisiana, from the 1981 shoreline determined by the U.S. Supreme Court to the boundaries of the Federal/Louisiana territorial seas and the extent of the EEZ.

1.3 Purpose and Need for Action

1.3.1 Background

Louisiana's economy traditionally has been based on the State's natural resources. Both renewable (e.g., fishing, forest products) and non-renewable (e.g., oil, natural gas) resources are important, and the industries associated with each have co-existed for years. Louisiana, and in particular its coastal and wetland regions, is of significant value to the Nation -- contributing greatly to the Nation's fisheries, wild fur and hide harvest, providing wintering grounds for migratory bird populations, and buffering the destructive impacts of hurricanes, storms, and floods. At the same time, 18% of the Nation's oil production and 24% of the gas production comes from coastal Louisiana (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation Authority of 1998, 16 USC 3951 *et seq.*).

The exploration, production, transportation, and storage of large volumes of oil occurring within the state resulted in the recognition that Louisiana has a higher exposure to oil spills than any other state. Louisiana's natural resources are susceptible to oil spill injury from a variety of sources. Among them are shipping, land-based oil fields, oil platforms in state waters, oil storage facilities, oil terminals/ports, crude or refined oil pipelines, oil refineries, abandoned vessels, pits, reservoirs, and other industries using oil in their operations. In the coastal regions alone, Louisiana is crisscrossed by 1,570 miles of oil and gas pipelines (Coastal Wetlands Planning, Protection, and Restoration Act [CWPPRA] 1990). It is estimated that approximately 250,000 oil and/or gas wells exist in Louisiana. In 1996 an inventory identified approximately 800 abandoned vessels/barges of which roughly 200 were characterized as posing a potential pollution problem. Beginning in 1992, a total of approximately 25,000 abandoned facilities, pits, sumps, or reservoirs in the Louisiana coastal area have been inventoried and are being evaluated to determine if the sites pose a risk to human health and safety, environment, and wildlife habitat through actual or potential discharge of oil.

Although Louisiana's oil and gas industry tries to avoid adverse impacts on renewable natural resources, injuries do occur as a result of incidents. Between 1991 and 2000, Louisiana had 18.65% of the total incidents in the nation and 21.1% of the volume. (U.S. Coast Guard [USCG] Spill Release Compendium at <http://www.uscg.mil/hq/g-m/nmc/response/stats/aa.htm>) The cumulative impact of these incidents on fish, wildlife and the environment can be significant and adversely affect the industries and communities depending on natural resources for commerce and recreation.

1.3.2 Need

The high spill probability, both in frequency and magnitude, and wide expanse of fragile and sensitive resources that could be impacted present a true challenge to the federal and Louisiana trustees when it comes to restoring natural resources held in public trust. Since the enactment of OPA, a total of 18 incidents have resulted in the initiation of the NRDA process in the State of Louisiana. Table 1.1 provides summary information for these incidents and the status of the NRDA cases.

1.4 Purpose of the Proposed Action

1.4.1 Regional Restoration Planning Program

The objective of the statewide comprehensive RRP Program including RRP is to establish an institutional framework and procedures that will enable the trustees to select and implement projects that compensate the public and environment for losses of natural resources and services from incidents in an efficient and predictable manner. In addition, the RRP Program seeks to provide increased flexibility to the trustees and the Responsible Parties (RPs) relative to the mechanisms through which NRDA cases are settled. The use of RRP will help expedite the assessment, settlement and/or restoration implementation, while simultaneously minimizing associated costs. In addition, development of RRP requires the examination of restoration alternatives across an entire region and may facilitate linkages with other regional or watershed objectives. The benefits of comprehensive, region-wide planning will accrue not only to the parties involved in the assessments, but also to the communities depending on natural resources for commerce and recreation.

Specifically, the RRP Program identifies the statewide RRP Program structure, the decision-making process, and the criteria that will be used to select the restoration project(s) that restore the natural resources injured by a given incident.

As part of the RRP Program development, the trustees: 1) conducted a nexus analysis to identify one or more appropriate restoration types for each of the “potentially injured resources/services”, 2) developed restoration type screening criteria to assist in the selection of the most appropriate restoration type(s) to restore resources/services injured during a given incident, and 3) developed screening criteria to select the most appropriate restoration project(s) during a given incident.

To further streamline the NRDA process, the trustees conducted an analysis of the environmental impacts associated with the implementation of the restoration types identified in the RRP Program by evaluating the impacts of the restoration techniques commonly used to implement the restoration types. This document provides an environmental analysis of the RRP Program restoration types. The discussion is necessarily broad and generalized to the technique on which the analysis has been performed, but provides the level of detail necessary to allow “tiering” from this document to subsequent environmental documentation under NEPA concerning the environmental impacts of implementing certain restoration types. The environmental impacts of specific restoration projects will be addressed specifically in subsequent NEPA documents when

Table 1.1: Status of NRDA for incidents in the State of Louisiana (1990-2002)

Location	Parish	Date of Incident	Amount (bbls)	Type of Habitat Injured	Type of Incident	Preferred Alternative	Restoration Project
Duck Lake	St. Martin	12/04/02	1,000	Cypress Tupelo Swamp	Pipeline Rupture	Preassessment Phase	Preassessment Phase
North Pass	Plaquemines	09/23/02	Unknown	Brackish Marsh	Storage Tank Rupture	Preassessment Phase	Preassessment Phase
Magnolia Field	Plaquemines	08/11/02	~500	Brackish Marsh	Storage Tank Rupture	Preassessment Phase	Preassessment Phase
East Lake Palourde	Assumption	Unknown	Unknown	Cypress Tupelo Swamp	Pipeline Rupture	To be Determined	To be Determined
Little Lake	Lafourche	04/06/02	~1,800	Intermediate Marsh	Pipeline Rupture	To be Determined	To be Determined
Mosquito Bay	St. Mary	04/05/01	1,000	Salt Marsh	Pipeline Rupture	Pre-assessment Phase	To be Determined
Mississippi River	Plaquemines	11/28/00	13,500	River Bank and Levee	Vessel Grounding	Crevasse Splay	4.7 Acres of Marsh
						Public Use Enhancement	Public Dock
Four Bayou Pass	Plaquemines & Jefferson	11/24/99	850	Water Column and Barrier Islands	Pipeline Rupture	Acquisition & Enhancement	2.8 Acres of Chenier Oak-Hackberry Habitat
Lake Grande Ecaille	Plaquemines	09/22/98	500-1,500	Brackish Marsh	Well Blowout	To be Determined	To be Determined
Cravens	Vernon	08/08/97	13,000 – 19,000	Forest	Well Blowout	To be Determined	To be Determined
Freshwater City	Vermillion	06/21/97	2,000	Salt Marsh	Pipeline Rupture	Planting	2.0 Acres of California Bulrush
Lake Barre	Terrebonne	05/17/97	6,561	Salt Marsh	Pipeline Rupture	Planting	18.6 Acres of Marsh
Attakapas	St. Mary	11/26/96	4,762	Wetlands	Well Blowout	Planting	30 Acres Forested Wetlands
Blind River	St. James	05/24/96	11,308	Wetlands	Pipeline Rupture	Mitigation Bank	33 Acres Forested Wetlands
						Public Use Enhancement	Addition to Educational Center
Dixon Bay	Plaquemines	01/12/95	250-2,500	Brackish Marsh	Well Blowout	Crevasse Splay	5 Acres Marsh
Paradis	St. Charles	01/15/93	~ 800	Fresh Marsh/ Flotant	Leak in SWD System	Raking of Biological litter	1.6 Acres Primary Restoration
Timbalier Bay	Lafourche & Terrebonne	09/29/92	2,285	Salt Marsh	Well Blowout	Marsh Creation	21.7 Acres Marsh
Lake Salvador	St. Charles	02/04/91	55	Lake	Well	Shoreline Protection	835 feet breakwater pilings

the projects are known. There will be circumstances in which the trustees may do restoration planning outside of the context of the RRP Program due to the specific conditions of the incident. Additionally, there may be cases in which restoration types and the attending analysis from the RRP Program, as well as restoration projects from the RRP, will be used to address certain injuries from an incident; and restoration planning outside of the context of the RRP Program will be carried out for other injuries from the incident.

The state will be divided into nine planning regions and a RRP will be prepared for each region. The RRP will be consistent with this programmatic EIS but also will identify the natural resources and/or services that could potentially be impacted by an incident and the restoration projects that are available for implementation within a given region.

The RRP Program will be jointly administered and used by the state and federal trustees to assist in carrying out their natural resource trust mandates under OPA and OSPRA.

The first RRP will be done for Region #2.

1.4.2 Benefits of the Proposed Action

The RRP Program, including the RRP, will benefit the public, industry and natural resource trustees by:

- ◆ Providing greater opportunities to make the public and the environment whole for injuries to natural resources/services;
- ◆ Expediting restoration of injured natural resources/services from incidents;
- ◆ Potentially reducing the cost of restoration planning and implementation;
- ◆ Pooling of individual case recoveries to provide for implementation of larger, more ecologically significant restoration projects;
- ◆ Providing for more consistency and predictability through detailing the NRDA process, thereby reducing uncertainty to the public and industry;
- ◆ Improving coordination between restoration activities under the NRDA mandates and other restoration efforts in the State;
- ◆ Enhancing the capability for trustees to restore resources/services injured by incidents for which there is no viable RP;
- ◆ Maximizing opportunities for partnering among RPs, trustees, and other public and private restoration efforts; and
- ◆ Increasing opportunity for public participation in the NRDA process through pre-incident planning.

1.5 Programmatic NEPA Process

As stated above, this document is both a DPEIS and the Louisiana RRP Program (40 CFR Part 1506.4). The proposed action is to establish and implement the RRP Program.

Under 40 CFR 1500.4(i) and (k)⁴ and 40 CFR 1502.20⁵, the trustees will “tier” both the identified NRDA program and environmental analyses (found in Chapter 3) for specific incidents by preparing a PEIS on the RRP Program and referencing the appropriate parts of the PEIS in subsequent documents (i.e., RRP and Damage Assessment and Restoration Plans (DARPs)). “Tiering” is defined by 40 CFR 1508.28 as:

“Tiering” refers to the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basinwide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when the sequence of statements or analyses is:

(a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis.

(b) From an environmental impact statement on a specific action at an early stage (such as need and site selection) to a supplement (which is preferred) or a subsequent statement or analysis at a later stage (such as environmental mitigation). Tiering in such cases is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.”

The purpose of “tiering” is to avoid repetition of the analyses of the same issues and focus on actual issues ripe for decision-making at each level of environmental review. Therefore this document describes the environmental impacts of establishing and implementing the RRP Program as a whole. The environmental consequences analysis is necessarily generalized. The exact manner in which the RRP Program will affect the environment will be determined largely by the implementation of the program as it applies to specific incidents. This analysis cannot and does not attempt to distinguish between all possibilities as to how the trustees may implement the RRP Program as it applies to specific incidents. Instead this analysis simply assesses likely impacts of implementing the RRP Program at a statewide scale.

The RRP that the trustees develop for specific regions will be “tiered” from the information in this document by both reference and incorporation of information relevant to the specific region. In addition, decisions on the selection of restoration types and

⁴ Sec. 1500.4(i) Using program, policy, or plan environmental impact statements and tiering from statements of broad scope to those of narrower scope, to eliminate repetitive discussions of the same issues (Secs. 1502.4 and 1502.20). (k) Integrating NEPA requirements with other environmental review and consultation requirements (Sec. 1502.25).

⁵ Sec. 1502.20 Tiering. Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (Sec. 1508.28). Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement and incorporate discussions from the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions. (Section 1508.28).

projects to be implemented as part of the restoration planning process for a specific incident are subject to NEPA requirements. Therefore, the trustees will reference and/or incorporate appropriate information and analyses from both the PEIS and RRP when preparing the DARP/Environmental Assessment (EA) for a specific incident or incidents.

1.5.1 NEPA Requirements

To comply with NEPA, this document includes a description of the purpose and need for action, the affected program and environment, and the proposed program action, alternatives, and their environmental consequences. To assist NEPA reviewers, Table 1.2 lists the NEPA requirements typically covered in a PEIS and the chapters and pages in this document where these requirements are addressed.

Table 1.2: NEPA Requirements

NEPA Requirement	Location	
	Chapter Number	Page Numbers
Purpose and Need (40 CFR 1502.14)	1.0	1-9
Affected Program and Environment (40 CFR 1502.15)	2.0 and App. B	10-25 and B1-B58
Proposed Action (40 CFR 1502.14)	3.0	26-85
Alternatives (40 CFR 1502.14)	5.0	86-91
Environmental Consequences (40 CFR 1502.16)	6.0	92-94
Coordination/Consultation [40 CFR 1502.25 and 1506.2 (d)]	7.0	95-106
RRP Program Development Process [40 CFR 1502.10 (i)] - Scoping	8.0	107-108
References	9.0	109-110
List of Preparers (40 CFR 1502.17)	10.0	111
List of Agencies	11.0	112

1.5.2 Reader's Guide to Document

The following is a guide to this document

Chapter 1, Purpose and Needs, (40 CFR 1502.14) includes an introduction to the RRP Program and its goals, including the legal mandates and authorities under which it was developed, as well as, an identification of the natural resource trustees (trustees) and their mandates. The setting is defined. Then the purpose and need for the establishment and implementation of the RRP Program and the purpose of the proposed action is described, including its goals and benefits. NEPA requirements typically covered in a PEIS and the chapters and pages in this document where these requirements are addressed are identified.

Chapter 2, Affected Program and Environment, (40 CFR 1502.15) provides a summary description of the affected program and the NRDA process, including; a definition of natural resources and services, the natural resource trustee jurisdictions, and RP liability.. A summary description of the environment that is likely to be affected is provided. References to more detailed information on the affected environment in Appendix B are made.

Chapter 3, Proposed Action; Regional Restoration Planning Program, (40 CFR 1502.14) reiterates the goals of the RRP Program and describes the specific legal authorities under state and federal law for establishing it. A detailed description of the RRP Program is provided, including: the components; management structure; case implementation process; sources of restoration funding and use of the RRP Program.

Chapter 4, Regional Boundaries, provides a description of the boundaries for the nine RRP that will be developed as part of the RRP Program.

Chapter 5, Alternatives, (40 CFR 1502.14) provides summary descriptions of the no action, preferred, and other alternative considered as part of the development of the RRP Program. An evaluation of the environmentally preferred alternative and summary of benefits is also provided.

Chapter 6, Environmental Consequences, (40 CFR 1502.16) describes for both the no action and environmentally preferred alternative the following: direct and indirect impacts, cumulative impacts and short-term uses vs. long-term productivity.

Chapter 7, Coordination with Other Programs, Regulatory Authorities, [40 CFR 1502.25 and 1506.2 (d)] describes compliance with federal and state laws and coordination and compatibility with existing federal, state and joint federal – state programs.

Chapter 8, RRP Program Development Process, [40 CFR 1502.10 (i)] describes the development process including RRP Program workgroup meetings, informal scoping and formal scoping notice and meetings that were conducted to develop the RRP Program and draft PEIS.

Chapter 9, References, Chapter 10, List of Preparers (40 CFR 1502.17) and Chapter 11, List of Agencies are self-explanatory.

There are 6 appendices (40 CFR 1502.18): **Appendix A - Acronyms and Definitions; Appendix B - Affected Environment; Appendix C - Threatened & Endangered Species and Essential Fish Habitat; Appendix D- Project Solicitation Form; Appendix E- NRDA Preliminary Assessment Worksheet; and Appendix F – Compliance.**

2.0 Affected Environment and Program

The goal of the NRDA provisions in OPA and OSPRA is to make the environment and public whole for injury to, loss of, or loss of use of natural resources and services caused by an incident. Under OPA, 33 USC 2706(b), and the NCP, 40 CFR 300.600, certain federal and state agencies and tribal authorities are designated natural resource trustees for natural resources injured by a discharge or substantial threat of a discharge of oil. Federal regulations governing the NRDA process under OPA can be found at 15 CFR 990. These regulations were promulgated by the U.S. Department of Commerce, acting through NOAA, and became effective February 5, 1996. Additional authority was granted to the state trustees under Louisiana's OSPRA, La. Rev. Stat. 30:2451 *et seq.* State regulations for the NRDA process under OSPRA were promulgated by the LOSCO in March 1999 and can be found at La. Admin. Code 43:XXIX.Chapter 1. Each designated trustee is authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages from the party or parties responsible for the discharge or threat of discharge. Natural resource damages recovered are used to plan and implement actions to restore the natural resources and resource services injured or lost as the result of an incident.

The OPA and OSPRA regulations for NRDA describe the process by which trustees:

- ◆ Identify injuries to natural resources and services resulting from an incident;
- ◆ Provide for the return of injured natural resources and services to baseline conditions and compensation for interim lost services; and
- ◆ Encourage and facilitate public involvement in the restoration process.

2.1 Affected Environment

This section is intended to provide a brief summary overview of environment that may be impacted by the implementation of the RRP Program. A more detailed description of the affected environment is provided in Appendix B of this document.

2.1.1 Physical Environment

The physical environment in the State of Louisiana is characterized by geology, geography, soils, water resources, climate, air quality, and noise. A brief description of each is provided.

- ◆ **Geology** – Most of Louisiana was formed by Mississippi River sediment deposits. As sea-level rose and fell over this low-lying region, the Mississippi River was carrying vast sediment loads and sedimentary rocks from the core of the North American continent and depositing it on the rim of the Gulf of Mexico. Organic matter from highly productive marine waters has been deeply buried under the whole state and far offshore, and through various processes has turned into petroleum. Massive salt deposits, formed by evaporation of sea water during historic dry periods, provide a stable confining layer for the underlying petroleum.
- ◆ **Geography** - Louisiana is comprised of two primary geographic regions, the lowlands and the uplands. The lowlands of Louisiana can be subdivided into three major divisions: the Mississippi and Red River alluvial plain, the deltaic plain, and the chenier plain. The uplands of Louisiana are comprised of two geomorphic regions, the Tertiary hills and the Pleistocene coastwise terraces.
- ◆ **Soils** - Seven general soil regions have been identified in Louisiana. The seven soil regions of Louisiana, as described by Johnson and Yodis (1998), are: 1) Tertiary

- Upland soils; 2) Pleistocene Terrace soils; 3) Flatwoods soils; 4) Coastal Prairie soils; 5) Loess soils; 6) Alluvial soils; and 7) Gulf Coast Marsh soils.
- ◆ **Water Resources** - Louisiana's ground water supply is primarily held in 13 major aquifers and aquifer systems composed of sand and gravel and confined by clay and silt. Much of Louisiana's ground water is suitable for use with little or no treatment; however, water quality is susceptible to both natural and human induced contamination. The U.S. Environmental Protection Agency (USEPA) estimates the state to contain 66,294 miles of rivers and streams, 1,078,031 acres (1,684 square miles) of lakes and reservoirs, 5,882,070 acres (9,191 square miles) of fresh and tidal wetlands, and 4,899,840 acres (7,656 square miles) of estuaries (Louisiana Department of Environmental Quality 2000). Water quality data for the State of Louisiana are routinely collected by the Louisiana Department of Environmental Quality (LDEQ) for monitoring and evaluation purposes. The *2000 Water Quality Inventory Section 305(b)* indicated as of January 2000, 19.5% (95) of Louisiana's 476 named regulatory subsegments, or water bodies, were fully supporting their overall designated use and 4.0% (19) were fully supporting but threatened. Water bodies that were partially supporting their overall designated use accounted for 29.8% (142) of Louisiana's assessed streams, lakes, wetlands, and estuaries. Water bodies not supporting their overall designated use accounted for 10.7% (51). Water bodies not assessed because of insufficient data accounted for 35.5% (169).
 - ◆ **Climate** - The climate of Louisiana is classified as subtropical and is governed by various terrestrial and atmospheric controls.
 - ◆ **Air Quality** - The LDEQ maintains a statewide monitoring network that consists of 44 air-monitoring stations.
 - ◆ **Noise** - Noise pollution is subject to local ordinances (LaCoure, personal communication 2002).

2.1.2 Biological Resources

Louisiana has a wide and diverse array of biological resources, including:

- ◆ **Nekton** - There are more than 500 nektonic species that live in Louisiana's waters (Douglas 1974). The unique combination of fresh and saltwater habitats in Louisiana is cause for a large biological diversity and number of species.
- ◆ **Benthos** - Benthic organisms can be split into two large categories: infauna (those below the sediment surface) and epifauna (those above the sediment surface).
- ◆ **Wildlife** - There are 71 species of mammals, 130 species of reptiles and amphibians, and 430 species of birds recorded in Louisiana (Dennett 1997).
- ◆ **Habitat Types and Associated Biota** – A number of distinct habitat types are found within Louisiana, including:
 - ◆ Marsh (Salt, brackish/Intermediate, Fresh)
 - ◆ Tidal Freshwater Marsh
 - ◆ Wetland Forest (Evergreen, Deciduous, and Mixed)
 - ◆ Wetland Shrub/Scrub (Evergreen, Deciduous, and Mixed)
 - ◆ Upland Forest (Evergreen, Deciduous, and Mixed)
 - ◆ Upland Shrub/Scrub (Evergreen, Deciduous, and Mixed)
 - ◆ Dense Pine Thicket
 - ◆ Agriculture-Cropland-Grassland
 - ◆ Wetland Barren
 - ◆ Upland Barren
 - ◆ Open Water
 - ◆ Marine/Estuarine Shore
 - ◆ Freshwater Shore
 - ◆ Marine/Estuarine and Freshwater Benthic (soft-sedimentary)

- ◆ Marine/Estuarine Encrusting Community (natural/artificial substrates)
- ◆ Living Reefs
- ◆ Marine/Estuarine Submerged Aquatic Vegetation
- ◆ Freshwater Submerged Aquatic Vegetation
- ◆ Mangrove Swamp
- ◆ Batture

The Louisiana GAP Analysis Program provides technical descriptions for these habitats (see <http://sdms.nwrc.gov/gap/gap2.html>) and Appendix B provides a discussion on the occurrence of these habitats within the state.

- ◆ **Threatened and Endangered Species** - The published list for the State of Louisiana includes 23 animal and three plant species (see Appendix C) (U.S. Department of the Interior, U.S. Fish and Wildlife Service 2003). One candidate species is listed for the state (U.S. Department of the Interior, U. S. Fish and Wildlife Service 2003).
- **Essential Fish Habitat** - Essential Fish Habitat (EFH) is identified in Fishery Management Plan (FMP) amendments of the Gulf of Mexico, South Atlantic, Caribbean and Mid-Atlantic Fishery Management Councils. Geographically defined habitat areas of particular concern are found in FMP amendments affecting southeast and Caribbean areas.

2.1.3 Socioeconomic Resources

Socioeconomic resources in Louisiana include resources such as cultural resources, industry, land holdings, federal facilities, and recreation and tourism.

- ◆ **Cultural Resources** - There are 16 prehistoric and historic sites, which may also be referred to as State Commemorative Areas, within the state. Presently, the State of Louisiana has 1,161 properties listed on the National Register of Historic Places.
 - ◆ **Population** - The nationwide census of the year 2000 (U.S. Department of Commerce, Census Bureau 2000) recorded the population of the State of Louisiana at 4,468,976, indicating a 5.9% increase in growth from the 1990 census.
 - ◆ **Infrastructure and Public Services** - Louisiana has more than 60,000 miles of roads in interstate highways, U.S. highways, state highways, parish roads, and city streets. State and parish maintained bridges number greater than 13,000 and include over 150 movable bridges (swing-span, lift-span, bascule, and pontoon). Approximately 15 state and parish operated ferries provide service across water bodies. Southern Pacific, Kansas City Southern, Amtrak, Illinois Central, and Union Pacific are primary rail lines. Louisiana has approximately 450 publicly and privately owned and used airports, heliports, and seaplane bases. The privately owned Louisiana Offshore Oil Port (LOOP) and fifteen smaller ports are situated within the coastal zone. The Gulf Intracoastal Waterway (GIWW) is a critical shallow-draft transportation link between the Mississippi and Texas state lines. The preceding information was largely extracted from Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998 *Coast 2050: Towards a Sustainable Coastal Louisiana*; 1997 *Roads of Louisiana*; and Calhoun 2002 *Louisiana Almanac 2002-2003 Edition*.
- ◆ **Industry** - Many industries depend on Louisiana's natural resources and the services that they provide, including commercial fisheries and aquaculture, forestry, agriculture, oil and gas, and tourism. A brief description of each is provided below.
 - ◆ **Commercial Fisheries and Aquaculture** - The inland waters, coastal marshes, and offshore waters of Louisiana support fishing and aquaculture industries. The total take of all species combined for the year 2000 was 1,357,933,958 pounds (615,954.8 metric tons) for a value of \$418,917,774 (NOAA, National Marine

Fisheries Service [NMFS] 2000). The Louisiana Department of Wildlife and Fisheries (LDWF) issued 19,438 commercial fisherman's licenses in 2000 to 2001 (Landry, personal communication 2001). The farm value for Louisiana's aquaculture crops in the year 2000 was estimated at \$121 million (Calhoun 2002).

- ♦ **Forestry** - Forestland comprises 48% of the state's total area or approximately 13.8 million acres. The estimated 2000 value of timber resources (value received by landowners from the sale of timber) was \$654 million (University of Louisiana at Monroe 2000).
- ♦ **Agriculture** - Animal production in Louisiana produced over a billion dollars in farm income for the year 2000 and nearly a billion dollars in value added worth. The total value of animal commodities was \$2,138,714,891 for the year 2000. Plant production in Louisiana created \$2.4 billion in gross farm income for the year 2000. The gross farm income along with value added totaled \$5.1 billion. The preceding data were synthesized from the University of Louisiana at Monroe, Center for Business and Economic Research, Louisiana Electronic Assistance Program and Calhoun *2002 Louisiana Almanac 2002-2003 Edition*.
- ♦ **Oil & Gas** - Louisiana ranks second in the nation in total energy produced, second in natural gas produced, and first in crude oil production (Louisiana Mid-Continent Oil and Gas Association 2002). Excluding offshore, Louisiana ranks seventh in total energy, third in natural gas and fourth in crude oil production (Louisiana Mid-Continent Oil and Gas Association 2002). In 2000 Louisiana produced over 75 million barrels of crude oil and over 1.4 billion metric cubic feet of natural gas (Louisiana Mid-Continent Oil and Gas Association 2000). In 1996 the oil and gas industry supported \$65.2 billion in sales in Louisiana firms and over \$8 billion in household earnings (Scott, 1996).
- ♦ **Tourism** - Tourism was an \$8.7 billion industry in Louisiana in the year 2000. Approximately 23.7 million domestic and international travelers visited the state, generating \$216.6 million locally, \$397.3 million for the state, and \$627.7 million for the federal government (Louisiana Department of Culture, Recreation and Tourism 2001).
- **Land Management and Ownership** - The following is a description of the types of land holdings and/or owners of large or significant lands, including parks, refuges, large private landowners and tribal lands.
 - ♦ **Parks** - The state manages 56 sites, of which 34 are operational and include 17 State Parks, 16 Historic Sites (State Commemorative Areas), and one Preservation Area. Total state holdings approximate 38,573 acres. The Department of the Interior (DOI), National Park Service (NPS) operates three National Historical Parks/Preserves/Heritage Areas and one National Monument in Louisiana. The U.S. Army, Army Corps of Engineers (USACE) manages lakeside recreational areas that are generally moderate in size.
 - ♦ **Refuges** - The Louisiana Department of Wildlife and Fisheries presently manages 48 Wildlife Management Areas (WMAs) in seven regions,. The DOI, U.S. Fish and Wildlife Service (USFWS) manages 23 National Wildlife Refuges (NWRs) in Louisiana.
 - ♦ **Forests** - Forestland comprises 48% of the state's total area, or approximately 13.8 million acres. There are 148,000 owners of Louisiana forestland, of which private, non-industrial landowners own 62%, forest products industries own 29%, and the general public owns nine percent. The USDA, U.S. Forest Service (USFS), manages Louisiana's only National Forest (NF), the Kisatchie National Forest. Two National Wildlife Preserves (Catahoula and Red Dirt) are located within the Kisatchie National Forest.

- ♦ **Large Private Land Holdings** - Forest statistics were derived from data obtained during a 1991 inventory of the 64 parishes by Vissage et al. (1992). Of the state's 26,265,400 acres, 4,472,100 acres were owned by the forest industry. Farmer-owned lands totaled 724,900 acres. Non-industrial private land (corporate) totaled 2,064,100 acres. Nonindustrial private land (individual) totaled 5,282,800 acres.
- ♦ **Tribal Lands** - The four federally recognized American Indian Tribal Reservations are: the Chitimacha Tribe of Louisiana (Charenton); the Coushatta Tribe of Louisiana (Elton); the Jena Band of Choctaw Indians (Jena); and the Tunica-Biloxi Indians of Louisiana (Marksville). The five state recognized American Indian Tribal Service Areas are: Caddo Adai Indians of Louisiana (Robeline); the Choctaw-Apache Tribe of Ebarb (Zwolle); the Clifton Choctaw Tribe of Louisiana (Clifton); the Four-Winds Cherokee (Slagle); and the United Houma Indians (Golden Meadow). The Apalachee Tribe of Louisiana is recognized as an Indian Tribal Community.
- ♦ **Recreation and Tourism** - The following are the major recreational and tourist areas and/or activities in Louisiana:
 - ♦ **Parks, Wildlife Management Areas/Refuges, and Forests** - Louisiana's State and National Parks (State Historic Sites, State Preservation Area, and National Preserve/Heritage Areas) provide for the recreational use of and/or preservation of the state's abundant natural and cultural resources. Louisiana's WMAs and NWRs provide recreational use of habitat types located throughout the state. Approximately 75 percent of the Alexander State Forest's 8,000 acres are managed for hunting and other recreational activities. The Kisatchie National Forest is Louisiana's only National Forest.
 - ♦ **Natural and Scenic River Systems** - The LDWF manages 52 natural, undeveloped rivers and streams. Saline Bayou is Louisiana's only designated national wild and scenic river and is located within the Kisatchie National Forest unit.
 - ♦ **Hunting** - The LDWF issued 589,234 hunting licenses, 9,673 lifetime licenses, and 982 trapping licenses in 2000 to 2001 (Hinds, personal communication 2002). The number of landowners leasing land for recreational hunting, primarily of Whitetail Deer, in 2000 was 5,653 for a total of 6,872,351 acres (Calhoun 2002).
 - ♦ **Fishing** - During the 2000 to 2001 season, 815,180 recreational fishing licenses were sold in the State of Louisiana (Hinds, personal communication 2002).
 - ♦ **Bird Watching** - Bird watching is an economically important activity in coastal Louisiana. Louisiana State Park holdings, WMAs, and NWRs promote birding and conduct annual bird counts.
 - ♦ **Boating** - As of December 31, 2000, the LDWF had registered 330,293 boats (Hinds, personal communication 2002).
- ♦ **Federal Facilities** - Federal facilities are defined as lands owned, leased, held in trust or whose use is otherwise by law subject solely to the discretion of the federal government, its officers or agents. See Table B-14 in Appendix B for the location of federal facilities in Louisiana.

2.2 Affected Program

2.2.1 Trust Natural Resources and Services

Trust natural resources are defined under OPA as:

“Natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the EEZ), any State or local government or Indian Tribe, or any foreign government, as defined in section 1001(20) of OPA (33 USC 2701(20)).”

Natural resources provide various services to other natural resources and to humans. Loss of services is included in the definition of injury under the OPA regulations (15 CFR 990.30).

“Services (or natural resource services) means the functions performed by a natural resource for the benefit of another natural resource and/or the public.” (15 CFR 990.30)

Natural resource services may be classified as follows:

- ♦ Ecological services - the physical, chemical, or biological functions that one natural resource provides for another. Examples include provision of food, protection from predation, and nesting habitat, among others; and
- ♦ Human services - the human uses of natural resources or functions of natural resources that provide value to the public. Examples include fishing, hunting, nature photography, and education, among others (NOAA 1996a).

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

2.2.2 Trustee Jurisdictions

Federal, state and tribal trusteeship is described under Subpart G of the NCP (40 CFR 300).

2.2.2.1 Federal Trustee Jurisdictions

Under the NCP, the President designated the federal agencies to act on behalf of the public as trustees for natural resources (40 CFR 300.600). The designated agencies are to act pursuant to section 1006 of OPA. Under the NCP, “natural resources” means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to or otherwise controlled by the United States, including the resources of the EEZ. (Section 300.5)

2.2.2.1.1 National Oceanic and Atmospheric Administration

The Secretary of Commerce was designated (subsequently delegated to NOAA) as a trustee for natural resources managed or controlled by NOAA and for natural resources managed or controlled by other federal agencies and that are found in, under, or using waters navigable by deep draft vessels, tidally influenced waters or waters of the contiguous zone, the EEZ, and the outer continental shelf. Examples of NOAA’s trusteeship include the following natural resources and their supporting ecosystems: marine fishery resources; anadromous fish; endangered species and marine mammals;

and, the resources of the National Marine Sanctuaries and National Estuarine Research Reserves (40 CFR 300.600(b)(1)).

NOAA is comprised of five line offices, two of which have primary trustee responsibilities for oil spills: the National Ocean Service (NOS) and, the NMFS.

- ♦ The NOS' mission is to be the Nation's principal advocate for coastal and ocean stewardship through partnerships at all levels; and to support and provide the science, information, management, and leadership necessary to balance the environmental and economic well-being of the Nation's coastal resources and communities.
- ♦ The NMFS' mission is to rebuild and maintain sustainable fisheries; promote the recovery of protected species; and protect and maintain the health of coastal marine habitats.

2.2.2.1.2 Department of the Interior

The Secretary of the Interior is designated as trustee for natural resources managed or controlled by DOI. Examples of DOI's trusteeship include the following natural resources and their supporting ecosystems: migratory birds; anadromous fish; endangered species and marine mammals; federally owned minerals; federal lands managed by DOI; and, certain federally owned water resources (40 CFR 300.600(b)(2)).

The DOI is comprised of a number of bureaus and offices including the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), the Bureau of Reclamation (BR), the USFWS, the U.S. Geological Survey (USGS), the Minerals Management Service (MMS), the NPS, the Office of Surface Mining (OSM), and the Office of the Secretary.

- ♦ The BIA mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.
- ♦ The BLM mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.
- ♦ The OSM mission is to carry out the requirements of the Surface Mining Control and Reclamation Act in cooperation with States and Tribes. The primary objectives are to:
 - ♦ ensure that coal mines are operated in a manner that protects citizens and the environment during mining;
 - ♦ assure that the land is restored to beneficial use following mining; and
 - ♦ mitigate the impacts of past mining by aggressively pursuing reclamation of abandoned coal mines.
- ♦ The MMS mission is to manage the mineral resources on the Outer Continental Shelf in an environmentally sound and safe manner and to timely collect, verify, and distribute mineral revenues from federal and Indian lands.
- ♦ The NPS mission is "...to promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."
- ♦ The USFWS mission is to work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continued benefit of the American people.
- ♦ The USGS mission is to serve the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural

disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

- ♦ The BR mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

2.2.2.1.3 Federal Land Managing Agencies

Federal land managing agencies are designated as trustees for natural resources located on, over, or under land administered by the United States. The trustees for the principal land managing agencies, aside from DOI, are USDA, DOD, and DOE. These agencies are trustees for all natural resources and their supporting ecosystems that are located on their lands and facilities (40 CFR 300.600(b)(3)).

2.2.2.2 State Trustee Jurisdictions

Under the NCP, state trustees act on behalf of the public as trustees for natural resources, including their supporting ecosystems, within the boundary of a state or belonging to, managed by, controlled by, or appertaining to such state. (40 CFR 300.5)

The Louisiana state trustees participate in NRDA pursuant to the Louisiana Constitution, Article IX, Section 1; OSPRA, L.R.S. 30:2451, *et seq.*; the Louisiana Oil Spill Contingency Plan; the Louisiana Natural Resource Damage Assessment Rules, La. Admin. Code 43:XXIX, Chapter 1, Section 101, *et seq.*; the Louisiana Constitution, Article IX Section 7(A), L.R.S. 36:601, *et seq.*, L.R.S 56:1, *et seq.*; the Louisiana Environmental Quality Act (EQA), L.R.S. 30:2001, *et seq.*; the Louisiana Coastal Wetlands Conservation, Restoration, and Management Act, L.R.S. 49:213.1, *et seq.*; and any other applicable laws or authorities.

2.2.2.2.1 Louisiana Oil Spill Coordinator's Office

Pursuant to the Louisiana OSPRA, L.R.S. 30:2451, *et seq.* and La. Admin. Code 43:XXIX.Chapter 1, LOSCO acts as the lead administrative trustee for the state in fulfilling its duties to protect, conserve, and replenish the natural resources of Louisiana in the event of an actual or threatened release of oil into the environment. As Louisiana's lead administrative trustee, LOSCO coordinates the activities of the state trustees in the NRDA process and compiles and maintains the associated administrative records.

2.2.2.2.2 Louisiana Department of Environmental Quality

The EQA created the LDEQ on February 1, 1984. LDEQ is the primary agency in the state concerned with environmental protection and regulation. The powers, duties, and structure of LDEQ are legislatively described in L.R.S. 30:2011(A)(1). LDEQ has jurisdiction over matters affecting the regulation of the environment within the state, including the regulation of air quality, water pollution, solid waste disposal, protection and preservation of the scenic rivers and streams of the state, the regulation and control of radiation, the management of hazardous waste, and the regulation of those programs which encourage, assist, and result in the reduction of wastes generated within Louisiana.

2.2.2.2.3 Louisiana Department of Natural Resources

The LDNR was created in 1976 by L.R.S. 36:351. The mission of LDNR is to preserve and enhance the nonrenewable natural resources of the state, consisting of land, water, oil, gas, and other minerals, through conservation, regulation, and management/exploitation. Specifically, the LDNR "shall be responsible for the conservation, management, and development of water, minerals, and other such natural

resources of the state, including coastal restoration and management, except timber and fish and wildlife.”

2.2.2.3 Louisiana Department of Wildlife and Fisheries

The LDWF is the state agency responsible for management of the state's renewable natural resources including all wildlife and all aquatic life. The control and supervision of these resources are assigned to the department in the Constitution of the State of Louisiana of 1974, Article IX, Section 7 and in revised statutes under Title 36 and Title 56.

The L.R.S. 36:602 states that LDWF shall control and supervise all wildlife of the state, including fish and all other aquatic life, and shall execute the laws enacted for the control and supervision of programs relating to the management, protection, conservation, and replenishment of wildlife, fish, and aquatic life in the state, and the regulation of the shipping of wildlife, fish, furs, and skins.

LDWF is also responsible for the conservation and management of all renewable resources on all wildlife management areas, wildlife refuges, scenic rivers, and wildlife preserves that it may own or lease. Leasing of nonrenewable state owned resources can only be carried out on such wildlife management areas, refuges, preserves, and scenic rivers with the concurrence of LDWF.

2.2.2.4 Indian Tribes

Section 1001 of OPA (33 USC 2701 (15)) defines “Indian tribe” as any Indian tribe, band, nation, or other organized group or community (but not including any Alaska Native regional or village corporation) which is eligible for the special programs and services provided by the United States to Indians due to their status as Native Americans having unique governmental authority. In addition, an Indian tribe has governmental authority over lands belonging to or controlled by the tribe. In the case of natural resource damages, provisions for the designation and recognition of Indian Tribe Trustees are made in Section 1006 of OPA (33 USC § 2706 (b)(4)). Under the NCP, Indian tribes are designated as “trustees for the natural resources, including their supporting ecosystems, belonging to, managed by, controlled by, or appertaining to such Indian tribe, or held in trust for the benefit of such Indian tribe, or belonging to a member of such Indian tribe, if such resources are subject to a trust restriction on alienation.” (40 CFR 300.610)

Title 43, Part XXIX, Section 109 of the Louisiana Administrative Code defines and recognizes as “Trustee(s)” those officials of the federal and state governments, of Indian tribes, and foreign governments, designated under 33 USC 2706(b) of OPA.

The four federally recognized American Indian Tribal Reservations in the State of Louisiana are: the Chitimacha Tribe of Louisiana (Charenton); the Coushatta Tribe of Louisiana (Elton); the Jena Band of Choctaw Indians (Jena); and the Tunica-Biloxi Indians of Louisiana (Marksville).

2.2.3 Responsible Party Liability

2.2.3.1 Viable Responsible Parties

The RP for a vessel or a facility from which oil is discharged (or which poses the substantial threat of a discharge of oil) into or upon the navigable waters or adjoining shorelines or the EEZ, is liable for the removal costs and damages that result from such incident. RP is defined in section 1001(32) of OPA (33 USC 2701(32) as follows:

- ◆ Vessel - In the case of a vessel, the RP is defined as - any person owning, operating, or demise chartering the vessel;
- ◆ Onshore facilities - In the case of an onshore facility (other than a pipeline) the RP is defined as - any person owning or operating the facility, except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as the owner transfers possession and right to use the property to another person by lease, assignment, or permit;
- ◆ Offshore facilities - In the case of an offshore facility (other than a pipeline or a deepwater port licensed under the Deepwater Port Act of 1974 (33 USC 1501 et seq.)), the RP is defined as the following:
 - ◆ the lessee or permittee of the area in which the facility is located; or
 - ◆ the holder of a right of use and easement granted under applicable state law or the Outer Continental Shelf Lands Act (43 USC 1301-1356) for the area in which the facility is located (if the holder is a different person than the lessee or permittee), except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as owner transfers possession and right to use the property to another person by lease, assignment, or permit;
- ◆ Deepwater ports - In the case of a deepwater port, the RP is defined as – a port licensed under the Deepwater Port Act of 1974 (33 USC 1501-1524), the licensee;
- ◆ Pipelines - In the case of a pipeline, the RP is defined as - any person owning or operating the pipeline;
- ◆ Abandonment - In the case of an abandoned vessel, onshore facility, deepwater port, pipeline, or offshore facility, the RP is defined as - the persons who would have been RPs immediately prior to the abandonment of the vessel or facility, as defined in section 1001(32) of OPA (33 USC 2701(32)); and
- ◆ Third Parties - In any case in which an RP establishes that a discharge or threat of a discharge and the resulting removal costs and damages were caused solely by an act or omission of one or more third parties, the third party or parties shall be treated as the RP or RPs for purposes of determining liability.

2.2.3.2 Non-Viable Responsible Parties

In some situations it is possible that a viable RP may not exist. In such a situation the trustees may elect to submit a natural resource damage claim to the Federal Oil Spill Liability Trust Fund (OSLTF) which is further described by OPA 33 USC 2712(a)(2) or the State Oil Spill Contingency Fund (OSCF) which is further described in La. Rev. Stat. 30:2483-2490. Situations that are considered to have non-viable RPs are defined as follows:

- ◆ Mystery Incidents – incidents in which no RP can be identified. These spills can be pursued by the Trustee's to the Federal OSLTF or the State OSCF; and
- ◆ Insolvent or Bankrupt RPs - Situations in which no financially sound RP, insurer, guarantor, or other liable party can be identified.

2.2.3.3 Excluded Incidents

The OPA of 1990 (33 USC 2701 et seq.) defines discharges from the following sources as excluded from its provisions and therefore exempt from liability:

- ◆ Discharges by a permit issued under Federal, State, or local law;
- ◆ Discharges from a Public Vessel - A public vessel means a vessel owned or bareboat chartered and operated by the United States, or by a state or political subdivision thereof, or by a foreign nation, except when the vessel is engaged in commerce, as defined in section 1001(29) of OPA (33 USC 2701(29));

- ◆ Discharges from an onshore facility which is subject to the Trans-Alaska Pipeline Authorization Act (43 USC 1651 et seq.);
- ◆ Discharges resulting from an Act of God - An act of God means an unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character the impacts of which could not have been prevented or avoided by the exercise of due care or foresight (33 USC 2701(1));
- ◆ Discharges resulting from an Act of War; and
- ◆ Acts or omission by a third party.

2.2.4 NRDA Process

Both state and federal NRDA regulations provide a step-by-step process for trustees to determine injuries, assess damages, and develop and implement restoration projects that compensate the public for injuries to natural resources impacted by an incident. This process is shown in Figure 2.1 and includes three phases:

- ◆ Pre-assessment;
- ◆ Restoration Planning; and,
- ◆ Restoration Implementation.

Each of the three phases is described in detail in Chapter 1 of the NOAA OPA guidance document (NOAA 1996a). The following sections provide an overview of the NRDA process and were largely taken from the guidance documents. Figure 2.2 further illustrates the process through which the trustees implement the NRDA regulations. It is important to note that RPs for incidents are encouraged to work cooperatively with the trustees through the NRDA process, and that trustees have a regulatory requirement to invite such cooperation.

2.2.4.1 Pre-assessment Phase

The purpose of the Pre-assessment Phase is to determine if trustees have the jurisdiction to pursue restoration under OPA, and, if so, whether it is appropriate to proceed with restoration planning (Figure 2.1). This preliminary phase begins when the trustees are notified of the incident by response agencies or other persons.

Based on early available information, trustees make a preliminary determination whether natural resources or services for which they are trustees under OPA or OSPRA may have been or are likely to be injured (see Step #1 in Figure 2.2). Through coordination with response agencies, trustees next determine whether response actions have addressed or will adequately address the injuries resulting from the incident, and if not, whether feasible primary and/or compensatory restoration alternatives exist to address such injuries. If the injuries will not be adequately addressed by response actions and feasible restoration alternatives exist to address such injuries, trustees may proceed with the NRDA process.

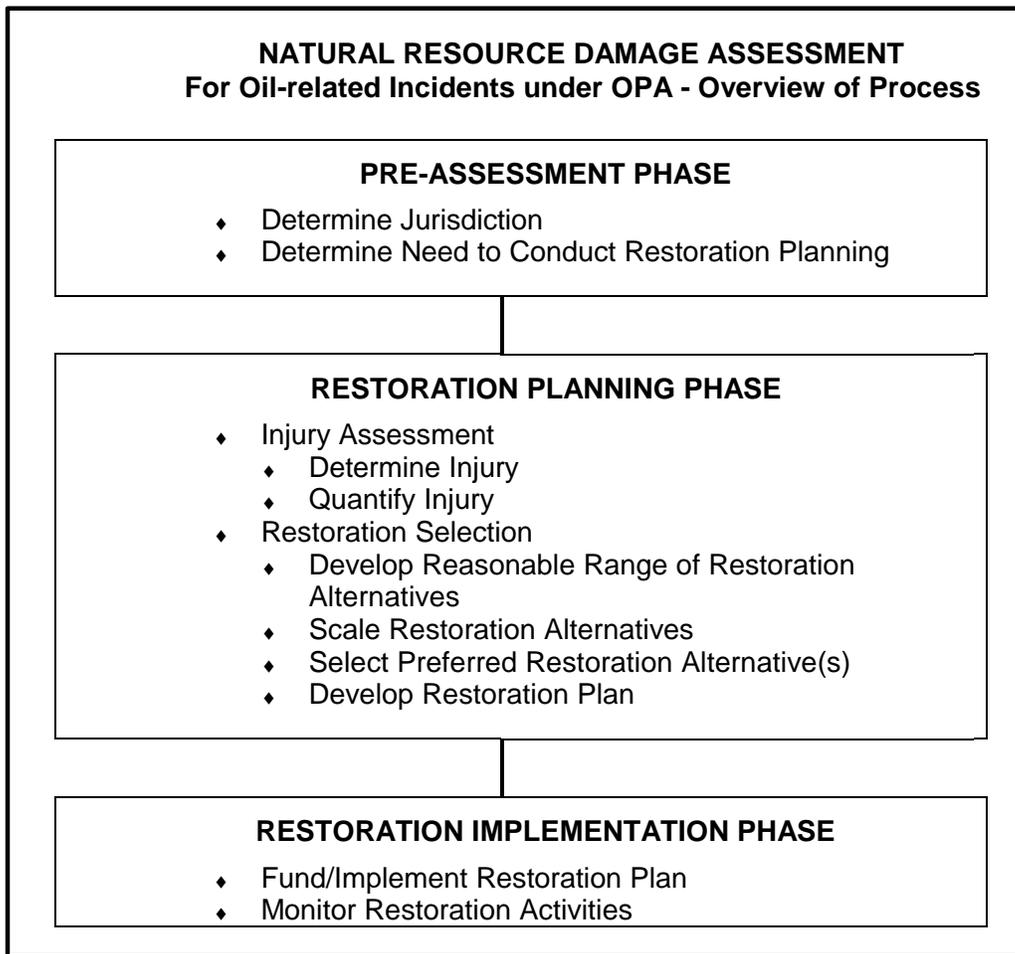


Figure 2.1: NRDA Process (adopted from NOAA 1996)

2.2.4.2 Restoration Planning Phase

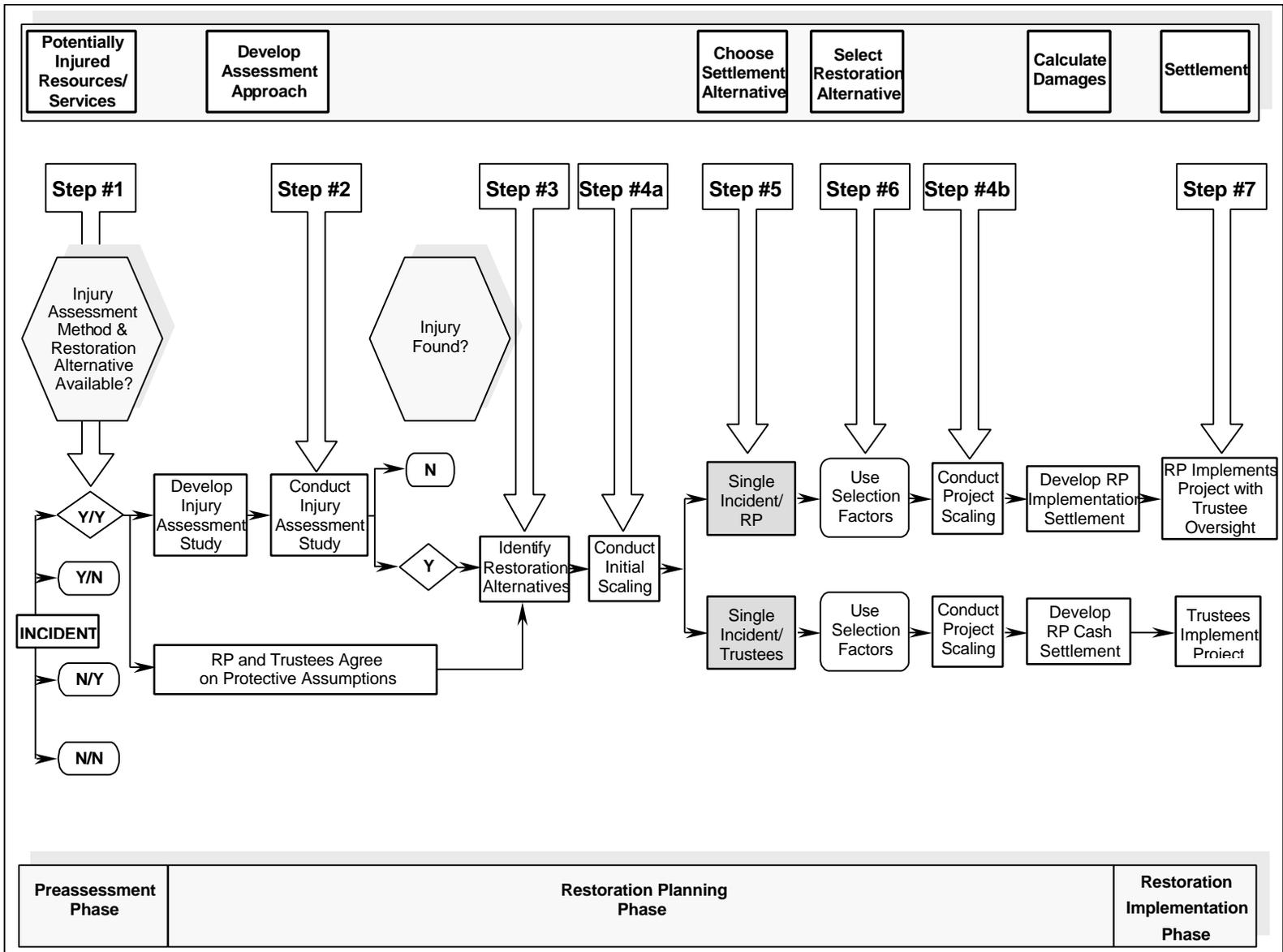
The purpose of the Restoration Planning Phase is to evaluate potential injuries to natural resources and services and use that information to determine the need for and scale of restoration actions. The Restoration Planning Phase provides the link between injury and restoration. The Restoration Planning Phase has two basic components: injury assessment and restoration selection (Figures 2.1 and 2.2).

2.2.4.2.1 Injury Assessment

The goal of injury assessment is to determine the nature, degree, and extent of injuries, if any, to natural resources and services (see Step #2 in Figure 2.2). This information is necessary to provide a technical basis for evaluating the need for, type of, and scale of restoration actions. Injury is defined as an observable or measurable adverse change in a natural resource or impairment of a natural resource service. To assess injury, trustees determine whether there is:

- ◆ Exposure, a pathway, and an adverse change to a natural resource or service as a result of an actual discharge; or

Figure 2.2: NRDA Process Implementation (PRD 2001)



To proceed with restoration planning, trustees also quantify the degree, and spatial and temporal extent of injuries. Injuries are quantified by comparing the condition of the injured natural resources or services to baseline, as necessary.

Injury assessment may be accomplished by using field observations, field studies, lab studies, literature reviews, physical/ecological models, or any combination of these methods. In cases where the RP is involved in the process, the trustees and the RP, where appropriate, may reach agreement on reasonable and protective assumptions that allow assessment of injury with less investment of time and money in assessment studies.

2.2.4.2.2 Restoration Selection

2.2.4.2.2.1 Developing Restoration Alternatives

Once injury assessment is complete or nearly complete, trustees develop a plan for restoring the injured natural resources and services. In the NRDA process, trustees identify a reasonable range of restoration alternatives (see Step #3 in Figure 2.2), evaluate and select the preferred alternative(s), and develop a Draft and Final Restoration Plan. Acceptable restoration actions include any of the actions authorized under OPA (and OSPRA): restoration, rehabilitation, replacement, or acquisition of the equivalent or some combination of those actions.

Restoration actions are either primary or compensatory. Primary restoration is action taken to return injured natural resources and services to baseline levels, including natural recovery. Compensatory restoration is action taken to compensate for the interim losses of natural resources and/or services pending recovery. Each restoration alternative will contain primary and/or compensatory restoration actions that address one or more specific injuries associated with the incident. The type and scale of compensatory restoration will depend on the nature of the primary restoration action, and the level and rate of recovery of the injured natural resources and/or services, given the primary restoration action.

When identifying the compensatory restoration components of the restoration alternatives, trustees must first consider compensatory restoration actions that provide services of the same type as those lost. If compensatory actions of the same type cannot provide a reasonable range of alternatives, trustees then consider other compensatory restoration actions that will provide services comparable to those lost.

2.2.4.2.2.2 Scaling Restoration Actions

To ensure that a restoration action appropriately addresses the injuries resulting from an incident, trustees must determine what scale of restoration is required to return injured natural resources to baseline levels and compensate for interim losses (see Step #4a and #4b in Figure 2.2). The approaches that may be used to determine the appropriate scale of restoration action are resource-to-resource (or service-to-service) and the valuation approach (see NOAA 1997 for more information on scaling of restoration actions).

2.2.4.2.2.3 Selecting a Preferred Restoration Alternative

The identified restoration alternatives are evaluated based on a number of factors (see Step #6 in Figure 2.2) that include:

- ◆ Cost to carry out the alternative;
- ◆ Extent to which each alternative is expected to meet the trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;
- ◆ Likelihood of success of each alternative;
- ◆ Extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;
- ◆ Extent to which each alternative benefits more than one natural resource and/or service; and
- ◆ Effect of each alternative on public health and safety (15 CFR 990.54(a)).

If the trustees conclude that two or more alternatives are equally favorable based on the above factors, the trustees must select the most cost-effective alternative.

2.2.4.2.2.4 Developing a Restoration Plan

The trustees provide a Draft DARP to the public for review and comment. The Draft DARP describes the trustees' pre-assessment activities, as well as injury assessment activities and results, evaluates restoration alternatives, and identifies the preferred restoration alternative(s). After reviewing public comments on the Draft DARP, trustees develop a Final DARP. The Final DARP becomes the basis of a claim for damages.

2.2.5 Restoration Implementation Phase

The Final DARP is presented to the RPs to implement or fund the trustees' costs of implementing the Plan (Figure 2.1 and see Step #5 and #7 in Figure 2.2; Single Incident/RP or Single Incident/Trustees respectively), therefore providing the opportunity for settlement of the damage claim without litigation. If the RPs choose to implement the restoration actions detailed in the Final DARP, then the trustees provide project-oversight, which is funded by the RPs.

Should the RPs decline to settle the claim, trustees are authorized to bring a civil action for damages in court or to present the claim⁶ to the Federal OSLTF or the States for such damages.

2.2.5.1 Restoration Monitoring

Restoration monitoring is necessary to determine whether the restoration actions are providing the resources and/or services required to make the environment and public whole. In order to accomplish this task, trustees identify performance criteria against which project success is judged through the evaluation of project objectives. Performance criteria may include structural, functional, temporal, and/or other demonstrable factors. The monitoring component of the Final DARP may address such factors as duration and frequency of monitoring needed to gauge progress and success, and level of sampling needed to detect the attainment of objectives and goals or the need for corrective action. Monitoring is usually conducted for a portion of the project's expected lifespan, a period of time sufficient to give assurance that the project will continue to perform as expected.

⁶ In the absence of a viable RP (e.g., where the RP is unknown, bankrupt or is not responsible due to a valid defense) or when a viable RP fails to respond to a demand letter after 90 days, the trustees have the option of going to the Federal OSLTF and/or State OSCF to seek monies to implement the restoration actions required for that case.

2.2.5.2 Corrective Action

If the monitoring program shows that the restoration actions are not meeting the performance criteria, then the trustees evaluate whether actions should be undertaken to correct the deficiencies.

3.0 Proposed Action: Regional Restoration Planning Program

Federal and Louisiana natural resource trustees are developing a statewide comprehensive RRP Program and RRPs for each of nine regions in the State of Louisiana to assist the natural resource trustees in carrying out their responsibilities for incidents. The goal of this planning effort is to establish a statewide program that will: expedite and potentially reduce the cost of the NRDA process; provide for consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and increase restoration of lost natural resources and services.

The RRP Program is established to expedite and make the NRDA process more cost-effective. The RRP Program is expected to shorten the restoration planning phase of the NRDA process through the development of individual RRPs, which will identify appropriate restoration projects subjected to public review on a regional basis prior to incidents occurring. To further streamline the NRDA process during specific incidents, the trustees have incorporated an analysis on the environmental consequences generally associated with the implementation of those restoration projects in the RRP Program. Additionally, the RRP Program will help to inform the selection of restoration projects by identifying the types of restoration that may be suitable to restore those resources and services likely to be injured by incidents in Louisiana. Consistent application of the RRP Program project selection criteria will enhance the predictability and accountability of the decision-making process. Flexibility will be increased through the introduction of additional settlement alternatives that are unique to the RRP process.

3.1 RRP Program Introduction

As described in Chapter 1 of this document, the RRP Program is required to be established in accordance with La. Rev. Stat. 30:2480.1:

“To assist in making the natural resource damage assessment process more efficient, the Regional Restoration Planning Program encompassing the entire geographic area of the state, is established in the office of the oil spill coordinator. The office of the oil spill coordinator shall develop and implement the program in coordination with the state natural resource trustees.”

The RRP Program is being established to address incidents under OPA and OSPRA. The RRP Program does not address injuries from releases of hazardous substances under CERCLA, 42 USC § 9601 *et seq.*, or physical injuries to resources under the National Marine Sanctuaries Act, 16 USC § 1431 *et seq.*, should a sanctuary be designated in the State of Louisiana.

The Louisiana RRP Program will be jointly administered and used by the trustees to assist in carrying out their natural resource trust mandates under OPA and OSPRA.

Regional restoration planning is defined in the preamble of the OPA regulations as:

“...compiling databases that identify existing, planned, or proposed restoration projects that may provide appropriate restoration alternatives for consideration in the context of specific incidents. Plans or projects developed on a regional basis (e.g., ecosystem, landscape, watershed, or any other) are appropriate so long as natural resources and/or services comparable to those expected to be injured by an incident are addressed in the plans. In no event may the use of a regional restoration plan or other existing proposed project restoration violate OPA’s

limitation that natural resource damages must be used solely to restore, rehabilitate, replace, or acquire the equivalent of natural resources and services injured by an incident.” (OPA Regulations, Preamble Discussion, Subpart A-Introduction, VI. Considerations for Facilitating Restoration, C. Regional Restoration Planning, 60 Fed. Reg. 440 [1996]).

Further, the OPA regulations require that:

“Regional restoration plans must be developed or annotated in such a way that trustees are able to justify linking the injuries from a particular incident or set of incidents with specific restoration projects within the plan. This may be facilitated by describing the types of injuries anticipated from incidents to specific natural resources within a region,...” (OPA regulations, Preamble Discussion, Appendix A - Considerations to Facilitate the Restoration Process).

Broad guidelines and the basic requirements of OPA provide the necessary direction for developing RRP. These guidelines and requirements are contained in 15 CFR 990. In summary, the general provisions concerning RRP are that they:

- ◆ Are tools trustees should consider “as a means to enhance successful restoration planning and implementation” (Preamble to OPA Regulations, Subpart A, VI, A, 60 Fed. Reg. 440 [1996]);
- ◆ “...may consist of compiling databases that identify, on a regional or watershed basis, or otherwise as appropriate, existing, planned, or proposed restoration projects that may provide appropriate restoration alternatives for consideration in the context of specific incidents” (15 CFR 990.15);
- ◆ “...must be capable of fulfilling OPA’s intent for trustees to restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources and/or services, and can be used provided that the plan
 - ◆ Was developed with public review and comment or is subject to review and comment;
 - ◆ Will adequately compensate the environment and public for injuries resulting from the incident;
 - ◆ Addresses, and is currently relevant to, the same or comparable natural resources and services as those identified as having been injured; and
 - ◆ Allows for reasonable scaling relative to the incident” (15 CFR §990.56).

It is important to note that the NRDA process as described by implementing regulations and guidance both under OPA and OSPRA does not change as a result of the RRP Program. The trustees are further institutionalizing an existing process, as well as identifying potential ways to expedite and further define the specific steps of that process, expressly within the requirements of the OPA and OSPRA NRDA regulations.

This chapter describes the RRP Program’s goals and objectives as well as its components in relation to the NRDA process and the goals and objectives of establishing the RRP Program. Each component is described specifically in terms of where it fits into the NRDA decision-making process, and how it meets the program development objectives.

The scope of the RRP Program as well as the components of the RRP Program are described in detail below and further illustrated in Figure 3.1 relative to where they would fit into the NRDA decision-making process previously shown in Figure 2.2.

3.2 RRP Program Components

3.2.1 Regional Restoration Plans

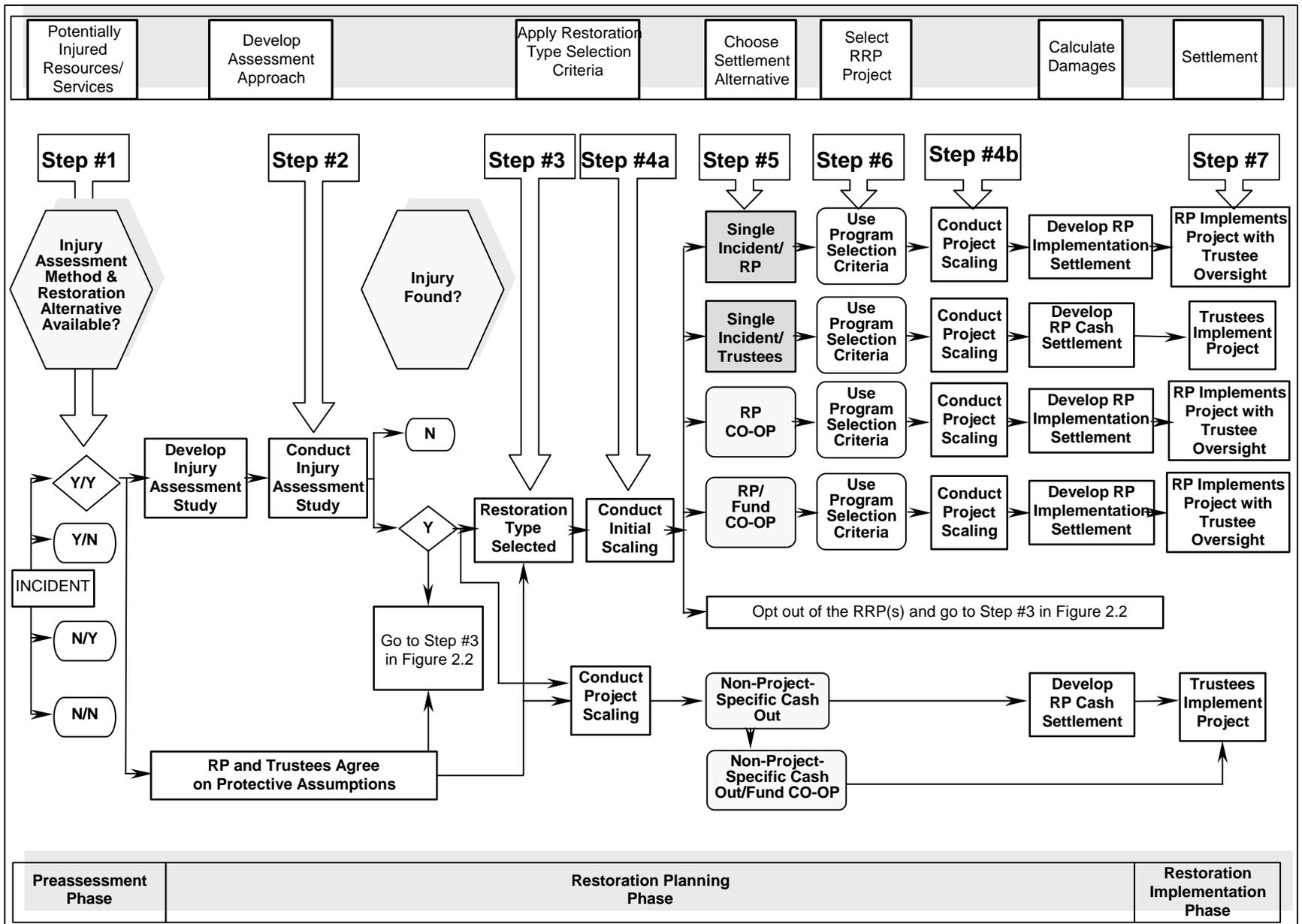
The trustees will develop specific RRP for each of the regions (see Chapter 4, *Regional Boundaries*) delineated under the RRP Program by identifying the natural resources/services in each region that are likely to be injured by an incident, the appropriate restoration types for each of the potentially injured resources/services, and the available restoration projects for each of the restoration types identified in each RRP. Restoration actions in response to an incident will typically occur in the same region where the incident took place. In some incidents, restoration actions may be selected in a region outside the region where the incident took place. Examples of such circumstances are provided in Section 3.2.4.3.

Identification of available projects will be achieved through a two-step process. The first step consists of soliciting projects from the public, government agencies, and industry. The types of restoration projects that will be incorporated into the RRP must address the restoration of natural resources and/or services that will be or are likely to be injured by an incident. (See description of Potentially Injured Resources/Services and Restoration Types below.) Therefore, trustees have developed selection criteria for determining whether a given restoration project can be included in an RRP. Application of those criteria represents the second step in the process. The following represent criteria for selection of restoration projects for incorporation into each RRP and are based in part on the OPA regulations (15 CFR 990.53(a)(2) and 990.54(a)(1-6)):

- ◆ “The extent to which each alternative is expected to meet the trustees’ goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;...” (15 CFR 990.54(a)(2)).
- ◆ **Strong Nexus to Injuries Included in the Applicable RRP**

Trustees must consider compensatory restoration actions that provide services of the same type and quantity, and of comparable values as those lost. Restoration projects are evaluated to determine how well the restoration would address the injuries to potentially injured resource/services that occurred as result of the potential incident in a specific region. Screening questions include: Will the project provide the same type of natural resources and services, both on site and off-site, that are lost due to the potential injury? If not, will the proposed project result in resources and services that are similar or complimentary to the potentially injured natural resources and services? Projects that come closest to restoring the same type of organisms and habitats as those injured by potential incidents are more likely to be selected than those projects where the nexus is not so close.

Figure 3.1: NRDA Process Implementation in RRP Program



- ◆ “The likelihood of success of each alternative;...” (15 CFR 990.54(a)(3)).
- ◆ **Technical Feasibility and Likelihood of Success**
Trustees consider whether a restoration project can be successfully implemented in a reasonable amount of time given available technology and expertise. Generally, the likelihood of a project’s success is evaluated based on whether the methods: 1) are proven; 2) have a high rate of success as documented in the literature; 3) are capable of being implemented in a cost-effective manner; and, 4) characterize the natural resource service gains stemming from the project. This does not preclude the use of existing technology in new and creative ways so long as there is a significant likelihood of successful implementation. Nevertheless, for new or unproven technologies, the trustees should provide technical justification demonstrating that there is a reasonable basis to believe that the project will be successful. They should also take into account project and site-specific factors that may influence project success.
- ◆ “Only those alternatives in accordance with applicable laws, regulations, or permits may be considered further under this part.” (15 CFR 990.53(a)(2)).
- ◆ **Consistency with Existing Laws and Regulations**
This criterion considers whether a given restoration project complies with applicable federal, state, and local laws, regulations, and policies.
- ◆ RRP Program specific criteria
 - ◆ **Listed as One of the Restoration Types Identified in the Applicable RRP**
The RRP’s identify those restoration types that are found to be reasonable for restoring each of the “potentially injured resources/services” within each of the RRP regions. The trustees must consider whether a proposed restoration project can be categorized as one of the restoration types identified in that RRP.
 - ◆ **Located (at least) Partially within the Boundaries of the Applicable RRP region**
This criterion considers the need for at least a portion of the project to be located within the boundaries of the applicable RRP Region.

Projects in each RRP will be classified by restoration type in order to facilitate the determination of the nexus between injuries and specific restoration projects, as well as the selection of specific restoration projects for a given NRDA.

3.2.1.1 RRP Revisions

The RRP’s will be updated through regular solicitations and the plans will be revised accordingly (see Appendix D for the *Project Solicitation Form* used in the RRP Program). It is anticipated that a formal public review and comment period on the revised RRP’s will be provided on a regular basis. The trustees will provide a public notice for this period.

3.2.2 Potentially Injured Natural Resources and Services

The RRP Program defines those natural resources and services in Louisiana that are likely to be injured (i.e., at risk) by incidents as “potentially injured resources/services.” Identification of these “potentially injured resources/services” will facilitate the development of the RRP’s and provide more detail to the pre-assessment phase in the NRDA process. (See Step #1 in Figure 3.1 where “Potentially Injured Resources/Services” were identified prior to the incident occurring and are subsequently

examined as part of the Pre-assessment Phase of the NRDA process.) This information will also assist in the coordination of response activities by informing incident response agency personnel of resources that may be of greatest concern to the trustees. The potentially injured resources/services are defined under three broad categories: coastal, inland, and statewide:

3.2.2.1 Coastal

3.2.2.1.1 Herbaceous Wetlands

Herbaceous wetlands are primarily salt, brackish/intermediate, and fresh marshes located in or near the coastal zone and alluvial basin. The Mississippi River delta complex marshes and other similar areas in Louisiana support a mix of freshwater, estuarine, and marine species. These wetlands are vital habitat for various fish, mammals, and resident and migratory birds. As considered here, this category includes marsh plants, invertebrates, bacteria, algae closely associated with the plants, and sediments, as well as all marsh habitat functions.

3.2.2.1.2 Forested Wetlands

Forested wetlands are wetland areas dominated by woody vegetation. They usually consist of an overstory of large trees, an understory of young trees or shrubs, and an herbaceous layer. As considered here, this category includes the trees, understory vegetation, soils, closely associated invertebrates, and the services that this habitat provides to other resources.

3.2.2.1.3 Beaches/Shoreline/Streambed

Unvegetated beaches and shorelines in coastal waters include the perimeters of barrier islands, estuaries and bays, tidal mudflats and river deltas. This zone begins at the lowest part of the intertidal zone and extends into the supratidal zone. As considered here, this injury category includes the invertebrates that burrow and/or live in this habitat. It encompasses all ecological functions performed by this habitat, including, among others, primary production by benthic diatoms in the intertidal zone and secondary production by grazers, but does not include human recreational services.

Streambeds include all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are partially or completely dewatered at low tide. Water regimes include the following: seasonally flooded, temporarily flooded, intermittently flooded, irregularly exposed, regularly flooded, irregularly flooded, seasonal-tidal, and temporary-tidal. As considered here, this injury category includes the substrate (soils/sediments and hard surfaces) and closely associated invertebrates, and includes all ecological functions performed by this habitat (Cowardin et. al. 1979).

3.2.2.1.4 Oyster and Other Reefs

This category considers living reefs in marine and estuarine waters. As considered here, living reefs encompass oysters, mussels, and/or other benthic organisms that make up the reef structure, and the fauna and flora that attach or are closely associated with these reefs. It also includes all ecological services this habitat provides to other natural resources.

3.2.2.1.5 Water Column Organisms

As considered here, this category consists of planktonic (including larval fish) and nektonic organisms in marine and estuarine waters, and the ecological services these

organisms provide to other resources. It also includes large mobile crustaceans, such as crabs and shrimp, and demersal fishes which live on or near the seafloor.

3.2.2.2 Inland

3.2.2.2.1 Herbaceous Wetlands

Inland herbaceous wetlands are generally those environments that experience periodic flooding and are comprised of emergent vegetation having little or no woody tissue. This definition refers specifically to the inland geographic areas where freshwater flow regimes prevail throughout the year and salt water does not typically penetrate from the coast. These wetlands support a diverse group of fish, birds and mammals. As considered here, this category includes marsh plants, invertebrates, bacteria, algae closely associated with the plants, and sediments, as well as all marsh habitat functions.

3.2.2.2.2 Forested Wetlands

Forested wetlands are characterized by woody vegetation that is at least 18.5 feet tall. They occur in palustrine systems and normally possess an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Specific examples of this habitat in Louisiana are wetland forest evergreen, deciduous, mixed, and batture. As considered here, this category includes the trees, understory vegetation, soils, closely associated invertebrates, and the services that this habitat provides to other resources.

3.2.2.2.3 Beaches/Shorelines/Streambeds

Unvegetated beaches and shorelines in fresh waters include, but are not limited to, lakefronts, ponds shores, mudflats and riverbanks. As considered here, this injury category includes the invertebrates that burrow and/or live in this habitat. It encompasses all ecological functions performed by this habitat, including, among others, primary production by benthic algae in the intertidal zone and secondary production by grazers, but does not include human recreational services.

Streambeds include all wetlands contained within the intermittent subsystem of the riverine system. Water regimes are restricted to irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, and intermittently flooded. As considered here, this injury category includes the substrate (soils/sediments and rocks) and closely associated invertebrates, and includes all ecological functions performed by this habitat.

3.2.2.2.4 Upland Vegetation

As considered here, this category includes vegetated urban, agricultural-cropland-grassland, dense pine thicket, upland shrub/scrub (deciduous, evergreen, and mixed), and upland forest (deciduous, evergreen, and mixed). It encompasses trees as well as understory vegetation, soils, and invertebrates in the soil or associated with plants, and the services this habitat provides to other resources.

3.2.2.2.5 Water Column Organisms

As considered here, this category consists of both planktonic (including larval fish) and nektonic organisms, such as fish that live in fresh waters streams, ponds, swamps, and lakes. It also includes the ecological services these organisms provide to other resources.

3.2.2.3 Statewide

3.2.2.3.1 Birds

Birds located permanently or seasonally in all coastal and inland areas listed in Appendix B are included in this category. This injury category can also include the ecological services birds provide to other resources.

3.2.2.3.2 Wildlife

Mammals, reptiles, and amphibians from all habitats in all coastal and inland areas listed in Appendix B are included in this category. This injury category can also include the ecological services these organisms provide to other resources.

3.2.2.3.3 Recreational

Recreational trust resources include habitats and/or areas that provide human recreational activities throughout the state and offshore within the EEZ. Indirect activities (i.e. hiking, biking, picnicking or jogging) and direct activities (i.e. bird and wildlife viewing, hunting, fishing, boating, or swimming) are included in this category. It does not include the resources themselves that are involved in the activity.

3.2.2.3.4 Cultural

Cultural Resources is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. Cultural resources in Louisiana include lands, buildings, monuments, travel routes, ship wrecks, burial sites, ceremonial sites, battle grounds, Indian mounds, middens and other artifacts, generally in excess of 50 years of age, that represent the history and culture of the region as perceived by the public or cultural scientists. While all state and local historic preservation groups may contribute to the list of state cultural resources, the Louisiana State Preservation Office, state Indian Tribes, and DOI are the primary designees of Louisiana's cultural resources. Natural resources can have cultural significance and values under specific conditions. As an example, a bald eagle may have spiritual/religious importance to native tribes. Its loss or injury would constitute not only natural resource injury, but cultural resource injury as well. Therefore, this category includes all state cultural resources, and the ecological services this category provides to other resources.

3.2.3 Restoration Types

As part of the RRP Program development, the trustees identified restoration types that are appropriate for the restoration of injuries for each of the "potentially injured resources/services" (discussed in Section 3.2.2) in the RRP Program. Identification of appropriate restoration types will again increase the predictability and consistency of the NRDA decision-making process. Furthermore, restoration projects in each RRP will be grouped by restoration type within each region identified in the plan which will allow the process of evaluating and selecting preferred restoration projects (Step #6 in Figure 3.1), for a particular region to be streamlined.

The restoration types in the RRP Program include the following seven broad categories and are defined below:

- ◆ Creation or enhancement of a habitat
- ◆ Physical protection of a habitat
- ◆ Acquisition or legal protection of a resource
- ◆ Stocking of fauna
- ◆ Physical protection of fauna
- ◆ Restoration of a recreational resource
- ◆ Restoration of a cultural resource

3.2.3.1 Habitat Creation/Enhancement

Creation of a habitat includes the physical construction of a habitat, such as a marsh or reef and planting of submerged aquatic vegetation (SAV) on a non-vegetated water bottom. Enhancements might also include hydrological changes to improve a habitat through the creation of a crevasse or water diversion; or any habitat manipulation that benefits a species, for example, providing nesting sites, increasing the food base, reducing predation, etc.

3.2.3.1.1 Creation/Enhancement of Coastal Herbaceous Wetlands

This restoration type consists of actions intended to create a coastal marsh or enhance the provision of marsh services from an existing marsh. There are many different methods that can be used to create a marsh, including depositing dredge material at a height suitable for marsh vegetation and then planting marsh vegetation following the dewatering or compaction of material, constructing a crevasse in a river levee allowing a marsh splay to form, and terracing to protect marsh from wave action and facilitate the increase of water bottom elevation through the deposition of sediment and organic matter. An example of an action designed to enhance marsh service flows would be increasing hydrologic flow into an existing marsh with poor circulation to augment utilization by marine organisms and growth of marsh vegetation.

3.2.3.1.2 Creation/Enhancement of Coastal Forested Wetlands

This restoration type consists of actions designed to provide additional areas of forested wetlands or enhance the provision of services from an existing forested wetland to other natural resources. Planting hardwoods along cheniers and ridges is an example of a project to create forested wetlands. An example of an action designed to enhance forested wetland service flows would be increasing hydrologic flow into an existing forested wetland with poor circulation to augment utilization by marine and estuarine water organisms, such as gapping spoil banks or introducing fresh river water to swamp.

3.2.3.1.3 Creation/Enhancement of Coastal Beach/Shoreline/Streambeds

This restoration type consists of actions designed to provide additional areas of beaches, shorelines, and streambeds or enhance the provision of services from an existing beach/shoreline/streambeds to other natural resources. Installing a hard structure to trap sediment, thus forming additional area of beach, is an example of coastal beach creation. Enhancement actions could include such methods as removing debris along the beach and/or shoreline that limit the habitat value.

Enhancement actions for streambeds could include such methods as removing debris that limit the habitat value of a streambed. Regrading or recontouring previously altered streambeds is another alternative for enhancement.

3.2.3.1.4 Creation/Enhancement of Coastal Oyster and Other Reefs

This restoration type consists of actions designed to produce reef habitat or to enhance the productivity of, and services provided by, an existing reef. A project such as the placing of hard substrates in an area suitable for oyster survival in a configuration designed to allow oysters or other reef-forming organisms to settle is an example of reef creation. A water quality improvement project that enhances the productivity of an existing oyster reef is an example of an enhancement action.

Construction of an artificial reef such as increasing hard structure on the seafloor or water column to allow colonization by encrusting organisms and provide habitat for reef fish is

an example of a project of this restoration type. Other actions designed to create artificial reefs or to increase the productivity of an existing reef are also classified in this restoration type.

3.2.3.1.5 Creation/Enhancement of Coastal Submerged Aquatic Vegetation

This restoration type consists of actions designed to create a new bed of submerged aquatic vegetation or enhance the productivity of an existing bed. Planting seagrasses in a bare area is an example of a project to create submerged aquatic vegetation. A water quality improvement project that reduces turbidity and enhances the productivity of an existing seagrass bed is an example of an enhancement action.

3.2.3.1.6 Creation/Enhancement of Inland Herbaceous Wetlands

This restoration type consists of actions to create herbaceous vegetated wetlands or enhance the provision of services from an existing wetland to other natural resources. Planting fresh marsh vegetation in a bare area is an example of a project to create herbaceous wetlands. An example of an action designed to enhance inland herbaceous vegetated wetland service flows would be increasing hydrologic flow into an existing herbaceous wetland with poor circulation to augment utilization by fresh water organisms and growth of the vegetation. Adding nutrients to herbaceous wetlands with low productivity is another method of enhancement.

3.2.3.1.7 Creation/Enhancement of Inland Forested Wetlands

This restoration type consists of actions designed to provide additional areas of forested wetlands or enhance the provision of services from an existing forested wetland to other natural resources. Planting bald cypress or overcup oak in a bare area is an example of a project to create forested wetlands. An example of an action designed to enhance forested wetland service flows would be increasing hydrologic flow into an existing forested wetland with poor circulation to augment utilization by freshwater organisms and growth of the woody vegetation.

3.2.3.1.8 Creation/Enhancement of Inland Beach/Shoreline/Streambeds

This restoration type consists of actions designed to provide additional areas of beaches, shorelines and streambeds to enhance the provision of services from an existing beach/shoreline/streambeds to other natural resources. Installing a hard structure to trap sediment and form an additional area of beach is an example of inland beach creation. Enhancement actions could include such methods as removing trash that limits the habitat value of a beach.

Enhancement actions for streambeds could include such methods as removing trash that limits the habitat value of a streambed. Regrading or recontouring previously altered streambeds, or Bendway projects are other alternatives for enhancement.

3.2.3.1.9 Creation/Enhancement of Inland Upland Vegetation

This restoration type consists of actions designed to provide additional areas of upland vegetation or enhance the provision of services from existing upland vegetation to other natural resources. Planting longleaf pine (*Pinus taeda*) in a bare area is an example of a project to create upland vegetation. Enhancement actions could include such methods as mid-story thinning to stimulate wildlife utilization and growth of the upland vegetation.

3.2.3.2 Physical Habitat Protection

Prevention of a particular organism or physical force from adversely affecting a habitat constitutes physical protection. Protection of a riparian habitat by fencing off cattle or

creating breakwaters to reduce wave energy would be examples of physical habitat protection.

3.2.3.2.1 Physical Protection of Coastal Herbaceous Wetlands

This type of restoration action involves projects designed to decrease the loss of coastal marsh. Armoring shorelines or erecting fences to exclude herbivores, or prevent excessive herbivory is one example of physical protection that may be implemented in coastal herbaceous wetlands.

3.2.3.2.2 Physical Protection of Coastal Forested Wetlands

This type of restoration action includes projects designed to decrease the loss of coastal forested wetlands. The use of tree shelters around the base of trees or exclusion fences around forest tracts to prevent herbivory are examples of physical protection that may be implemented in this habitat.

3.2.3.2.3 Physical Protection of Coastal Beach/Shoreline/Streambeds

This type of restoration action involves projects designed to decrease the loss of a coastal beach or other unvegetated shoreline. It may involve the placement of artificial structures or construction of some natural habitat adjacent to an existing shoreline that would reduce erosion of the substrate.

3.2.3.2.4 Physical Protection of Inland Herbaceous Wetlands

This type of restoration action involves projects designed to decrease the loss of herbaceous vegetated wetlands. Erecting fences to exclude herbivores or prevent excessive herbivory is one example of physical protection that may be implemented in inland herbaceous wetlands.

3.2.3.2.5 Physical Protection of Inland Forested Wetlands

This type of restoration action involves projects designed to decrease the loss of forested wetlands. The use of tree shelters around the base of trees to prevent herbivory and scouring is an example of physical protection that may be implemented in this habitat.

3.2.3.2.6 Physical Protection of Inland Beach/Shoreline/Streambeds

This type of restoration action involves projects designed to decrease the loss of a sandy beach or other unvegetated shoreline. It may involve placement of artificial structures or construction of some natural habitat adjacent to an existing shoreline that would reduce shoreline erosion of the substrate.

This type of restoration action may also involve projects designed to reduce the loss of inland streambeds. Planting fringe vegetation to reduce sedimentation into a streambed to keep it from filling in is one example of this type of restoration. Fencing off access to the streambed to prevent cattle from entering, or enhancing vegetated buffers around streambeds, would qualify as protection.

3.2.3.2.7 Physical Protection of Inland Upland Vegetation

This type of restoration action involves projects designed to decrease the loss of upland vegetation. Laying weed mats around the base of trees to alleviate excessive weed growth in the area is an example of physical protection that can be implemented in an upland vegetated habitat. Erecting deer exclusion fencing, or supporting the control of detrimental species, would provide physical protection of the habitat.

3.2.3.3 Acquisition/Legal Protection

Acquisition or servitude of land as a buffer or protection of created or enhanced habitat is an example of restoration under this type. Acquisition or preservation of existing habitat may be a potential restoration alternative, although no increase in service flows would occur through acquisition or protection alone. Acquisition will generally be used in conjunction with other restoration types, such creation or enhancement of habitat. Acquisition may be considered as a restoration alternative if, and only if, the particular habitat has 1) unique qualities, 2) its location is especially valuable, and 3) its destruction is imminent. Acquisition of a habitat or resource already afforded protection under law, such as purchase of wetlands, would not normally be considered under this restoration type. Private land owners may also be encouraged to make an easement donation to one of the many non-profit organizations in place to handle land conservation efforts. As with all restoration alternatives, trustees must first consider actions that provide services of the same type and quality, and of comparable value as those lost.

3.2.3.3.1 Acquisition/Legal Protection of Coastal Herbaceous Wetlands

As mentioned above, acquisition of a habitat or resource already afforded protection under law, such as purchase of wetlands, would not normally be considered under this restoration type. Acquisition of this type of coastal herbaceous wetlands will generally be used in conjunction with other restoration types, such creation or enhancement of the habitat. This restoration type may also include actions that meet the three requirements listed above, such as buying imperiled tracts of herbaceous wetlands or other herbaceous wetlands in jeopardy of being developed or pursuing conservation easements to remove them from consideration for development or other anthropogenic activities. While service flows would not be increased through this alternative, areas that may otherwise stop providing services to the public and environment may remain intact and contribute toward landscape continuity.

3.2.3.3.2 Acquisition/Legal Protection of Coastal Forested Wetlands

Again as mentioned above, acquisition of a habitat or resource already afforded protection under law, such as purchase of wetlands, would not normally be considered under this restoration type. Acquisition of this type of coastal forested wetlands will generally be used in conjunction with other restoration types, such creation or enhancement of the habitat. This restoration type may include actions such as purchasing tracts or pursuing conservation easements on tracts of coastal forested wetlands in jeopardy of being developed or imperiled for other reasons. While service flows would not be increased through this alternative, areas that would otherwise stop providing services to the public and environment would remain intact and continue to contribute to landscape continuity.

3.2.3.3.3 Acquisition/Legal Protection of Coastal Beaches/Shorelines/Streambeds

This restoration type would include actions such as purchasing areas adjacent to coastal beaches and shorelines (coastal beaches are public lands up to the mean high water line), or purchasing privately owned canals/streambeds. Other actions may be taken to legally protect this resource such as pursuing conservation easements, limiting access, or taking other measures deemed appropriate. While service flows would not be increased through this alternative, areas that would otherwise stop providing services to the public and environment would remain intact and contribute toward landscape continuity.

3.2.3.3.4 Acquisition/Legal Protection of Coastal Oyster (and Other Reefs)

This restoration type would include actions such as buying an existing oyster lease to provide ecological services.

3.2.3.3.5 Acquisition/Legal Protection of Inland Herbaceous Wetlands

Again as mentioned above, acquisition of a habitat or resource already afforded protection under law, such as purchase of wetlands, would not normally be considered under this restoration type. Acquisition of this type of inland herbaceous wetlands will generally be used in conjunction with other restoration types, such creation or enhancement of the habitat. This restoration type would include such actions as purchasing tracts of herbaceous vegetated wetland habitat that are not otherwise protected and are in imminent peril of loss to development.

3.2.3.3.6 Acquisition/Legal Protection of Inland Forested Wetlands

Again as mentioned above, acquisition of a habitat or resource already afforded protection under law, such as purchase of wetlands, would not normally be considered under this restoration type. Acquisition of this type of inland forested wetlands will generally be used in conjunction with other restoration types, such creation or enhancement of the habitat. This restoration type would include such actions as purchasing tracts of forested wetland habitat that is not otherwise protected and is in imminent peril of loss to development.

3.2.3.3.7 Acquisition/Legal Protection of Inland Beach/Shorelines/Streambeds

Inland beaches and shorelines, as considered in this section, include river, stream and lake edges. State law, based on the land survey of 1812, states that the public (state) owns all navigable rivers and streams in the State of Louisiana. This restoration type would include such actions as purchasing stream edges that are not otherwise protected and are in imminent peril of loss to development.

3.2.3.3.8 Acquisition/Legal Protection of Inland Upland Vegetation

This restoration type would include such actions as purchasing tracts of upland vegetation habitat that are not otherwise protected and are in imminent peril of loss to development.

3.2.3.4 Stocking of Fauna

This restoration type includes the stocking of fish, birds, or other wildlife into their native environment to replenish individuals lost or injured as a result of the incident.

3.2.3.4.1 Stocking Coastal Water Column Organisms

This restoration type is broadly defined as any action designed to directly increase the number of coastal water column organisms. Releasing fish from a hatchery to increase the wild species' population is an example of this type of restoration.

3.2.3.4.2 Stocking Oysters (and Other Reefs)

This restoration type is defined as the placement of oysters in an area suitable for their survival. Adult or seed oysters could be used in this type of restoration. The intent of this type of restoration is to provide oyster biomass and oyster services, apart from reef services in general.

3.2.3.4.3 Stocking Inland Water Column Organisms

This restoration type is broadly defined as any action designed to directly increase the number of fresh water column organisms. A project such as releasing fish from a hatchery to increase the population of that fish species is an example of this type of restoration.

3.2.3.4.4 Stocking Birds

This restoration type is broadly defined as any action designed to directly increase the number of birds in general or the number of a particular species or guild. A project such as releasing birds hatched and raised from eggs collected in the wild is an example of this type of restoration.

3.2.3.4.5 Stocking Wildlife

This restoration type is broadly defined as any action designed to directly increase the population of one or more wildlife species. Actions such as raising and releasing the species of wildlife injured are included in this restoration type.

3.2.3.5 Physical Protection of Fauna

An action such as fencing in an area where birds are nesting to keep predators out is an example of this restoration type. Another example would be to remove fishing line and other trash from trees and other vegetation to prevent bird injury due to entanglement. Use of signage to make the public aware of critical habitat and/or nesting seasons to protect fauna from injury or disturbance due to human use.

3.2.3.5.1 Physical Protection of Birds

This restoration type is broadly defined as any action designed to reduce bird mortality. An action such as installing fences to protect nests from predators qualifies as this restoration type.

3.2.3.5.2 Physical Protection of Wildlife

This restoration type is broadly defined as any action designed to physically protect wildlife to increase survival. Excluding predators from an area to reduce predation is an example of this restoration type.

3.2.3.6 Recreational Resources Restoration

The restoration of any habitat that provides to the public recreational services, direct or indirect such as fishing, hiking, hunting, nature photography, education, etc., falls under this type. This type of restoration includes actions designed to increase access to, or enhance, recreational opportunities. Stocking a lake with fish or creating an artificial reef are examples of restoration actions that would enhance the experience of recreational fishing. The construction or enhancement of structures such as fishing piers, boat ramps, wildlife viewing areas, etc., could also be considered restoration if it can be shown that the amenity would restore lost recreational services to the public.

3.2.3.7 Restoration of Cultural Resources

Restoration of natural resources that also have cultural resource value would be an example of restoration under this type. Restoring bald eagle nesting habitat or restoring historic lands such as battlegrounds, tribal land or national reserves are examples of cultural resource restorations.

3.2.4 Relationship of Resource/Services to Restoration Types/Projects

In the restoration planning phase (after the injury assessment has been conducted [Step #2 in Figure 3.1]), the trustees must identify a reasonable range of restoration alternatives. Identification of these “restoration alternatives” as defined in the OPA regulations (Step #3 in Figure 2.2) involves both the identification and selection of the appropriate “restoration types” (Step #3 in Figure 3.1) and specific “restoration projects” (Step #6 in Figure 3.1) under the RRP Program.

As part of the RRP Program development, the trustees: 1) conducted a nexus analysis to identify one or more appropriate restoration types for each of the “potentially injured resources/services”, 2) developed restoration type screening criteria to assist in the selection of the most appropriate restoration type(s) to restore resources/services injured during a given incident, and 3) developed screening criteria to select the most appropriate restoration project(s) during a given incident.

3.2.4.1 Nexus Analysis

The results of the nexus analysis are presented in Figures 3.2 and 3.3. The Figures conceptually demonstrate those restoration types that are found to be reasonable for restoring each of the “potentially injured resources/services.” Checked boxes in these Figures indicate that a restoration type is an appropriate restoration alternative for the corresponding potentially injured resource or service. The following is a general summary of the analysis that the trustees used to define appropriate restoration types for each of the “potentially injured resources/services.” The analysis began with determining which restoration types had the closest nexus with each of the “potentially injured resources/services” and moved through a logical process to those restoration types which had significantly dissimilar service flows and therefore were found not to be appropriate.

3.2.4.1.1 Resource to Resource

Resource to resource restoration has a strong nexus because it is a one-to-one relationship. The injured resource is ultimately replaced by direct restoration of the same resource. In Figures 3.2 and 3.3, any injured resource that is directly restored has been identified by the trustees as having a strong nexus and is therefore considered to be an appropriate restoration type. For example, Figure 3.2 indicates that appropriate restoration for injured coastal forested wetland would be creation/enhancement or physical protection of coastal forested wetland. Similarly, an injury to an oyster reef could be directly restored by creation/enhancement of a new oyster reef or by stocking an existing reef to increase productivity. In both cases, the same type of injured resource can be directly restored, or protected, and therefore has a strong resource-to-resource nexus. Figure 3.3 presents the results of this resource to resource analysis for the potentially injured resources in the inland regions where appropriate restoration types for a forested wetland is the creation/enhancement, physical protection, or acquisition/legal protection of a forested wetland.

COASTAL		POTENTIALLY INJURED RESOURCES/SERVICES								
		Herbaceous Wetlands	Forested Wetlands	Beach/Shoreline/Streambed	Oyster Reefs (& other)	Water Column Org.	Birds	Wildlife	Recreational	Cultural
RESTORATION TYPES	C/E ⁽¹⁾	Coastal Herbaceous Wetlands	v	v		v	v	v	v	v
		Coastal Forested Wetlands	v	v			v	v	v	v
		Coastal Beach/Shoreline/Streambed			v		v	v	v	v
		Coastal Oyster Reefs (& other)				v	v	v	v	v
		Coastal Artificial Reefs				v	v	v	v	v
		Coastal SAV	v			v	v	v	v	v
	PP ⁽²⁾	Coastal Herbaceous Wetlands	v	v		v	v	v	v	v
		Coastal Forested Wetlands	v	v			v	v	v	v
		Coastal Beach/Shoreline/Streambed			v		v	v	v	v
	Ac/LP ⁽³⁾	Coastal Herbaceous Wetlands	v	v		v	v	v	v	v
		Coastal Forested Wetlands	v	v			v	v	v	v
		Coastal Beach/Shoreline/Streambed			v		v	v	v	v
		Coastal Oyster Reefs (& other)				v	v	v	v	v
		Coastal SAV	v				v	v	v	v
	S ⁽⁴⁾	Coastal Water Column Org.					v			v
		Coastal Oyster Reefs (& other)				v	v			v
		Birds						v		v
		Wildlife							v	v
	PF ⁽⁵⁾	Birds						v		v
		Wildlife							v	v
	Recreation								v	
	Cultural								v	

- (1) Creation/Enhancement
- (2) Physical Protection of Habitat
- (3) Acquisition/Legal Protection
- (4) Stocking of Fauna
- (5) Physical Protection of Fauna

Figure 3.2: Coastal Restoration Types by Resource/Service Category

INLAND			POTENTIALLY INJURED RESOURCES/SERVICES								
			Herbaceous Wetlands	Forested Wetlands	Beach/Shoreline/Streambed	Upland Vegetation	Water Column Org.	Birds	Wildlife	Recreational	Cultural
RESTORATION TYPES	C/E ⁽¹⁾	Inland Herbaceous Wetlands	v				v	v	v	v	
		Inland Forested Wetlands		v			v	v	v	v	
		Inland Beach/Shoreline/Streambed			v		v	v	v	v	
		Inland Upland Vegetation				v	v	v	v	v	
	PP ⁽²⁾	Inland Herbaceous Wetlands	v				v	v	v	v	
		Inland Forested Wetlands		v			v	v	v	v	
		Inland Beach/Shoreline/Streambed			v		v	v	v	v	
		Inland Upland Vegetation				v	v	v	v	v	
	Ac/LP ⁽³⁾	Inland Herbaceous Wetlands	v				v	v	v	v	
		Inland Forested Wetlands		v			v	v	v	v	
		Inland Beach/Shoreline/Streambed			v		v	v	v	v	
		Inland Upland Vegetation				v	v	v	v	v	
	S ⁽⁴⁾	Inland Water Column Org.					v			v	
		Birds						v		v	
		Wildlife							v	v	
	PF ⁽⁵⁾	Birds						v		v	
		Wildlife							v	v	
			Recreation							v	
			Cultural								v

- (1) Creation/Enhancement
- (2) Physical Protection of Habitat
- (3) Acquisition/Legal Protection
- (4) Stocking of Fauna
- (5) Physical Protection of Fauna

Figure 3.3: Inland Restoration Types by Resource/Service

3.2.4.1.2 Service to Resource

In some cases it is not possible, feasible, or desirable to replace injured resources directly. For example, some species cannot be restocked because of technical or cost limitations. In such cases, the most appropriate restoration action is often to enhance, protect, or create a habitat or resource that produces services that benefit the injured resource. This is the basis for “service-to-resource” restoration. Although the compensation in this type of restoration is indirect, a strong nexus exists because the injured resource/service is ultimately replaced through the restoration of an ecological link. In Figures 3.2 and 3.3 the following restoration types have been identified as appropriate for injuries to coastal and inland services because of a strong service-to-resource relationship:

Coastal:

- ◆ Water column organisms. Water column organisms are defined in Appendix B as plankton, nekton, large mobile crustaceans, and demersal fishes. Appropriate restoration types include:
 - ◆ Creation/enhancement or physical protection of herbaceous wetlands, forested wetlands, and beaches/shorelines/streambeds. These restoration types can increase the export of detritus (which serves as an organic food source) and essential nutrients to the estuary. Its increase will sustain greater abundance of water quality organisms. Created or enhanced herbaceous wetlands improve water quality, and increase spawning area and nursery area and habitat for adult fish. All of these actions stimulate production of water column organisms.
 - ◆ Creation or enhancement of benthic or submerged habitats such as oyster reefs, artificial reefs and SAV. These restoration types create habitat for small benthic organisms and control local turbidity through filtration (oyster reefs) or wave energy absorption (SAV). These processes benefit water column organisms by providing low-energy havens and benthic food sources for plankton and juvenile nekton that in turn promotes the sustainability of the resource.
- ◆ Birds. Birds are defined in Appendix B as both permanent and migratory species throughout Louisiana. Appropriate restoration types include:
 - ◆ Creation/enhancement or physical protection of herbaceous wetlands, and forested wetlands. These restoration types can increase bird food sources (both terrestrial and aquatic) and provide refuge and nesting and foraging habitat to birds. Thus, these restoration types benefit injuries to bird populations.
 - ◆ Creation/enhancement or physical protection of beaches/shorelines/streambeds. These restoration types can benefit injuries to shorebirds, wading birds and raptors by creating intertidal, benthic, and pelagic feeding communities.
 - ◆ Creation or enhancement of benthic or submerged habitats such as oyster reefs, artificial reefs and SAV. These restoration types can also benefit injuries to shorebirds, wading birds and raptors by creating benthic and pelagic feeding grounds.
- ◆ Wildlife. Wildlife is defined in Appendix B as mammals, reptiles, and amphibians in all habitats throughout Louisiana. Appropriate restoration types include:
 - ◆ Creation/enhancement or physical protection of herbaceous wetlands, and forested wetlands. These restoration types can increase wildlife food sources (both terrestrial and aquatic), and provide refuge and foraging habitat for wildlife. Thus, these restoration types benefit injuries to wildlife populations.
 - ◆ Creation/enhancement or physical protection of beaches/shorelines/streambeds. These restoration types can benefit injuries to wildlife by creating intertidal, benthic, and pelagic feeding communities.
 - ◆ Creation or enhancement of benthic or submerged habitats such as oyster reefs, artificial reefs and SAV. These restoration types can also benefit injuries to wildlife by creating intertidal, benthic, and pelagic feeding communities.
- ◆ Recreation. Recreational resources are defined in Appendix B as habitats and/or areas that provide human recreational activities, both direct and

indirect, throughout the state and offshore within the EEZ. Appropriate restoration types include:

- ◆ Creation/enhancement or physical protection of herbaceous wetlands and forested wetlands. These restoration types build bird and wildlife populations, increase aesthetic qualities and support juvenile fish. All of these benefits can compensate for recreational injuries such as bird watching, hunting, hiking, and fishing.
- ◆ Creation/enhancement or physical protection of beach/shoreline/streambeds. These restoration types can provide food and habitat for fish, birds and wildlife, and increase aesthetic qualities. Each of these benefits can compensate for recreational injuries, among others, to bird watching, hunting, hiking, picnicking, and fishing.
- ◆ Creation or enhancement of intertidal, benthic, or submerged habitats such as oyster reefs, artificial reefs and SAV. These restoration types can also benefit injuries to recreational fishing by creating benthic and pelagic feeding communities which attract sport fish.
- ◆ Stocking existing habitats with water column organisms (generally fish), birds, wildlife, and oyster reefs. These restoration types replenish organisms that provide human recreation and can compensate for recreational injuries such as bird watching, hunting, and fishing.
- ◆ Physical protection of existing bird and wildlife populations that have been injured. These restoration types can compensate the public for recreational losses such as bird watching and hunting.

Inland:

- ◆ Water column organisms. Water column organisms are defined in Appendix B as plankton, nekton, large mobile crustaceans, and demersal fishes. Appropriate restoration types include:
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of herbaceous wetlands, forested wetlands, beaches/shorelines/streambeds and upland vegetation. These restoration types can increase the export of detritus (which serves as an organic food source) and essential nutrients to the estuary. Its increase will sustain greater abundance of water quality organisms. Created or enhanced herbaceous wetlands improve water quality, and increase spawning and nursery area and habitat for adult fish. All of these methods stimulate production of water column organisms.
- ◆ Birds. Birds are defined in Appendix B as both permanent and migratory species throughout Louisiana. Appropriate restoration types include:
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of herbaceous wetlands, forested wetlands and upland vegetation. These restoration types can increase bird food sources (both terrestrial and aquatic), and provide birds with refuge and nesting habitat. Thus, these restoration types benefit injuries to bird populations.
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of inland beaches/shorelines/streambeds. These restoration types can benefit injuries to shorebirds, wading birds and raptors by creating benthic and pelagic feeding communities.

- ◆ Wildlife. Wildlife is defined in Appendix B as mammals, reptiles, and amphibians in all habitats throughout Louisiana. Appropriate restoration types include:
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of herbaceous wetlands, forested wetlands and upland vegetation. These restoration types can increase wildlife food sources (both terrestrial and aquatic), and provide refuge and habitat for wildlife. Thus, these restoration types benefit injuries to wildlife populations.
 - Creation/enhancement, physical protection or acquisition/legal protection of inland beaches/shorelines/streambeds. These restoration types can benefit injuries to wildlife by creating shoreline, benthic, and pelagic feeding communities and diversifying fauna by habitat diversification (e.g., pools and riffles) and improving habitat quality by improvement of stream canopy.
- ◆ Recreation. Recreational resources are defined in Appendix B as habitats and/or areas that provide to the public human recreational activities, both direct and indirect, throughout the state and offshore within the EEZ. Appropriate restoration types include:
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of herbaceous wetlands, forested wetlands and upland vegetation. These restoration types build bird and wildlife populations, increase aesthetic qualities and support juvenile fish. All of these benefits may compensate for recreational injuries such as bird watching, hunting, hiking, and fishing if the areas created, enhanced, acquired or protected are open to such use.
 - ◆ Creation/enhancement, physical protection or acquisition/legal protection of beaches/shorelines/streambeds. These restoration types may provide food and habitat for fish, birds and wildlife, and increase aesthetic qualities. Each of these benefits can compensate for recreational injuries, among others, to bird watching, hunting, hiking, picnicking, and fishing if the areas created, enhanced, acquired or protected are open to such use.
 - ◆ Stocking existing habitats with water column organisms (generally fish or zooplankton), birds, wildlife, and oyster reefs. These restoration types replenish organisms that provide human recreation can compensate for recreational injuries such as bird watching, hunting, and fishing.
 - ◆ Physical protection of existing bird and wildlife populations that have been injured. These restoration types can compensate the public for recreational losses such as bird watching and hunting.

3.2.4.1.3 Service to Service

Some restoration types will not directly restore an injured resource but will generate similar services and support the same wildlife species, and recreational and cultural activities. In cases where a restoration type generates the same or similar services as the injured resource, a strong nexus may be established even though the injured and restored resources are not the same. This is the basis for “service-to-service” restoration. In Figure 3.2 the following restoration types have been identified as appropriate for injuries to natural resource services because of a strong service-to-service relationship:

- ◆ Herbaceous wetlands. Coastal herbaceous wetlands are defined in Appendix B as primarily salt, brackish/intermediate, and fresh marshes located in or

near the coastal zone and alluvial basin. Appropriate restoration types include:

- ◆ Creation/enhancement or physical protection of coastal forested wetlands. These restoration types can compensate for injury to herbaceous wetlands since these two ecosystems are ecologically linked in the Louisiana coastal zone. The two ecosystems exchange wildlife, undergo similar biogeochemical processes, improve various water quality parameters, and retain sediments vital to nutrient cycling and productivity.
- ◆ Forested wetlands. Coastal forested wetlands are defined in Appendix B as coastal wetland areas dominated by woody vegetation that usually consists of an overstory of large trees, an understory of young trees or shrubs, and an herbaceous layer. Appropriate restoration types include:
 - ◆ Creation/enhancement or physical protection of herbaceous wetland areas. These restoration types can compensate for injury to forested wetlands since these two ecosystems are ecologically linked in the Louisiana coastal zone. The two ecosystems exchange birds, wildlife, biogeochemistry, hydrology and sediment in a symbiotic relationship.
- ◆ Oyster reefs (& other). Oyster and other reefs are defined in Appendix B as living reefs encompassing oysters, mussels, and/or other benthic organisms that make up the reef structure, and the fauna and flora that attach or are closely associated with these reefs. Appropriate restoration types include:
 - ◆ Creation/enhancement or physical protection of herbaceous wetland areas. These restoration types export detrital matter for oyster consumption, storm energy abatement, and filtration. These attributes stimulate reef production.
 - ◆ Creation/enhancement of artificial reefs and SAV. These restoration types benefit this class of service since they are closely linked in the coastal zone. These restored habitats exchange benthic and pelagic organisms with oyster reefs, provide storm abatement, and reduce turbidity; all of which promote reef productivity.
- ◆ Water column organisms. Water column organisms are defined in Appendix B as plankton, nekton, large mobile crustaceans, and demersal fishes. Appropriate restoration types include:
 - ◆ Stocking of coastal oyster reefs. This restoration type provides habitat for benthic organism that in turn provide food for water column organisms. Oyster reefs also act as highly efficient water filters that decrease turbidity and thereby promote productivity of pelagic organisms.

3.2.4.1.4 Dissimilar services

Empty cells in Figures 3.2 and 3.3 represent a weak nexus between “potentially injured resources/services” and restoration types. Many of the resources/services-restoration types relationships have a weak nexus due to significantly dissimilar services. For example, creation/enhancement or stocking of coastal oyster reefs is highly unlikely to compensate for injuries to coastal forested wetlands. Similarly, the creation/enhancement or physical protection of inland beaches, shorelines, and streambeds will not necessarily remunerate injuries to inland forested wetlands (and vice-versa) as the two habitats are not directly linked in the ecosystem.

When a restoration type has the potential, but not likelihood or certainty, to restore an injured service/resource, the nexus is also considered to be weak. For example, physical

protection or legal acquisition of SAV may compensate for injuries to a beach, shoreline, or streambed if it can be shown that the SAV has the potential to trap sediments and, hence, build beach, shoreline, or streambed. Controlling detrital export from a coastal forested wetland through enhancement, physical protection or acquisition may compensate damages to oyster reefs by reducing turbidity. In both cases, the same type of injured resource has the potential, but is not likely to be restored and therefore is generally characterized as having a weak nexus. Despite this general characterization, the empty cells in Figures 3.2 and 3.3 might, on occasion, support a viable nexus for restoration planning. Such a nexus, if applied in a given incident, will be explained on a case-by-case basis in the restoration plan for that incident.

3.2.4.1.5 Restoration Type Selection Criteria

The trustees have developed restoration type selection criteria that will further assist in determining which of the various restoration types with a strong nexus to the potentially injured resource/services identified in Figures 3.2 and 3.3 will be most appropriate to restore the injured resources/services during a given incident. Application of the restoration type selection criteria during a given incident would occur in Step #3 in Figure 3.1 (where potential "Restoration Types" were identified in the RRP Program, prior to the incident occurring.)

These restoration type selection criteria are based in part on the OPA regulations (Section 990.54(a)(1-6)) and include:

- ◆ "The extent to which each alternative is expected to meet the trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;..." (Section 990.54(a)(2)).
- ◆ **Strength of Nexus to the Injury**

Trustees must consider compensatory restoration actions that provide services of the same type and quantity, and of comparable values as those lost. Restoration types are evaluated to determine how well the restoration alternative would address the injuries to potentially injured resources/services that occurred as result of the incident in a specific region. Screening questions include: Does the option provide the same type of natural resources and services, both on site and off-site, that are lost due to the injury? If not, will the proposed option result in resources and services that are similar or complimentary to the injured natural resources and services? Alternatives that come closest to restoring the same type of organisms and habitats as those injured by the incident are more likely to be selected than those where the nexus is not so close.
- ◆ **Scalability**

The compensatory restoration projects must be scaled in order to compensate for the injury. The gains in resources and/or services provided by the compensatory projects must be at least equal to the resources and/or services lost as a result of the injury. Accordingly, the trustees must consider whether the restoration projects in a restoration type category are scalable for the incident.
- ◆ "The extent to which each alternative benefits more than one natural resource and/or service;..." (Section 990.54(a)(5)).
- ◆ **Degree to Which Restoration Type Addresses Multiple Injuries**

The trustees consider the ability of a restoration type to address more than one natural resource or habitat injury or loss.

- ◆ RRP Program specific criteria
 - ◆ **Availability of Projects for this Restoration Type in RRP**

The RRP's identify those restoration types that are found to be reasonable for restoring each of the "potentially injured resources/services" within each of the RRP regions. The trustees must consider whether a restoration project(s) exists for the applicable restoration types.
- ◆ Other case specific parameters

3.2.4.2 Project Selection Screening Criteria

After selecting the appropriate restoration type(s), conducting initial scaling and selecting the settlement alternative, a specific restoration project(s) will be selected (Step #6 in Figure 3.1) and scaled, if required (Step #4b in Figure 3.1) for implementation (Step #7 in Figure 3.1). In order to provide consistency, predictability and accountability in this phase of the NRDA decision-making process, the trustees established project selection/screening criteria to assist in selecting the specific restoration action(s) required.

The trustees will use the following criteria (based in part on the OPA regulations (Section 990.54(a)(1-6)), for selecting specific restoration projects:

- ◆ "The cost to carry out the alternative;..." (Section 990.54(a)(1)).
 - ◆ **Project Cost-Effectiveness** (including ability to partner)

Trustees consider the relationship of restoration project costs to natural resource benefits. Favored projects are those that provide the most benefit for the least cost expended. Lower cost projects that provide equivalent restoration benefits are preferred over more costly, but otherwise similar projects. Factors that may influence project costs include methods and procedures for project implementation, materials, equipment, project design, permitting, oversight, maintenance (including contingency funds), monitoring, and the ability to partner.
- ◆ "The extent to which each alternative is expected to meet the trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;..." (Section 990.54(a)(2)).
 - ◆ **Proximity to Affected Area**

Proximity addresses whether the restoration project is located within the area injured or is within a reasonable distance from the affected area (e.g., same watershed, ecosystem, and/or political boundary). It also considers the extent to which the project directly or indirectly benefits injured habitats or compensates for lost use within the affected area. For example, a habitat restoration project located some distance from the habitat injured may be sufficiently related to the injured resources, based on species migratory patterns, patterns of habitat use, affected life stages, or predator/prey relationships to warrant consideration. Similarly, a project in one location which is intended to restore human uses lost in another location may be reasonably related to the lost uses if there is evidence indicating that the affected user groups would likely benefit from the project.

- ◆ **Scalability**
The compensatory restoration projects must be scaled in order to compensate for the injury. The gains in resources and/or services provided by the compensatory projects must be at least equal to the resources and/or services lost as a result of the injury.
- ◆ **Extent of Benefit to Injured Resources/Services**
Trustees must consider compensatory restoration actions that provide services of the same type and quantity, and of comparable value as those lost. Restoration projects are evaluated to determine how well the restoration project would address the injuries to the injured resource/services that occurred as result of the incident in a specific region. Screening questions include: Does the project provide the same type of natural resources and services, both on site and off-site, that are lost due to the injury? If not, will the proposed project result in resources and services that are similar or complimentary to the injured natural resources and services? Projects that come closest to restoring the same type of organisms and habitats as those injured by the incident are more likely to be selected than those projects where the nexus is not as strong.
- ◆ “The likelihood of success;...” (Section 990.54(a)(3)) and “those alternatives considered technically feasible ...” (Section 990.53(a)(2)).
- ◆ **Technically Feasibility and Likelihood of Success**
Trustees consider whether a restoration project can be successfully implemented in a reasonable amount of time given available technology and expertise. Generally, the likelihood of a project’s success is evaluated based on whether the technologies: 1) are proven; 2) have a high rate of success as documented in the literature; 3) are capable of being implemented in a cost-effective manner; and, 4) characterize the natural resource service gains stemming from the project. This does not preclude the use of existing technology in new and creative ways so long as there is a significant likelihood of successful implementation. Nevertheless, for new or unproven technologies, the trustees should provide technical justification demonstrating that there is a reasonable basis to believe that the project will be successful. Also, project and site-specific factors that may influence project success.
- ◆ “The extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;...” (Section 990.54(a)(4)).
- ◆ **Avoidance of Future Additional Injury Resulting from Project**
The trustees must consider the extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative. Specifically, trustees must consider the potential for a restoration project to aggravate or cause additional natural resource or habitat injuries, including to resources or habitats that could be injured as a result of implementation of the project
- ◆ “The extent to which each alternative benefits more than one natural resource and/or service;...” (Section 990.54(a)(5)).

- ◆ **Degree to Which Project Addresses Multiple Injuries**
The trustees consider the ability of a restoration project to address more than one natural resource or habitat injury or loss.
- ◆ RRP Program specific criteria
 - ◆ **Ability to Implement Project with Minimal Delay**
The trustees consider the stage of a project's development. Projects that have engineering and design and/or permitting completed or underway may be given priority when choosing among otherwise equal projects. Design or implementation flexibility, where a portion of a project may be completed more quickly, may also be considered.
 - ◆ **Degree to Which Project Supports Existing Strategies/Plans**
The trustees consider the extent to which a restoration project supports, or is consistent with, national, regional, and local restoration initiatives and mandates, local resource management plans, town ordinances, and the agendas of various community groups. The trustees may also consider if the project can "stand-alone" or could be integrated into an existing resource management program or larger project. Projects that can be integrated may leverage the environmental benefits of the existing program and realize significant administrative cost savings. However, although integration with other programmatic efforts may be beneficial, the trustees need to ensure that constraints that may be imposed by those programs do not conflict with the trustees' restoration goals under OPA.
 - ◆ **Project Urgency**
The trustees consider the window of opportunity in which it a project may be constructed. For example, the infrastructure to support the project exists but may not be present if delayed (deterioration of a feature, such as a ridge, that once gone would make project difficult or impossible) or the construction of a restoration project by another program or individual that is imminent and can be added on to may be considered.

3.2.4.3 Special Circumstances

It is possible that there may be occasions where the trustees will be applying the restoration type and/or project selection criteria described in the preceding sections to restoration type(s) and/or project(s) in more than one region for incidents that have impacted more than one region. Likewise, the trustees may find that in applying the restoration type an/or project selection criteria, the most appropriate restoration project(s) for an incident in one region is located outside that region. In both cases, in accordance with the law, regulation and criteria above, the trustees will select the restoration project(s) that will provide the closest nexus between the injuries and restoration, in the most cost-effective manner.

3.2.5 Environmental Impacts of Restoration Type Implementation

Once the preferred restoration project(s) is selected, and prior to implementation of the project(s), the trustees must, in accordance with NEPA, conduct an environmental analysis to evaluate the potential impacts of the project(s) implementation. To further streamline the NRDA process, the trustees have conducted an analysis of the environmental impacts associated with the implementation of the restoration types identified in the RRP Program by evaluating the impacts of the restoration techniques commonly used to implement the restoration types. This section provides the

environmental consequences analysis of the RRP Program Restoration types. The discussion will be necessarily broad and generalized to the technique on which the analysis has been performed, but provides the level of detail necessary to allow “tiering” from this document to subsequent environmental documentation under NEPA concerning the environmental impacts of implementing certain restoration types. The environmental impacts of specific restoration projects will be addressed specifically in subsequent NEPA documents when the projects are known. If necessary, avoidance and mitigation measures will be implemented to lessen the adverse impacts of any construction activities.

The analysis is divided into two subsections, coastal restoration techniques and inland restoration techniques.

3.2.5.1 Coastal Restoration Techniques

The coastal restoration techniques include:

- Vegetative Planting;
- Vegetative Protection;
- Hydrologic Restoration;
- Marsh Management;
- Dredge and Fill;
- Shoreline Protection;
- Faunal Stocking;
- Sediment Diversion;
- Freshwater Diversion;
- Outfall Management; and
- Nutrient and Sediment Trapping.

3.2.5.1.1 Vegetative Planting

Vegetative planting projects are often used in conjunction with dredge and fill projects, hydrologic restoration, sediment diversion, and shoreline protection projects. This technique typically involves planting nursery stock, rooted cuttings, or broadcasting seed of species found adjacent to the area being restored or created. Plantings may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beach/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**
Vegetative planting will reduce soil erosion by creating frictional resistance on the substrate through its vertical and horizontal structure and the addition of organic matter. The enhancement of the soil through the addition of organic matter benefits the soil's ability to store and cycle nutrients while maintaining reasonable levels of plant productivity. Increased productivity will attract birds and wildlife, thereby increasing wildlife habitat values and maintaining landscape continuity. After plant establishment along shorelines, some additional wave-absorption benefits may be realized. Direct socioeconomic impacts of vegetative planting include increased recreational and cultural opportunity and aesthetic quality from increased productivity. However, this may have a negative socioeconomic impact on the recreational value of the areas from which stock are taken, if stocks are transplanted from one area to another.
- ◆ **Indirect impacts:**
There may be both positive and negative impacts of vegetative planting. On the positive side, if the planting utilizes multiple species, the area's species richness is

increased. Areas of increased species richness are typically more resistant to disturbance events such as fire, drought, herbivory and insectivory. Such resistance increases the chance of long-term sustainability. Negative impacts may occur if a monoculture or a nursery stock, rooted cuttings, or seed genotype not specific to the area, is planted. Long-term sustainability of the area may be jeopardized due to this scenario. Indirect socioeconomic impacts may occur in both cases; recreational and cultural opportunity and aesthetic quality would increase if species richness increases, and may decrease if the opposite occurs.

3.2.5.1.2 Vegetative Protection

Vegetative protection is most often used in conjunction with vegetative plantings and involves the use of materials that aid in increasing the propagule or seedling survival rates. This method can protect against herbivory and/or competition through the placement of tree shelters, exclusion fences, weed mats, and the application of herbicides, insecticides, fungicides, and mammal repellents, as well as other applications. Protective materials may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beach/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
By increasing or maintaining the rate of vegetative survival, the desired species composition and density at the time of the project is more likely to be realized. Other direct impacts vary depending on the application chosen. Moisture retention may occur due to the type or shape of material, thereby contributing to the resources the area needs to thrive. If applications of herbicides and other agents are conducted improperly, the water quality as well as fish and wildlife habitat may be negatively affected for a short period of time. A secondary direct impact is plant survival. Due to the ensured presence of the plants through the use of these materials, the area positively benefits from the direct impacts of the vegetative plantings. Vegetative protection may have positive direct socioeconomic impacts by increasing species composition and thus recreational and cultural opportunity and aesthetic quality. Additionally, if water quality and fish and wildlife habitat were adversely affected, there would be negative socioeconomic impacts on recreational and commercial fishing and other recreational activities as well as negative health impacts. Finally, shelters, mats, and exclusion devices may be aesthetically displeasing until the vegetative cover becomes more productive. They also may be targets for vandalism resulting in deposition of trash into the environment and hazards to wildlife.

- ◆ Indirect impacts:
Adverse indirect impacts stem from vegetative protection only if the technique is applied incorrectly. If, for example, excess levels of the substance(s) applied are held in the soil, the eradication of insects and animals important to the reproductive strategy of the area plants may be eradicated. Similarly, excess substances may be introduced into nearby waterways through run-off or direct application and impact aquatic plants or organisms. These impacts can be minimized through the use of trained personnel and proper chemicals scheduled for the area of concern. There are no indirect socioeconomic impacts expected from the use of this technique.

3.2.5.1.3 Hydrologic Restoration

Hydrologic restoration projects involve changing human-altered drainage patterns back to historically natural drainage patterns in an attempt to address the problems associated with excessive or reduced drainage. This may include plugging or back-filling oil and gas

canals or removing/installing water control structures. This technique may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beach/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**

Restored hydrology may cause immediate and negative direct impacts to an area through erosion if the existing vegetation is not supported or productive due to the altered water table levels. Alteration of hydrology can supply or deprive areas of sediment for marsh building and maintenance as well as help or hinder the encroachment of high salinity waters. Too much water may cause a loss of vegetation from water logging, and too little could result in excess oxidation of organic matter in the soils speeding subsidence. Another immediate impact, which could be positive or negative depending upon the site-specific conditions, is the emergence of new vegetation either through planting or natural recruitment and landscape continuity. There are also possible direct impacts on the aquatic communities in the vicinity of the restoration, especially if water control structures are utilized. Short-circuiting of drainage systems can deliver excess nutrients to open water areas causing dystrophic conditions. For example, the possibility exists for fisheries and shellfish resources and fish habitat to be either created or altered. Direct socioeconomic impacts may be increased or decreased recreational and commercial opportunities resulting from changes to fish habitat. Additionally, increased or decreased recreational and cultural opportunity and aesthetic quality may also result from changes in landscape continuity and the emergence of new vegetation. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.
- ◆ **Indirect impacts:**

To restore the hydrology of an area, water levels are either raised or lowered, or water is diverted from its current path. In the latter case, there will typically be a resource or service provided, bird and wildlife habitat for example, that may be decreased as a result of the restoration. Adjacent wetlands may receive altered inputs, thereby changing their productivity, and adjacent areas may be opened or closed to use by humans due to accessibility issues. The sustainability and proliferation of flora and fauna in adjacent areas may be affected due to shifts in resource availability. Indirect socioeconomic impacts on recreational and cultural opportunity and aesthetic quality may occur in both cases through changes of resources and services in adjacent areas.

3.2.5.1.4 Marsh Management

Marsh management projects often employ structures to alter water levels, manage hunting and fishing for recreation, manage grazing animals, control local water quality, and direct tidal flow. Structures used include dikes, natural landscape features, weirs, flap gates, and culverts. Scheduled burning is a form of marsh management that does not employ structures to alter water levels. The marsh management technique may be used in the creation/enhancement and vegetative protection of coastal herbaceous wetlands and forested wetlands, as well as the restoration of recreational, wildlife and cultural areas.

- ◆ **Direct impacts:**

Because most marsh management is dependent upon alteration of hydrology many of the benefits and detriments discussed in 3.2.5.3 are relevant. Direct impacts in areas managed by weirs or flap gates can, as intended, control water levels and salinities

inside the managed area. SAV and waterfowl often thrive within managed areas. Direct adverse impacts of marsh management can result if local hydrological conditions cause scour around the structure, or the structure is not carefully designed to accommodate changes in water levels. Areas controlled by burning will stimulate vegetative density and vigor, and organic material availability. Adverse impacts of burning may result if wildlife, vegetative type, stage of plant succession, weather patterns and burn intensity are not properly considered. Marsh management may have direct socioeconomic impacts on recreational and cultural opportunity and aesthetic quality if vegetative and land patterns are altered. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.

- ◆ Indirect impacts:
The indirect impacts of marsh management can be negative. If not planned and implemented properly, the restoration technique may restrict or reduce nutrient and sediment exchange. Loss of nutrient exchange in a managed area will degrade water column and vegetative vigor. Lack of new sediment inputs may increase the organic sediment fraction of the marsh and compromise substrate integrity. Restriction or reduction of sediment and nutrient input could lead to habitat alteration, local subsidence, and a conversion to open water within the managed area. This may have a negative socioeconomic impact on recreational and cultural opportunity and aesthetic quality. However, positive recreational socioeconomic impacts may be realized due to an increase in waterfowl inside managed areas.

3.2.5.1.5 Dredge and Fill

Dredge and fill is often used in conjunction with vegetative plantings, vegetative protection, shoreline protection, sediment diversion, outfall management, hydrologic restoration, and nutrient and sediment trapping. This technique may involve building new marshland, filling abandoned oil and gas canals, restoring historical land elevations, constructing terraces, and repairing breached levees or natural ridges. Dredge material is ideally obtained from adjacent waterways, but can be obtained elsewhere if the sediment characteristics are more desirable. This technique may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beach/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
Potential direct impacts of dredge and fill are modifications to sediment quality, water quality and water column organisms. A disruption or enhancement of flora and/or fauna, and a potential change in recreational, cultural, and aesthetic values may occur if a waterway is in the vicinity and site run-off is improperly controlled. In the short-term, newly deposited (filled) substrates will lack vital components needed for high rates of productivity and nutrient cycling/storage, such as organic matter accumulation, established benthic communities, established soil profile, and soil microtopography. In the long-term, open water areas can be returned to productive marsh habitats, and reconnect disrupted marsh linkages. In addition, returning subsided or eroded marsh to historic elevations could stimulate native plant vigor and create wildlife habitat. If water quality is affected, dredge and fill may have short-term negative socioeconomic impacts on recreational and commercial fishing. In the long-term, however, this may have positive socioeconomic impacts on recreational opportunities and aesthetic quality. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.

- ◆ Indirect impacts:
Adjacent habitats may be indirectly impacted by nearby dredge and fill projects due to possible alterations in hydrologic patterns, changes in wave fields, sediment plumes, the migration or emigration of fauna, and recreational usage. A change in marsh function is possible if the imported dredge material is not adequate in grain size and organic composition to promote the local vegetative species. Adverse indirect impacts will likely be a cumulative result of the techniques used in conjunction with dredge and fill projects. Potential direct socioeconomic impacts of these alterations to adjacent habitats include decreased recreational possibilities and aesthetic quality. Additionally, if care is not taken during the planning stages of projects using this technique, there exists a possibility that cultural resources could be affected by its implementation.

3.2.5.1.6 Shoreline Protection

Shoreline protection projects are often used in conjunction with vegetative planting, vegetative protection, dredge and fill, freshwater diversion, and outfall management techniques. Shoreline protection is designed to protect beaches, streambeds, and pond edges from exposure to flooding, wave energy, longshore transport, or wave energy. Most often, wave energy can be dissipated by employing structures such as wave mats, fences or segmented breakwaters. Flooding and wave energy is often controlled through the use of bulkheads, seawalls, revetments, riprap, or other structures directly adjacent and parallel to the shoreline. Lastly, longshore transport is generally controlled through the use of jetties that run perpendicular to the shoreline and trap sediments.

- ◆ Direct impacts:
The direct impacts of shoreline protection are variable depending on the habitat characteristics, hydrological conditions, and structure employed. Less invasive structures, those that allow partial water and sediment flow, will reduce wave energy and erosion. Bulkheads, seawalls, revetments, and riprap, if not carefully designed for the local ecosystem can alter hydrologic patterns and increase erosion, cause undercutting of the structures, and starve the protected area of new sediment and nutrient supplies. Jetties can be used to effectively control local erosion along beaches, streambeds, and shorelines, although careful design considerations must be considered for each new project. Hard surfaces may encourage the development of encrusting communities increasing habitat heterogeneity. By controlling erosion along shorelines, this restoration technique may have a direct positive socioeconomic impact on recreational and cultural opportunity, commercial construction and aesthetic quality.
- ◆ Indirect impacts:
The loss of connectivity between a water source and its adjacent habitat can be detrimental to the wildlife and plant species composition, sediment stability, and nutrient cycling. Where longshore transport is concerned, an adverse indirect and certain impact of jetties is erosion occurring downshore or downstream. Downstream erosion may have an indirect negative socioeconomic impact on recreational opportunities in that area.

3.2.5.1.7 Faunal Stocking

Faunal stocking projects are often used in conjunction with vegetative planting, vegetative protection, hydrologic restoration, and dredge and fill projects. This technique involves the stocking or re-introduction of fauna once present in the habitat or extirpated from the state entirely. Faunal stocking may be used in the creation/enhancement of coastal

herbaceous wetlands, forested wetlands, and beaches/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**

Increased species richness and diversity are the most immediate direct impacts of faunal stocking. The presence of fauna in the area has the potential to affect soil structure, vegetative composition and productivity, and faunal diversity and productivity. Negative impacts to the above may result if non-native species are introduced to the area. Additionally, if too many species are introduced too soon during the community's development, there is a chance the habitat will lack the resources to support the introduction. The result could be the natural selection of animals unable to compete for resources, or total exhaustion of those resources. In addition, hatchery stock may not be genetically diverse thus diluting the gene pool of indigenous species. Direct socioeconomic impacts of faunal stocking may include impacts on the recreational and commercial sector from altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity, as well as the introduction of non-native and undesirable species.
- ◆ **Indirect impacts:**

The potential for adverse indirect impacts exist only if an improper introduction of species occurs. Such an event will reverberate through the surrounding faunal communities and likely offset the trophic balance established in the habitat. Such imbalance could lead to changes in soil structure, water quality, vegetative composition and productivity. Positive indirect impacts are proliferation of desired fauna that emigrate to adjacent communities, possible restoration of trophic levels, and cultural enhancement to the surrounding areas. Socioeconomic impacts may include impacts on the recreational and commercial sector from altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity of surrounding areas, as well as the proliferation of non-native and undesirable species in adjacent communities.

3.2.5.1.8 Sediment Diversion

Sediment diversion projects are often used in conjunction with vegetative planting, outfall management, hydrologic restoration, and nutrient and sediment trapping. Most often, this technique involves creating a cut in a levee (crevasse splay) in order to reconnect a disconnected wetland with its historical sediment source to build land. A sediment diversion can be uncontrolled (water and sediment flow freely), partially controlled (directional jetties), or controlled (control structures), depending on the ecosystem characteristics and size of the restoration project. Sediment diversion may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beaches/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**

Land building and sediment renourishment is the main objective and direct impact of sediment diversions. The use of jetties or control structures may have adverse impacts in terms of scour at or near the structure employed as well as create navigation issues. The size of the crevasse created for uncontrolled diversions should be carefully considered in terms of water and sediment discharge versus project area carrying capacity. Creating a crevasse that is too wide will decrease flow at the outfall and sediments will settle too soon, creating a hydrologically inefficient

splay. On the other hand, a crevasse that is too small can promote hydrological turbulence and scour at the diversion outfall. Sediment diversion may cause immediate negative impacts to an area through erosion if the existing vegetation is not supported or productive due to the altered water table levels. Nutrients in association with sediments are generally a benefit if deposited in existing wetland areas but in open water may promote eutrofication. Erosion may have a direct negative socioeconomic impact on recreational and cultural opportunity, commercial construction and aesthetic quality. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.

- ◆ Indirect impacts:
Indirect impacts of sediment diversion may include local avoidance by water column organisms due to increased turbidity and decreased water column primary production. The addition of sediments into the project area will promote vegetation and wildlife habitats. There exists a possibility that non-native species will colonize newly accreted areas. If this occurs, the services provided by the created area will be altered and will likely affect flora and fauna. Indirect socioeconomic impacts may include impacts on the recreational and commercial sector from altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity.

3.2.5.1.9 Freshwater Diversion

Freshwater diversion projects are often used in conjunction with vegetative planting, outfall management and hydrologic restoration. Most often, this technique involves creating a control structure in a levee in order to reconnect a wetland with its historical freshwater source to maintain isohalines. Freshwater diversion may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beaches/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
The most significant direct impact of freshwater diversions is the decrease of salinity levels into fresh herbaceous wetlands and forested wetlands. Freshwater diversion may cause immediate negative impacts to an area through erosion if the existing vegetation is not supported or productive due to the altered water table and salinity levels. Other immediate impacts, which could be positive or negative depending upon the site-specific conditions, are the emergence of new vegetation either through planting or natural recruitment, and landscape continuity. Direct socioeconomic impacts may include impacts on recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity. Erosion may have a direct negative socioeconomic impact on recreational and cultural opportunity, commercial construction and aesthetic quality.
- ◆ Indirect impacts:
Returning a habitat to its historic salinity regime will alter the current species composition. This can have an adverse impact on the species present, but the overall services and resources gained in the estuary are a significant positive impact. These service and resource gains include species diversity, land building, seasonal pulsing, and nutrient cycling, sediment deposition, water quality improvements, and habitat creation. The sustainability and proliferation of flora and fauna in adjacent areas may be affected due to shifts in resource availability. Altering species composition and increasing habitat creation may have an indirect socioeconomic

impact on recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity. Improving conditions for land building as well as water quality may also have a positive socioeconomic impact on the recreational and commercial sectors.

3.2.5.1.10 Outfall Management

Outfall management projects are often used in conjunction with sediment diversions, freshwater diversions and hydrologic restoration. Most often, this technique involves creating structures that direct the flow of water and/or sediments through outfall areas. The managed route generally mimics historical flow routes of major estuarine arteries. Outfall management projects may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beaches/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
Outfall management may cause immediate negative impacts to an area through erosion if the existing vegetation is not supported or productive due to the altered water table levels. Other immediate impacts, which could be positive or negative depending upon the site-specific conditions, are the emergence of new vegetation either through planting or natural recruitment and landscape continuity. A direct socioeconomic impact of outfall management may be impacts to navigation resulting from the repairing of banklines, thus influencing recreational and cultural uses. Additionally, recreational and cultural opportunity and aesthetic quality may be affected due to changed vegetative composition. Erosion may also have a direct negative socioeconomic impact on recreational and cultural opportunities, commercial construction and aesthetic quality.
- ◆ Indirect impacts:
To manage the outfall of diverted sediment and/or water into an area, water levels are either raised or lowered, or water is diverted from its current path. In the latter case, there will typically be a resource or service provided, bird and wildlife habitat for example, that may be decreased as a result of the restoration. Adjacent wetlands may receive fewer inputs, nearby forests may retain less water thereby altering their productivity, and adjacent areas may be opened or closed to use by humans due to accessibility issues. The sustainability and proliferation of flora and fauna in adjacent areas may be affected due to shifts in resource availability particularly oyster beds. This may also have an indirect socioeconomic impact on recreational and cultural opportunity and aesthetic quality.

3.2.5.1.11 Nutrient and Sediment Trapping

Nutrient and sediment trapping projects are often used in conjunction with sediment diversions, dredge and fill, vegetation planting, and shoreline protection. This technique is carried out through the use of Christmas tree fences, terraces, and vegetative buffers. This project type may be used in the creation/enhancement of coastal herbaceous wetlands, forested wetlands, and beaches/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
The restored area will benefit from elevation gains due to sediment deposition, and increased productivity due to nutrient cycling. Sediment and nutrient trapping may cause immediate negative impacts to an area through accretion if the existing vegetation is not supported or productive due to the altered elevations. Other

immediate impacts, which could be positive or negative depending upon the site-specific conditions, are the emergence of new vegetation either through planting or natural recruitment and landscape continuity. Structures and deposited sediments may obstruct navigable waters and create hazards to navigation. Additionally, the increase in nutrient availability into an area will enhance microbial activity and decomposition and a reduction of oxygen in the surrounding water column may result. A direct socioeconomic impact of sediment deposition may be altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition.

- ◆ Indirect impacts:
Downstream or down river areas will be adversely affected by a reduction in sediment and nutrient supplies. The immediate area will benefit indirectly from increased bird, wildlife, and benthic habitat. The sustainability and proliferation of flora and fauna in adjacent areas may be affected due to shifts in resource availability. Therefore, there may be a positive socioeconomic impact on recreational and cultural opportunity and aesthetic quality in the immediate area.

3.2.5.2 Inland Restoration Techniques

The inland restoration techniques include:

- ◆ Vegetative Planting;
- ◆ Vegetative Protection;
- ◆ Hydrologic Restoration;
- ◆ Silvicultural Techniques
- ◆ Land/Substrate Recontouring and Rehabilitation;
- ◆ Resource Enhancement; and
- ◆ Faunal Stocking.

3.2.5.2.1 Vegetative Planting

Vegetative planting projects are often used in conjunction with hydrologic restoration, silvicultural techniques, and land/substrate recontouring and rehabilitation. This technique typically involves the planting of nursery stock, rooted cuttings, or seed found adjacent to the area being restored or created. Plantings may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
Vegetative planting will reduce soil erosion by creating frictional resistance on the substrate through its vertical and horizontal structure and the addition of organic matter. The enhancement of the soil through the addition of organic matter benefits the soils' ability to store and cycle nutrients while maintaining reasonable levels of plant productivity. Increased productivity will attract birds and wildlife. Direct socioeconomic impacts of vegetative planting include increased recreational and cultural possibility and aesthetic quality from increased productivity. However, this may have a negative socioeconomic impact on the recreational value of the areas from which stocks are taken, if stocks are transplanted from one area to another.
- ◆ Indirect impacts:
There may be both positive and negative indirect impacts of planting. On the positive side, if the planting utilizes multiple species, the area's species richness is increased. Areas of increased species richness are typically more resistant to disturbance events such as fire, drought, herbivory and insectivory. Such resistance increases the

chance of long-term sustainability. Negative impacts may occur if a monoculture or a nursery stock, rooted cuttings, or seed genotype not specific to the area, is planted. Long-term sustainability of the area may be jeopardized due to this scenario. Indirect socioeconomic impacts may occur in both cases; recreational and cultural opportunity and aesthetic quality may increase if species richness increases, and may decrease if the opposite occurs.

3.2.5.2.2 Vegetative Protection

Vegetative protection is most often used in conjunction with vegetative plantings and involves the use of materials that aid in increasing the propagule or seedling survival rates. This method can protect against herbivory and/or competition through the placement of tree shelters, exclusion fences, weed mats, and the application of herbicides, insecticides, fungicides, and mammal repellents, as well as other applications. Protective materials may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**

By increasing or maintaining the rate of vegetative survival, the desired species composition and density at the time of the project is more likely to be realized. Other direct impacts vary depending on the application chosen. Moisture retention may occur due to the type or shape of material, thereby contributing to the resources the area needs to thrive. If applications of herbicides and other agents are conducted improperly, the water quality as well as fish and wildlife habitat may be negatively affected for a short period of time. A secondary direct impact is plant survivability. Due to the ensured presence of the plants through the use of these materials, the area positively benefits from the direct impacts of the vegetative plantings. Vegetative protection may have positive direct socioeconomic impacts by increasing species composition and thus recreational and cultural opportunity and aesthetic quality. Additionally, if water quality and fish and wildlife habitat were affected, there may be negative socioeconomic impacts on recreational and commercial fishing and other recreational activities as well as negative health impacts. Finally, shelters, mats, and exclusion devices may be aesthetically displeasing until the vegetative cover becomes more productive.
- ◆ **Indirect impacts:**

Indirect impacts stem from vegetative protection only if the technique is applied incorrectly. If, for example, excess levels of the substance(s) applied are held in the soil, the eradication of insects and animals important to the reproductive strategy of the areas plants may be eradicated. Similarly, excess substances may be introduced into nearby waterways through run-off or direct application and impact aquatic plants or organisms. These impacts can be minimized through the use of trained personnel and proper chemicals scheduled for the area of concern. There are no indirect socioeconomic impacts expected from the use of this technique.

3.2.5.2.3 Hydrologic Restoration

Hydrologic restoration projects involve changing human-altered drainage patterns back to historically natural drainage patterns (USACE 1993, p. 61) or mimic natural drainage systems in an attempt to address the problems associated with excessive or reduced drainage. This may include plugging or back-filling agricultural drainage ditches or removing or installing water control structures. This technique may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland

upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**
Restored hydrology may cause immediate negative direct impacts to an area through erosion if the existing vegetation is not supported or productive due to the altered water table levels. Other immediate impacts, which could be positive or negative depending upon the site-specific conditions, are the emergence of new vegetation either through planting or natural recruitment. Direct socioeconomic impacts of this technique may be increased or decreased recreational and cultural opportunity and aesthetic quality resulting from changes in landscape continuity and the emergence of new vegetation.
- ◆ **Indirect impacts:**
To restore the hydrology of an area, water levels are either raised or lowered, or water is diverted from its current path. In the latter case, there will typically be a resource or service provided, bird and wildlife habitat for example, that may be decreased as a result of the restoration. Adjacent wetlands may receive fewer inputs, upland forests may retain less water (thereby increasing their productivity), and adjacent areas may be opened or closed to use by humans due to accessibility issues. The sustainability and proliferation of flora and fauna in adjacent areas may be affected due to shifts in resource availability. Indirect socioeconomic impacts on recreational and cultural opportunity and aesthetic quality may occur in both cases through the shifting or decline of resources and services in adjacent areas.

3.2.5.2.4 Silvicultural Techniques

Silvicultural techniques are often used in conjunction with land/substrate recontouring and rehabilitation, vegetative plantings, vegetative protection, resource enhancement, and faunal protection/stocking. Commonly used techniques are selective harvesting, shelterwood, timber stand improvement, thinning, seed tree, as well as other even and uneven-aged techniques. The use of the above techniques will contribute to increased forest health and productivity, the input of coarse woody debris to an ecosystem, the mimicking of natural disturbance, and, if desired, increased understory cover and wildlife habitat, as well as numerous other ecological benefits. This technique may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**
As a result of some silvicultural techniques, the soil temperature increases as a result of reduced canopy cover. Increases in soil temperature may contribute to increase cellulose decomposition, thereby increasing or decreasing the mobility of various nutrients essential to tree growth. Harvesting of the overstory creates gaps in the canopy, increases light availability, and typically increases percent cover of the understory and mid-story. Dense understories facilitate the trapping of sediments in riverine systems and decrease the amount of run-off in upland systems – both of which contribute to on-site and downstream water quality improvements. Slash, the bi-product of harvesting, contributes to the amount of coarse woody debris on the forest floor and aids in sediment trapping, nutrient cycling, and may add or detract from wildlife habitat values. Overall habitat values change depending on the edge to open space ratio, the management plan, and post-harvest actions. Silvicultural operations will reduce the opportunity for recreation on the site until the canopy emerges into the mid-story or provisions are made for those users. Direct

socioeconomic impacts will be felt by recreational and commercial sector by altered downstream water quality. Additionally, the aesthetic value of the area may change due to the nature of the operation. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.

- ◆ Indirect impacts:
If wood utilization is not maximized on site, slash and larger timbers may attract insects and pathogens to the area, thereby jeopardizing the health of the surrounding forests. Mechanical alterations to the substrate as a result of timber removal with a skidder may either encourage or discourage the recruitment of understory and overstory in those areas. If proper precautions are not taken during the harvest, water quality may be influenced by improper skidder crossings over waterways, skid trails on steep slopes, or incorrectly spaced waterbars. These indirect impacts may cause negative socioeconomic impacts due to decreased water quality and decreased recreational and cultural opportunity and aesthetic quality as a result of mechanical alterations.

3.2.5.2.5 Land/Substrate Recontouring and Rehabilitation

Land/substrate recontouring and rehabilitations are often used in conjunction with hydrologic restoration, vegetative plantings, vegetative protection, and silvicultural techniques. This technique may involve reworking soils to create microtopography, grading soils for proper drainage, and creation of bedding for post-harvest manipulation, as well as numerous other benefits to ecological services. This technique may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ Direct impacts:
Potential direct impacts of land/substrate recontouring and rehabilitation are modifications to water quality and water column organisms if a waterway is in the vicinity and run-off is improperly controlled, and disruption or enhancement of flora and fauna. In the short-term, newly created or manipulated substrates will lack vital components needed for high rates of productivity and nutrient cycling/storage, such as organic matter accumulation, established benthic communities, established soil profile, and soil microtopography. Direct socioeconomic impacts may be felt by the recreational and commercial sector due to water quality modifications. Additionally, the aesthetic value of the area may change due to the nature of the operation.
- ◆ Indirect impacts:
Adjacent habitats may be indirectly impacted by nearby land/substrate recontouring and rehabilitation due to possible alterations in hydrologic patterns and the migration or emigration of fauna to/from these other habitats. Adverse indirect impacts will likely be a cumulative result of the techniques used in conjunction with land/substrate recontouring and rehabilitation. These indirect impacts may cause negative socioeconomic impacts due to altered recreational and cultural opportunity and aesthetic quality of adjacent habitats.

3.2.5.2.6 Resource Enhancement

Resource enhancements are often used in conjunction with vegetative plantings, vegetative protection, and silvicultural techniques. This technique includes application of appropriate amounts of fertilizer, creation of cavities in trees for avian habitat, selective culling of trees for habitat, and application of herbicides for the manipulation of understory

and overstory vegetative components and increased agricultural/cropland/grassland production. This technique may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**

Resource enhancement produces positive and/or negative impacts. The outcome is dependent upon the skill with which the technique is applied. Positive benefits often include increases in productivity to both the understory and overstory communities, which is largely beneficial to the fauna that utilize the area, as it increases the area's utility as a foraging and nesting area. Additionally, increased productivity in different canopy levels contributes toward the addition of organic matter to the substrate, thereby contributing to the storage/cycling of nutrients and enhancement of the soil structure. Another potential positive benefit is the immediate creation of habitat. In the event of modifications to the canopy, a direct positive impact is the addition of coarse woody debris to the understory. Its benefits are two-fold: the slow release of nutrients into the system as the material decomposes and creation of habitat for herptofauna and other microfauna. Negative impacts may result due to the improper application of resource enhancement. Of major concern is water quality in the vicinity, especially after the removal of significant portions of a forest canopy, the application of various chemicals for the control of biotic elements, and the removal of habitat specific to some fauna. These direct negative impacts can be greatly minimized or eliminated with proper planning and application. Direct socioeconomic impacts of water quality modifications may be felt by the recreational and commercial sectors. Additionally, the aesthetic, cultural and recreational value and quality of the area may change due to the nature of the operation. Finally, the temporary increase in noise level during the period of restoration may be a short-term nuisance.
- ◆ **Indirect impacts:**

If the above positive direct impacts occur, indirect impacts are likely the long-term sustainability of flora and fauna, particularly the latter. Through the creation of habitat, reproductive rates will be sustained or increased until the newly created or enhanced habitat reaches its carrying capacity. Through increased productivity of the flora, the area's ability to process nutrients and various pollutants will increase, thereby improving downstream water quality through reducing turbidity and the release of excess nutrients and pollutants bound to sediments. Long-term indirect negative impacts may be continued loss of soil function if on-site erosion is not considered and addressed during the operation. In the case of both fertilizer and herbicide applications, care must be taken not to inflict collateral damage on the community this technique was meant to benefit. This injury may take the form of increased productivity of non-native or opportunistic species or the removal of all native and desirable species. This can be avoided through the application of products scheduled for use in specific areas or for specific plants, such as legumes. Indirect socioeconomic impacts may include benefits to the recreational and commercial sector from improved water quality as well as decreased recreational and cultural opportunity and aesthetic quality from the removal of native and desirable species.

3.2.5.2.7 Faunal Stocking

Faunal stocking projects are often used in conjunction with vegetative planting, vegetative protection, hydrologic restoration, silvicultural techniques, land/substrate recontouring and rehabilitation, and resource enhancement. This technique involves the stocking or re-

introduction of fauna once present in the habitat or extirpated from the state entirely. Faunal stocking may be used in the creation/enhancement of inland herbaceous wetlands, inland forested wetlands, inland upland vegetation, and inland shores/shoreline/streambeds as well as the restoration of recreational and cultural areas.

- ◆ **Direct impacts:**
Increased biomass is the most immediate direct impacts of faunal stocking. The presence of fauna in the area has the potential to affect soil structure, vegetative composition and productivity, faunal diversity and productivity. Negative impacts to the above may result if non-native species are introduced to the area. Hatchery reared stock may not be genetically diverse, potentially increasing the susceptibility of the population to disease and adverse environmental conditions. Additionally, if too many species are introduced too soon during the community's development, there is a chance the habitat will lack the resources to support the introduction. The result could be the natural selection of animals unable to compete for resources, or the total exhaustion of those resources. Direct socioeconomic impacts of faunal stocking may include impacts on the recreational and commercial sector from altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity, as well as the introduction of native and undesirable species.

- ◆ **Indirect impacts:**
The potential for adverse indirect impacts exist only if an improper introduction of species occurs. Such an event will reverberate through the surrounding faunal communities and likely offset the trophic balance established in the habitat. Such imbalance could lead to changes in soil structure, water quality, vegetative composition and productivity. Positive indirect impacts are the proliferation of desired fauna that emigrate to adjacent communities, possible restoration of trophic levels, and cultural enhancement to the surrounding areas. Socioeconomic impacts may include impacts on the recreational and commercial sector from altered recreational and cultural opportunity and aesthetic quality due to changed vegetative composition and faunal diversity/productivity of surrounding areas, as well as the proliferation of native and undesirable species in adjacent communities.

3.2.6 Settlement Alternatives

Under the RRP Program, selection of the settlement alternative to be used in a given incident (Step #5 in Figure 3.1) typically occurs after a restoration type(s) has been identified and initial scaling has been conducted (Step #4a in Figure 3.1). The latter is done to obtain a general estimate of the appropriate quantity of replacement natural resources and/or services that will compensate for the amount of injured natural resources or services.

When settling a NRDA case with an RP for a given incident, the trustees and RP generally have two options (Figure 2.2): the RP can: 1) implement the restoration actions that are required to restore the injured resources and services for the incident with trustee oversight, or 2) provide funding for the trustees to implement the required restoration actions (i.e., "project-specific cash out"). Note that an RP can also settle its NRDA liability by using both options for one case, where the RP implements a project to restore some of the injured resources and services from an incident and provides funds to the trustees to resolve the remaining liabilities for other injuries.

In the absence of a viable RP (e.g., where the RP is unknown, bankrupt or is not responsible due to a valid defense) or when a viable RP fails to respond to a demand letter after 90 days, the trustees also have the option of going to the Federal OSLTF and/or State OSCF to seek monies (similar to the “project-specific cash out” option) to implement the restoration actions required for that case. Under the NRDA process described in Chapter 2, *Natural Resource Damage Assessment (NRDA) Process* (NOAA 1996a), the required restoration action(s) in this instance generally involves a specific restoration project(s) that has (have) been selected, in part, because it (they) provide(s) the appropriate quantity of replacement natural resources and/or services to compensate for the amount of injured natural resources or services resulting from a given incident.

The RRP Program offers a number of additional case settlement alternatives to assist the trustees and RPs in negotiations to resolve RP liabilities for incidents. These settlement alternatives may provide opportunities for implementing restoration projects more quickly and cost-effectively, pooling settlements to implement larger projects than could be accomplished by using individual settlements, and potentially addressing basin-wide, ecosystem-level initiatives.

The settlement alternatives available through the RRP Program are depicted in Figure 3.1 (See step #5, “Choose Settlement Alternatives”) and are described below according to two categories: those general alternatives that already are used (Section 3.2.6.1) and those that are unique to the RRP Program (Section 3.2.6.2).

3.2.6.1 Existing Settlement Alternatives

3.2.6.1.1 Single Incident - RP Implemented Restoration Project

This settlement alternative provides for the implementation of an entire RRP restoration project(s) by a single RP who is liable for injuries resulting from a specific incident. (RP implementation of an entire restoration project is the only settlement alternative that has been used in Louisiana to resolve liability for incidents under OPA and/or OSPRA.)

3.2.6.1.2 Single Incident - Trustees Implemented Restoration Project

This settlement alternative provides for a cash settlement between a single RP and the trustees. The RP provides cash to the trustees based on the cost of implementing a specific restoration project(s) in order to resolve liability for an individual, specific incident. The trustees in turn use the settlement funds to implement a specific restoration project(s) in an RRP. (This method of resolving liability has been widely used in other states under OPA.)

3.2.6.2 Additional Settlement Alternatives

3.2.6.2.1 RP CO-OP

This settlement alternative provides an opportunity for RPs to partner with others to implement a restoration project identified in an RRP that is larger than their individual liability for a specific incident, and thereby share the implementation costs (e.g., engineering and design, permitting, mobilization, and demobilization, etc.). This alternative may allow the RPs to take advantage of economies of scale in implementing a larger project, thereby lowering their costs of resolving their specific liabilities. Specifically, RPs could potentially partner to implement a larger project in a number of ways, for example:

- ◆ A group of RPs could jointly implement a project by pooling funds based on their specific liability;
- ◆ One RP could implement a project with other RPs contributing the funds based on their specific liabilities;
- ◆ One and/or a group of RPs could implement a project that appropriately resolves the RP's OPA NRDA liability and that is carried out in conjunction with restoration needs for other purposes (e.g., Coast 2050 restoration); or
- ◆ An RP with a "partner(s)" (e.g., other state or federal restoration programs, conservation organizations, etc.) could jointly implement a project that meets the needs of both partners and still appropriately resolves the RP's liability.

Additionally, the RP CO-OP settlement alternative provides an opportunity for a single RP to use one appropriately scaled project to address its liability for two or more of its own incidents.

3.2.6.2.2 RP/Fund CO-OP

This settlement alternative provides an opportunity to the RP(s) to implement a restoration project identified in an RRP that is larger than the specific liability for a specific incident and, therefore, cost-share the implementation costs (e.g., engineering and design, permitting, mobilization and demobilization, etc.) with either Federal OSLTF or State OSCF monies received by the trustees to resolve liability from similar incidents for which there was no viable RP or a viable RP failed to respond to a demand letter after 90 days. This settlement alternative is similar to the RP CO-OP settlement alternative except that instead of the RP partnering with other parties to share the cost of a larger

project, the RP cost shares the implementation of the project with the trustees using cash settlements received from the Federal OSLTF and/or the State OSCF. A prerequisite for the potential use of this settlement alternative is the prior occurrence of an incident(s) for which the trustees have received partial monies to implement required restoration actions from the Federal OSLTF and/or the State OSCF. This alternative may allow the RP to take advantage of economies of scale in implementing a larger project and thereby may lower their costs of resolving their specific liabilities.

3.2.6.2.3 Non-Project-Specific Cash Out

This settlement alternative provides an opportunity for RPs to make a cash settlement based on the average cost of implementing certain restoration types to resolve their liability. This differs from the “Single Incident – Trustee Implemented Restoration Project” alternative in that the amount of the claim is not based on a specific project to be implemented. Rather, the cost to the RP is based on representative costs for implementing projects of a given restoration type in a region. The trustees will determine representative costs for predominant restoration type(s) in the RRP using averages of past costs, pricing for representative projects, or other appropriate methods as necessary. The trustees will use the money recovered to implement one project of the selected restoration type from an RRP or they may pool with other recoveries generated under this settlement alternative to implement a larger RRP project. In regions where representative unit costs are determined for more than one restoration type, selection of the restoration type to be used as a basis for the cash settlement for a given incident will be done using the restoration type selection criteria identified in Section 3.2.4.1.5.

The critical component to this settlement alternative is the determination of the representative unit cost to be applied to the restoration type(s). For each RRP, one or more restoration type(s) will be identified that the trustees anticipate will be used most frequently. These are the predominant habitat types by region and can provide services to natural resources most likely to be lost or injured by an incident in each region. For each of those restoration type(s), the trustees will use information where available on past project cost and performance, estimated and projected costs for existing projects, and information from restoration contractors and experts to develop estimates of representative project costs per unit of services generated. (The services would be quantified in discounted service acre-years (DSAYs) where an acre-year is the flow of services from one acre of habitat for one year.) These analyses will provide a representative dollar cost/DSAY figure for the selected restoration type(s) in each region that the trustees may use to formulate a damage claim for the oil spill. The representative costs will be explained in technical memoranda and provided for public review with the RRP. From time to time, as determined by the trustees, representative costs will be reviewed and revised if needed to reflect changing costs, new technologies, better understanding of benefits derived from projects, inflation, or other factors that would have a material influence on representative unit costs.

3.2.6.2.3.1 Project Selection Criteria under Non-Project-Specific Cash Out

Upon receipt of settlement monies, the trustees will use the following criteria (based in part on the OPA regulations (15 CFR 990.54(a)(1-6))) as the basis for determining the project to be implemented with the pooled funds under the Non-Project-Specific Cash Out settlement alternative:

- ◆ The cost to carry out the alternative (15 CFR 990.54(a)(1)).
 - ◆ **Existence of Sufficient Funds in Pooled Settlement Account**
There must be sufficient monies pooled to implement one or more of the projects in the RRP. Additionally, trustees evaluate the rate at which settlement monies are accruing relative to the cost of the project to determine whether the project can be implemented within a reasonable timeframe.
 - ◆ **Project Cost-Effectiveness** (including ability to partner)
Trustees consider the relationship between restoration project costs to natural resource benefits. Favored projects are those that provide the most benefit for the least cost expended. Lower cost projects that provide equivalent restoration benefits are preferred over more costly, but otherwise similar, projects. Factors that may influence project costs include methods and procedures for project implementation, materials, equipment, project design, permitting, oversight, maintenance (including contingency funds), monitoring, and the ability to partner.
- ◆ “The extent to which each alternative is expected to meet the trustees’ goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;...” (15 CFR 990.54(a)(2)).
 - ◆ **Proximity to Affected Areas**
Proximity addresses whether the restoration alternative is located within the area injured or is within a reasonable distance from the affected area (e.g., same watershed, ecosystem, and/or political boundary). It also considers the extent to which the option directly or indirectly benefits injured habitats or compensates for lost use within the affected area. For example, a habitat restoration project located some distance from the habitat injured may be sufficiently related to the injured resources, based on species migratory patterns, patterns of habitat use, affected life stages, or predator/prey relationships, to warrant consideration. Similarly, a project in one location that is intended to restore human uses lost in another location may be reasonably related to the lost uses if there is evidence indicating that the affected user groups would likely benefit from the project.
 - ◆ **Scalability**
The compensatory restoration projects must be scaled in order to compensate for the injury. The gains in resources and/or services provided by the compensatory projects must be at least equal to the resources and/or services lost as a result of the injury.
- ◆ “The extent to which each alternative benefits more than one natural resource and/or service...” (15 CFR 990.54(a)(5)).
 - ◆ **Degree to which Project Addresses Multiple Injuries**
The trustees consider the ability of a restoration project to address more than one natural resource habitat injury or loss.

- ◆ “The likelihood of success of each alternative” (15 CFR 990.54(a)(3)) and “those alternatives considered technically feasible.” (15 CFR 990.53(a)(2)).
 - ◆ **Technical Feasibility and Likelihood of Success**
Trustees consider whether a restoration project can be successfully implemented in a reasonable amount of time given available technology and expertise. Generally, the likelihood of a project’s success is evaluated based on whether the methods: 1) are proven; 2) have a high rate of success as documented in the literature; 3) are capable of being implemented in a cost-effective manner; and, 4) characterize the natural resource service gains stemming from the project. This does not preclude the use of existing technology in new and creative ways so long as there is a significant likelihood of successful implementation. Nevertheless, for new or unproven technologies, the trustees should provide technical justification demonstrating that there is a reasonable basis to believe that the project will be successful. Additionally, project and site-specific factors may influence project success.
- ◆ “The extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;...” (15 CFR 54(a)(4)).
 - ◆ **Avoidance of Future Additional Injury Resulting from Project**
The trustees must consider the extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative. Specifically, trustees must consider the potential for a restoration project, or implementation of a restoration project, to aggravate or cause additional natural resource or habitat injuries.
- ◆ RRP Program Criteria
 - ◆ **Ability to Implement Project with Minimal Delay**
The trustees consider the stage of a project’s development. Projects that have engineering and design and/or permitting completed or underway may be given a higher priority when choosing between otherwise equal alternatives, since they likely will be able to be implemented more quickly and at a lower cost. Design or implementation flexibility, where a portion of a project may be completed more quickly, may also be considered.
 - ◆ **Degree to Which Project Supports Existing Strategies/Plans**
The trustees consider the extent to which a restoration project supports, or is consistent with, national, regional, and local restoration initiatives and mandates, local resource management plans, town ordinances, and the agendas of various community groups. The trustees may also consider if the project can "stand-alone" or could be integrated into an existing resource management program or larger project. Projects that can be integrated may leverage the environmental benefits of the existing program and realize significant administrative cost savings. However, although integration with other programmatic efforts may be beneficial, the trustees need to ensure that constraints that may be imposed by those programs do not conflict with the trustees’ restoration goals under OPA. Further, the trustees must determine that funding for the restoration project (or share of the project specifically

addressed by the NRDA) has not already been committed by an entity outside of the NRDA.

- ◆ **Project Urgency**

The trustees consider the window of opportunity in which it a project may be constructed. For example, the infrastructure to support the project exists but may not be present if delayed (deterioration of a feature, such as a ridge, that once gone would make project difficult or impossible) or the construction of a restoration project by another program or individual that is imminent and can be added on to may be considered.

- ◆ **Other Factors as Appropriate**

3.2.6.2.4 Non-Project-Specific Cash Out/Fund CO-OP

This settlement alternative would enable trustees to implement a project of the one of the “Non-Project-Specific Cash Out” restoration types from an RRP by using monies from a “pool” of cash settlements from the RPs (as described under the Non-Project-Specific Cash Out alternative) and cash received by trustees for specific restoration types or project(s) from the Federal OSLTF and/or the State OSCF. This alternative provides the RP with a quick mechanism of cashing out and resolving their liability for a specific incident. It also allows the trustees to implement projects identified in the RRP more quickly.

3.2.7 Restoration Project Performance Criteria

Performance criteria are measurable sets of targets, quantified through the collection of data in accordance with a prescribed monitoring protocol or methodology, that reflect the structural, functional, and/or temporal objectives of a restoration project. Performance criteria will be used by the trustees to determine when project objectives have been met and the desired restoration outcome has been achieved, and if interim corrective actions are necessary. Performance criteria may vary from project to project as the scope of monitoring conforms to the specific objectives of the restoration project. Some examples of performance criteria might include: plant coverage (i.e. canopy architecture, density), plant survival rate, species richness and composition, elevation, hydrology, and soil properties (i.e. organic matter, nutrients, salinity). Because they are used to determine when a project has achieved the desired restoration outcome (i.e. project goals), careful development of performance criteria is essential to obtaining a robust indication of goal achievement. The following guidelines will be considered fundamental to the development of performance criteria: 1) clearly define project objectives; 2) develop performance criteria prior to project implementation to avoid potential bias; and 3) conceive performance criteria with a comprehensive understanding of the target ecosystem and habitat.

3.2.8 Restoration Project Monitoring Requirements

Monitoring of implemented restoration projects will be an essential component of the RRP Program because monitoring data provide the trustees with quantitative information that is used to determine when an RP has satisfied his liability for natural resource injuries or if interim corrective action is necessary. Specifically, periodic collection and assessment of monitoring data enable the trustees to evaluate performance criteria in relation to the specific objectives of the restoration project to determine when project objectives have been met, and to quantify the trajectory of the restoration project in order to identify needs, if necessary, for implementing corrective actions in a timely manner. Prescribed monitoring protocols will be project-specific and vary by restoration type, habitat type,

project features, and the availability of cost-effective sampling techniques. Monitoring requirements for restoration projects will be specified in a monitoring plan that will be drafted prior to implementation of the project. The monitoring plan will: 1) define the project objectives that must be attained to achieve the desired outcome of the restoration project; 2) identify the performance criteria that will measure the attainment of each objective; 3) specify monitoring protocols pertaining to sampling design, sampling frequency, sampling techniques, data procurement and analysis, quality assurance and quality control of data, the schedule of site visits, report deadlines, and corrective action plans; and 4) identify a reference site(s), if determined to be necessary.

3.3 RRP Management Structure

The management framework for RRP Program implementation consists of four major components: the Authorized Officials; the Trustee Council; NRDA Case Teams (including Regional Staff); and RRP Administration and Coordination (including Administrative Staff and the Project Monitoring Team). Figures 3.4 and 3.5 depict the RRP Program Management Framework.

3.3.1 Authorized Officials

The primary role of the Authorized Officials is to provide policy oversight and guidance to their staffs involved in the management, administration and implementation of the RRP Program and to function as the authorized official (programmatic approving authority) to approve RRP Program settlements. Consistent with agency policy, authorized officials may delegate authority for approving settlements. The membership of the Authorized Officials will consist of the legally designated “authorized officials” representing each of the natural resource trustee agencies and Indian tribes that are participating in the RRP Program, or their designee.

3.3.2 Trustee Council

The membership of the Trustee Council will consist of a representative from each of the designated trustee agencies and Indian tribes that are party to the RRP Program. However, decisions on individual NRDA cases will be made by those members of the Trustee Council that have jurisdiction over the public trust resources impacted by a particular incident.

The primary role of the Trustee Council is to guide and manage the case activities of the NRDA Case Teams (see Section 3.4 for details). Trustee Council members will individually seek concurrence and direction from their respective authorized official on settlement and negotiation of cases. All decisions related to the individual NRDA cases, from case selection to restoration project implementation, will be made by the Trustee Council, as appropriate, for approval by the authorized officials to ensure statewide consistency in the cases processed through the RRP Program.

3.3.2.1 Case Teams

The primary role of the NRDA Case Teams will be to conduct the technical components of the individual NRDA cases processed through the RRP Program under the direction

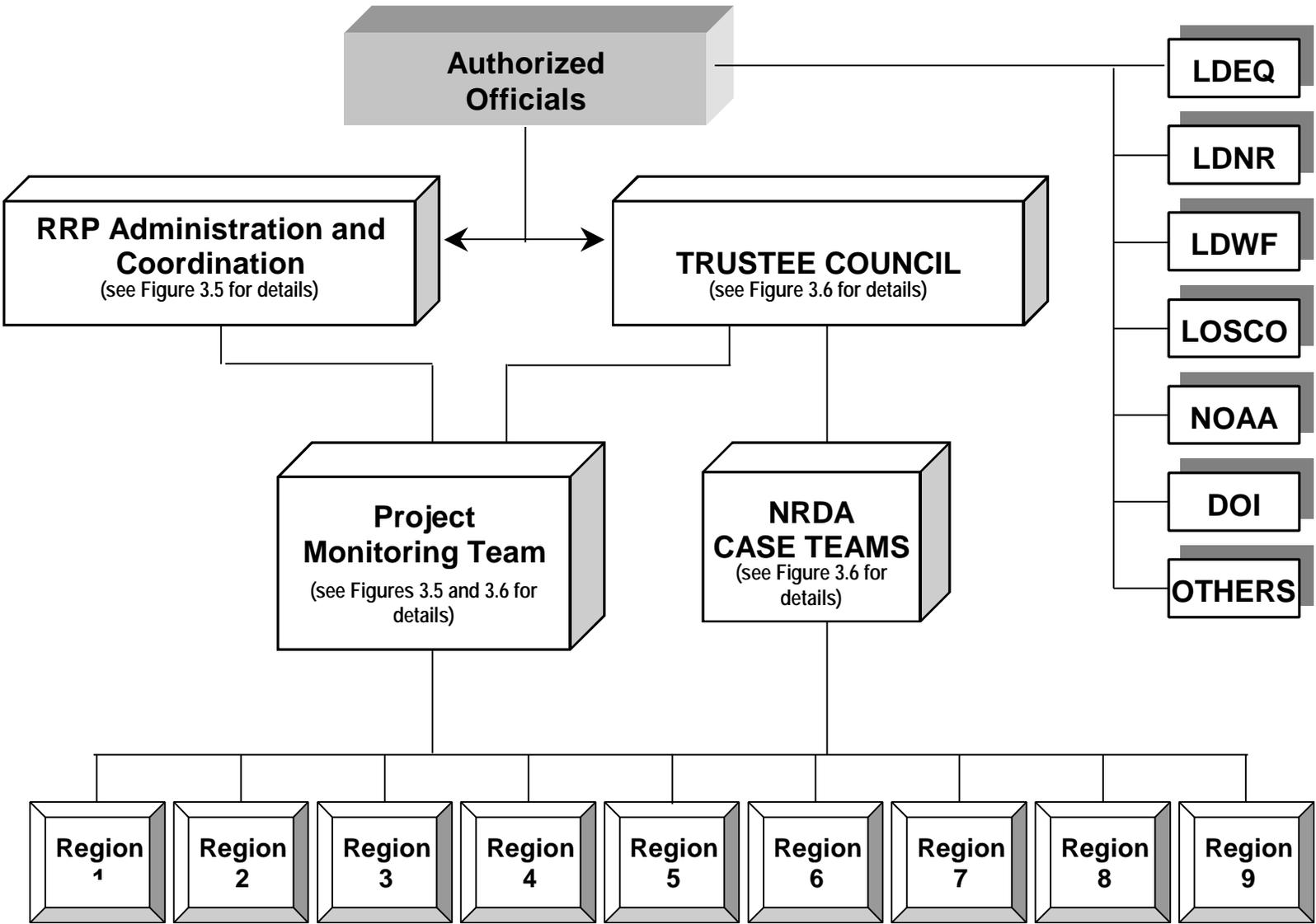


Figure 3.4: RRP Program Management Framework

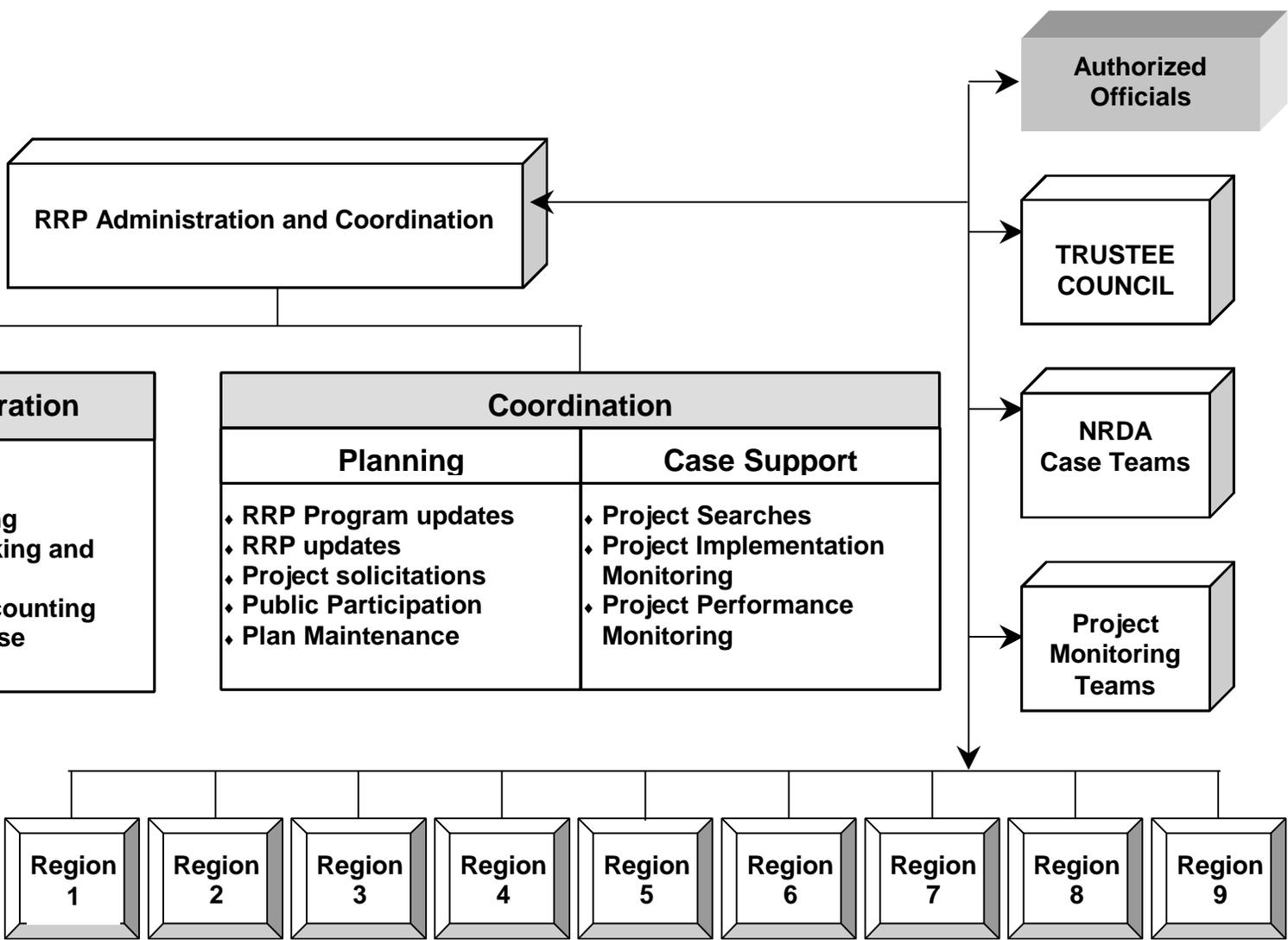


Figure 3.5: RRP Program Management Framework - Administrative

of the Trustee Council, including the NRDA pre-assessment and assessment phases of the NRDA RRP Program process.

Membership of the NRDA Pre-Assessment and/or Assessment Case Teams for a given incident will depend on the location of the incident relative to each of the trustees' jurisdictions, the resources impacted, and availability of each agency's personnel. In general, NRDA Case Team membership will be limited to those agency representatives that have jurisdiction in the area impacted by the incident or have resources impacted by the incident. However, lack of participation in a NRDA Case Team for a given incident does not preclude a trustee agency with jurisdiction from participating in the NRDA process for that incident, as it may be more efficient for some trustees to rely on the information generated by the NRDA Case Team.

Each Trustee Council member will be responsible for designating the NRDA Case Team member(s) for his or her agency. Case Teams may consist of members of the Trustee Council and/or Regional RRP field staff (or contractors with trustee oversight), as appropriate. The following is a list of some of the responsibilities/functions/products that will be carried out by the NRDA Case Teams under the direction of the Trustee Council:

- ◆ Drafting and making available for review Draft and Final DARPs;
- ◆ Drafting and publishing Notices of Intent to use the RRP, conduct restoration planning, and/or the availability of a DARP;
- ◆ Scheduling, holding and maintaining records on public meetings and public hearings; and
- ◆ Conducting the restoration planning
- ◆ Drafting and finalizing any settlement documents⁷, including administrative settlements, consent decrees, amendments to such documents, etc.

3.3.2.2 Regional Field Staff

Some of the participating trustee agencies have regional offices and field staff throughout the State of Louisiana. To maximize the cost-efficiency of RRP Program implementation, it is anticipated that agency regional field personnel will be assigned to support the implementation of the RRP Program. Specifically, it is anticipated that the assigned regional staff assist in the pre-assessment and restoration planning phase of the NRDA cases processed through the RRP Program, and in restoration project implementation oversight activities.

3.3.2.3 RRP Administration and Coordination

LOSCO, in coordination with the other trustee agencies, will be responsible for RRP Program administration and coordination functions. Administrative functions for the RRP Program include: record keeping; reporting; financial tracking and accounting; Natural Resources Restoration Trust Fund accounting; and restoration project database maintenance.

Coordination activities are related to planning and case support. Coordination of planning activities may include: coordinating revisions to the RRP Program, including updates to the RRP (e.g., solicitation of potential restoration projects, incorporation of restoration projects, etc.); RRP maintenance (e.g., project tracking); and public participation.

Coordination of case support may include: restoration project searches for cases, and coordination of the trustees' project implementation and performance monitoring.

⁷ Settlement Documents will be prepared by trustee attorneys in consultation with Case Team members.

3.3.2.4 RRP Project Monitoring Team

It is anticipated that an RRP Restoration Project Monitoring Team will be established to conduct the monitoring activities for restoration projects implemented by the trustees or, alternatively, review the monitoring results for restoration projects implemented by the RPs and submitted to the Trustee Council to determine whether restoration performance criteria have been met. The membership of the RRP Program Monitoring Team may vary depending on the location of the restoration project and will be determined by the Trustee Council.

3.4 RRP Program Case Implementation Process

The following is a description of the RRP Program Case Implementation Process beginning with the notification of an incident through completion of the oversight and monitoring of the restoration project (Figure 3.6). Specifically, it describes the general roles and responsibilities for the case implementation process including: coordination and movement of data and information, development and implementation of damage assessment; and decision-making between and among the field staff, Authorized Officials, Lead Administrative Trustee (LAT)⁸, Trustee Council, Case Teams and the Monitoring Team. It should be noted that though the steps described below are presented separately; in the case of a real incident, some of these steps would occur simultaneously. Additionally, due to the amount of information available and/or the cooperative nature of the NRDA, some of the steps may be skipped altogether.

3.4.1 Preliminary Assessment

When an incident occurs in Louisiana, state and federal response agencies are notified that an incident has occurred. Often, Louisiana state and federal NRDA trustee agencies are notified at the same time by response or other personnel. A response team⁹ made up of state and federal personnel, as appropriate, go to the site to investigate the incident and carry out their response and/or clean up responsibilities.

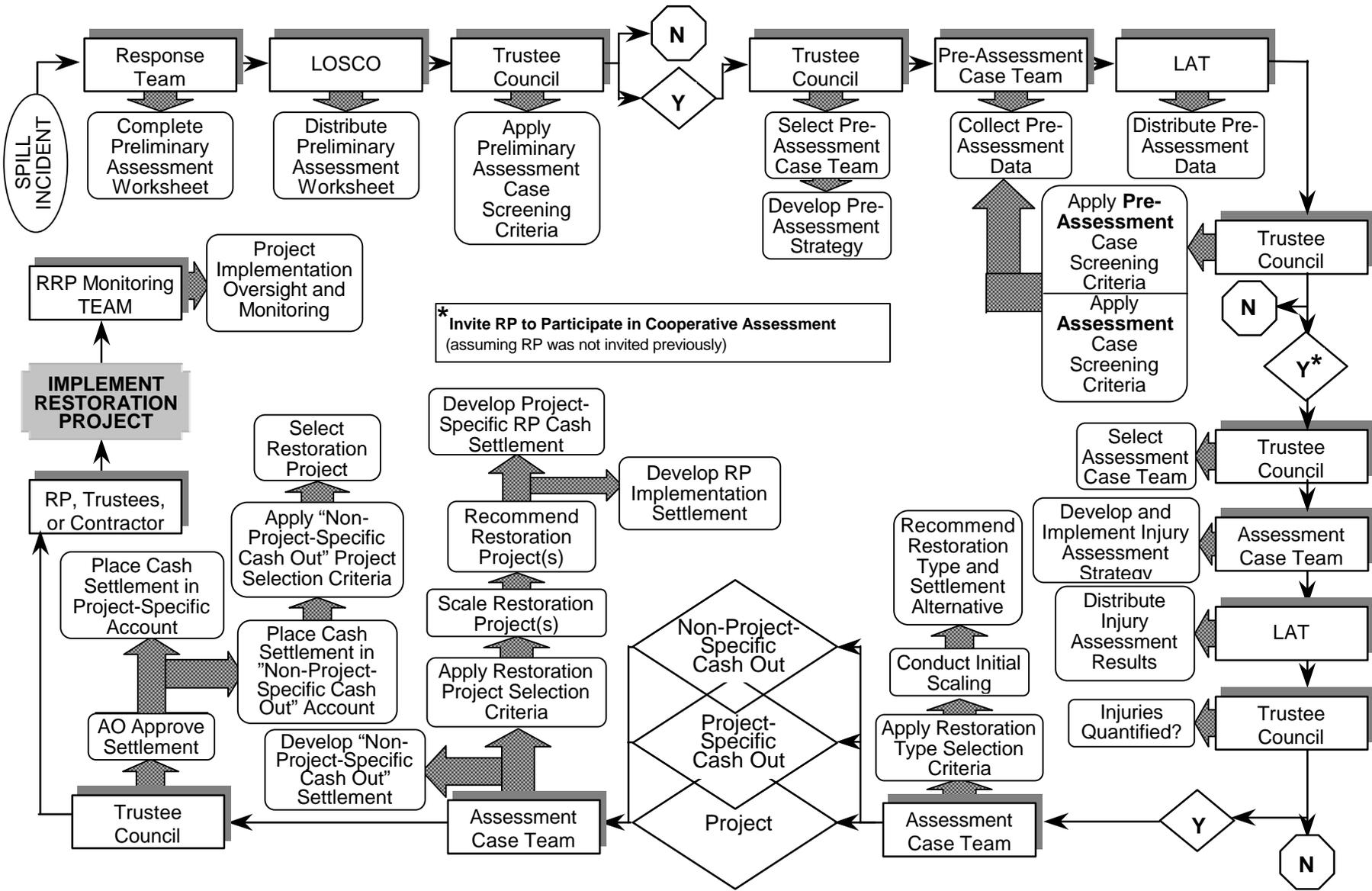
3.4.1.1 Preliminary Assessment Case Selection Screening

Under the RRP Program, a "NRDA Preliminary Assessment Worksheet" (see Appendix E for a copy of the worksheet) will usually be completed by the response field personnel when they investigate an incident. The worksheet will then be transmitted to LOSCO who will distribute it to the Trustee Council. Using the information provided in the worksheet, the Trustee Council will apply the "Preliminary Assessment Case Selection Screening Criteria" and make a preliminary determination as to whether or not "natural resources under the trusteeship of the trustee may have been, or may be, injured as a result of the incident" (15CFR 990.41(a)(3)). When the Trustee Council makes a determination of jurisdiction, they will assign a Pre-Assessment Case person or team to go to the site of the incident and initiate the Pre-Assessment Phase.

⁸ Lead Administrative Trustee means the trustee(s) who is selected by all participating trustees to coordinate natural resources damage assessment activities and maintain the Administrative Record. The LAT(s) should also facilitate communication between the OSC and other natural resource trustees regarding their activities during the response phase. (15CFR 990.30)

⁹ "Response" means containment and removal of oil or a hazardous substance from water and shorelines or the taking of other actions as may be necessary to minimize or mitigate damage to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches, as defined in section 1001(30) of OPA (33 USC 2701(30)).

Figure 3.6: RRP Program Case Implementation Process



3.4.2 Pre-Assessment Phase

3.4.2.1 Pre-Assessment Case Selection Screening

The Pre-Assessment Case personnel will collect pre-assessment data to confirm whether: injuries to public trust resources have resulted, or are likely to result, from the incident; response actions have not adequately addressed, or are not expected to address, the injuries resulting from the incident; and feasible primary and/or compensatory restoration actions exist to address the potential injuries (Section 990.42(a)(1-3)) (i.e., the “Pre-Assessment Case Selection Screening Criteria”). The pre-assessment data will be provided to the LAT who will distribute the data to the Trustee Council. Based on the data provided and a preliminary determination that restoration planning is feasible, the Trustee Council may decide to proceed with pre-assessment actions.

3.4.2.2 Case Selection Screening

Once the Trustee Council has decided to proceed with the Pre-Assessment Phase, the Pre-Assessment Case personnel will continue to collect pre-assessment data. The pre-assessment data will be provided to the LAT, who will distribute it to the Trustee Council. Using the information provided by the Pre-Assessment Case personnel, the Trustee Council will apply the “Case Screening Criteria” to determine whether: “potential injuries actually have occurred to trust resources, the response actions will not adequately address the injuries, injury assessment and scaling methods are available and feasible primary and/or compensatory actions exist to address the potential injuries.” If the case selection criteria are met, the Trustee Council may decide to proceed with the Restoration Planning Phase.

3.4.3 Restoration Planning Phase

If the Trustee Council decides to pursue a NRDA for this incident, an Assessment Case Team will be identified for that case, a Notice of Intent to Conduct Restoration Planning will be prepared, and the administrative record will be opened. At this time the RP will be invited to participate in a cooperative assessment, assuming they have not been invited earlier. Under the supervision of the Trustee Council, the Assessment Case Team will then carry out the technical components of the restoration planning phase, including: developing and implementing an injury assessment strategy, and providing a preliminary recommendation of a restoration type(s). This information will be provided to the LAT, who will distribute it to the Trustee Council for review. Based on that information, the Trustee Council will determine if the injuries have been adequately quantified. If so, the Case Team, under the supervision of the Trustee Council, will select an appropriate restoration type(s) (see Section 3.2.4, Relationship of Resource/Services to Restoration Types), conduct initial scaling, and begin negotiations with the RP on which settlement alternative to pursue.

3.4.3.1 Settlement Alternatives

Settlement alternatives are described in detail in Sections 3.2.6 Settlement Alternatives. Each proposed settlement will be submitted for approval to the Authorized Officials Group.

3.4.3.1.1 Cash Settlements (Trustee-Implemented-Restoration Project)

If the settlement alternative selected and approved by the Trustee Council is one in which the RP provides cash to the trustees based on the cost of implementing a specific

restoration project (Single Incident – Trustees Implemented Restoration Project), the Case Team will apply the restoration project selection criteria (see Section 3.2.4.2, Screening Criteria for Project Selection) to and with approval of the Trustee Council and Authorized Officials Group, select the restoration project(s). In the case of the “Non-Project-Specific Cash Out”, the Case Team will calculate, subject to the approval by the Trustee Council and Authorized Officials Group, the amount of the cash settlement in accordance with the RP’s liability and the unit cost/DSAY for the applicable restoration type in the region in which the incident occurred. Depending on the “cash out” settlement alternative, the cash settlement will be placed in either a “Non-Project-Specific Cash Out” restoration account for the applicable restoration type or a “Project-Specific Cash Out” account to fund future implementation of one of the RRP projects.

3.4.3.1.2 RP-Implemented-Restoration-Project Settlement

If the settlement alternative selected and approved by the Trustee Council, involves any RP(s) implemented projects, the Case Team will apply the project selection criteria (see Section 3.2.4.2, Screening Criteria for Project Selection) to and with approval of the Trustee Council and Authorized Officials Group, select the restoration project(s) to be implemented by RP(s).

3.4.3.2 Restoration Project Selection

Regardless of the specific settlement alternative selected, the restoration project selection for all project-specific settlements (i.e., Single Incident – Trustees Implemented Restoration Project; Single Incident – RP Implemented Restoration Project; RP CO-OP; RP Fund/CO-OP) will be completed using the screening criteria described in Section 3.2.4.2 of this document.

Selection of the specific restoration project to be implemented with the funds collected from the “Non-Project Specific Cash-Out” settlements will be done using the screening criteria described in Section 3.2.6.2.3.1 of this document.

3.4.3.3 Settlement Requirements

3.4.3.3.1 Restoration projects/Alternatives

As a requirement of settlement, the RP(s) or the trustees will be implementing a restoration project to compensate the public and environment for the resources and services lost as a result of an incident. In addition to the requirement to implement a project, the settlement will also include provisions for project monitoring, structural operations and maintenance, potential corrective actions, contingencies, and reimbursement of assessment costs.

3.4.3.3.2 Monitoring

The purpose of monitoring is two-fold: 1) to determine whether the project goals and objectives have been or will be met by evaluating project performance against performance criteria and, 2) to identify any mid-course corrections or adaptive management procedures that may be necessary to ensure the sustainability of a project. To fulfill these objectives, monitoring will be undertaken after project implementation. Monitoring of projects implemented under the RRP will be performed using replicable, technically sound sampling techniques and designs that measure both the structure and function of a system.

3.4.3.3.3 Operation and Maintenance

Under some circumstances, a project may involve “hard” structures that are not self-maintaining or operating such as variable-crested weirs, flap gates, etc. For these structures, an operations and maintenance plan must be developed at the time of the structure’s design. Each plan will include the design specifications of the structure, a detailed map showing structure location, permits and permit amendments, a schedule of maintenance and operation, a schedule of inspections, budget, cost-share agreement (if needed), a schedule for reports including the construction completion report, and a strategy for structure removal if at a later point in time the structure is deemed structurally unsound, e.g., a navigation hazard.

3.4.3.3.4 Corrective Actions/Project Adjustments

Corrective actions and project adjustments are any action that the Trustee Council deems necessary to ensure the success of the project after project implementation. The decision to proceed with corrective actions and/or adjustments will be made following evaluation of the monitoring data and consideration of the performance criteria. Corrective actions and/or adjustments will be considered if performance criteria goals and objectives are not met, or are progressing too slowly. As part of the settlement, the RP(s) is financially responsible for the cost of the required corrective actions and/or adjustments. In the case of a trustee-implemented project, the trustees may collect or require, as appropriate, that the RP(s) place in an escrow, a sum of money to cover possible corrective actions and/or adjustments. In cases where the RP has implemented the project, the RP(s) will be required to implement the corrective action and/or adjustment.

3.4.3.3.5 Contingencies

Trustees may collect from or require that the RP place in an escrow, a sum of money to cover unexpected costs associated with the implementation of the project. Such contingencies may also be applied to trustee oversight costs as these future costs can only be estimated at the time of settlement. Any contingency funds collected or placed in escrow, as appropriate, will be used in the manner specified in the settlement documents.

3.4.3.3.6 Assessment Costs

The financial responsibility of the RP(s) for a given incident extend(s) to the trustees’ assessment costs resulting from the incident. Assessment costs are administrative and other costs incurred by the trustees associated with the injury assessment and restoration planning phase of the NRDA.

3.4.3.4 Settlement Calculation

Regardless of the specific settlement alternative selected, the financial responsibilities of the RP include: the costs associated with injury assessment, project planning (site selection, feasibility analyses, engineering and design, permitting, conservation easements, etc.), project implementation, monitoring, operations and maintenance, trustee oversight and administrative costs, corrective actions, contingencies, and any other project-related costs that may arise throughout the life of the project.

3.4.3.4.1 RP-Implemented Restoration Project

If an RP chooses to implement a restoration project itself or through a contracted third party, the settlement calculation, will consist primarily of the cost associated with the trustees’ costs to conduct the injury assessment and restoration planning, and the required trustee oversight and administrative costs for the life of the project . Costs associated with the implementation of the project, monitoring, operations and

maintenance, potential corrective actions, and contingencies would remain the responsibility of the RP(s) as part of the settlement but would not need to be calculated. In the case of multiple RPs or the implementation of a RRP restoration project with a partnering program or organization, the settlement calculation would take into account what portion of the cost each contributing RP or program is responsible for.

3.4.3.4.2 Cash Settlement - Project-Specific Cash Out

If the RP(s) provide the trustees with the money to implement a specific restoration project in the RRP (which was selected by the trustees with input from the RP(s) by applying the RRP Program project selection criteria), the settlement calculation would include the trustees' assessment costs plus all costs to conduct the project planning and design, permitting, implementation, monitoring, operations and maintenance, oversight and administration, and contingencies. This cash settlement is paid to the trustees. If the RP's liability is such that it does not owe the full amount of the project (e.g., RP Fund/CO-OP Settlement Alternative), the RP can cash out based on the percentage of the selected restoration project for which it is liable.

3.4.3.4.3 Cash Settlement - Non-Project-Specific Cash Out

If the "Non-Project-Specific Cash Out" settlement alternative is selected as the basis for resolving an RP's liability, the settlement calculation consists of calculating the RP's liability in accordance with the unit cost/DSAY for the applicable restoration type in the region in which the incident occurred. As discussed in previously, the unit cost/DSAY by definition includes trustees' assessment costs plus all costs to conduct the project planning and design, permitting, implementation, monitoring, operations and maintenance, and contingencies. The trustees will use these types of cash settlements to implement a restoration project in the RRP based on the "Project Selection Criteria under Non-Project-Specific Cash Out" discussed in Section 3.2.6.2.3.1

3.4.4 Restoration Implementation

LOSCO will be responsible for coordinating and tracking the implementation of all restoration projects, whether carried out by the RP(s) or the trustees, and providing periodic reports on their status to the Trustee Council. As part of this responsibility and in consultation with the specific Case Teams, LOSCO will coordinate the Project Monitoring Teams in terms of scheduling, tracking, and assuring that specific implementation and performance monitoring takes place. Regular status reports, including need for corrective actions or letters of completion, will be provided to the Case Teams and Trustee Council until the case is closed.

3.5 Sources of Restoration Funding

There are three potential sources of funds for restoration of resources and services injured or lost as a result of an incident.

- ♦ RP(s), through cash settlements to resolve their liability from incidents, can/will provide funds: for a specific project, as part of pooled funding for a specific project, or as payment under the "Non-Project-Specific Cash Out" settlement alternative.
- ♦ In the absence of a viable RP (e.g., where the RP is unknown, bankrupt, or is not responsible due to a valid defense) or when a viable RP fails to respond to a demand letter after 90 days, the trustees have the option of going to the Federal OSLTF and/or State OSCF to seek monies to implement the restoration actions required for that incident.
- ♦ Funds from other programs that carry out restoration (i.e., permit mitigation, Coastal Impact Assistance Funds) may be available in conjunction with funds from cash

settlements to implement larger projects, or cash settlements may be used as matches for other restoration program projects (i.e., CWPPRA). Funds from other programs cannot be used to replace a restoration requirement associated with natural resource liability from an incident. The trustees will ensure that the public receives an appropriate increment of restoration benefit beyond that which accrues from other programs when combining a settlement for natural resource liability with programs supported by public funds.

3.6 Use of the RRP Program and RRPs

The trustees propose to use the RRP Program and RRP

s in a variety of situations, as appropriate. The trustees with jurisdiction for any given event will determine the most effective process for conducting a NRDA for that spill. In the majority of circumstances, it is anticipated that the projects in an RRP will be used by trustees as potential restoration alternatives for injuries and service losses requiring restoration during the restoration planning phase of the NRDA process, thereby minimizing the need to do more lengthy incident-specific restoration planning as part of the damage assessment process for most incidents. In some cases, there will be circumstances in which the trustees may do restoration planning outside of the context of the RRP Program due to the specific conditions of the incident. For example, the trustees may decide to follow the traditional NRDA process after injury assessment or after initial scaling of the injury (see Figure 3.1). Additionally, there may be cases in which restoration types and the attending analysis from the RRP Program, as well as restoration projects from the RRPs, will be used to address certain injuries from an incident; and restoration planning outside of the context of the RRP Program will be carried out for other injuries from the incident.

4.0 Regional Boundaries

Based on an evaluation of the existing Louisiana plans/programs, as well as other data, the state will be divided into nine RRP regions (Figure 4.1). These nine regions include the four COAST 2050¹⁰ regions along the coast, including state waters, (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation Authority 1998) plus five inland regions, created through a combination of LDEQ's defined watersheds (LDEQ 2000). The ability to show "nexus," or the ability to link potential injuries to restoration alternatives and/or projects within a region, is simplified due to habitat similarities within these boundaries. It is anticipated that dividing the state into nine regions will facilitate trustee implementation of the RRP Program and the management of the RRP.

In addition, as appropriate, the trustees intend to address impacts to the resources in federal waters off the State of Louisiana by use of restoration projects from one or more of the coastal RRP. "Federal waters" encompasses the federal waters offshore Louisiana between the boundary of the Federal/Louisiana territorial seas to the extent of the EEZ.



Figure 4.1: Regional Boundaries for the RRP Program

¹⁰ The Coast 2050 Plan is the Louisiana coastal resources management plan that was developed "to sustain a coastal ecosystem that supports and protects the environment, economy and culture of southern Louisiana, and that contributes greatly to the economy and well-being of the nation."

4.1 Definition of RRP Regional Boundaries

The RRP regional boundaries demarcate four coastal and five inland regions that encompass the entire state. The boundaries of the coastal regions correspond to regional boundaries delineated and defined in the Coast 2050 Plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). The boundaries of the inland regions correspond to a conglomeration of watersheds originally delineated by the LDEQ. A description of each RRP region is provided in the following sections.

4.1.1 Region 1

This region encompasses the Lake Pontchartrain hydrologic basin and portions of the Mississippi River, Amite River, and Pearl River basins, the Pleistocene terraces, and delta plain. Bordered to the north by Interstate 12 and the St. Bernard Parish line, Region 1 extends south to the Mississippi River and Mississippi River Gulf Outlet, and from the Amite River and intermediate terraces along its western border to the Pearl River and Chandeleur Islands along its eastern border. The following parishes are located either partly or completely within Region 1: Ascension, Jefferson, Livingston, Orleans, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany, and Tangipahoa.

4.1.2 Region 2

This region encompasses the Breton Sound and Barataria hydrologic basins and the lower Mississippi River basin, delta plain and modern Balize delta (Birdsfoot delta). Bordered to the north by the headwaters of Bayou Lafourche and the Mississippi River, Region 2 extends south to the Caminada-Moraueu Headland, Plaquemines barrier system, and Birdsfoot delta, and from Bayou Lafourche along its western border to the Mississippi River and Mississippi River Gulf Outlet along its eastern border. The following parishes are located either partly or completely within Region 2: Ascension, Assumption, Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, and St. John the Baptist.

4.1.3 Region 3

This region encompasses the Terrebonne, Atchafalaya, and Teche/Vermilion hydrologic basins, and portions of the alluvial valley and delta plain. Bordered to the north by intermediate and prairie terraces and natural levees, Region 3 extends south from the landward extent of coastal wetlands, as defined by the Louisiana Coastal Wetlands Conservation Plan (LDNR 1997), to the Timbalier and Isle Dernieres barrier island chains and Atchafalaya Delta, and from Freshwater Bayou Canal along its western border to Bayou Lafourche along its eastern border. The following parishes are located either partly or completely within Region 3: Assumption, Iberia, Lafourche, St. Martin, St. Mary, Terrebonne, and Vermilion.

4.1.4 Region 4

This region encompasses the Calcasieu River, Sabine River, and Mermentau River hydrologic basins, and portions of the Chenier plain and Pleistocene terraces. Bordered to the north by the Prairie terraces, Region 4 extends south from the landward extent of the Chenier Plain to the Gulf of Mexico and from the Louisiana/Texas border along its western border to Freshwater Bayou Canal along its eastern border. The following parishes are located either partly or completely within Region 4: Calcasieu, Cameron, and Vermilion.

4.1.5 Region 5

This region encompasses a majority of the Pearl River, Bogue Chitto River, Tangipahoa River, and Amite River drainage basins and portions of the Mississippi River basin and Pleistocene terraces. Bordered to the north by the Louisiana/Mississippi border, the eastern boundary of Region 5 extends south along the Pearl River to Interstate 12 near Slidell, Louisiana. The southern boundary extends west from the Pearl River along Interstate 12 to the Amite River. The eastern boundary of Region 5 follows the Amite River south to near Port Vincent and then extends southwest along the western margin of St. Amant Swamp and the Pleistocene terrace to the Mississippi River near Burnside, Louisiana. The following parishes are located either partly or completely within Region 5: Ascension, Concordia, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, St. Tammany, Tangipahoa, Washington, West Baton Rouge, and West Feliciana.

4.1.6 Region 6

This region encompasses portions of the Red River, Atchafalaya River, Mississippi River, and Teche/Vermilion basins and the alluvial valley. The northern boundary of Region 6 extends east from the confluence of the Red River and Calcasieu River basins, near the town of Otis, Louisiana, to the Louisiana/Mississippi border north of the town of Point Breeze, Louisiana. The boundary follows the Red River east to Bayou Choctaw and then cuts south to the town of Bunkie, Louisiana where it turns east and follows Bayou Des Glaises and the Outflow Channel to the Mississippi River in Concordia Parish. The eastern boundary of Region 6 extends south to the northern boundary of the coastal wetlands, as defined in the Louisiana Coastal Wetlands Conservation Plan (LDNR 1997). The southern boundary of Region 6 extends along the coastal wetlands from Bayou Lafourche near Donaldsonville, Louisiana to Freshwater Bayou Canal on the west. The western boundary of Region 6 extends north from Freshwater Bayou Canal and continues along the western boundary of the Teche/Vermilion River basin to the confluence of the Red River, and Calcasieu River basins near the town of Otis, Louisiana. Along its eastern border, Region 6 is bounded by the Mississippi River from just north of Point Breeze, Louisiana to Donaldsonville, Louisiana. The following parishes are located either partly or completely within Region 6: Acadia, Allen, Ascension, Assumption, Avoyelles, Concordia, Evangeline, Iberia, Iberville, Lafayette, Pointe Coupee, Rapides, St. Landry, St. Martin, St. Mary, Vermilion, West Baton Rouge, and West Feliciana.

4.1.7 Region 7

This region encompasses portions of the Calcasieu River, Mermentau River and Sabine River basins. The western boundary extends from the confluence of the Louisiana/Texas border and the Red River and Sabine River basins, just south of the town of Bethany, Louisiana, to the marsh areas just north of the Gulf Intracoastal Waterway and the Louisiana/Texas border. The eastern boundary extends southeast from the confluence of the Louisiana/Texas border and the Red River and Sabine River basins, just south of the town of Bethany, Louisiana, to the western bank of Freshwater Bayou Canal. The southern boundary extends from the western bank of Freshwater Bayou Canal westward to the Louisiana/Texas border, along the northern extent of the Chenier Plain. On the west, Region 7 follows the Louisiana/Texas border from the marsh areas just north of the Gulf Intracoastal Waterway north to the confluence of the Louisiana/Texas border, the Red River and the Sabine River basins, approximately three miles south of the town of Bethany, Louisiana. The eastern boundary follows the eastern edge of the Sabine, Calcasieu and Mermentau basins inclusively. The following parishes are located either partly or completely within Region 7: Acadia, Allen, Beauregard, Caddo, Calcasieu,

Cameron, De Soto, Evangeline, Jefferson Davis, Lafayette, Natchitoches, Rapides, Sabine, St. Landry, Vermilion, and Vernon.

4.1.8 Region 8

This region encompasses the Little River, Tensas River, and Ouachita River basins and a portion of the Mississippi River basin. Bordered to the north by the Louisiana/Arkansas border and to the east by the Louisiana/Mississippi border, Region 8 extends southwest from the state line approximately six miles northeast of the town of Waterproof, Louisiana (located along the Mississippi River) to the Tensas River where it extends west and south to the Black River and then south to the Catahoula Lake Diversion Canal. The boundary continues west along the southern margin of Catahoula Lake to the westward margin of the Little River drainage basin. The western boundary of Region 8 extends north along the western margin of the Little River and Ouachita River drainage basins to the Louisiana/ Arkansas border. The following parishes are located either partly or completely within Region 8: Bienville, Caldwell, Catahoula, Claiborne, Concordia, East Carroll, Franklin, Grant, Jackson, La Salle, Lincoln, Madison, Morehouse, Ouachita, Rapides, Richland, Tensas, Union, West Carroll, and Winn.

4.1.9 Region 9

This region encompasses portions of the Red River and Mississippi River basins. Bordered to the north by the Louisiana/Arkansas border, Region 9 extends south from the state line along the Louisiana/Texas border to the confluence of the Red River and Sabine River drainage basins, just north of the town of Bethany, Louisiana, and then southeast to the confluence of the Calcasieu River and Red River drainage basins, near the town of Otis, Louisiana. The boundary follows the Red River east to Bayou Choctaw and then cuts south to the town of Bunkie, Louisiana where it turns east and follows Bayou Des Glaises and the Outflow Channel to the Mississippi River in Concordia Parish. The western boundary of Region 9 extends south from the Louisiana/Arkansas border along the western margin of the Ouachita River and Little River drainage basins to the southern margin of Catahoula Lake and east to the Catahoula Lake Diversion Canal. The boundary continues north along the Black River and Tensas River and then northeast to the Mississippi River approximately six miles north of the town of Waterproof, Louisiana. The eastern boundary follows the Louisiana/Mississippi border from the point north of Waterproof, Louisiana to just north of the Outflow Channel near Point Breeze, Louisiana. The following parishes are located either partly or completely within Region 9: Avoyelles, Bienville, Bossier, Caddo, Catahoula, Claiborne, Concordia, De Soto, Grant, La Salle, Lincoln, Natchitoches, Rapides, Red River, Sabine, Tensas, Vernon, Webster, and Winn.

5.0 Alternatives

This chapter describes the alternatives considered, outlines the process that was used to generate and evaluate the alternatives to achieve the purpose and needs for the program, and provides a programmatic basis for the choice of the preferred alternative. The “No Action Alternative” is described first. The “RRP Program/Environmentally Preferred Alternative” is then described. The other programmatic alternative that was considered prior to formal scoping (but not carried forward) is noted, along with the rationale for eliminating it from further consideration.

The “No Action Alternative” is to continue to carry out NRDA in the State of Louisiana using the NRDA process and current practices described in Chapter 2.

The “Environmentally Preferred Alternative” is the statewide comprehensive RRP Program described in detail in Chapters 3 and 4 of this document. These chapters describe the RRP Program components in relation to the NRDA process and the goals and objectives of establishing the RRP Program.

The NRDA process as described by implementing regulations and guidance both under OPA and OSPRA will not change as a result of the RRP Program. The trustees are proposing to further institutionalize an existing process, as well as identify ways to expedite and further define the specific steps of that process, within the requirements of the OPA and OSPRA NRDA regulations.

To expedite the NRDA process and make it more cost-effective, the RRP Program proposes to shorten the restoration planning phase of the process through the development of individual RRPs, which will identify and subject to public review appropriate restoration projects prior to incidents. In addition, the RRP Program will aid the selection of restoration projects by identifying in advance the types of restoration that may be suitable to restore those resources and services likely to be injured by incidents in Louisiana. The RRP Program/PEIS will also streamline the NEPA process for case specific documents and decision-making by “tiering” the programmatic and environmental analysis for both the project selection and implementation from the PEIS and RRPs. Consistent application of the RRP Program project selection criteria will enhance the predictability and accountability of the decision-making process. Flexibility will be increased through the introduction of additional settlement alternatives.

5.1 No Action Alternative

5.1.1 Summary

Both state and federal NRDA regulations provide for a step-by-step process for trustees to determine injuries, assess damages, and develop and implement restoration projects that compensate the public for injuries to natural resources harmed by an incident.

The No Action Alternative is defined as continuing to implement the NRDA process without the institution of the RRP Program. The No Action Alternative is used as a basis for comparison with the RRP Program. The affected environment and existing NRDA process are described in Chapter 2, Affected Environment and Program and in Appendix B, Affected Environment. The following are the major phases of the NRDA process:

- ◆ Pre-assessment phase;
- ◆ Restoration planning phase; and
- ◆ Restoration implementation phase.

5.1.2 Overview of the NRDA Process

The description below of the NRDA process is intended to provide the context for the comparison of the No Action Alternative and the RRP Program Alternative.

Pre-assessment Phase – The purpose of the Pre-assessment Phase is to determine if trustees have the jurisdiction to pursue restoration under OPA, and, if so, whether it is appropriate to do so.

Restoration Planning Phase – The purpose of the Restoration Planning Phase is to evaluate potential injuries to natural resources and service losses and use that information to determine the need for and scale of restoration actions. The Restoration Planning Phase provides the link between injury and restoration. The Restoration Planning Phase has two basic components: injury assessment, and restoration selection.

Restoration Implementation Phase – The Restoration Implementation Phase occurs after the DARP is presented to the RPs to implement or fund the trustees' costs of implementing the DARP, therefore providing the opportunity for settlement of the damage claim without litigation. Should the RPs decide to decline to settle the claim, trustees are authorized to bring a civil action for damages in court or to present the claim to the Federal OSLTF or the State OSCF for such damages. If the RPs choose to implement the restoration actions detailed in the DARP, then the trustees provide project oversight that is funded by the RPs. Otherwise the trustees will implement the project.

5.2 RRP Program/Preferred Alternative

5.2.1 Summary

The RRP Program is described in its entirety in Chapters 3 and 4 of this document. The RRP Program will define, expand, and/or refine several important components beyond the existing NRDA process. The following are the major components:

- ◆ Potentially injured resources/services;
- ◆ Restoration types (including nexus analysis, and environmental consequences analysis of implementation);
- ◆ Settlement alternatives;
- ◆ Screening criteria; and
- ◆ Regional boundaries of the RRP.

5.2.2 Overview of Program Components

The descriptions below of the program components are programmatic and are not intended to define the case-specific actions or outcomes that may be implemented under the RRP Program.

Potentially Injured Resources/Services – The RRP Program defines those natural resources and services in Louisiana that are likely to be or are anticipated to be injured (i.e., at risk) by incidents as “potentially injured resources/services.” Identification of these “potentially injured resources/services” will facilitate the development of the RRP, provide more timely detail to the pre-assessment phase and facilitate the expedient development of restoration alternatives during the restoration planning phase. The

¹¹ In the absence of a viable RP (e.g., where the RP is unknown, bankrupt or not responsible due to a valid defense) or when a viable RP fails to respond to a demand letter after 90 days, the trustees have the option of going to the OSLTF and/or OSCF to seek monies to implement the restoration actions required for that case.

“potentially injured resources/services” are listed under three broad categories: coastal, inland, and statewide in Chapter 3:

- ◆ Coastal
 - ◆ Herbaceous Wetlands
 - ◆ Forested Wetlands
 - ◆ Beaches/Shorelines/Streambeds
 - ◆ Oyster Reefs (and other reefs)
 - ◆ Water Column Organisms
- ◆ Inland
 - ◆ Herbaceous Wetlands
 - ◆ Forested Wetlands
 - ◆ Beaches/Shorelines/Streambeds
 - ◆ Oyster Reefs (and other reefs)
 - ◆ Water Column Organisms
- ◆ Statewide
 - ◆ Birds
 - ◆ Wildlife
 - ◆ Recreational
 - ◆ Cultural

Restoration Types – The RRP Program identifies restoration types that are appropriate for the restoration of injuries for each identified “potentially injured resources/services” in the RRP Program. These restoration type categories are:

- ◆ Creation/Enhancement
- ◆ Physical Protection of Habitat
- ◆ Acquisition/Legal Protection
- ◆ Stocking of Fauna
- ◆ Physical Protection of Fauna
- ◆ Restoration of Recreation Resources
- ◆ Restoration of Cultural Resources

Figures 3.2 and 3.3 summarize the specific restoration type(s) in each restoration type category that is appropriate for the restoration of injuries to each identified “potentially injured resources/services” in the RRP Program. This determination of the range of appropriate restoration types is based on the nexus analysis that is described in Chapter 3. The trustees have also conducted an environmental consequences analysis on the restoration types. Carrying out both analyses in the PEIS will result in both technical, process and NEPA compliance efficiencies at the case level during the restoration planning phase. The trustees will be able to “tier” the case specific DARPs and environmental assessments off of the PEIS.

The trustees also have developed restoration type selection criteria that will further assist in determining which of the various restoration types identified in Figures 3.2 and 3.3 will be most appropriate to restore the injured resources/services during a given incident. It is anticipated that the criteria will also provide a level of predictability to the public and affected parties regarding restoration project selection. Projects in each RRP will be classified by restoration type in order to facilitate the determination of the nexus between injuries and selection of specific restoration projects, thereby allowing the process of evaluating and selecting preferred restoration projects to be streamlined.

Settlement Alternatives – The RRP Program describes a number of additional case settlement alternatives that will assist the trustees and RPs in negotiations to resolve RP liabilities for incidents at the end of the restoration planning phase. These additional settlement alternatives generally represent different ways of resolving liability from an incident under one or the other (or both) of the two options: RP implemented restoration; or RP cash out and trustee implemented restoration. These settlement alternatives also may provide opportunities for implementing restoration projects more quickly and cost-effectively; pooling settlements to implement larger projects than could be accomplished by using individual settlements, and potentially encompassing landscape scale efforts.

Screening Criteria – In order to improve consistency, predictability, and accountability to the NRDA decision-making process, the trustees identified and defined project selection and other screening criteria to be used in implementing the RRP Program. These criteria are for:

- ◆ Selection of restoration projects to be incorporated into each RRP;
- ◆ Selection of projects for implementation under the Non-Project-Specific Cash Out alternative; and
- ◆ Project selection/screening of specific restoration actions required for a case.

Regional Boundaries of the RRPs – The RRP Program establishes nine regions for which regional plans will be developed. There will be four coastal regions based on the Coast 2050 Plan regions and five inland regions based on LDEQ's defined watersheds. For each region, an individual RRP will be produced. Each RRP will identify the resources and/or services that could potentially be affected by an incident and the restoration projects that are available for implementation within that region. The first RRP will be done for Region 2. Establishing regions will also provide an administrative tool to, among other things, facilitate tracking of cases, settlement accounting, restoration, monitoring, etc.

5.3 Other Programmatic Alternative Considered

Prior to the commencement of the formal scoping process for this PEIS on the RRP Program, the trustees considered one other alternative. This alternative consisted of developing RRPs with databases that identify existing, planned, or proposed restoration projects that may provide appropriate restoration alternatives for consideration in the context of specific incidents. It was determined that this alternative did not meet the objectives of providing greater consistency and predictability of the NRDA process by detailing how that process would work, thereby minimizing uncertainty to the public and industry. Also, it did not meet the state legislative mandate to establish a program. Therefore, this alternative was not carried forward. Instead, a more comprehensive alternative, embodied in the RRP Program, was developed for review by the public.

5.4 Evaluation of Alternatives

In evaluating the programmatic aspects of the "RRP Program/Environmentally Preferred Alternative" versus the "No Action Alternative," a comparative analysis has been done determining the relative programmatic consequences of implementing the RRP Program or not. The analysis of the relative environmental consequences of the two alternatives is provided in Chapter 6.

5.4.1 RRP Program/Environmentally Preferred Alternative

As described above, it is anticipated that the RRP Program will achieve the following:

- ◆ Expedite and potentially reduce the cost of the NRDA process;

- ◆ Provide greater consistency and predictability by detailing the NRDA process, thereby minimizing uncertainty to the public and industry; and
- ◆ Increase restoration of lost natural resources and services.

To expedite and make the NRDA process more cost-effective, the RRP Program proposes to shorten the restoration planning phase of the NRDA process through the development of individual RRPs, which will identify appropriate restoration projects subjected to public review prior to incidents occurring. In addition, the RRP Program will help to inform the selection of restoration projects by identifying in advance the types of restoration that may be suitable to restore those resources and services likely to be injured by incidents in Louisiana. Further, through the development of a PEIS for the RRP Program and “tiering” the RRPs and case specific DARPs from the information and analysis provided in the PEIS, the NEPA process for the NRDA cases will be streamlined significantly. It is also anticipated that model documents (including DARPs, consent decrees, Notice of Intents (NOIs), etc.) will be developed under this program, to provide more efficiencies and lower the costs of carrying out NRDA. Although the RRP Program will require upfront costs to identify restoration projects in advance and develop planning documents, economies of scale will allow overall implementation costs to be lower.

Consistent application of the RRP Program project selection criteria will enhance the predictability, consistency, and accountability of the decision-making process. Flexibility will be increased through the introduction of additional settlement alternatives.

It is anticipated that describing the NRDA process in greater detail will enable the public and affected entities to participate more fully in restoration planning for incidents. First, the RRP Program identifies resources that are likely to be injured from an incident and what restoration type is appropriate to restore the resources/services that were injured or lost. It also provides the rationale for how those decisions were made. The public and affected parties will have an opportunity to review the restoration projects by restoration type that are available in a specific region to restore resources/services injured in that region prior to an incident occurring. By describing in detail each step and the criteria used in the NRDA process, the public and affected parties will understand the trustees’ roles and rationale for their decisions, thereby improving the ability of interested parties to participate in the process.

Finally, by streamlining the NRDA process and making it more efficient: the costs to both the trustees and RPs will be lowered; restoration of injured resources will be increased; and most importantly, the public will be made whole more quickly.

5.4.2 Summary of Benefits

The RRP Program, including the RRPs, will benefit the public, industry, and natural resource trustees by:

- ◆ Providing greater opportunities to make the public and the environment whole for injuries to trust resources/services;
- ◆ Expediting restoration of injured resources/services from oil incidents;
- ◆ Potentially reducing the cost of restoration planning and implementation;
- ◆ Pooling of individual case recoveries to provide for implementation of larger, more ecologically significant restoration projects;

- ◆ Providing for more consistency and predictability through detailing the NRDA process, thereby reducing uncertainty to the public and industry;
- ◆ Improving coordination between restoration activities under the NRDA mandates and other restoration efforts in the State;
- ◆ Enhancing the capability for trustees to restore resources/services injured by oil incidents for which there is no viable RP;
- ◆ Maximizing opportunities for partnering among RPs, trustees, and other public and private restoration efforts; and
- ◆ Increasing opportunity for public participation in the NRDA process through pre-incident planning.

6.0 Environmental Consequences

This chapter discusses the environmental consequences of the “No Action Alternative” compared to the “RRP Program/Environmentally Preferred Alternative” based on the description of the programmatic benefits described in Chapter 5. Section 6.1 will describe the direct and indirect impacts of the alternatives; section 6.2 will describe the cumulative impacts of the alternatives; section 6.3 will summarize the balance between short-term uses versus long-term productivity; and, section 6.4 will list the irreversible and irretrievable commitments of resources.

The environmental consequences analysis is necessarily generalized. The exact manner in which the implementation of the “RRP Program/Environmentally Preferred Alternative” will affect the environment will be determined largely by the implementation of the program as it applies to specific cases. This analysis does not attempt to distinguish between all possibilities as to how the trustees may implement the “RRP Program/Environmentally Preferred Alternative” as it applies to specific cases. Instead this analysis simply assesses likely impacts at a statewide scale.

Under OPA and OSPRA, the selection of restoration projects to be implemented as part of a specific case is subject to NEPA and all relevant laws, regulations, etc., that are applicable. This is the case whether the No Action Alternative or the RRP Program is selected.

The number of cases and speed of their resolution through implementation of restoration will determine the actual beneficial impact of the program. On a statewide, landscape scale, substantial impacts cannot be expected for a number of years, but locally, landscape impacts may be evident sooner. In a geographic sense, the impact of the RRP Program can be expected to be most prominent and most quickly realized in Region 2 which is the region with the highest frequencies of incidents.

This DPEIS can only anticipate what might be the cumulative impacts of the statewide implementation of the RRP Program as cumulative impacts are those, that result from the incremental consequences of an action when added to past, present, and reasonably foreseeable future actions.

6.1 Direct and Indirect Impacts

The environmental resource impacts and social and economic impacts are presented below on a programmatic level. The major differences between the impacts of the No Action Alternative and the “RRP Program/Environmentally Preferred Alternative” are ones of degree or proportion. Therefore, the beneficial environmental impacts and lack of potentially significant adverse environmental impacts and economic and social impacts are similar.

6.1.1 Beneficial Impacts

Compared to the No Action Alternative, it is anticipated that the amount of restoration accomplished under the “RRP Program/Environmentally Preferred Alternative” will be larger, accomplished more quickly and generally at a larger scale, with more public participation, and at a lower cost to the trustees and RPs. The “RRP Program/Environmentally Preferred Alternative” will also improve coordination with other restoration efforts in the state and maximize opportunities for partnering. Therefore the trustees expect that the beneficial impacts of the “RRP Program/Environmentally Preferred Alternative” will be greater than those of the No Action Alternative.

6.1.1.1 Direct

Both alternatives share the goal of making the public and the environment whole for injuries to trust resources/services from incidents. Restoration actions taken by the trustees to return injured resources and habitats to baseline and compensate the public for interim losses will have long-term and significant beneficial impacts on both the physical environment and biological resources impacted by incidents. Whether restoration occurs at the site of the incident or off-site, restoration under NRDA is required to create, protect, or enhance resources and habitats, and therefore it serves to directly benefit those types of resources and habitats that are the focus of restoration actions.

For example, in the case of threatened and endangered species, many species have been listed in that status because of population declines due to the loss of their primary habitats. Likewise, the intent of identifying and protecting essential fish habitat in the coastal area is to prevent the decline of fish populations. Therefore restoration of habitat, in general, and specifically habitat for threatened and endangered species, will assist in the maintenance and possibly the recovery of populations of threatened and endangered species. Restoration of habitat will benefit essential fish habitat when habitat restoration is in the coastal area.

Restoration of resources/services that are of cultural value or support economic activities, such as recreation, tourism, commercial fishing, etc., will also be impacted in a beneficial way by the restoration of those resources/services on which they depend.

6.1.1.2 Indirect

The restoration of resources/services injured by incidents will have foreseeable indirect beneficial impacts to the other parts of the physical environment, biological resources, cultural resources, or related economic activities. For example, when addressing an injury related to one type of service flow from a resource by restoring that resource, usually all service flows related to that resource are restored or enhanced.

6.1.2 Potentially Significant Adverse Environmental Impacts

At a programmatic level, it is anticipated that under the "RRP Program/Environmentally Preferred Alternative" there will be more restoration of injured resources/services and restoration will be accomplished more quickly. Therefore, there appears to be less of a potential for significant adverse environmental impacts under the "RRP Program/Environmentally Preferred Alternative" as compared to the no action alternative. Under implementation of either alternative, mitigation measures are available to avoid or reduce any potentially significant adverse impacts to a less than significant level as individual restoration project(s) are reviewed and implemented. The project(s) will be scaled in such a way that the net benefits of the project compensate for injury(s) resulting from the incident(s) and collateral injury(s) (if any) from the implementation of the compensation project(s). Specific analysis of environmental impacts, their significance, and the availability and choice of specific mitigation measures will be developed and presented in future second or third tier environmental documents prepared, as necessary, prior to the implementation of specific restoration projects.

6.1.3 Economic and Social Impacts

Both alternatives result in beneficial socioeconomic impacts to the public and the industries and communities that depend on the state's resources for commerce and recreation as a result of the restoration of resources/services on which they depend. At the same time, under "RRP Program/Environmentally Preferred Alternative", RPs for

incidents will have a predictable and efficient way of resolving their liabilities. By implementing restoration more quickly, the time between an incident and full recovery of lost resources/services will be reduced, thereby reducing the RPs' liability.

6.2 Cumulative Impacts

The restoration of resources/services injured by incidents will contribute to avoidance or mitigation of the adverse environmental impact to those resources/services and other parts of the physical environment, biological resources, cultural resources, and related economic activities. Both alternatives will contribute to the cumulative beneficial impacts of restoration efforts that have previously been constructed and are being constructed under separate Federal and State authorities and by local and private entities.

Compared to the No Action Alternative, it is anticipated that the amount of restoration accomplished and therefore the cumulative beneficial impacts under the "RRP Program/Environmentally Preferred Alternative" will be significantly greater, will be accomplished more quickly and generally will be at a larger scale. At the same time, the "RRP Program/Environmentally Preferred Alternative" will also improve coordination with other restoration efforts in the state and maximize opportunities for partnering which will also have a cumulative beneficial impact.

6.3 Short-Term Uses vs. Long-Term Productivity

At a programmatic level under both alternatives, overall benefits to long-term productivity related to the state's physical environment, biological resources, cultural resources, and resource-dependent industries outweigh the limited short-term adverse impacts. Under the "RRP Program/Environmentally Preferred Alternative", it is anticipated that the overall long-term productivity will be greater than under the No Action Alternative.

Both alternatives may have short-term construction related impacts as a result of implementing restoration projects. However, these impacts would usually be minor and would cease when construction is complete. Avoidance and mitigation measures will be implemented to lessen the adverse impacts of any construction activities.

6.4 Irreversible and Irretrievable Commitments

As part of implementation, irreversible commitments of resources could result from restoration actions that involve construction or land conversion under either of the alternatives. Committed resources could include construction materials, labor and energy necessary for construction, operation and maintenance. Potential land conversion would commit habitat, agriculture, or other land uses to other uses, however, in many cases these land conversions could be undone if there were any unanticipated adverse impacts. Avoidance and mitigation measures will be implemented to lessen the adverse impacts of any construction or land conversion activities to lessen impacts under either alternative.

7.0 Coordination with Other Programs, Regulatory Authorities

7.1 Overview

As a cooperative interagency effort, the RRP Program is required to comply with various state and federal environmental laws, regulations and policies. This chapter, not necessarily exhaustive, provides a general overview of the regulatory and programmatic environment in which NRDA restoration activities will be conducted under the RRP Program. Federal environmental laws and regulations to which the RRP Program is subject are outlined in Sections 7.2.1 (“Program Compliance with Federal Laws”) and 7.2.2 (“Program Compliance with Federal Regulations”). Louisiana state environmental laws and regulations to which the RRP Program is subject are discussed in Section 7.2.3 (“State Laws”) and 7.2.4 (“State Regulations”).

In addition to laws and regulations, the trustees must also consider existing environmental programs or plans in developing and implementing the RRP Program. Through coordination with other established programs, the trustees can ensure that the RRP Program does not duplicate other efforts, but instead leads to more effective and cost-efficient NRDA procedures. This, in turn, will add to the overall effort to protect, enhance and restore the natural resources of Louisiana. Major state, federal, and joint state-federal partnership programs that the RRP Program will seek to complement are listed below.

Appendix F provides a table that summarizes the current state of the RRP Program’s compliance and coordination with local, state and federal environmental laws, regulations, and existing programs.

7.2 Program Compliance with Environmental Laws and Regulations

7.2.1 Program Compliance with Federal Laws

Anadromous Fish Conservation Act (AFCA), 16 USC §757a et seq.

The AFCA authorizes the Secretaries of Commerce and/or the Interior to enter into cooperative agreements with the states for the conservation, development, and enhancement of the Nation’s anadromous fishery resources. Pursuant to such agreements, the federal government may undertake studies and activities to restore, enhance, or manage anadromous fish, fish habitat and passages. The Act authorizes federal grants to the states or other non-federal entities to improve spawning areas, install fishways, construct fish protection devices and hatcheries, conduct research to improve management, and otherwise increase anadromous fish resources. The trustees will carefully consider the provisions of the AFCA when making any site-specific restoration choice, and may be able to take advantage of the provisions and funding of AFCA in order to enhance anadromous fish restoration plans and projects within the State of Louisiana.

Clean Water Act (CWA) (Federal Water Pollution Control Act), 33 USC §1251 et seq.

The CWA is the principal law governing pollution control and water quality of the Nation’s waterways. Section 404 establishes a permit program for the disposal of dredged or fill material into national waters and is administered by the USACE. In general, restoration projects which move dredged or filled material into or out of navigable waters or wetlands – for example, hydrologic restoration of salt marshes or the placement of artificial reefs – require 404 permits.

Under the 404 program, NRDA restoration projects arising from court decisions, consent decrees, settlement agreements, or non-judicial settlement agreements are authorized under Nationwide Permit 32, Completed Enforcement Actions (iii).

Under Section 401 of the CWA, restoration projects that entail discharge or fill to wetlands or waters within federal jurisdiction must obtain certification of compliance with state water quality standards. In general, restoration projects with minor wetlands impacts (i.e. a project covered by an USACE Programmatic General Permit) are not required to obtain certification under Section 401, while projects with potentially large or cumulative impacts to critical areas require certification.

It is probable that some of the RRP Program's restoration projects will require permits. However, since project-specific restoration sites have not yet been selected, no Section 404 permits or 401 certifications will need to be issued at this time. Through coordination with the USACE, the trustees will ensure that any site-specific restoration project is properly permitted under both Sections 401 and 404 of the CWA.

Coastal Wetlands Planning, Protection and Restoration Act of 1990 (CWPPRA), P.O. 101-646

Through implementation of this Act, the federal government funds wetland enhancement projects nationwide, with approximately \$50 million appropriated for restoration activities in Louisiana alone. A Taskforce initiated under the authority of the CWPPRA annually develops a list of high-priority projects for implementation. The projects targeted by CWPPRA focus on marsh creation, wetland restoration, and various other modes of protection and enhancement of these valuable resources. The trustees hope to be able to partner with the Taskforce by contributing funding to appropriate restoration projects that meet both the CWPPRA and OPA mandates.

Coastal Zone Management Act (CZMA), 16 USC §1451 et seq.

The CZMA establishes a policy to preserve, protect, develop and, where possible, restore and enhance the Nation's coastal resources. The federal government provides matching grants to states for the realization of these goals through the development and implementation of state coastal zone management programs. Section 1456 of the CZMA requires federal actions in the coastal zone to be consistent, to the maximum extent practicable, with approved state programs. It stipulates that no federal licenses or permits be granted without giving the state the opportunity to concur that the project is consistent with the state's coastal policies. Other provisions of the CZMA provide for the development of special area management plans for areas of the coastal zone of particular importance (16 USC §1456b(6)). In addition, Section 6217 of P.L. 101-508, codified at 16 USC §1455b, requires states with federally approved coastal zone management programs to develop programs for the control of coastal non-point pollution control.

In order to comply with the CZMA, the trustees will forward a copy of this DPEIS to the LDNR, Coastal Management Program for their review and determination of programmatic consistency. Once a particular site-specific restoration project is selected, a further determination of consistency will likely be necessary.

Endangered Species Act of 1973 (ESA), 16 USC §1531 et seq.

The ESA requires that all federal departments and agencies seek to conserve endangered and threatened species and their habitats and encourages those departments and agencies to utilize their authorities to further these purposes. Under the ESA, the Departments of Commerce and/or Interior publish lists of endangered or threatened species. Specifically, Section 7 of the ESA charges federal agencies with aiding in the conservation of listed species (section 7(a)(1)); and requires federal agencies to ensure that their activities will not jeopardize the continued existence of listed species or adversely modify designated critical habitats (section 7(a)(2)). Section 7 of the ESA further requires that federal agencies and departments consult with the Departments of Commerce and/or Interior to minimize the impacts of federal actions on endangered and threatened species. The concurrence of the appropriate agencies is necessary for this determination.

The trustees have performed an analysis of the potential impacts of RRP Program implementation to threatened and endangered species and have determined that RRP Program activities will promote, not jeopardize, the continued existence of listed species and designated critical habitat in Louisiana. This determination, along with a copy of this DPEIS, has been forwarded to the NMFS and the USFWS for their concurrence. See the list of Threatened and Endangered Species in Appendix C.

In addition, the trustees will carefully consider the status and needs of endangered species and designated critical habitat when evaluating site-specific restoration plans. Once a site-specific restoration project is chosen, another Section 7 consultation will be undertaken as necessary.

Essential Fish Habitat (EFH), Section 303(a)(7) of the amended Magnuson-Stevens Act

In Section 303(a)(7) of the amended Magnuson-Stevens Act, Congress directs the NMFS and the eight regional Fishery Management Councils, under the authority of the Secretary of Commerce, to: 1) describe EFH and identify EFH in each fishery management plan; 2) minimize to the extent practicable the adverse impacts of fishing on EFH; and 3) identify other actions to encourage the conservation and enhancement of EFH. Essential Fish Habitat consultation can be combined with existing environmental review procedures, such as those used under the NEPA and the ESA to streamline these requirements. A programmatic evaluation of EFH concerns within the Louisiana region has been performed, and is included in the analysis forwarded to federal trustees in satisfaction of the Section 7 consultation requirements of the ESA (see above).

Additionally, the trustees will carefully consider all potential impacts to EFH when making site-specific restoration project selections, and will seek a determination of consistency with the provisions of the EFH when more site-specific details become available. (See Appendix C)

Fish and Wildlife Coordination Act (FWCA), 16 USC §661 et seq.

FWCA Subsection 2(a) requires that federal agencies consult with the USFWS, the NMFS, and state wildlife agencies for activities that affect, control, or modify waters of any stream or body of water in order to conserve and protect these resources. FWCA Subsection 2(b) requires the USFWS and NMFS to: 1) report its recommendation for wildlife conservation and development, and the expected results; and 2) describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. This consultation is generally incorporated into the

process of complying with the Section 404 (see Clean Water Act, above) permitting process or other review requirements. In addition, the FWCA provides NMFS and USFWS with grant-making authority which may be useful in disbursing funds for specific restoration projects, or for leveraging restoration projects with additional federal funding.

The fact that the three consulting agencies of the FWCA are represented by the RRP Program trustees means that FWCA compliance will generally be inherent in the Trustee's decision-making process. However, a further assessment of compliance with the FWCA will be made at the time of selection of site-specific restoration projects.

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). The DPEIS, upon release as a draft, is an information product covered by information quality guidelines established by NOAA and DOI for this purpose. The information contained herein complies with applicable guidelines.

National Environmental Policy Act (NEPA), 42 USC §4321 et seq.

NEPA is the basic national charter for protection of the environment. It requires the government to consider the consequences of major federal actions on humans and the natural environment in order to minimize, where possible, adverse impacts. Equally important, NEPA establishes a process of environmental review and public notification for federal planning and decision-making. A presidentially appointed Council on Environmental Quality (CEQ) has developed specific implementing regulations for NEPA (see "Regulations" below).

The trustees have fully integrated their planning and development with the requirements of NEPA through production of this DPEIS which outlines the anticipated benefits and possible adverse impacts of the RRP Program. Implementation of specific restoration projects, once selected by the trustees, will likely require additional NEPA documentation, probably in the form of project-specific Environmental Assessments.

Moreover, public involvement in the RRP Program's planning process has been even greater than that required by NEPA compliance alone. The trustees have produced a Public Review Document, published various public notices, and held several public meetings in order to maximize the opportunity for public review of and comment on the RRP Program. The trustees envision continued public involvement in the RRP Program, whereby the public will be involved in helping to develop, shape and comment on site-specific restoration planning and implementation.

The National Historic Preservation Act of 1966 (NHPA), 16 USC § 470 et seq.

Section 106 of the NHPA requires federal agencies, or federally funded entities, to consider the impacts of their projects on historic properties. NHPA regulations require that federal agencies take the lead in this process, and outline procedures to allow the Advisory Council on Historic Preservation to comment on any proposed federal action. The trustees have already undertaken the process of surveying the important cultural and historic resources that exist within Louisiana (see Section 5.3.3.8?). At the time of selection of a site-specific restoration project, a further evaluation of possible impacts to historic properties will be made in order to ensure compliance with the NHPA.

Oil Pollution Act of 1990 (OPA), 33 USC §2701 et seq.

The OPA is the main statute detailing procedures for contingency planning for, prevention of, and response to oil spills within the United States. The OPA identifies which governmental departments and authorities have Trustee authority. Additionally, a major goal of OPA is to make the environment and public whole for injury to or loss of natural resources and services as a result of a discharge or substantial threat of a discharge of oil. The trustees have striven to ensure full compliance with all of the dictates of OPA and will coordinate closely with all of the authorities and programs delineated in OPA which relate to oil spill planning, response and restoration.

Rivers and Harbors Act, 33 USC §401 et seq.

The Rivers and Harbors Act regulates development and use of the Nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and invests the USACE with the authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 permits (see Clean Water Act, above) are also likely to require permits under Section 10 of the Rivers and Harbors Act -- however, a single permit generally serves for both. Once a site-specific restoration project is chosen, the trustees will ensure full compliance with the Rivers and Harbors Act either through Section 404 permitting procedures or through a separate Section 10 permit, as necessary.

Other Potentially Applicable Federal Laws

- ♦ Americans With Disabilities Act
- ♦ Clean Air Act, 42 USC §7401 et seq.
- ♦ Emergency Wetlands Resources Act, 16 USC §3901
- ♦ Estuarine Protection Act, 16 USC §1221 et seq.
- ♦ Marine Protection, Research, and Sanctuaries Act, 33 USC §1401 et seq.
- ♦ Marine Mammal Protection Act, 16 USC § 1361 et seq.
- ♦ Migratory Bird Treaty Act, 16 USC §703 et seq.

7.2.2 Program Compliance with Federal Regulations

Council on Environmental Quality's (CEQ's) Implementing Regulations, 40 CFR §1500 et seq.

The Presidentially appointed CEQ developed specific implementing regulations for NEPA (see "NEPA" discussion above). These regulations address, among other topics, the overall structure, purpose and format to which Environmental Impact Statements should adhere. The trustees have carefully considered the CEQ implementing regulations in formatting this DPEIS.

NOAA's 1996 Final Rule on Natural Resource Damage Assessments: (61 Fed. Reg. 440 (January 5, 1996) and 15 CFR Part 990.

As discussed in Section 1 of this DPEIS, the federal regulations which govern NRDA in response to incidents can be found at 15 CFR Part 990. Under the authority of the OPA (see above), the U.S. Department of Commerce, acting through the NOAA, issued final regulations which provide an approach that trustees may use when conducting NRDA assessments. Potential establishment of RRP's, and procedures for conducting Regional Restoration Planning and Restoration, are also discussed in these regulations. The trustees have striven to ensure that all Programmatic elements are in full compliance with these NOAA regulations. They will also strive to incorporate the NRDA regulations into site-specific restoration project selection and implementation.

Executive Order 12898 – "Environmental Justice"

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”, requires federal agencies to identify and address disproportionately high and adverse human health or environmental impacts of programs, policies, and activities on minority or low-income populations. Where disproportionate adverse impacts on minority and low-income populations are identified, federal agencies are tasked with addressing those impacts. The trustees sought input from “Environmental Justice” interest groups during the formal scoping process by sending copies to their members. The trustees will review the potential for disproportionate adverse impacts on minority and low-income populations at the time of site-specific restoration project selection.

Executive Order 11988 – “Floodplain Management”

Executive Order 11988 is a flood-hazard policy for federal agencies, requiring them to take action to reduce the risks of flood losses; to restore and preserve the natural and beneficial values served by floodplains; and to minimize flood impacts on human safety, health, and welfare. The trustees will comply with Executive Order 11988 by considering the potential impacts of any site-specific project and minimizing, to the farthest extent practicable, any flooding impacts that might result.

Executive Order 11990 – “Protection of Wetlands”

Executive Order 11990 is an overall wetlands policy covering all agencies charged with managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. This Order requires federal agencies to follow avoidance, mitigation, and preservation procedures before proposing new construction in wetlands. It also provides mechanisms for public input into the decision process. Executive Order 11990 can restrict the sale of federal land containing wetlands. However, it does not apply to federal discretionary authority for non-federal projects (other than funding) on non-federal land. The trustees believe that the RRP Program will add greatly to the protection and wetlands. The trustees will additionally comply with Executive Order 11990 by considering all impacts to wetlands when evaluating site-specific restoration projects.

Executive Order 13007 – “Indian Sacred Sites”; and Executive Order 13175 – “Consultation and Coordination with Indian Tribal Governments”

Executive Order 13007 describes federal policy for accommodating sacred Indian sites. This Order requires federal agencies with statutory or administrative responsibility for managing federal lands to: 1) accommodate access to and ceremonial use of Indian sacred sites by Indian religions practitioners; 2) avoid adversely affecting the physical integrity of such sacred sites and; where appropriate, 3) maintain the confidentiality of these sacred sites.

Executive Order 13175 exists to: 1) promote regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications; 2) strengthen the United States government-to-government relationships with Indian tribes; and 3) reduce the imposition of unfounded mandates upon Indian tribes.

A list of tribal treaties throughout the nation can be found at www.envirotext.eh.doe.gov. Federally recognized Indian tribes are natural resource trustees (see Section 2.2.2.4). The trustees will carefully consider the potential impacts of any site-specific restoration project on sacred Indian sites, and the need for consultation and collaboration with Indian tribal officials will be evaluated at the time of project selection.

7.2.3 Program Compliance with State Laws

Management of State Lands L.R.S. 41:1701.1 et seq.

This statute provides authority for the management of state lands to the LDNR and State Lands Office (LA SLO). This statute creates provisions regarding permitting, land reclamation, and usage of land and waterbottoms belonging to the state. The trustees will coordinate with these agencies as necessary regarding the construction of RRP projects on state owned lands and waterbottoms.

Archaeological Finds on State Lands L.R.S. 41:1605

This statute provides for the permitting of all activities that fall within sites of archaeological importance on state lands. No activity shall commence within these sites without obtaining a permit from the LA Dept. of Culture, Recreation and Tourism. The trustees will require the acquisition of such permits where required.

Coastal Wetlands Conservation and Restoration Authority L.R.S. 49:213.1

This statute establishes the restoration authority which is comprised of state agency leaders and is located within the Office of the Governor. Their main purpose is to govern the State Wetlands Trust Fund, as well as provide direction and development of the state's Coastal Vegetated Wetlands Conservation and Restoration Plan. The RRP Program trustees will coordinate with the authority on matters regarding coastal restoration priorities, and will plan restoration activities consistent with overall state strategies.

Coastal Wetlands Conservation and Restoration Plan L.R.S. 49:213.6

The above-mentioned authority is tasked on an annual basis to develop a plan that serves as the state's overall strategy for conducting coastal restoration activities and management of restoration projects. This plan specifies the funding requirements of that year in regards to the state Wetlands Trust Fund. The plan is presented to the public and ultimately, the legislative natural resources committees for ultimate approval. The trustees will review the plan to ensure RRP projects are consistent with the state's overall planning strategies.

Louisiana State and Local Coastal Resources Management Act L.R.S. 49:214 et seq. (also, Louisiana Coastal Resources Program).

This program was established in coordination with state, federal and local advisory and regulatory agencies, as well as Louisiana citizens, to preserve, restore, and enhance Louisiana's coastal resources. This program establishes the guidelines for the Coastal Management and Restoration Divisions of the LDNR to manage and restore coastal resources. Under this statute, the following guidelines are of particular interest to project planning and construction within the coastal zone:

- ◆ **Governor's Advisory Commission on Coastal Restoration and Conservation L.R.S. 49:214.11**

This provides for the creation of an advisory committee to provide input for developing restoration strategies. The commission represents a broad range of people and groups that are critical to the efforts of coastal restoration. The RRP trustees will coordinate with this commission in so that restoration planning will compliment their efforts.

- ◆ **Special Areas, Projects, and Programs L.R.S. 49:214.29**

Special areas are designations by the LDNR that have unique or valuable characteristics requiring special management practices. Special areas may

include beaches, barrier islands, shell deposits, salt domes, or other geological areas of interest both to coastal habitat and infrastructure. The LDNR may set priorities to these areas, specifically for funding available under Section 308 of the Federal Coastal Zone Management Act (PL 92-583 as amended by PL 94-370). The RRP trustees will, to the maximum extent practicable, identify these sites for special consideration as they may pertain to the RRP Program.

- ◆ **Coastal Use Permit (CUP) L.R.S. 49:214.30**

This statute stipulates that no entity shall commence a coastal use of state or local concern without acquiring a coastal use permit through the Coastal Management Division (CMD). Applications for a local use may be submitted to the local government. The permit process is a means to ensure that project activities, especially dredging and filling, are done in accordance with the Louisiana Coastal Resources Program. Like most permits, the CUP provides for a public notice and hearing period. The RRP trustees will require a CUP for all projects being constructed as part of the RRP Program.

- ◆ **Consistency Determination L.R.S. 49:214.32**

This statute provides for the regulation of projects constructed within the coastal zone to be consistent with guidelines established under the Coastal Zone Management Act (16 USC §1451 et seq.) and the Louisiana State and Local Coastal Resources Management Act (L.R.S. 49:214 et seq.). Consistency determinations are provided by the LDNR/CMD. The trustees will ensure that all restoration projects receive a favorable consistency determination, and comply with approved federal, state, and local coastal zone programs.

Title 56 L.R.S. 56

This title outlines the duties and authorities of the LDWF. In addition, the Wildlife and Fisheries Commission is created within the Executive Branch, and is responsible for determining policy and rules governing the wildlife and fisheries populations throughout the state.

- ◆ **Fish Restoration and Management Projects L.R.S. 56:25**

Provides that the State of Louisiana adhere to the provisions of 16 USCA § 777 et seq. which requires the federal government to aid states in fish restoration and management projects. Furthermore, the Louisiana Wildlife and Fisheries Commission is authorized, empowered, and directed to perform such acts as may be necessary to conduct fish restoration projects as defined and stipulated by the act. The trustees will conduct restoration planning in accordance with this act.

- ◆ **Civil Penalties for Restitution of Value of Wildlife and Aquatic Life L.R.S. 56:40 et seq**

This statute provides that the LDWF may impose penalties on parties responsible for injury to or unlawful capture of wildlife and aquatic life. Furthermore, the Louisiana Wildlife and Fisheries Commission shall create procedures for determining the value of said injuries. The trustees will ensure, to the greatest extent practicable, that RRP projects do not inflict injury on surrounding wildlife and aquatic life.

- ◆ **Wildlife Management Areas L.R.S. 56:109**
This statute provides that the LDWF establish, manage, and regulate use of wildlife management areas, preserves, refuges, and sanctuaries. Commercial activities and project construction within these areas are allowed at the consent of the department. The trustees will coordinate with the department regarding any project activities that may fall within these designated areas.
- ◆ **Oysters and Oyster Industry L.R.S. 56:421 et seq.**
This section establishes the Oyster Task Force and regulations of the industry. In addition, this section establishes authority under the LDWF to create a private leasing program within state waterbottoms for the purpose of oyster cultivation. Lessee notification is required for any coastal activity located in close proximity to leased waterbottom. The trustees will coordinate with the LDWF and/or private lessees regarding any RRP project that may impact private or public oyster grounds.
- ◆ **Management of Natural and Scenic River Systems L.R.S. 56:1841 et seq.**
This statute provides for the establishment of the Natural and Scenic Rivers System under the authority of the LDWF. This system is administered for the purposes of preserving, protecting, developing, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological diversity of certain free-flowing streams. This statute provides criteria for classifying a scenic river system, and calls for the creation of a management plan for each system. The LDWF is responsible for plan implementation, and for reviewing permit requests to determine consistency with management objectives. The trustees will coordinate with the LDWF in regards to project planning in the vicinity of designated scenic river systems.
- ◆ **Threatened or Endangered Species Conservation L.R.S. 56:1901 et seq.**
This section provides for the LDWF to designate and conserve endangered or threatened species pursuant to the Federal Endangered Species Act (16 USC §1531 et seq.). Species listed under this act are federally and state protected from unlawful sale, trade, or capture. Furthermore, the state has the authority to draft regulations regarding the permitting of such activities that may be harmful to listed species or their habitat. As stated above, the impacts of the RRP on endangered or threatened species have been studied, and are anticipated to benefit these species by restoring and enhancing ecological habitat.

Water Quality Control L.R.S. 30:2074 et seq.

The LDEQ is provided, under this statute, the authority to manage and regulate discharges of waste materials and pollutants into any waters within the state. Furthermore, the LDEQ provides water quality certifications for all activities involving discharge of sediments into state waters. This certification is required prior to construction and is granted in accordance with Section 404 of the federal Clean Water Act. Other water permits may be required for project construction depending upon the nature of the activity. The regulations governing the permitting process through LDEQ are provided under La. Admin. Code 33.I.1701. The trustees will ensure that all appropriate permits are obtained prior to project construction.

7.2.4 Program Compliance with State Regulations

Management of Archaeological and Historical Sites 1 La. Reg. 375

These regulations were created pursuant to L.R.S. 41:1605 regarding the preservation of archaeological sites located on state lands. Permits are required prior to conducting any project activities located within these sites. The trustees will seek such permits where required.

Louisiana Surface Water Quality Standards La. Admin. Code 33.IX, Chapter 11

These regulations establish the procedures that the LDEQ follows regarding the permitting of wastewater discharge into state waters. These follow general permitting guidelines stated under La. Admin. Code 33.I.1701, and are pursuant to L.R.S. 30:2074 et seq. The trustees will ensure that all appropriate permits are obtained prior to project construction.

Louisiana Coastal Resources Program v 43:700 et seq.

As discussed above, these regulations were promulgated pursuant to L.R.S. 49:214 et seq. These regulations provide guidelines for establishing the coastal program, including coastal guidelines, CUP process, mitigation, and consistency review. The RRP trustees will ensure that these state provisions are adhered to and that the appropriate permits and determinations are acquired.

Oyster Lease Relocation Program La. Admin. Code 43:I, 850-859, Subchapter B.

The purpose of this Program is to reduce conflict between public coastal restoration projects and private oyster leases that may be impacted by the projects. The program is voluntary and establishes four options from which the lessee may choose. A matrix determines relocation costs and the lease is reverted back to the State. The trustees will investigate these regulations for its pertinence to the RRP Program, and will consider any conflicts that may arise with private oyster leases as a result of restoration projects.

7.3 Program Coordination and Compatibility with Existing Federal, State, and Joint Federal-State Programs

The Barataria-Terrebonne National Estuary Program (BTNEP)

The Barataria-Terrebonne estuary basins encompass over 4.1 million acres, bounded by the Mississippi River to the east, the Atchafalaya basin to the west, the town of Morganza, Louisiana in the north and the town of Grand Isle, Louisiana to the south. The Barataria-Terrebonne National Estuary Program has identified seven priority issues which affect this important area. They are: changes in water flow; sediment reduction; habitat loss; eutrophication; pathogen contamination; toxic substances; and changes in living resources. The Louisiana RRP Program trustees will evaluate the information provided by BTNEP and consider the priority issues identified when making site-specific restoration implementation decisions.

Caernarvon and Davis Pond Freshwater Diversion Projects

This project was authorized by the Flood Control Act of 1965 and has been in operation since 1991. The Caernarvon Freshwater Diversion is located on the eastern bank of the Mississippi River near the boundary line dividing St. Bernard and Plaquemines Parishes. The project diverts freshwater from the Mississippi River to surrounding estuarine and coastal areas of Breton Sound in an effort to promote historic environmental and ecological conditions. The Davis Pond Freshwater Diversion Project is a \$119.6 million project that was opened in early 2002 and is the world's largest freshwater diversion project. Davis Pond is designed to reintroduce freshwater and the associated nutrients and sediments into the Barataria estuary. The USACE was responsible for construction of these projects and the LDNR is responsible for the ongoing operation. The RRP Program trustees will strive to coordinate their activities with those of the Caernarvon and Davis Pond Freshwater Diversion Projects.

Coast 2050

Coast 2050 is a joint planning initiative of state and federal agencies, and includes members of the Louisiana Wetland Conservation Restoration Authority, the CWPRA Task Force, and the LDNR Coastal Zone Management Authority. This coalition of agencies is currently developing a strategic plan to provide enhanced protection of the state's coastal resources.

Coast 2050 aims to "maximize the diversity and extent of coastal habitats, while minimizing impacts to coastal users". The Coast 2050 initiative also strives to involve fishers, hunters, industry, and other regulatory agencies in its planning structure. The trustees will strive to coordinate with and complement the activities of the Coast 2050 initiative. In an effort to further this complementary relationship, the trustees established the boundaries in the four coastal regions identified in the RRP Program to be the same four regions delineated in the Coast 2050 plan.

Louisiana North American Waterfowl Management Plan

The North American Waterfowl Management Plan was established as a joint venture between the Canadian and United States governments in 1985, with the goal of conserving waterfowl populations through habitat protection and restoration. The government of Mexico also joined the partnership in 1994. This international program is managed in units of "Joint Ventures" at the local level. The Louisiana Joint Venture includes representatives from the LDWF and the USFWS, private landowners, and conservation groups, among others. The RRP Program trustees will strive to coordinate their activities, as much as practicable, with those of the Louisiana North American Waterfowl Management Plan.

Tensas River Basin Initiative

In an effort to restore and conserve the Tensas River Basin, the U.S. Environmental Protection Agency made Section 104(b) and 319 grants to the LDEQ, in order that a watershed model of the system could be developed. In addition, the U.S. Department of Agriculture participated in identifying and developing potential restoration sites in the Tensas River Basin. The Nature Conservancy has also been an important partner in this effort. The RRP Program trustees will strive to coordinate their activities, as much as practicable, with those of the Tensas River Basin Initiative.

Wetlands Reserve Program

The Wetlands Reserve Program is an effort to encourage, and establish formal procedures for, voluntary conservation and restoration of wetlands on privately held properties. This Program is administered by the Natural Resources Conservation Service, a division of the U.S. Department of Agriculture. The Program offers participating landowners three possible options to conserve and protect wetlands on their property: 1) establishment of 30-year conservation easements; 2) establishment of permanent conservation easements; or 3) entry into a restoration cost-share agreement of at least 10-years duration. The RRP Program trustees will strive to coordinate with and complement, to the fullest extent practicable, the goals and efforts of the Wetlands Reserve Program.

Other Potentially Applicable Federal, State and Joint State-Federal Programs

- ◆ Conservation Reserve Program (USDA)
- ◆ Louisiana Comprehensive Historic Preservation Plan
- ◆ Wildlife Habitat Incentives Program (USDA - NRCS)
- ◆ Farm Service Agency Conservation Reserve Program (USDA)
- ◆ Environmental Quality Incentives Program (USDA)

State Only:

- ◆ Atchafalaya Basin Program (LDNR)
- ◆ Small Dredge Program (LDNR)
- ◆ (Parish) Coastal Zone Management Program (LDNR)
- ◆ Louisiana Comprehensive Water Management Plan (LDNR)
- ◆ 2002 Water Quality Inventory Section 305(b) (LDEQ)
- ◆ Nonpoint Source Pollution Program, Water Quality Management Plan (LDEQ)
- ◆ Ozone Alert Action Plan/Ozone Action Program (LDEQ)
- ◆ General Forest Management Plan (LDWF)
- ◆ Louisiana Natural Areas Registry Program (with the Nature Conservancy) (LDWF)
- ◆ Forest Stewardship Program (LDAF)
- ◆ Louisiana Statewide Transportation Plan (LDOTD)
- ◆ Louisiana's Comprehensive Archeological Plan (CRT)

Also:

- ◆ Ducks Unlimited
- ◆ Lake Pontchartrain Basin Foundation
- ◆ The Nature Conservancy
- ◆ Partners for Wildlife

8.0 RRP Program Development Process

This Chapter describes the RRP Program development process. The process included a series of RRP Program Workgroup planning meetings, informal scoping and formal scoping to develop the RRP Program/Draft PEIS.

8.1 RRP Program Workgroup Meetings

The RRP Program Workgroup includes trustee representatives from the following federal and state trustee agencies: NOAA, DOI, LOSCO, LDNR, LDEQ, and LDWF. This workgroup began meeting in January 2000 to develop the RRP Program. Twenty-eight (28) planning meetings were held by the workgroup since that date.

8.2 Informal Scoping

Between October, 2000 and through the Spring, 2001, more than 15 informal scoping meetings and presentations were made to regulatory agencies, environmental and conservation groups, parishes, landowners, industry and the public. The purpose of these scoping meetings and presentations was to describe the concepts that form the various components of the RRP Program and to request input and comments from the public and effected parties on these Program components. The input provided was used to assist in the finalization of a draft proposal that was entitled, "Louisiana's Proposed Regional Restoration Planning Program, Public Review Document, June, 2001" (PRD). This document described the:

- ♦ Purpose and need for the RRP Program;
- ♦ Proposed RRP Program, including the concepts for RRP's (and boundaries), Potentially Injured Resources/Services, Restoration Types; and Settlement Alternatives; and
- ♦ Benefits of the proposed RRP Program.

8.3 Formal Scoping

Formal scoping for the RRP program and EIS began on June 19, 2001 with the publication and distribution of the PRD and publication of the Notice of Intent (NOI) to develop a PEIS. As part of the NOI, an Administrative Record (AR) was established. The AR is maintained at NOAA in Silver Spring, MD and duplicate copies are maintained at LOSCO, Baton Rouge, LA and on a website at <http://www.darp.noaa.gov>. Formal solicitation for appropriate restoration projects for potential inclusion in the RRP's began on that date also.

As part of the formal scoping process, over 1000 copies of the PRD were distributed to the public and affected parties on or before July 2, 2001. Six (6) public meeting were held through out the State of Louisiana on the following dates, at the following locations:

July 17, 2001
State Office Building
1525 Fairfield Avenue, Room 205
Shreveport, Louisiana

July 18, 2001
Monroe City Hall, Council Chamber
400 Lea Joyner Expressway
Monroe, Louisiana

July 19, 2001

Louisiana Convention Centre
2225 N. MacArthur Drive
Alexandria, Louisiana

July 24, 2001
Joseph S. Yenni Bldg.
1221 Elmwood Park Blvd.
Jefferson Parish Council Chamber
Jefferson/New Orleans, Louisiana

July 25, 2001
Burton Business Center
McNeese State University
350 Lawton Drive
Lake Charles, Louisiana

July 26, 2001
Louisiana Department of Wildlife & Fisheries
2000 Quail Drive, 1st Floor
Louisiana Room
Baton Rouge, Louisiana

All public comments provided at the public meeting or sent are summarized in the AR.

8.4 Development of the Draft PEIS

Based on input from the public and further consideration by the RRP Program Workgroup, the RRP Program/Draft PEIS was completed for public review pursuant to NEPA.

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10.0 List of Preparers

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Derek Hamilton	Environmental Affairs
Richard Stanek	Wildlife Biology
Louisiana Department of Wildlife and Fisheries (LDWF)	
Jim Hanifen	Biology
Terry Romaine	Marine Biology
Heather Finley	Geology

11.0 List of Agencies

Office of the Governor

Louisiana Oil Spill Coordinator's Office (LOSCO)

United States Department of Commerce (USDOC)

National Oceanic and Atmospheric Administration (NOAA)

United States Department of the Interior (USDOI)

United States Fish and Wildlife Service (USFWS)

Louisiana Department of Environmental Quality (LDEQ)

Louisiana Department of Natural Resources (LDNR)

Louisiana Department of Wildlife and Fisheries (LDWF)

APPENDIX A: LIST OF ACRONYMS, ABBREVIATIONS, and DEFINITIONS

Acronyms and Abbreviations

BIA	(USDOJ) Bureau of Indian Affairs
BLH	Bottomland hardwood
BLM	(USDOJ) Bureau of Land Management
BR	(USDOJ) Bureau of Reclamation
CAA	Clean Air Act
CARA	Conservation and Reinvestment Act
CERCLA	Comprehensive, Environmental Response, Compensation and Liability Act
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
DARP(s)	Damage Assessment and Restoration Plan(s)
DO	Dissolved Oxygen
DSAY(s)	Discounted Service Acre Year(s)
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
EQA	Environmental Quality Act
FEIS	Final Environmental Impact Statement
FWPCA	Federal Water Pollution Control Act
GAP	(Louisiana) GAP Analysis Program
GIWW	Gulf Intracoastal Waterway
HEA	Habitat Equivalency Analysis
INSD	Insufficient Data
LAT	Lead Administrative Trustee
LCRT	Louisiana Department of Culture, Recreation and Tourism
LDAF	Louisiana Department of Agriculture and Forestry
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LOOP	Louisiana Offshore Oil Port
LOSCO	Louisiana Oil Spill Coordinator's Office
MMS	(USDOJ) Minerals Management Service
MOA	Memoranda of Agreement
MR & T	(USACE New Orleans District [NOD]) Mississippi River and Tributaries Project
MSA(s)	Metropolitan Statistical Area(s)
NAAQS	National Ambient Air Quality Standards
NASS	(USDA) National Agricultural Statistics Service
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NF	National Forest
NMFS	(USDOC, NOAA) National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOD	(USACE) New Orleans District
NOI	Notice of Intent
NOS	(USDOC, NOAA) National Ocean Service
NPFC	National Pollution Funds Center
NPS	(USDOJ) National Parks Service

NRDA(s)	Natural Resource Damage Assessment(s)
NWR	(USDOI, USFWS) National Wildlife Refuge
OAQPS	(USEPA) Office of Air Quality Planning and Standards
OIA	(USDOI) Office of Insular Affairs
OPA	Oil Pollution Act
OSC	On-Scene Coordinator
OSCF	(State) Oil Spill Contingency Fund
OSLTF	(Federal) Oil Spill Liability Trust Fund
OSM	(USDOI) Office of Surface Mining
OSPRA	Louisiana Oil Spill Prevention and Response Act
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PEIS	Programmatic Environmental Impact Statement
PRD	Public Review Document
QA	Quality Assurance
RP(s)	Responsible Party(ies)
RRP(s)	Regional Restoration Plan(s)
RRP Program	Regional Restoration Planning Program
SAV	Submerged Aquatic Vegetation
T&E	Threatened and Endangered (species)
TDS	Total Dissolved Solids
URL	Uniform Resource Locator
USACE	United States Army Corps of Engineers
USACE NOD	United State Army Corps of Engineers, New Orleans District
USDA	United States Department of Agriculture
USDOC	United States Department of Commerce
USDOD	United States Department of Defense
USDOE	United States Department of Energy
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC(s)	Volatile Organic Compound(s)
WMA	(LDWF) Wildlife Management Area

Definitions

Baseline means the condition of the natural resources and services that would have existed had the incident not occurred. Baseline data may be estimated using historical data, reference data, control data, or data on incremental changes (e.g., number of dead animals), alone or in combination, as appropriate.

Benthic means pertaining to the bottom of a body of water.

Brackish means pertaining to water with a low salt content, usually up to five parts per thousand during the period of average annual low flow.

Chronic means an effect in which the organism of interest is exposed to the contaminant such as oil for a significant stage of its life cycle or the entire life cycle (i.e., generally weeks to years depending on the reproductive life cycle of the organism). Typical effects endpoints include reproductive, growth, or development impairment as well as behavioral changes.

Claim for purposes of a release under CERCLA, means a demand in writing for a sum certain; for purposes of a discharge under CWA, it means a request, made in writing for a sum certain, for compensation for damages or removal costs resulting from an incident. Claimant as defined by section 1001 of the OPA means any person or government who presents a claim for compensation under Title I of the OPA.

Coastal waters means the waters and bed of the Gulf of Mexico within the jurisdiction of the state of Louisiana, including the arms of the Gulf of Mexico subject to tidal influence, estuaries, and any other waters within the state if such other waters are navigated by vessels with a capacity to carry ten thousand gallons or more of oil as fuel or cargo.

Corrective action means any action necessary to correct for a failure of a project to meet a specific performance criterion.

Cost-effective means the least costly activity among two or more activities that provide the same or a comparable level of benefits, in the judgment of the trustee. ~~CEQ~~ regulations mean the Council on Environmental Quality regulations implementing NEPA, 40 CFR chapter V.

Damages means damages specified in section 1002(b) of OPA (33 USC. 1002(b)), and includes the costs of assessing these damages, as defined in section 1001(5) of OPA (33 USC 2701(5)).

Discharge means any emission (other than natural seepage), intentional or unintentional, and includes, but is not limited to, spilling, leaking, pumping, pouring, emitting, emptying, or dumping, as defined in section 1001(7) of OPA (33 USC 2701(7)).

Discount rate means the rate at which dollars or other valued items or services being provided in different time periods are converted into current time period equivalents. A discount rate is used to compensate for delayed provision of services. For example, with zero inflation and a 3% interest rate, \$100 available today could be invested to produce \$103 one year from now. Under this scenario, if one wanted to compare dollars to be provided one year from now to dollars being provided today, a discount rate of 3% should be applied (\$103 discounted at a 3% annual rate is equivalent to \$100 in today's currency).

Dystrophic means having low nutrient content, but high organics.

Ecosystem means the biological community and its environment that, together, function as a system of complimentary relationships, with the transfer and circulation of energy and matter.

Ephemeral means the physical or biological components of the environment that are short lived or transitory.

Exclusive Economic Zone means the zone established by Presidential Proclamation 5030 of March 10, 1983 (3 CFR, 1984 Comp., p. 22), including the ocean waters of the areas referred to as "eastern special areas" in Article 3(1) of the Agreement between the United States of America and the Union of Soviet Socialist Republics on the Maritime Boundary, signed June 1, 1990, as defined in section 1001(8) of OPA (33 USC 2701(8)).

Exposure means direct or indirect contact with the discharged oil.

Facility means any structure, group of structures, equipment, or device (other than a vessel) which is used for one or more of the following purposes: exploring for, drilling for, producing, storing, handling, transferring, processing, or transporting oil. This term includes any motor vehicle, rolling stock, or pipeline used for one or more of these purposes, as defined in section 1001(9) of OPA (33 USC 2701(9)).

Habitat means the area that supports a given organism, population, or community.

Incident means any occurrence or series of occurrences having the same origin, involving one or more vessels, facilities, or any combination thereof, resulting in the discharge or substantial threat of discharge of oil into or upon navigable waters or adjoining shorelines or the Exclusive Economic Zone, as defined in section 1001(14) of OPA (33 USC 2701(14)).

Indian tribe (or *tribal*) means any Indian tribe, band, nation, or other organized group or community, but not including any Alaska Native regional or village corporation, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians and has governmental authority over lands belonging to or controlled by the tribe, as defined in section 1001(15) of OPA (33 USC 2701(15)).

Injury means an observable or measurable adverse change in a natural resource or impairment of a natural resource service. Injury may occur directly or indirectly to a natural resource and/or service. Injury incorporates the terms “destruction,” “loss,” and “loss of use” as provided in OPA.

Interim losses and *interim lost services (uses)* means the reduction in resources and the services they provide, relative to baseline levels, that occur from the onset of an incident until complete recovery of the injured resources.

Intertidal means the region between highest and lowest tide lines (i.e., that region covered with water at high tide and exposed at low tide) in a marine, estuarine, or tidal freshwater environment.

Lead Administrative Trustee(s) (or *LAT*) means the trustee(s) who is selected by all participating trustees whose natural resources or services are injured by an incident, for the purpose of coordinating natural resource damage assessment activities. The LAT(s) should also facilitate communication between the OSC and other natural resource trustees regarding their activities during the response phase.

National Pollution Funds Center (NPFC) means the entity established by the Secretary of Transportation whose function is the administration of the Oil Spill Liability Trust Fund (OSLTF). Among the NPFC's duties are: providing appropriate access to the OSLTF for federal agencies and states for removal actions and for federal trustees to initiate the assessment of natural resource damages; providing appropriate access to the OSLTF for claims; and coordinating cost recovery efforts.

Natural resource damage assessment (or assessment) means the process of collecting and analyzing information to evaluate the nature and extent of injuries resulting from an incident, and determine the restoration actions needed to bring injured natural resources and services back to baseline and make the environment and public whole for interim losses.

Natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the Exclusive Economic Zone), any state or local government or Indian tribe, or any foreign government, as defined in section 1001(20) of OPA (33 USC 2701(20)).

Navigable waters means the waters of the United States, including the territorial sea, as defined in section 1001(21) of OPA (33 USC 2701(21)).

NCP means the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan) codified at 40 CFR part 300, which addresses the identification, investigation, study, and response to incidents, as defined in section 1001(19) of OPA (33 USC 2701(19)).

NEPA means the National Environmental Policy Act, 42 USC 4321 et seq.

Oil means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil. However, the term does not include petroleum, including crude oil or any fraction thereof, that is specifically listed or designated as a hazardous substance under 42 USC 9601(14)(A) through (F), as defined in section 1001(23) of OPA (33 USC 2701(23)).

On-Scene Coordinator (or OSC) means the official designated by the U.S. Environmental Protection Agency or the U.S. Coast Guard to coordinate and direct response actions under the NCP, or the government official designated by the lead response agency to coordinate and direct response actions under the NCP.

OPA means the Oil Pollution Act of 1990, 33 USC 2701 et seq.

OSLTF means the Oil Spill Liability Trust Fund administered by the US Coast Guard National Pollution Funds Center (NPFQ).

Pathway means any link that connects the incident to a natural resource and/or service, and is associated with an actual discharge of oil.

Person means an individual, corporation, partnership, association, state, municipality, commission, or political subdivision of a state, or any interstate body, as defined in section 1001(27) of OPA (33 USC 2701(27)).

Person responsible, responsible person, or responsible party means:

(a) The owner or operator of a vessel or terminal facility from which an unauthorized discharge of oil emanates or threatens to emanate.

(b) In the case of an abandoned vessel or terminal facility, the person who would have been the responsible person immediately prior to the abandonment.

(c) Any other person, but not including a person or entity who is rendering care, assistance, or advice in response to a discharge or threatened discharge of another person, who causes, allows, or permits an unauthorized discharge of oil or threatened unauthorized discharge of oil.

Public Use(s) means the services provided by natural resources for human activities; this includes, but is not limited to, cultural, archaeological, transportation, public water supply, industrial water supply, swimming, fishing, harvesting of natural resources, nature viewing, hunting, diving, sailing, boating, hiking, camping, climbing, photographing, drawing, painting, and other human uses.

Public vessel means a vessel owned or bareboat chartered and operated by the United States, or by a state or political subdivision thereof, or by a foreign nation, except when the vessel is engaged in commerce, as defined in section 1001(29) of OPA (33 USC 2701(29)).

Quality Assurance (QA) means the total integrated program for assuring the reliability of collected data.

Reasonable assessment costs means, for assessments conducted under this part, assessment costs that are incurred by trustees in accordance with this part. In cases where assessment costs are incurred but trustees do not pursue restoration, trustees may recover their reasonable assessment costs provided that they have determined that assessment actions undertaken were premised on the likelihood of injury and need for restoration. Reasonable assessment costs also include: administrative, legal, and enforcement costs necessary to carry out this part; monitoring and oversight costs; and costs associated with public participation.

Recovery means the return of injured natural resources and services to baseline.

Response (or remove or removal) means containment and removal of oil or a hazardous substance from water and shorelines or the taking of other actions as may be necessary to minimize or mitigate damage to the public health or welfare, including, but not limited to, fish, shellfish, wildlife, and public and private property, shorelines, and beaches, as defined in section 1001(30) of OPA (33 USC 2701(30)).

Responsible party means:

(a) *Vessels*. In the case of a vessel, any person owning, operating, or demise chartering the vessel.

(b) *Onshore facilities*. In the case of an onshore facility (other than a pipeline), any person owning or operating the facility, except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as the owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(c) *Offshore facilities*. In the case of an offshore facility (other than a pipeline or a deepwater port licensed under the Deepwater Port Act of 1974 (33 USC 1501 et seq.)), the lessee or permittee of the area in which the facility is located or the holder of a right of use and easement granted under applicable state law or the Outer Continental Shelf Lands Act (43 USC 1301-1356) for the area in which the facility is located (if the holder is a different person than the lessee or permittee), except a federal agency, state, municipality, commission, or political subdivision of a state, or any interstate body, that as

owner transfers possession and right to use the property to another person by lease, assignment, or permit.

(d) *Deepwater ports*. In the case of a deepwater port licensed under the Deepwater Port Act of 1974 (33 USC 1501-1524), the licensee.

(e) *Pipelines*. In the case of a pipeline, any person owning or operating the pipeline.

(f) *Abandonment*. In the case of an abandoned vessel, onshore facility, deepwater port, pipeline, or offshore facility, the persons who would have been responsible parties immediately prior to the abandonment of the vessel or facility, as defined in section 1001(32) of OPA (33 USC 2701(32)).

Restoration means any action (or alternative), or combination of actions (or alternatives), to restore, rehabilitate, replace, or acquire the equivalent of injured natural resources and services. Restoration includes:

(a) *Primary restoration*, which is any action, including natural recovery, that returns injured natural resources and services to baseline; and

(b) *Compensatory restoration*, which is any action taken to compensate for interim losses of natural resources and services that occur from the date of the incident until recovery.

Restoration action means any of the actions authorized under OPA (restoration, rehabilitation, replacement, or acquisition of the equivalent), or some combination of those actions. Restoration actions by trustees are intended to complement the initial response and cleanup activities of response agencies.

Restoration alternative means a combination of primary and/or compensatory restoration actions that address one or more specific injuries associated with the incident. Acceptable restoration alternatives include any of the actions authorized under OPA (restoration, rehabilitation, replacement, or acquisition of the equivalent), or any combination of those actions. Each restoration alternative must be designed so that, as a package of one or more actions, the alternative would make the environment and public whole.

Restoration Plan means a plan developed for public review and comment that describes the restoration alternatives to be considered in the restoration, rehabilitation, replacement, and/or acquisition of equivalent natural resources.

Sample means a selected segment of a population studied to gain knowledge of the whole.

Sampling means the process of taking observations of a population.

Scale means the size or spatial and temporal extent of restoration actions.

Scaling means the process of determining, for identified restoration actions, the size or scale of the actions that would be required to expedite recovery of injured resources to baseline and compensate the public for interim lost resources and services.

Scaling approach means the general framework used for scaling a restoration action. Trustees may use resource-to-resource or service-to-service approaches, or valuation approaches. In scaling compensatory restoration actions, each approach is used with the objective of providing benefits from compensatory actions equal to losses from resource injuries.

? *Resource-to-resource or service-to-service* scaling is an approach in which the natural resources injured and the services lost due to the incident are replaced by an equivalent quantity of discounted natural resources and services (or resource proxies).

Given that the focus of this guidance document is on scaling compensatory restoration actions, we primarily employ the term *service-to-service* since the underlying concept is to ensure that not only are the same or comparable resources provided, but also that the resources provide a sufficient quantity of the same or comparable services.

The *valuation* approach requires that the value of injured natural resources and/or services be measured explicitly, and that a restoration action provide natural resources and/or services of equivalent value to the public. The approach relies on the concept that lost value can be determined using one of a variety of possible units of exchange, including units of natural resource services or dollars. The primary valuation approach is value-to-value. Under some circumstances, a second valuation approach, value-to-cost, may be used.

Under the *value-to-value* approach to scaling, trustees determine the scale of restoration actions required to provide gains (or “value”) equal to the value of the interim losses. Again, discounting is used to take into account differences in timing of losses and gains. *Value-to-cost* is a variant of the valuation approach. Under the value-to-cost approach, a restoration action is scaled by setting the cost of the restoration action equal to the value of losses due to the injury.

Scaling method means a technique (these terms are used interchangeably in the rule and guidance documents) that is employed to generate the required information under the different scaling approaches. Examples of scaling methods include habitat equivalency analysis under the service-to-service or resource-to-resource approaches, or the travel cost method under the valuation approaches. (See Appendix D for brief descriptions and short annotated bibliographies for various scaling methods). More than one method may be employed if needed to address the different injuries resulting from an incident, but trustees must be careful to avoid double-counting when using multiple methods.

Services (or natural resource services) means the functions performed by a natural resource for the benefit of another natural resource and/or the public.

Significant means a difference, at a specified probability level, between or among two or more sampling distributions.

State Trustee(s) means the state trustee coordinator (Louisiana Oil Spill Coordinator) and the state natural resource trustees (Louisiana Department of Environmental Quality, Louisiana Department of Natural Resources, Louisiana Department of Wildlife and Fisheries). The definition of state trustees may also include other agencies of the state of Louisiana designated by the Governor according to the Oil Pollution Act of 1990 as state natural resource trustees.

Statistical Analysis means the formal mathematical statements of the specific hypotheses to be tested.

Subtidal means the region in marine, estuarine, or tidal freshwater environments that is deeper than the lowest tide line, such that it is always submerged at any tidal height.

Toxicity means the inherent potential of a contaminant such as oil to adversely affect individual organisms.

Trustees (or natural resource trustees) means those officials of the federal and state governments, of Indian tribes, and of foreign governments, designated under 33 USC 2706(b) of OPA.

Unauthorized discharge of oil means any actual or threatened discharge of oil not authorized by a federal or state permit.

United States and State means the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession of the United States, as defined in section 1001(36) of OPA (33 USC 2701(36)).

Value means the maximum amount of goods, services, or money an individual is willing to give up to obtain a specific good or service, or the minimum amount of goods, services, or money an individual is willing to accept to forgo a specific good or service. The total value of a natural resource or service includes the value individuals derive from direct use of the natural resource, for example, swimming, boating, hunting, or birdwatching, as well as the value individuals derive from knowing a natural resource will be available for future generations.

APPENDIX B: AFFECTED ENVIRONMENT

The purpose of this appendix is to describe the affected environment in the State of Louisiana. This appendix is intended to provide a summary overview of that environment.

Physical Environment

Geology

Most of Louisiana was formed by Mississippi River sediment deposits. As sea-level rose and fell over this low-lying region, the Mississippi River was carrying vast sediment loads and sedimentary rocks from the core of the North American continent and depositing it on the rim of the Gulf of Mexico. Organic matter from highly productive marine waters has been deeply buried under the whole state and far offshore, and through various processes has turned into petroleum. Massive salt deposits, formed by evaporation of sea water during historic dry periods, provide a stable confining layer for the underlying petroleum.

The oldest surface rocks are the Palaeocene formations found in the Sabine Uplift of northwest Louisiana (Regions 7 and 9), which date back over 54 million years and are composed of a thick series of non-marine sands, silty sands, clays, and gravels with some thick deposits of lignite. North central Louisiana (Region 8) is typified by Eocene (54 to 38 million years ago (mya)) non-marine and marine medium- to very fine-grained sands, silts, and silty clays, which lie on top of elevated salt-domes. Oligocene (38 to 26 mya) and Miocene (26 to 5 mya) formations are apparent, but not dominant, in Regions 7 and 8 and are typified by tan to reddish brown silt with some clay and minor amounts of very fine sand. Approximately 25% of the state's surface is occupied by deposits associated with Pleistocene (1.6 to 0.01 mya) terraces (mostly Regions 5 and 7); these also consist of sand, gravel, and mud, but underlie raised, flat surfaces with varying degrees of tilt and dissection depending on their relative ages. These surfaces are remnants of preexisting floodplains, and form trends along the major rivers in north Louisiana and coast-parallel belts in south Louisiana. Holocene (0.01 mya to present) alluvial sediments of the Mississippi, Red, Ouachita, and other rivers and smaller tributaries, together with coastal marsh deposits, occupy about 55% of Louisiana's surface. The alluvial sediments (mostly Regions 1,2,3,6, and 9) consist of sandy and gravelly channel deposits mantled by sandy to muddy natural levee deposits, with organic-rich muddy backswamp deposits in between; coastal marsh deposits (Regions 1 through 4) are chiefly fine-grained clay, silt and organic matter.

The coastal region of Louisiana has been formed over the last 7,500 years and is the result of 7 discrete and consecutive delta lobes. If left in its natural state, the Mississippi River would have shifted most of its flow to the Atchafalaya River course beginning in the 1950s. Since the turn of the last century, however, the U.S. Army Corps of Engineers has held the Mississippi River in its present course to ease navigation and commerce, to avoid the tremendous cost of moving industrial and other operations that depend on its present location, and to prevent flooding. This containment of the river has created the current dilemma of high rates of erosion in the coastal regions of the state. If the river were allowed to shift its course naturally, and to flood, its sediment could replenish the wetlands and coastal marshes that are now deteriorating, restore the land as it subsides, and provide nutrients vital to coastal fisheries and vegetation. As it is, the river is held in an overextended course that has reached the edge of the continent shelf, and most of its sediment now accumulates there and farther out in the Gulf.

Geography

Louisiana is comprised of two primary geographic regions, the lowlands and the uplands. Much of the landscape of south Louisiana was formed during the Holocene (0.01 mya to present) epoch. The lowlands of Louisiana can be subdivided into three major divisions: the Mississippi and Red River alluvial plain, the deltaic plain, and the chenier plain.

The Mississippi River Basin drains 41% of the contiguous United States and a portion of Canada, transporting water and sediment over an area of 1.2 million square miles. The Mississippi River alluvial plain (width of 25 to 90 miles) is comprised of numerous landforms, created by successive river course switching. The Mississippi River is a classic example of a fluvially dominated, meandering river. Ridge and swale topography and abandoned channels in the form of oxbow lakes and chutes are common features. Natural levees were created with overbank flooding and stand as low, broad ridges (typically 15 feet higher than the backswamp) on the landscape. Crevasse splays, created by a break in a levee bank, form higher ground. Urban areas, infrastructure, industry, and agriculture typically develop on these higher grounds. Ridges and hills of Pleistocene-aged materials outcrop in northern Louisiana and have elevations 45 to 70 feet higher than the surrounding Holocene-aged alluvial plain.

The Red River, once a major tributary of the Mississippi River, has a similar alluvial plain (width of 2 to 10 miles) created by the occupation of several river courses. Presently, the Red River is a tributary of the Atchafalaya River. Extensive alluvial ridges, natural levees, terraces, and remnant impounded tributaries (raft lakes) are visible features on the present-day landscape (Johnson and Yodis 1998).

The Mississippi River deltaic system is composed of six deltas that were deposited over the last 7,500 years when sea levels rose and reached its present level following the advance and retreat of Pleistocene-aged inland glaciers (Mac et al. 1998). The result of the building and subsequent abandonment of these delta lobes by the river was the construction of a modern deltaic coastal plain with a total area of 28,000 square kilometers (10,811 square miles) (Coleman 1976). The most recent deltaic cycle (~last 500 years) has formed the Modern birdfoot, or Balize delta (Mac et al. 1998). The deltaic cycle consists of a constructional phase (Scruton 1960) of broad coastal marsh (sub-delta) formation and a destructional phase (Scruton 1960) with river abandonment of sediment reworking, subsidence, flooding, and sinking. Coastal headlands, barrier islands, and shoals form at the mouths of former distributaries. Prodelta clay, distributary mouth sand bars, and mudlumps are other deltaic deposits associated with the Balize delta. The Atchafalaya River is diverting a portion (~30%) of the Mississippi River's water and sediment discharge. The new Atchafalaya River delta is beginning its expansion phase (Van Heerden and Roberts 1980; Wells et al. 1982).

The chenier plain is located to the west of the Mississippi River deltaic plain and is characterized by marsh that is segmented by long, narrow coast-parallel sand and shell ridges. The low ridges support a natural vegetation cover of live oaks. Chenier shoreline morphology reflects a depositional history quite different than that of the Mississippi River deltaic plain. During western occupation of Mississippi River deltaic lobes, fine-grained sediments were transported by longshore currents and deposited as mudflats on the coast of southwest Louisiana. Conversely, sediment influx ceased with eastern occupation of Mississippi River deltaic lobes. Existing coarser sediments in the mudflats were reworked by wave action, forming sand and shell beaches. Subsequent re-occupation and abandonment of deltaic lobes has created the topographic features visible on the landscape today. As a result of differential subsidence of the chenier

ridges, river patterns in the chenier plain differ from those of the deltaic plain. Subsidence and the associated ponding of rivers have formed a series of lagoonal lakes north of the cheniers.

Louisiana comprises the largest expanse of coastal wetlands in North America, having approximately 3,800 square miles of marsh and 800 square miles of swamp. The state's wetlands support an extremely productive commercial fishery and oil and gas industry, as well as provide over-wintering habitat for migratory waterfowl.

The State of Louisiana is losing 25 to 30 square miles of marsh each year due to the combined effects of levee construction, subsidence, and associated hydrologic changes (Coast 2050 2002). *Coast 2050: Towards a Sustainable Coastal Louisiana* is a "jointly developed Federal, State, and Local plan to address Louisiana's massive coastal land loss problem and provide for a sustainable coastal ecosystem by the year 2050" (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). Coast 2050 is an integrated, multiple use approach to ecosystem management and is supported by federal, state, and local agencies mandated to address coastal erosion. "The goals of 2050 are to create and sustain marsh by accumulating sediment and organic matter; to maintain habitat diversity by varying salinities and protecting key land forms; and to maintain the exchange of energy and organisms" (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998).

The uplands of Louisiana are comprised of two geomorphic regions, the Tertiary hills and the Pleistocene coastwise terraces. The hilly topography of upland Louisiana originated with sediment deposition in coastal environments throughout the Tertiary period. Lithified layers of sandstone, siltstone, and shale outcrop in belts parallel to the coast (generally west to east) and erode with stream and river incision. Upland ridges resistant to weathering are typically asymmetrical with north-facing steep cliffs and escarpments (~150 to 535 feet) and gentle south-facing slopes and are termed wolds (or cuestas). Easily eroded rock formations form lowlands and are termed vales. With the exception of salt domes, the oldest rocks, Eocene (38 to 54 mya) and Pleistocene in age, are located in the Tertiary hills. The hilly topography of north Louisiana is bisected by the Red River and Ouachita River alluvial plains.

The Pleistocene coastwise terraces of Louisiana are in general, situated between the Holocene alluvial and marsh deposits of southern Louisiana and the hilly upland region of northwestern Louisiana. Terraces formed during the Pleistocene, as episodic events of continental glaciation caused the Mississippi River to deposit sediments in floodplain and deltaic environments. Terraces lie in a step-like configuration parallel to the coastline as a result of uplift and subsidence in north and south Louisiana, respectively. Termed complex landforms, terraces are flat to gently sloping (40 to 350 feet) and composed of multiple surface levels of various ages, depositional environments, sedimentary sequences, and glacial or interglacial origin (Johnson and Yodis 1998).

Loess deposits, fine unconsolidated wind-blown sediments, located in upland regions are Pleistocene in age and of Mississippi River origin. During continental glaciation and resulting lower water levels, prevailing winds transported silt glacial outwash deposits onto adjacent uplands. The Mississippi River is flanked by loess deposits some 30 to 60 miles wide that thin and fine with increasing outward distance.

Pimple mounds are round to elliptical shaped topographic features unique to the landscape west of the Mississippi River alluvial plain. Located on Pleistocene terrace complexes, mounds are typically 2 to 3 feet in elevation, 50 feet in diameter, and composed of coarser grained sediments than surrounding deposits. The origin of pimple mounds is unknown.

Salt domes are both surface and subsurface features created by the process of salt penetrating overlying sediments during conditions of high pressure and temperature at great depth. The salt layer in Louisiana dates to the Jurassic period (140 to 208 mya) and corresponding lower stands in sea levels. Four to 8 miles of Cenozoic (Holocene and Pleistocene) deposits overlie the salt deposit. Topographic depressions (lakes), though rare, are surface features often associated with salt domes. Depressions form when the rate of ground water dissolution is greater than the rate of uplift, causing overlying strata to collapse. Salt domes are located in both interior basins and in coastal/offshore (collapse faults) regions of Louisiana. Salt domes in coastal areas are typically wooded and may have elevations approximating 157 feet and diameters approximating 2 miles.

Soils

Soil formation and development, or pedogenesis, is largely the dynamic and natural transformation of surface deposits via physical, chemical, and biological processes. The principal pedogenic factors are parent material, climate, topography, organisms, and time. To a lesser extent, human activities influence this process.

Seven general soil regions have been identified in Louisiana. Soil profiles exhibiting similar characteristics are termed soil series. Soil associations are defined as groups of soil series occurring together in any geomorphic setting. The seven soil regions of Louisiana, as described by Johnson and Yodis (1998), are: 1) Tertiary Upland soils; 2) Pleistocene Terrace soils; 3) Flatwoods soils; 4) Coastal Prairie soils; 5) Loess soils; 6) Alluvial soils; and 7) Gulf Coast Marsh soils.

The soils of the Tertiary Uplands have developed on Tertiary bedrock, ranging in age from about 2 to 65 million years. Highly weathered and oxidized, the soils have a distinctive red-yellow coloration. Soil characteristics include the following: low amounts of organic matter and a thin, grayish-brown surface soil; red, yellow, or brown subsoil; sandy; acidic; and low in fertility. The soils are typically used for tree farming, livestock grazing, and growing leguminous crops such as peanuts and field peas.

The Pleistocene Terrace soils have developed on upland and intermediate terrace complexes and on Tertiary-aged rock of the Red and Ouachita River alluvial plains. The soils have formed on alluvium 10,000 to 2 million years in age and are deeply dissected to gently undulating. Soils typically support forest, cropland, or pasture. A fragipan, defined as a dense and firm subsoil layer that is high in silt content and has a polygonal structure, is common. Low in permeability, excessive surface wetness is common.

Flatwood soils have developed on the prairie terrace complex of southeast Louisiana and the intermediate complex of southwest Louisiana in nearly flat and poorly drained mixed longleaf pine and hardwood forests. The soil is characterized by high acidity, low fertility, and poor drainage. Flatwood soils primarily support the lumber industry and the commercial production of strawberries.

The soils of the Coastal Prairie have developed on the prairie terrace complex of southwest Louisiana. The soil is characterized by a well developed profile, dark organic horizons, and a subsurface claypan horizon (an impermeable layer that restricts the downward movement of water). Prairie soils (primarily Crowley series) are used for rice production.

Loess deposits of sufficient thickness for profile development are of Mississippi River origin and Pleistocene in age. Soils are tan-colored and vary in calcium carbonate concentration and fertility. Loess soils support sweet potatoes, soybeans, and other crops. Common soil series are the Memphis, Calhoun, and Loring.

Alluvial soils include those of Mississippi River, Red River, and Ouachita River origin. Common soil associations of the Mississippi River alluvial plain include Commerce, Mhoon, and Sharkey. Commerce soils have developed on natural levee crests and backslopes, consist of silt and sandy loams, are well drained, and are generally used for the production of commercial crops. Soils of the Mhoon association have formed on lower positions of the backslope, are silty clays, and are poorly drained. Soils of the Sharkey association have formed in the backswamp, consist of clays, are poorly drained, and frequently flood. Both the Mhoon and Sharkey series have a high content of decomposing organic material. In addition, sand has formed point bar, chute, and crevasse splay deposits.

Soils of the coastal marsh of Louisiana primarily consist of organic matter (30 to 85%) and river silts and clays. Soils are characterized by a black and brown to gray color, are poorly drained, range in thickness from 2 to 12 feet, and are located on elevations of less than five feet. Muck soils are decomposed and black-colored; conversely, peat soils have not decomposed due to anoxic conditions and are brown in color. Common series are the Allemands, Kenner, Scatlake, Bancker, and Creole.

Sediment Quality

Sediment quality is defined as the suitability of the habitat for supporting designated uses, including but not limited to, benthic fauna and aquatic plants. In aquatic ecosystems, sediments can serve both as reservoirs and as potential sources of chemical substances to the water column (Macdonald et al. 2000) which may impair the quality of the sediment as habitat through direct toxicity to benthic fauna and aquatic plants or through sub-lethal effects, altering benthic invertebrate community structure (Chapman 1989). However, in the absence of disturbance and with sufficient sedimentation, contaminants may become sequestered in a reduced environment below the biotic zone. Under these conditions, contaminants may pose little risk to the environment or to people. Therefore, it is most appropriate to narrow consideration to surficial sediments for the purpose defined above.

Aquatic sediments are essential in maintaining the structure (assemblage of organisms) and function (processes) of aquatic ecosystems. The importance of sediment quality is the role that sediments play in supporting community productivity. The productivity of green plants, algae, and bacteria build the foundation of food webs upon which higher aquatic organisms depend. Sediments provide essential habitats for epibenthic (live on sediments) and infaunal (live in sediments) invertebrates and demersal fish, which represent important food sources for amphibians, reptiles, fish, birds, and mammals. In addition, many fish and amphibian species utilize sediments at stages in their life cycles for the purposes of spawning, incubation, refuge, and over-wintering.

Adverse alterations to sediments can have a significant effect throughout the food web. Changes to community structure at the producer and first-order consumer level may very likely change the stability of higher-order consumer groups due to changes in food availabilities. Further, compounds that biomagnify may be passed up the food web to higher-order consumers, causing lethal and/or sub-lethal effects on these organisms including birds, fish, and mammals.

Water Resources

Ground Water Resources

Louisiana's ground water supply is contained within permeable geologic formations or parts of formations, termed aquifers. Louisiana's water supply is primarily held in 13 major aquifers and aquifer systems composed of sand and gravel and confined by clay and silt. An aquifer system is a group of two or more aquifers that act as a water-yielding hydraulic unit of regional extent. Much of the ground water in Louisiana is pumped or withdrawn for household, industrial, and agricultural use. Typically, ground water in Louisiana moves in a southerly direction and towards stream valleys (Stuart et al. 1994). Pumping in urbanized and industrialized areas results in the formation of cones of depression, thus altering regional ground water flow patterns (Stuart et al. 1994).

Aquifers are classified as artesian or water-table. Artesian aquifers, or confined aquifers, are confined by overlaying and underlying impermeable formations that restrict water movement into or out of an aquifer (Stuart et al. 1994). Water-table aquifers, or unconfined aquifers, are those in which the water is not confined by low permeability units (Stuart et al. 1994). The water level in an artesian aquifer will rise above the top of the aquifer and may rise above the land surface. In a water-table aquifer, the upper surface of the aquifer rises to a level of static hydraulic pressure as there are no confining beds between the zone of saturation and the surface.

The addition of water to ground water is termed recharge. Recharge areas are defined as areas where the aquifer is at or near the land surface and water moves rapidly into the aquifer. Ground water moves very slowly through all but the most porous of formations, generally at a rate of only a few feet per year (Stuart et al. 1994). Recharge rates of aquifers vary from year to year due to changes in weather patterns and usage. Louisiana's annual rainfall is enough to replenish some of the water drawn from the state's aquifers. Discharge from an aquifer occurs both naturally and artificially by man's withdrawal. Due to extreme drought conditions experienced in the recent past, along with increased demand, some freshwater users have experienced shortages. Ground water quantity issues are currently being studied under legislative mandate in an attempt to resolve shortages and protect aquifers.

Louisiana's 13 major aquifers and aquifer systems are described in Table B-1 (Stuart et al. 1994).

Ground Water Quality

Much of Louisiana's ground water is suitable for use with little or no treatment; however, water quality is susceptible to both natural and human induced contamination. Water is defined as fresh if it has a dissolved chloride concentration of 250 milligrams/liter or less (Stuart et al. 1994). Many of the state's aquifers contain saltwater, defined as water having chloride levels of 250 milligrams/liter or greater (Stuart et al. 1994). The zone of transition between salt and freshwater is termed a saltwater wedge. Coastward, the aquifer is completely salty. Landward, the top of the aquifer becomes increasingly fresh

until fresh throughout. Saltwater may be present in inland aquifers which dip towards the coast and/or Mississippi River valley. Saltwater encroachment laterally or vertically into the freshwater lens can be a result of pumping. Freshwater in the coastal parishes of Terrebonne, Lafourche, Assumption, Jefferson, Orleans, Plaquemines, St. Charles, St. Bernard, and St. James is limited; thereby requiring large amounts of water to be withdrawn from surface water sources for public-supply purposes (Lovelace 1991). Saltwater encroachment has occurred into aquifers in south Baton Rouge and into the Chicot aquifer system of southwestern Louisiana (Stuart et al. 1994).

Ground water quality is affected by naturally occurring inorganic properties or constituents that, above established U.S. Environmental Protection Agency (USEPA) levels, may pose a health risk. Properties or constituents of concern in Louisiana include the following: pH, color, hardness, calcium and magnesium, sodium, sulfate, chloride, fluoride, dissolved solids, nitrogen and nitrate plus nitrite, and iron and manganese (Stuart et al. 1994). High iron concentrations are of particular concern to users of the Chicot aquifer system, the Cockfield aquifer, and the Sparta aquifer (U.S. Geological Survey 1998). Also, iron and chloride are problematic in localized areas of the Mississippi River alluvial aquifer. High color is objectionable to users in the New Orleans area and to some areas that withdraw water from the Sparta, Evangeline, and Jasper aquifer systems (Stuart et al. 1994). Throughout the state, high sodium concentrations in ground water resources is problematic for agricultural industries.

Of recent concern, is human-induced contamination of ground water supplies. Only within the last 20 years was it realized that ground water reserves might be affected by surficial activities. In Louisiana, primary concerns are: 1) contamination from surface disposal of agricultural chemicals and petroleum products; 2) contamination by hazardous waste sites around the state; and 3) contamination from surface wastes and saltwater through abandoned wells (Stuart et al. 1994). Industrial wastes, landfills, septic tanks, animal wastes, and leaking underground storage tanks are additional sources of potential contamination.

Surface Water Resources

Louisiana's abundant water bodies, although difficult to enumerate, are estimated to comprise approximately 7% of the total surface area of the state (Louisiana Department of Environmental Quality 2000). The USEPA estimates the state to contain 66,294 miles of rivers and streams, 1,078,031 acres (1,684 square miles) of lakes and reservoirs, 5,882,070 acres (9,191 square miles) of fresh and tidal wetlands, and 4,899,840 acres (7,656 square miles) of estuaries (Louisiana Department of Environmental Quality 2000).

The Mississippi River, the longest river on the North American continent, is Louisiana's most important surface water resource. The Mississippi River system in Louisiana is the terminus for the largest capacity inland waterway system in the world (Louisiana Department of Transportation and Development 2002). The river serves as a navigation

Table B-1: Louisiana Aquifers

Aquifer Name	Location	Sediments	Recharge	Use	Description
Cockfield	northeast Louisiana	very fine to fine sand	rainfall on outcrop area; leakage from overlying alluvial aquifer; leakage from underlying aquifers	~600 million gal/day; primarily public supply	water movement is eastward and southward
Sparta	north and north-central Louisiana	very fine to medium sand; interbedded with thin layers of clay and lignite	rainfall on outcrop area and water moving downward through terrace deposits; leakage from overlying Cockfield and underlying Carrizo-Wilcox aquifers	~64 million gal/day primarily industry and public supply	recharge towards east and south and Monroe; high sodium in eastern part of aquifer makes unsuitable for irrigation
Carrizo-Wilcox	northwest Louisiana; both sides of Red River	fine to medium sand, silt, clay, and lignite	rainfall on surficial sediments	~13 million gal/day public, domestic, and small farm supply	aquifer discharges into Red and Sabine Rivers
Chicot Aquifer System	southwest Louisiana	coarse sand and gravel	primarily in northern part of aquifer; rainfall in Allen and Beauregard Parishes; leakage from overlying and underlying areas	~690 million gal/day; primarily agriculture	groundwater movement towards coast and pumping stations; water soft in recharge and southern area; harder in central and southeastern areas; subdivision: 220 ft sand, 500 ft sand, 700 ft sand, upper sand unit, lower sand unit
Evangeline	southwest Louisiana	fine to medium sand; sand units separated by clay	rainfall in Vernon, Avoyelles, and Rapides Parishes; leakage from Chicot aquifer; leakage from underlying aquifers	~14 million gal/day primarily public supply	water generally moves southward; seepage into Sabine and Calcasieu Rivers towards west and into Atchafalaya River towards east; overlying Chicot system provides water for irrigation
Jasper Aquifer System	southwest Louisiana	fine to medium sand; extensive clay layers separate from overlying and underlying aquifers	rainfall in Vernon and Natchitoches Parishes	~46 million gal/day primarily public supply	comprised of the Williamson Creek (upper) aquifer and the Carnahan Bayou (lower) aquifer; groundwater movement towards south and southeast and pumping center water from Carnahan Bayou slightly harder than from Williamson Creek
Catahoula	western edge of Louisiana in a northeasterly direction across the state	fine to medium sand; forms sandstone	rainfall on outcrop area and percolating through overlying alluvial and terrace deposits	~3 million gal/day; primarily public supply	limited use as a source of freshwater; divided into three freshwater areas by saltwater under Red River Valley and Little River divide
Chicot Equivalent	southeast Louisiana	fine to coarse sand and gravel	along Louisiana-Mississippi State line; rainfall or leakage from surficial sands; leakage from underlying aquifers	~88 million gal/day; primarily industry	principal sands are 400 ft and 600 ft Baton Rouge; Gramercy, Norco, and Gonzales-New Orleans; 1,200 ft New Orleans; upper Pontchatoula water generally moves southward; saltwater moves northward across Baton Rouge fault into 600 ft sand; 1,200 ft sand in New Orleans not pumped because water is saline; upper Pontchatoula is least developed
Evangeline Equivalent	southeast Louisiana	fine to medium sand	in south-central and southwest Mississippi; rainfall on surficial sands	~68 million gal/day; primarily public use	comprised of 800 ft sand, 1,000 ft sand, 1,200 ft sand, 1,500 ft sand, and 1,700 ft sand of the Baton Rouge area; lower Pontchatoula; Big Branch; Kentwood; Abita; Covington; and Slidell aquifers; water generally moves southward
Jasper Equivalent	southeast Louisiana	fine to coarse sand	in southwestern Mississippi; rainfall on surficial sands; leakage from overlying aquifers	~112 million gal/day; primarily industry and public use	principal aquifers are 2,000 ft sand, 2,400 ft sand, and 2,800 ft sand of Baton Rouge area; Tchefuncta; Hammond; Amite; and Ramsay aquifers
Mississippi River Alluvial	follows the river's course from northeastern to south-central Louisiana	sand and gravel; fine grained in upper part grading to coarse in lower part; confined by overlying fine sand, silt, and clay (0 to 150 ft thick)	rainfall on aquifer surface and underlying aquifers; leakage from underlying aquifers locally from Mississippi River near pumping centers	~284 million gal/day; primarily irrigation	in southern Louisiana joins with alluvium of the Atchafalaya River to form a large alluvial aquifer water generally moves southward; seepage into major streams and withdrawal from wells; requires treatment for domestic and public supply use; saltwater from underlying aquifers, oil and gas activities, and ancient unflushed saltwater; threats include improperly plugged or abandoned wells and misuse of agricultural chemicals; no detection of major organic contamination
Red River Alluvial	Red River Valley	clay, silt, and fine sand grading to coarse sand and gravel	rainfall on fine-grained surficial sediments; leakage from underlying aquifers	~4 million gal/day; primarily aquaculture	small amount of water pumped because treatment is required for most uses
Upland Terrace	discontinuous band along northwestern edge of Red River Valley and western edge of Mississippi River Valley	clay, silt, and fine sand grading to coarse sand and gravel	rainfall on fine-grained surficial sediments; leakage from underlying aquifers	~22 million gal/day primarily public supply and industry	not extensively used for freshwater due to potential for contamination

artery of great importance (in conjunction with the Gulf Intracoastal Waterway [GIWW]) and supplies water for the cities and industries that have developed along its banks. The Mississippi River drainage basin is the fourth largest in the world, draining 41% of the continental United States. The basin encompasses greater than 1.2 million square miles, includes all or parts of 31 states, and three Canadian provinces. Other important rivers in the state include the Red, Atchafalaya, Ouachita, Sabine, Calcasieu, Mermentau, Vermilion, Pearl, and Black.

The state's numerous bayous comprise a drainage network and often act as distributaries, rather than tributaries, and serve as drainage outlets. Bayous Teche, Macon, Lafourche, and Boeuf are the largest.

Louisiana's lacustrine resources include lagoons, oxbow lakes, and raft lakes. Barataria, Timbalier, and Terrebonne Bays and Lakes Pontchartrain, Maurepas, and Salvador are typical of lagoonal lakes on the deltaic plain. Oxbow lakes form when meander bends are cutoff from a river's course and are located throughout Louisiana's Mississippi River alluvial plain. False River is one such example. Remnant impounded tributaries are termed raft lakes in the Red River alluvial plain. Caddo, Bistineau, and Black Lakes are such examples.

Numerous natural and manmade reservoirs are located in central and north Louisiana, of which Toledo Bend is the largest. This 186,000-acre lake (1,200 miles of shoreline) was created by damming the Sabine River on the Louisiana-Texas border.

Surface Water Quality

Water quality data for the State of Louisiana are routinely collected by LDEQ for monitoring and evaluation purposes. The *2000 Water Quality Inventory Section 305(b)* indicated that as of January 2000, 19.5% (95) of Louisiana's 476 named regulatory subsegments, or water bodies, were fully supporting their overall designated use and 4.0% (19) were fully supporting but threatened. Water bodies that were partially supporting their overall designated use accounted for 29.8% (142) of Louisiana's assessed streams, lakes, wetlands, and estuaries. Water bodies not supporting their overall designated use accounted for 10.7% (51). The category Insufficient Data (INSD) was utilized to account for those water bodies where LDEQ's ambient water quality data or other reliable data were not available to make a defensible assessment. Water bodies assessed INSD accounted for 35.5% (169).

The following was the status of Louisiana's 351 named regulatory rivers and streams as of 2000: 63 (17.9%) were fully supporting their overall designated use (represents 26.2% or 2,483 miles of total assessed stream miles); 12 (3.4%) were fully supported but threatened (2.8% or 261 miles); 109 (31.1%) were partially supporting use (37.3% or 3,528 miles); 44 (12.5%) were not supporting designated use (11.1% or 1,048 miles); and 123 (34.9%) were assessed the category INSD (22.5% or 2,136 miles). Metals (arsenic, cadmium, copper, lead, and mercury) were the suspected cause for most impaired river/stream miles. Pathogen indicators (fecal coliforms) were the second most frequently cited suspected cause of river/stream impairment. Organic enrichment/low dissolved oxygen (DO) was the third largest suspected cause of river/stream impairment. Sources of river/stream impairment included natural, agricultural, municipal point source, and septic tanks.

The following was the status of Louisiana's 66 named regulatory lakes and reservoirs as of 2000: 14 (21.2%) were determined to be fully supporting their overall designated use

(represents 57.1% or 378,960 acres of total assessed lakes and reservoirs); two (3.0%) were fully supported but threatened (0.7% or 4,838 acres); 23 (34.9%) were partially supporting use (14.8% or 98,190 acres); three (4.5%) were not supporting designated use (5.5% or 36,188 acres); and 24 (36.4%) were assessed as INSD (22% or 145,948 acres). Mercury in fish tissue or water quality criteria exceedences was suspected for most impaired lacustrine acreages. Lead, copper, and cadmium were cited as suspected causes for the impairment of lakes/reservoirs. Organic enrichment/low DO was the next most frequently cited cause of impairment. In addition, salinity/total dissolved solids (TDS)/chlorides and pathogen indicators were cited as suspected sources. Sources of lakes/reservoirs impairment included atmospheric deposition, natural, and hydromodification.

The following was the status of Louisiana's 51 evaluated estuary subsegments as of 2000: 15 (29.4%) were fully supportive of their designated use (represents 33.2% or 1,644 square miles of total assessed estuary subsegments); five (9.8%) were fully supported but threatened (6.2% or 308 square miles); eight (15.7%) were partially supporting overall designated use (36.3% or 1,795 square miles); four (7.8%) were not supporting designated use (5.8% or 288 square miles); and 19 (37.3%) were assigned as INSD (18.4% or 912 square miles). Metals and mercury were primary suspects in estuarine impairment. Pathogen indicators and nutrients followed. Atmospheric deposition, municipal point sources, and septic tanks were indicated as sources of impairment.

The following was the status of Louisiana's eight evaluated wetland areas as of 2000: three (represents 52.4% or 845 square miles of total assessed wetland areas) were considered fully supporting overall designated use; two (19.5% or 315 square miles) were partially supporting overall use; and three (28.1% or 453 square miles) were classified as INSD. Mercury, cadmium, copper, and lead were cited as suspected causes of estuarine impairment. Atmospheric deposition was indicated as a source.

Climate

The climate of Louisiana is classified as subtropical and is governed by various terrestrial and atmospheric controls. Situated along the northern Gulf of Mexico between 29° and 33° north latitude, Louisiana's climate and temperature pattern are strongly influenced by seasonal changes in atmospheric circulation. During the summer months, prevailing southerly and southeasterly winds, associated with the Bermuda High, transport warm, moist air from the Gulf of Mexico across the coast and deep into the continental United States. This maritime tropical air mass significantly influences temperature and humidity across the state. Summer temperatures range between 85°F and 95°F during the afternoons and 65°F to 75°F during the early mornings and humid conditions prevail with occasional periods of hot and dry weather. During the months between September and May, variable weather conditions prevail as arctic and polar air masses associated with extratropical cyclones aperiodically inundate the state and produce cooler and drier conditions. Maritime polar and continental polar air masses can cause large and rather sudden drops in temperature. The average January temperatures for Louisiana range from 55°F to 60°F in the afternoons and near freezing to 40°F during the early morning hours.

Climate patterns differ across the state. Northern Louisiana records larger annual temperature variations and lower average annual rainfall than southern Louisiana because it is further from the influences of the Gulf of Mexico. In central and north Louisiana, freezing temperatures (32°F or lower) are recorded on 30 to 40 days during an

average year. South Louisiana experiences lower annual temperature variations due to its proximity to the temperature-moderating Gulf of Mexico. Freezing temperatures are recorded 10 to 35 days during an average year. Louisiana's coastal parishes and areas along the Mississippi River, south of New Orleans, do not record freezing temperatures in every year. During the summer, daytime highs rarely exceed 100°F in the coastal parishes.

Precipitation in Louisiana is largely due to convectional activity and extratropical storms during the summer and winter months, respectively. Summer precipitation is most common during the mid-afternoon. Winter precipitation is associated with extratropical storms and cold front passages. Rainfall in Louisiana varies and generally decreases from the southeast (62 to 66 inches per year) to the northwest (48 inches per year) regions of the state. Central Louisiana is a region of transition, having characteristics of both the northern and southern regions of the state.

Louisiana is susceptible to tropical waves, tropical depressions, tropical storms, and hurricanes due to its proximity to the Gulf of Mexico. Historical data from 1901 to 1995 indicate that 25 hurricanes and 30 tropical storms have made landfall along the Louisiana coastline (Johnson and Yodis 1998). These weather events can produce significant amounts of precipitation over a very short period of time and are often accompanied by strong winds, tornadoes, and storm surge along the coastal areas.

Air Quality

The LDEQ maintains a statewide monitoring network that consists of 44 air-monitoring stations. The data collected are used to determine compliance with National Ambient Air Quality Standards (NAAQS) and track trends in air quality. The EPA Office of Air Quality Planning and Standards (OAQPS) set NAAQS for six principal pollutants considered harmful to public health and the environment. Termed criteria pollutants, the six are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), lead (Pb), particulate <10 micrometers (PM-10), and sulfur dioxide (SO₂). Volatile organic compounds (VOCs), many of which are hazardous air pollutants, are not listed as criteria air pollutants but are measured at selected sites throughout Louisiana. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m³), and micrograms per cubic meter of air (µg/m³). See Table B-2 for NAAQS (Louisiana Department of Environmental Quality 1997).

The CAA establishes two types of national air quality standards, primary and secondary. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. A geographic area that meets or exceeds primary standards is classified as an attainment area. Areas that violate NAAQS for one or more of the six criteria pollutants are classified as nonattainment areas. See B-2 for NAAQS.

Louisiana violates the 1-hour average ozone primary and secondary standards (0.12 ppm; 235 µg/m³) in the five parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge (Louisiana Department of Environmental Quality 1997). Collectively, these parishes are called the Baton Rouge Nonattainment Area (Louisiana Department of Environmental Quality 1997). Louisiana is in attainment for the remaining five criteria pollutants (Oubre, personal communication 2002).

Table B- 2: Louisiana Air Quality -NAAQS

Pollutant	Averaging Time	Standard Value*	Standard Type
Carbon Monoxide (CO)	8-hour Average	9 ppm (10mg/m ³)	Primary
	1-hour Average	35 ppm (40 mg/m ³)	Primary
Nitrogen Dioxide (NO₂)	Annual Arithmetic Mean	0.053 ppm (100 µg/m ³)	Primary & Secondary
Ozone (O₃)	1-hour Average	0.12 ppm (235 µg/m ³)	Primary & Secondary
	8-hour Average**	0.08 ppm (157 µg/m ³)	Primary & Secondary
Lead (Pb)	Quarterly Average	1.5 µg/m ³	Primary & Secondary
Particulate < 10 micrometers (PM-10)	Annual Arithmetic Mean	50 µg/m ³	Primary & Secondary
	24-hour Average	150 µg/m ³	Primary & Secondary
Particulate < 2.5 micrometers (PM-2.5)	Annual Arithmetic Mean**	15 µg/m ³	Primary & Secondary
	24-hour Average**	65 µg/m ³	Primary & Secondary
Sulfur Dioxide (SO₂)	Annual Arithmetic Mean	0.03 ppm (80 µg/m ³)	Primary
	24-hour Average	0.14 ppm (365 µg/m ³)	Primary
	3-hour Average	0.50 ppm (1300 µg/m ³)	Secondary

* Parenthetical value is an approximate equivalent concentration
 ** The 8-hour average ozone standard and the PM-2.5 standards are included only for the purpose of providing information. A May 1999 Federal Court ruling blocked the EPA's authority to implement these standards, as proposed in July 1997. The U.S. Environmental Protection Agency and the Department of Justice have appealed the court's decision and are seeking to have it overturned.

Noise

The Louisiana Department of Environmental Quality (LDEQ) was given the authority to govern the regulation of noise pollution by the USEPA. However, inaction in the development of a program may occur when a mandate by the federal government is not funded. Due to the lack of funding provided to the LDEQ by the EPA to date, there are no regulations or programs for the administration of noise-pollution related activities. Therefore, no data exists at the state-level relative to this subject and noise pollution is subject to local ordinances (LaCour, personal communication 2002).

Biological Resources

Nekton

Louisiana's diversity of fresh and saltwater environments, in the form of bayous, rivers, streams, oxbows, ponds, marshes, swamps, lakes, and coastline, provide essential habitat for many species of fresh and saltwater fish, estuarine-marine invertebrates, and marine mammals. There are more than 500 nektonic species that live in Louisiana's waters (Douglas 1974). The larger rivers of the state (Mississippi, Atchafalaya, Red, Ouachita, Sabine, Pearl, and Black), along with numerous smaller tributaries (Amite, Boeuf, Chitto, Calcasieu, Comite, Tangipahoa, and Tickfaw), together with thousands of small ponds, creeks, and streams, provide habitat for the freshwater fish of Louisiana. In conjunction with these freshwater systems, Louisiana has 7,721 miles of shoreline and extensive estuaries, sounds, lagoons, and brackish bayous (NOAA 1975; Farrow et al. 1992; Bureau of the Census 1994). Coastal waters and waterways provide habitat for many species of fish, invertebrates, and mammals. The unique combination of fresh and saltwater habitats in Louisiana is cause for a large biological diversity and number of species.

The freshwater regions of Louisiana include more than 40,000 miles of rivers, bayous, and creeks, nearly 450,000 acres of lakes and ponds, and over 3.5 million acres of marsh (Calhoun 1997). Each habitat supports a variety of species and populations. Louisiana has 22 families and 148 species of freshwater fish (Douglas 1974). Easily accessible waterways and an abundance of warm-freshwater game fish, such as the largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), and black crappie (*Pomoxis nigromaculatus*), has made the waters of Louisiana the destination of choice for freshwater fishermen. While the aforementioned three species are most highly prized by fishermen, the state's waters contain an abundance of other species that encompass many sizes and shapes. The following list of freshwater species is only a small representation of all those that are found in the state and includes only those species which have a statewide distribution or significant commercial or sport fishing value. Species include the Mississippi silvery minnow (*Hybognathus nuchalis*), golden shiner (*Notemigonus crysoleucas*), creek chub (*Semotilus atromaculatus*), carp (*Cyprinus carpio carpio*), channel catfish (*Ictalurus punctatus*), pirate perch (*Aphredoderus sayanus*), mosquito fish (*Gambusia affinis*), white bass (*Morone chrysops*), yellow bass (*Morone mississippiensis*), striped bass (*Morone saxatilis*), rock bass (*Ambloplites rupestris*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), warmouth (*Lepomis gulosus*), longear sunfish (*Lepomis megalotis*), redear sunfish (*Lepomis microlophus*), spotted sunfish (*Lepomis punctatus*), spotted bass, largemouth bass, white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), sand darter (*Ammocrypta clara*), banded darter (*Etheostoma zonale*), freshwater drum (*Aplodinotus grunniens*), spotted gar (*Lepisosteus oculatus*) and longnose gar (*Lepisosteus osseus*), bowfin (or choupique) (*Amia calva*), bigmouth buffalo (*Ictiobus cyprinellus*), smallmouth buffalo (*Ictiobus babalus*), and paddlefish (*Polyodon spathula*).

The red swamp crawfish (*Procambarus clarkii*) and white river crawfish (*Procambarus acutus*) are well-known and valuable freshwater crustaceans. Having a statewide distribution, crawfish are found in many bodies of water and are concentrated within the overflow basins of the Atchafalaya, Red, and Pearl Rivers. Crawfish can survive both in and out of the water and are active burrowers, building large systems of underground tunnels and galleries (Huner and Barr 1991). The diet of the crawfish consists primarily of water plants, detritus, and aquatic insects and insect larvae.

The convergence of the Mississippi River with the Gulf of Mexico has created a range of habitats utilized by both freshwater and saltwater species. These brackish waters provide essential habitat for many species of fish, most notably the red drum (redfish) (*Sciaenops ocellatus*), southern flounder (*Paralichthys lethostigma*), sheepshead (*Archosargus probatocephalus*), Atlantic croaker (*Micropogonias undulates*), spot (*Leiostomus xanthurus*), sand seatrout (*Cynoscion arenarius*), spotted seatrout (*Cynoscion nebulosus*), Gulf menhaden (*Brevoortia petronus*), bay anchovy (*Anchoa mitchilli*), catfishes (*Ictaluridae*), sheepshead minnow (*Cyprinodon variegates*), livebearers (*Poeciliidae*) killifishes (*Fundulide*), silversides (*Membras* sp.), and gobies (*Gobiidae*).

The deeper coastal waters offshore are habitat to many finfish common to the Gulf of Mexico. Many species congregate around the stanchions of the deepwater drilling rigs. These artificial reefs provide shelter to offshore species including the bluefish (*Pomatomus saltatrix*), dolphin (*Coryphaena hippurus*), and blacktip shark (*Carcharhinus limbatus*). The following fish have a greater association with the rigs themselves: red

snapper (*Lutjanus campechanus*), sheepshead (*Archosargus probatocephalus*), spadefish (*Chaetodipterus faber*), and gray triggerfish (*Balistes caprisucus*).

Offshore rigs, artificial reefs, oyster reefs, breakwaters, jetties, and snapper banks provide habitat to diverse assemblages of encrusting organisms (epibenthic organisms), including hydroids and corals (*Phylum Cnidaria*), bryzoans (*Phylum Entoprocta*), sponges (*Phylum Porifera*), barnacles, amphipods, decapods, and other crustaceans (*Phylum Arthropoda*) and fish. Those environs farthest offshore often support species of tropical origin.

The waters of Louisiana comprise numerous species of estuarine-marine invertebrates including the brown shrimp (*Penaeus aztecus*), white shrimp (*Penaeus setiferus*), seabob shrimp (*Xiphopenaeus kroyeri*), pink shrimp (*Penaeus duorarum*), and royal red shrimp (*Pleoticus robustus*). Brown and white shrimp, the most abundant of the shrimp species, spawn in the Gulf of Mexico. Throughout February and March the brown shrimp larvae move into the lower estuaries, where postlarval and juvenile growth takes place. As young adults the shrimp emigrate into deeper estuarine waters, eventually moving into the nearshore Gulf of Mexico in early to mid summer. Emigration is keyed to lunar tides (Blackmon 1974). White shrimp follow a similar pattern of migration with few exceptions. Most notably, inshore development occurs in June through August with emigration into the Gulf driven by late fall/early winter cold frontal passages (Mac et al. 1998).

Although decapod species found in coastal waters are quite diverse and prevalent, the blue crab (*Callinectes sapidus*) is the most common and important commercial crab species in the north central Gulf of Mexico. The blue crab can survive in a range of environments, from offshore marine waters to freshwater marshes. Like the shrimp, the blue crab is dependent upon the state's estuaries for the completion of its life cycle. In late summer, egg-baring females migrate offshore to spawn. Shortly thereafter, the larvae of the blue crab adopt the inshore migration patterns of estuarine-marine fish. Mature male blue crabs remain in brackish and freshwater estuaries for the remainder of their lives; conversely, female blue crabs complete their life cycle on the continental shelf (Mac et al. 1998).

The nektonic mollusk recorded in greatest numbers within the estuaries is the brief squid (*Lollinguncula brevis*). Long fin (*Loligo pealei*) and arrow squid (*Doryteuthis plei*) are also common and are commercially important as bait for commercial and recreational fishing, as well as for human consumption.

Louisiana's innumerable surface freshwater hydrologic systems, brackish estuaries, and deeper coastal waters provide essential habitats and conditions for the state's hundreds of nektonic species and together form what is considered part of one of the world's most productive fisheries regions. As a result of low stream gradients throughout most of the state, many waters move slowly, particularly in association with swamps and other wetlands, and are therefore dystrophic. Local aquatic communities appear to have adapted to these conditions and populations are typically healthy despite low oxygen conditions. However, during periods of extended drought and low water levels, coupled with warm temperatures and high algal respiration, fishkills may occur. Population growth has caused additional impacts to aquatic habitats. In recent years, hypoxic conditions have been documented annually, to varying degrees, for extensive areas on the continental shelf off of Louisiana. In an effort to reduce this phenomenon, programs are currently being developed and implemented in states within the extensive Mississippi River watershed, aimed at reducing nutrient input into the Mississippi River and its

tributaries. Runoff problems are also being addressed statewide under the Nonpoint Source Program.

Benthos

Benthic organisms are defined as those that live on or in association with the bottom of a body of water. Benthic organisms can be split into two large categories: infauna (those below the sediment surface) and epifauna (those above the sediment surface). Benthic organisms are an important link in Louisiana's aquatic ecosystems.

Most coastal communities indicative of soft bottom (poorly consolidated silty clay) habitats, are rich in organic material (detritus) and are very productive. However, currents and wave energy perturb these communities and consequently, assemblages are often dominated by opportunistic species. This is not necessarily the case in streams and waterways found elsewhere in the state, where stream bottom community composition varies with the ecoregion.

The eastern oyster (*Crassostrea virginica*) is a well-known and important benthic organism both economically and ecologically. The oyster begins life as a free-floating larva and remains suspended in the water column for several days while developing a tiny bivalve shell. The embryo lives at the mercy of the tides and currents while seeking to attach itself to a clean and hard surface. If no surface is found, the oyster falls to the sea floor and is buried. If a suitable surface is found, the larva cements itself onto that surface and loses all organs of locomotion; thus remaining stationary. The young oyster grows rapidly, building a larger shell. The oyster develops best in a mixture of fresh and saltwater, ranging from 20% to 75% the salinity of ocean water (Dugas 1982). Louisiana's coastal intertidal and subtidal zones, brackish bayous, and inlets provide essential habitat for the development of the oyster. The oyster filters seawater through tiny, hair-like structures on the gills, removing oxygen, mineral salts, and microscopic floating plants (diatoms)/other microscopic organisms. A single oyster can pump 100 gallons of water a day through its shell, thereby feeding and cleansing itself (Dugas 1982). Of ecological significance, the processes of straining and filtration cleanse the water of the estuaries. In addition, oysters build extensive reefs or beds. Oyster reefs comprise the majority of hard substrate found in Louisiana's coastal waters. These structures provide protection and support for both the oyster and other diverse macrofauna.

Wildlife

Louisiana has a diverse array of wildlife. There are 71 species of mammals, 130 species of reptiles and amphibians, and 430 species of birds recorded in Louisiana (Dennett 1997). The overall abundance and diversity of wildlife is directly attributed to the variety of habitats located throughout the state. Changes in habitat type generally follow the geographical boundaries of the state. Wildlife is distributed throughout the pine and hardwood forests, prairies, coastal marshes, and alluvial plains of Louisiana. Each habitat supports large numbers of animal and bird species, many of which are utilized by the populous of the state, including trappers and sport hunters, naturalists, students, and others who enjoy observing wildlife.

Mammalian habitats in Louisiana are extremely diverse, ranging from open-ocean, protected estuaries, coastal marshes, and freshwater swamps and marshes, to thick pine and hardwood forests, grasslands, and prairies. The mammals that utilize these habitats are equally as varied. In size they range from the small eastern harvest mouse (*Reithrodontomys humulis*) to the large Louisiana black bear (*Ursus americanus*).

Louisiana has a number of species of Neotropical fauna, as a result of warm climate and proximity to the Gulf of Mexico. Neotropical species evolved in Latin America at various times in the past and dispersed northward and eastward into Texas and Louisiana. Neotropical fauna include the nine-banded armadillo (*Dasypus novemcinctus*), Virginia opossum (*Didelphis marsupialis*), northern yellow bat (*Lasiurus intermedius*), Brazilian free-tailed bat (*Talariida brasiliensis*), marsh rice rat (*Oryzomys palustris*), fulvous harvest mouse (*Reithrodontomys fulvescens*), and the hispid cotton rat (*Sigmodon hispidus*). Although not indigenous to the continental United States, a few, such as the Virginia opossum, have lived here for more than 20,000 years (Choate et al. 1994).

The following descriptions of mammals were synthesized from information contained within Choate et al. 1994 text *Handbook of Mammals of the South-Central States*.

Order Artiodactyla consists of even-toed ungulates, otherwise known as “hoofed mammals.” Louisiana, prior to modern civilization, had American elk (*Cervus elaphus*) and bison (*Bison bison*). Both have now been extirpated from the southeast. The only ungulate that lives in Louisiana today is the whitetail deer (*Odocoileus virginianus*).

Members of the order Carnivora inhabit all landmasses, including Antarctica. Carnivores are generally flesh eaters, although species regularly consume fruits, nuts, and other plant matter. Louisiana has many of these familiar mammals including the coyote (*Canis latrans*), red wolf (*Canis rufus*) (in captivity), gray fox (*Urocyon cinereoargenteus*), black bear (*Ursus americanus*), ringtail (*Bassariscus astutus*), raccoon (*Procyon lotor*), long tailed weasel (*Mustela frenata*), mink (*Mustela vison*), eastern spotted skunk (*Spilogale putorius*), striped skunk (*Mephitis mephitis*), river otter (*Lontra canadensis*), mountain lion (*Puma concolor*), and bobcat (*Lynx rufus*).

Order Chiroptera are volant mammals, capable of true flight. All bats in Louisiana are insectivorous. Species in Louisiana include the southeastern myotis (*Myotis austroriparius*), silver haired bat (*Lasionycteris noctivagans*), eastern pipistrelle (*Pipistrellus subflavus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), evening bat (*Nycticeius humeralis*), northern yellow bat (*Lasiurus intermedius*), Seminole bat (*Lasiurus seminolus*), and the Brazilian free-tailed bat (*Talariida brasiliensis*).

Opossums (*Didelphis marsupialis*) are the only species of the order Didelphimorphia found in the state. They are the most primitive of all living mammals and have a fossil record dating to the late Cretaceous period (75 to 80 million years ago). Opossums differ from other mammals in that the young are relatively undeveloped when born and must live the first part of their lives within the mother's marsupium, or “pouch”.

Another primitive order of mammals with beginnings in the late Cretaceous period is the order Insectivora. This order includes shrews and moles, which are found throughout Louisiana. Species include the southeastern shrew (*Sorex longirostris*), southern short-tailed shrew (*Blarina carolinensis*), least shrew (*Cryptotis parva*), and the eastern mole (*Scalopus aquaticus*).

Order Lagomorpha includes hares and rabbits, which are found throughout Louisiana and valued by sport hunters and trappers. Species in Louisiana include the swamp rabbit (*Sylvilagus aquaticus*) and the eastern cottontail (*Sylvilagus floridanus*). Both species are

characterized as nocturnal, have semi-solid bones to reduce body weight, and a diet composed entirely of plant matter.

Order Rodentia is the most diverse group of living mammals. Members of this order are located on every landmass, with the exception of New Zealand and Antarctica. Louisiana has many different species including the eastern chipmunk (*Tamias striatus*), eastern gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), southern flying squirrel (*Glaucomys volans*), hispid pocket mouse (*Chaetodipus hispidus*), beaver (*Castor Canadensis*), marsh rice rat (*Oryzomys palustris*), fulvous harvest mouse (*Reithrodontomys fulvescens*), cotton mouse (*Peromyscus gossypinus*), white footed mouse (*Peromyscus leucopus*), golden mouse (*Ochrotomys nuttalli*), hispid cotton rat (*Sigmodon hispidus*), eastern wood rat (*Neotoma floridana*), prairie vole (*Microtus ochrogaster*), woodland vole (*Microtus pinetorum*), and muskrat (*Ondatra zibethicus*).

The nine-banded armadillo (*Dasypus novemcinctus*) is the only species of the order Xenarthra found in Louisiana.

Louisiana's subtropical climate and abundant precipitation create an ideal habitat for cold-blooded animals. Throughout the state, amphibians and reptiles are found in great numbers. In addition to natural habitats, frogs, turtles, and snakes can be found in man-made lakes, ponds, parks, and homeowners' yards. Louisiana provides habitat to the American alligator (*Alligator mississippiensis*), which after virtual extirpation by trappers and hunters has made a strong comeback throughout the state.

The following descriptions of amphibians and reptiles were synthesized from information contained within Dundee and Rossman's 1989 text *The Amphibians and Reptiles of Louisiana*.

Class Amphibia, order Anura, consists of frogs and toads. All members of this order are characterized by abbreviated chunky bodies, lack of tail, and elongated hind legs used for jumping. Species found in Louisiana include the northern cricket frog (*Acris crepitans*), gray treefrog (*Hyla versicolor*), green treefrog (*Hyla cinerea*), spring peeper (*Pseudacris crucifer*), ornate chorus frog (*Pseudacris nigrita*), striped chorus frog (*Pseudacris triseriata*), greenhouse frog (*Eleutherodactylus planirostris*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), southern leopard frog (*Rana sphenoccephala*), American toad (*Bufo americanus*), oak toad (*Bufo quercicus*), and southern toad (*Bufo terrestris*).

Class Amphibia, order Urodela, includes salamanders and newts. The following are found in Louisiana: spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), tiger salamander (*Ambystoma tigrinum*), southern dusky salamander (*Desmognathus auriculatus*), long-tailed salamander (*Eurycea longicauda*), slimy salamander (*Plethodon kisatchie*), southern red-backed salamander (*Pseudotriton ruber*), gulf coast waterdog (*Necturus maculosus*), mudpuppy (*Necturus maculosus*), and eastern newt (*Notophthalmus viridescens*). Most live in moist forested regions, and unlike other amphibians, lay their eggs on land rather than in water.

Class Reptilia, order Crocodylia includes the American alligator (*Alligator mississippiensis*). The American alligator was once very common throughout the state. The skin of the alligator, highly prized for commercial value, led to massive kills by hunters and trappers. Louisiana outlawed the hunting and trapping of alligators in 1963, and under this new protection the American alligator recovered quickly. A limited hunting

season was reopened in 1972. Today the American alligator can be found virtually statewide, with the exception of the hill country of central and northern Louisiana.

Order Squamata consists of lizards and snakes. Fourteen lizard species are found in Louisiana and all are carnivores that consume other lizards, insects, worms, and small prey. Lizards that inhabit Louisiana include the slender glass lizard (*Ophisaurus attenuatus*), eastern glass lizard (*Ophisaurus ventralis*), Mediterranean gecko (*Hemidactylus turcicus*), green anole (*Anoles carolinensis*), collared lizard (*Crotaphytus collaris*), Texas horned lizard (*Phrynosoma cornutum*), eastern fence lizard (*Sceloporus undulatus*), coal skink (*Eumeces anthracinus pluvialis*), five-lined skink (*Eumeces fasciatus*), prairie skink (*Eumeces septentrionalis*), and ground skink (*Scincella lateralis*). The second division of order Squamata is the snake. The snake is the most diverse reptile found in Louisiana, with 39 species common to the state. The southern water snake (*Nerodia fasciata*) is known to live in every parish. All snakes are carnivores and lacking any holding claws and cutting teeth, must swallow their prey whole. Louisiana has a few venomous species (families Elapidae and Viperidae) and many non-venomous species (family Colubridae). Louisiana's subtropical climate is habitat to North America's only species from the highly poisonous Elapidae family. The eastern coral snake (*Micrurus fulvius fulvius*) is easily recognized by bright bands of yellow, red, and black. The second family of venomous snakes in Louisiana is the Viperidae and includes the copperhead (*Agkistrodon contortrix*), cottonmouth (*Agkistrodon piscivorus*), eastern diamond-backed rattlesnake (*Crotalus adamanteus*), timber rattlesnake (*Crotalus horridus*), and pygmy rattlesnake (*Sistrurus m. barbouri*). Non-venomous snakes, of the family Colubridae, include the worm snake (*Carphophis amoenus*), scarlet snake (*Cemophora coccinea*), racer, corn snake (*Elaphe guttata*), rat snake (*Elaphe obsoleta*), mud snake (*Farancia abacura*), rainbow snake (*Farancia erythrogr*), eastern hog-nosed snake (*Heterod platerinos*), king snake (*Lampropeltis getulus*), milk snake (*Lampropeltis triangulum*), coachwhip (*Masticophis flagellum*), salt marsh snake (*Nerodia clarki*), southern water snake (*Nerodia fasciata*), rough green snake (*Opheodrys aestivus*), pine snake (*Pituophis ruthveni*), crayfish snake (*Regina grahamii* and *Regina grahami*), brown snake (*Storeria dekayi*), red-bellied snake (*Storeria occipitomaculata*), flat headed snake (*Tantilla grac*), eastern ribbon snake (*Thamnophis sauritus*), western ribbon snake (*Thamnophis proximus*), and the common garter snake (*Thamnophis sirtalis*).

Class Reptilia, order Testudines, includes turtles, tortoises, and terrapins. This ancient group has existed for nearly 200 million years with little change in basic body form. Turtles, tortoises, and terrapins are defined by limb type. Turtles have paddle-like appendages and live in the ocean. Terrapins have semi-webbed feet and live in and out of freshwater. Tortoises have stump-like limbs with abbreviated toes and live on land. Species found in Louisiana include the following: loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), snapping turtle (*Chelydra serpentina*), alligator snapping turtle (*Macrolemys temminckii*), painted turtle (*Chrysemys picta*), chicken turtle (*Deirochelys reticularia*), Mississippi map turtle (*Graptemys kohni*), eastern box turtle (*Terrapene carolina*), western box turtle (*Terrapene ornata*), eastern mud turtle (*Kinosternon subrubrum*), softshell turtle (*Apalone muticus*), and gopher tortoise (*Gopherus polyphemus*).

The most diverse and abundant land animal in Louisiana is the bird. Louisiana has no less than 411 different bird species that live here for part or all of the year (Lowery 1974). These species descend from 19 orders and 66 families. The diversity and abundance of

birds in Louisiana is attributed to the state's geographic position and climate, which support numerous habitat types. Rivers, streams, bayous, lakes, ponds, coastal marshes, and tidal beaches and estuaries provide unequalled habitat for the hundreds of bird species. In addition, Louisiana has abundant hardwood swamplands, beech-oak uplands, pine forests, and treeless grassy plains, all of which provide habitat to land birds. The single greatest factor providing such great diversity is the presence of the Mississippi River. Louisiana lies in the Mississippi and Central flyways, routes for birds migrating from the Rocky Mountain region, the midwest, and the east. The yearly mass movement of birds to the south in the fall brings many northern nesting birds to Louisiana. Some remain all winter, while others rest before continuing on to destinations further south.

The following descriptions of birds were synthesized from information contained within Lowery's 1974 text, *Louisiana Birds*.

The order Ciconiiformes includes herons, bitterns, storks, and ibises. Representative species in the state include the following: great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), little blue heron (*Egretta caerulea*), cattle egret (*Bubulcus ibis*), great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), American bittern (*Botaurus lentiginosus*), wood stork (*Mycteria americana*), white faced ibis (*Plegadis chihî*), and scarlet ibis (*Eudocimus ruber*).

Gulls, terns, plovers, and sandpipers, of order Charadriiformes, include the herring gull (*Larus argentatus*), ring billed gull (*Larus delawarensis*), laughing gull (*Larus atricilla*), common tern (*Sterna hirundo*), royal tern (*Sterna maxima*), black tern (*Chlidonias niger*), piping plover (*Charadrius melodus*), whimbrel (*Numerius phaeopus*), and American woodcock (*Scolopax minor*).

Order Pelecaniformes includes cormorants and pelicans. Representative species in Louisiana include the the brown pelican (*Pelecanus occidentalis*), eastern (great) white pelican (*Pelecanus erythrorhynchos*), and the double-crested cormorant (*Phalacrocorax auritus*).

The whooping crane (*Grus americana*) and sandhill crane (*Grus canadensis*) are of the order Gruiformes.

The storm petrel (*Oceanites gracilis*) is representative of the order Procellariiformes.

Ducks (dabbling, diving, merganser, tree, and stiff-tailed), geese, and swans comprise the order Anseriformes and inhabit water, rushes, cane, and other marsh vegetation. In autumn, great numbers of ducks and geese arrive in Louisiana via the Mississippi and Central flyways to winter. Representative species include the mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), red-breasted merganser (*Mergus serrator*), green-winged teal (*Anas crecca*), American black duck (*Anas rubripes*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), American wigeon (*Anas americana*), redhead (*Aythya americana*), canvasback (*Aythya valisineria*), goldeneye (*Bucephala clangula*), ruddy duck (*Oxyura jamaicensis*), bufflehead (*Bucephala albeola*), fulvous tree duck (*Dendrocygna bicolor*), Canadian goose (*Branta canadensis*), snow goose (*Chen caerulescens*).

Upland game birds of the order Galliformes found in Louisiana include the bobwhite quail (*Colinus virginianus*), ring-necked pheasant (*Phasianus colchicus*), and the wild turkey

(*Meleagris gallopavo*). The prairie chicken (*Tympanuchus cupido*) was last recorded in 1919.

Louisiana has birds of prey of the order Falconiformes. Representative species include the Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus*), merlin (*Falco columbarius*), and the American kestrel (*Falco sparverius*).

The nine orders of Columbiformes (doves and pigeons), Psittaciformes (parrots), Cuculiformes (cuckoos), Strigiformes (owls), Caprimulgiformes (goatsuckers), Apodiformes (swifts and hummingbirds), Coraciiformes (rollers, kingfishers, and relatives), Piciformes (woodpeckers, toucans, and relatives), and Passeriformes (songbirds or passerines and perching birds) are comprised of birds that inhabit nearly all areas of the state. An abbreviated listing of the hundreds of species includes the following: mourning dove (*Zenaidura macroura*), ground dove (*Columbina passerina*), yellow-billed cuckoo (*Coccyzus americanus*), barn owl (*Tyto alba*), screech owl (*Otus asio*), horned owl (*Bubo virginianus*), snowy owl (*Nyctea scandiaca*), burrowing owl (*Athene cunicularia*), long eared owl (*Asio otus*), whip-poor-will (*Caprimulgus vociferus*), nighthawk (*Chordeiles minor*), chimney swift (*Chaetura pelagica*), ruby throated hummingbird (*Archilochus colubris*), black chinned hummingbird (*Archilochus alexandri*), broad tailed hummingbird (*Selasphorus platycercus*), belted kingfisher (*Ceryle alcyon*), red-bellied woodpecker (*Melanerpes carolinus*), red-headed woodpecker (*Melanerpes erythrocephalus*), pileated woodpecker (*Dryocopus pileatus*), eastern kingbird (*Tyrannus tyrannus*), sulphur bellied flycatcher (*Myiodynastes luteiventris*), Acadian flycatcher (*Empidonax vireescens*), tree swallow (*Tachycineta bicolor*), barn swallow (*Hirundo rustica*), blue jay (*Cyanocitta cristata*), common crow (*Corvus brachyrhynchos*), Carolina chickadee (*Parus carolinensis*), winter wren (*Troglodytes troglodytes*), marsh wren (*Cistothorus palustris*), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), wood thrush (*Hylocichla ustulata*), eastern bluebird (*Sialia sialis*), starling (*Sturnus vulgaris*), golden-winged warbler (*Vermivora chrysoptera*), Baltimore oriole (*Icterus galbula*), common grackle (*Quiscalus quiscula*), northern cardinal (*Cardinalis cardinalis*), goldfinch (*Carduelis tristis*).

Habitat Types and Associated Biota

The Louisiana GAP Analysis Program provides technical descriptions for the majority of the habitats listed below (see <http://sdms.nwrc.gov/gap/gap2.html>). Therefore, the following descriptors will elaborate on the biotic descriptors of the community, not the structural characteristics.

Dominant biota associated with the habitat types discussed below are summarized in the following tables:

- Vegetation (Table B-3)
- Mammals (Table B-4)
- Reptiles and Amphibians (Table B-5)
- Birds and Water Fowl (Tables 6-12)
- A key to habitat type abbreviations can be found in Table 13

As for fish associated with these habitat types, there are too many to list in table format. At least 500 fresh and salt water fish species utilize Louisiana's aquatic habitats from northern lakes to off-shore reefs. Therefore, it can be assumed that all aquatic habitats

discussed below have fish species associated with them. For a complete list of freshwater fishes in Louisiana refer to the Peterson Field Guide for Freshwater Fishes (1991). For a complete list of salt water fishes refer to www.fishbase.org

Table B- 3: Common Vegetation of Louisiana and their Associated Habitats

Scientific Name	Common Name	Habitats (see Table B-13 for key)
<i>Spartina alterniflora</i>	smooth cordgrass	SM, B/IM
<i>Distichlis spicata</i>	spikegrass	SM, B/IM,
<i>Salicornia perennis</i>	woody glasswort	SM
<i>Juncus roemerianus</i>	black rush	SM
<i>Spartina patens</i>	marshhay cordgrass	SM, B/IM, FM
<i>Scirpus spp.</i>	bulrushes, three squares	B/IM, FM
<i>Phragmites australis</i>	common reed	B/IM
<i>Phragmites communis</i>	roseau cane	FM
<i>Typha spp.</i>	cattail	FM
<i>Zizania aquatica</i>	wild rice	FM
<i>Panicum hemitomon</i>	maidencane	FM
<i>Cladium jamaicense</i>	saw grass	FM
<i>Eleocharis spp.</i>	spike-rush	FM
<i>Pontederia cordata</i>	pickerelweed	FM
<i>Sagittaria spp.</i>	arrowhead	FM
<i>Salix nigra</i>	black willow	FM, WF, OS
<i>Quercus spp.</i>	oak	WF, UF
<i>Liquidambar styraciflua</i>	sweet gum	WF, UF
<i>Nyssa spp.</i>	gum	WF
<i>Acer rubrum</i>	red maple	WF
<i>Taxodium distichum</i>	bald cypress	WF
<i>Ulmus americana</i>	american elm	WF
<i>Fraxinus spp.</i>	ash	WF
<i>Liriodendron tulipifera</i>	tulip poplar	WF
<i>Platanus occidentalis</i>	sycamore	WF
<i>Quercus lyrata</i>	overcup oak	WF
<i>Magnolia virginiana</i>	swamp magnolia	WF
<i>Cephalanthus occidentalis</i>	buttonbush	WF
<i>Avicennia germinans</i>	black mangrove	MS
<i>Carya spp.</i>	hickory	UF
<i>Pinus palustris</i>	long leaf pine	UF
<i>Pinus echinata</i>	short leaf pine	UF
<i>Potamogeton spp.</i>	pondweed	M/ESAV, FSAV
<i>Zostera marina</i>	eel grass	M/ESAV
<i>Ceratophyllum demersum</i>	coontail	FSAV
<i>Utricularia sp.</i>	bladder wort	FSAV
<i>Eichhornia crassipes</i>	water hyacinth	FSAV
<i>Alternanthera philoxeroides</i>	alligatorweed	FSAV
<i>Limnobiium spongia</i>	American frog-bit	FSAV
<i>Pistia stratiotes</i>	water lettuce	FSAV
<i>Nymphaea odorata</i>	white water lily	FSAV
<i>Hydrilla verticillata</i>	hydrilla	FSAV

Table B- 4: Common Mammals of Louisiana and their Associated Habitats

Scientific Name	Common Name	Habitats (see Table B-13 for key)
<i>Odocoileus virginianus</i>	whitetail deer	B/IM, FM, WF, OS, WS/S, UF, A/C/G, US/S, FS, U
<i>Sylvilagus spp.</i>	swamp rabbit, eastern cottontail	B/IM, FM, WF, OS, WS/S, UF, A/C/G, US/S, U
<i>Myocastor coypus</i>	nutria	B/IM, FM, WF, OS, WS/S, FS
<i>Ondatra zibethica</i>	muskrat	B/IM, FM, WF, OS, WS/S, FS

<i>Procyon lotor</i>	raccoon	B/IM, FM, WF, OS, WS/S, UF, US/S, FS, M/ES, A/C/G, U
<i>Sus scrofa</i>	wild boar	FM, WF, OS, UF, WS/S, US/S
<i>Reithrodontomys spp.</i>	mice	SM, B/IM, FM, WF, OS, UF, MS, UF, A/C/G, WS/S, US/S, FS, M/ES
<i>Ursus americanus</i>	black bear	WF, UF, OS
<i>Dasypus novemcinctus</i>	armadillo	WF, OS, UF, A/C/G, WS/S, US/S
<i>Canis latrans</i>	coyote	UF, A/C/G, WF, OS, WS/S, US/S
<i>Canis niger</i>	red wolf	UF, A/C/G, US/S
<i>Vulpes fulva</i>	red fox	WF, OS, UF, A/C/G, US/S, WS/S
<i>Urocyon cinereoargenteus</i>	gray fox	UF, A/C/G, US/S
<i>Felis concolor</i>	mountain lion	WF, OS, UF, US/S
<i>Lynx rufus</i>	bobcat	WF, OS, UF, US/S

Marsh (Salt, Intermediate, Fresh, and Flotant)

There are four types of marsh found in Louisiana: Salt, Intermediate/Brackish, and marsh. These sub-categories of marsh are detailed below as described by Mitsch and Gosselink (1987).

Salt Marsh

Located at and around the margins of sounds and estuaries, backs of barrier islands, and old flood tide deltas near closed inlets with regular salt water tides, salt marsh vegetation is dominated by *Spartina alterniflora* at the lower elevations (low marsh) typically between mean low tide and mean high tide. Zonation of vegetation occurs between mean tide and mean high tide with zones of *Juncus roemerianus*, *Spartina alterniflora*, and sometimes other brackish marsh species. Salt marsh communities are highly productive due to the dynamic environment in which they are found. In this setting, organic matter is regularly removed and sediment deposited by the tides. Under optimal conditions (i.e., presence of a coarse-grain sediment source) tidal sedimentation causes a rise in the marsh surface and landward migration of the marsh. Sediment may also be deposited on the shoreline, causing estuarine ward progradation of the marsh. Marshes on the backsides of barrier islands may be subject to episodic burial by sand overwash.

Salt marshes are distinguished from all other community types by the dominance of *Spartina alterniflora* as well as by their tidal, saltwater environments. Relatively narrow zones of brackish marsh at the upper edge are considered part of the salt marsh, but larger expanses in the heads of creeks and in the interior of large marsh islands are considered separate brackish marsh communities.

Table B- 5: Common Reptiles and Amphibians of Louisiana and their Associated Habitats

Scientific Name	Common Name	Habitats (see Table B-13 for key)
<i>Alligator mississippiensis</i>	American alligator	SM, B/IM, FM, WF, OS, MS, M/ESAV, FSAV, M/EBS, FB
<i>Chelydra serpentina</i>	snapping turtle	B/IM, FM, M/ES, FS, WF, OS, M/ESAV, FSAV, M/EBS, FB
<i>Sternotherus spp.</i>	musk turtle	FM, FS, WF, OS, FSAV, FB
<i>Kinosternon spp.</i>	mud turtle	B/IM, M/ES, FM, FS, WF, OS, FSAV, M/ESAV, M/EBS, FB
<i>Graptemys kohnii</i>	Mississippi map turtle	FM, FS, WF, OS, FSAV, FB
<i>Malaclemys terrapin</i>	diamondback terrapin	SM, B/IM, M/ES, M/ESAV, M/EBS
<i>Deirochelys reticularia</i>	chicken turtle	FM, FS, WF, OS, FSAV, FB
<i>Chrysemys picta</i>	painted turtle	FM, FS, WF, OS, FSAV, FB
<i>Pseudemys concinna</i>	river cooter (turtle)	FM, FS, WF, OS, FSAV, FB
<i>Trachemys scripta</i>	slider (turtle)	FM, FS, WF, OS, FSAV, FB
<i>Terrapene spp.</i>	box turtles	WF, OS, UF, A/C/G, WS/S, US/S, FS,
<i>Apalone spp.</i>	softshell turtles	FM, FS, WF, OS, FSAV, FB
<i>Nerodia spp.</i>	water snake	SM, B/IM, M/ES, M/ESAV, FM, FS, WF, OS, FSAV
<i>Regina spp.</i>	crawfish snake	FM, FS, WF, OS, FSAV, A/C/G, WS/S
<i>Thamnophis spp.</i>	garter, ribbon snakes	FM, FS, WF, OS, FSAV, UF, A/C/G, US/S, WS/S
<i>Storeria spp.</i>	redbelly, brown snakes	FM, FS, FSAV, WF, OS, UF, A/C/G, US/S, WS/S
<i>Virginia spp.</i>	earth snakes	FM, FS, FSAV, WF, OS, UF, A/C/G, US/S, WS/S
<i>Diadophis punctatus</i>	ringneck snake	WF, OS, UF, A/C/G, US/S, WS/S, FS
<i>Heterodon platirhinos</i>	eastern hognose snake	WF, OS, UF, A/C/G, US/S, WS/S, FS
<i>Cemophora coccinea</i>	scarlet snake	WF, OS, UF, A/C/G, US/S, WS/S, FS
<i>Opheodrys aestivus</i>	rough green snake	WF, OS, UF, A/C/G, US/S, WS/S, FS, FM
<i>Farancia abacura</i>	mud snake	SM, B/IM, M/ES, M/ESAV, FM, FS, WF, OS, FSAV
<i>Coluber constrictor</i>	racer (snake)	WF, OS, FM, FS, WS/S
<i>Pituophis melanoleucus</i>	Louisiana pine snake	UF, A/C/G, WF, OS, WS/S, US/S
<i>Elaphe spp.</i>	rat snakes	UF, A/C/G, WF, OS, US/S, WS/S
<i>Lampropeltis spp.</i>	milk snake, kingsnake	B/IM, M/ES, FM, FS, WF, OS, UF, A/C/G, WS/S, US/S
<i>Tantilla spp.</i>	crowned, flathead snakes	FM, FS, WF, OS, UF, A/C/G, WS/S, US/S
<i>Agkistrodon piscivorus</i>	cottonmouth (snake)	B/IM, M/ES, FM, FS, WF, OS, WS/S
<i>Agkistrodon contortrix</i>	copperhead (snake)	FS, WF, OS, US/S, WS/S, A/C/G, UF
<i>Micrurus fulvius</i>	coral snake	WF, OS, FS, UF, A/C/G, US/S, WS/S
<i>Sistrurus miliaris</i>	pigmy rattlesnake	FS, WF, OS, WS/S, US/S, A/C/G, UF
<i>Crotalus horridus</i>	timber rattlesnake	FS, WF, OS, WS/S, US/S, A/C/G, UF
<i>Lepidochelys kempii</i>	Atlantic ridley (sea turtle)	M/ES
<i>Dermochelys coriacea</i>	leatherback (sea turtle)	M/ES
<i>Ophisaurus attenuatus</i>	slender glass lizard	A/C/G, UB, UF, U, US/S, M/ES
<i>Ophisaurus ventralis</i>	eastern glass lizard	A/C/G, UB, UF, U, US/S, M/ES
<i>Scincella lateralis</i>	ground skink	WF, WS/S, UF, OS, A/C/G, FS, M/ES, U, US/S, UB
<i>Hyla spp.</i>	tree frogs	B/IM, M/ES, M/ESAV, FM, FS, FSAV, WF, OS, WS/S
<i>Psuedacris spp.</i>	chorus frogs	B/IM, M/ES, M/ESAV, FM, FS, FSAV, WF, OS, WS/S, A/C/G
<i>Acris spp.</i>	cricket frog	B/IM, M/ES, M/ESAV, FM, FS, FSAV, WF, OS, WS/S, A/C/G
<i>Rana spp.</i>	true frog	B/IM, M/ES, M/ESAV, FM, FS, FSAV, WF, OS, WS/S, US/S, A/C/G, UF

Table B- 6: Common Birds of Louisiana and their Associated Habitats - Ducks, Duck-like and Swimming Birds

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Gavia immer</i>	common loon	W	M/ES, FS, M/ESAV, FSAV, W
<i>Podiceps spp.</i>	grebes	W	M/ES, M/ESAV, W
<i>Phalacrocorax auritus</i>	double-crested cormorant	W	M/ES, M/ESAV, FS, FSAV, W
<i>Anhinga anhinga</i>	American anhinga	YR	WF, OS, A/C/G, FS, WS/S, W
<i>Chen caerulescens</i>	snow goose	W	M/ES, FS, B/IM, FM, A/C/G, W
<i>Branta Canadensis</i>	Canada goose	W	M/ES, FS, B/IM, FM, A/C/G, W
<i>Anas fulvigula</i>	mottled duck	YR	B/IM, M/ES, FM, FS, M/ESAV, FSAV, W
<i>Anas rubripes</i>	American black duck	W	B/IM, M/ES, FM, FS, M/ESAV, FSAV, W
<i>Anas strepera</i>	gadwall	W	B/IM, M/ES, FM, FS, M/ESAV, FSAV, W
<i>Anas platyphynchos</i>	mallard	W	B/IM, M/ES, FM, FS, M/ESAV, FSAV, WF, OS, WS/S, W
<i>Anus acuta</i>	common pintail	W	SM, B/IM, M/ES, FM, FS, M/ESAV, FSAV, W
<i>Americana</i>	American wigeon	W	B/IM, M/ES, FM, FS, M/ESAV, FSAV, A/C/G, W
<i>Aix sponsa</i>	wood duck	YR	WF, WS/S, FS, OS, W
<i>Anas clypeata</i>	northern shoveler	W	FM, FS, FSAV, SM, B/IM, M/ES, M/ESAV, W
<i>Anas discors</i>	blue winged teal	YR	FM, FS, FSAV, W
<i>Anas crecca</i>	green-winged teal	W	M/ES, B/IM, FM, FS, FSAV, W
<i>Aythya valisineria</i>	canvasback	W	SM, B/IM, FM, M/ES, FS, M/ESAV, FSAV, W
<i>Aythya collaris</i>	ring-necked duck	W	WF, WS/S, FS, OS, W
<i>Aythya affinis</i>	lesser scaup	W	FS, FSAV, M/ES, W
<i>Aythya marila</i>	greater scaup	W	FS, FSAV, M/ES, W
<i>Bucephala clangula</i>	common goldeneye	W	WF, WS/S, FS, W, OS, M/ES
<i>Bucephala albeola</i>	bufflehead	W	FS, FSAV, M/ES, M/ESAV, W
<i>Oxyura jamaicensis</i>	ruddy duck	W	FS, FM, FSAV, M/ES, W
<i>Mergus serrator</i>	red-breasted merganser	W	FS, M/ES, FSAV, W
<i>Gelochelidon nilotica</i>	gull-billed tern	W	SM, M/ES, WB, A/C/G, W, B/IM
<i>Lophodytes cucullatus</i>	hooded merganser	W, Br	WF, WS/S, OS, FS, W
<i>Fulica Americana</i>	American coot	YR	W, FM, B/IM, FS, B/IS, A/C/G, M/ESAV, FSAV
<i>Gallinula chloropus</i>	common gallinule	YR	W, FM, FS, FSAV
<i>Porphyryula martinica</i>	purple gallinule	YR	W, FM, FS, WF, OS, FSAV
*Br = present during breeding season (generally spring and/or summer)			
W = present in winter			
YR = present year round			

Table B- 7: Common Birds of Louisiana and their Associated Habitats - Fowl

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Meleagris gallopavo</i>	wild turkey	YR	WF, OS, UF, WS/S, US/S
<i>Colinus virginianus</i>	common bobwhite	YR	A/C/G, US/S, U, UF, WF
*Br = present during breeding season (generally spring and/or summer)			
W = present in winter			
YR = present year round			

Table B- 8: Common Birds of Louisiana and their Associated Habitats – Waders

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Ardea herodias</i>	great blue heron	W	FM, B/IM, SM, WB, FS, M/ES, WF, MS, OS, WS/S, W
<i>Florida caerulea</i>	little blue heron	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, A/C/G, W, FS, ME/S
<i>Hydranassa tricolor</i>	Louisiana heron	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, ME/S
<i>Dichromanassa rufescens</i>	reddish egret	Br	B/IM, SM, WB, W, M/ES
<i>Casmerodius albus</i>	great egret	YR	FM, B/IM, SM, WB, WF, W, FS, ME/S, WF, FS, M/ES
<i>Egretta thula</i>	snowy egret	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Bubulcus ibis</i>	cattle egret	YR	FM, WB, W, A/C/G, N/VU, FS
<i>Nycticorax nycticorax</i>	black-crowned night heron	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Nyctanassa violacea</i>	yellow-crowned night heron	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Butorides striatus</i>	green heron	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Ixobrychus exilis</i>	least bittern	Br	FM, FS, W
<i>Botaurus lentiginosus</i>	American bittern	W	FM, FS, W
<i>Mycteria americana</i>	wood stork	Br	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Plegadis chihi</i>	white-faced ibis	W, Br	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES, A/C/G
<i>Eudocimus albus</i>	white ibis	YR	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES, A/C/G
<i>Rallus spp.</i>	rails	W, Br	FM, B/IM, SM, WB, WF, MS, OS, WS/S, W, FS, M/ES
<i>Haematopus palliatus</i>	American oystercatcher	YR	SM, B/IM, M/ES
<i>Himantopus mexicanus</i>	blacknecked stilt	YR	FM, FS, W, WB
<i>Recurvirostra americana</i>	American avocet	W	M/ES, FS, W
<i>Pluvialis squatarola</i>	black-bellied plover	W	FS, WB, ME/S, W
<i>Arenaria interpres</i>	ruddy turnstone	W	FS, WB, ME/S, W, WS/S
<i>Charadrius semipalmatus</i>	semipalmated plovers	W	ME/S
<i>Charadrius melodus</i>	piping plover	W	ME/S
<i>Charadrius alexandrinus</i>	snowy plover	W	ME/S
<i>Charadrius wilsonia</i>	Wilson's plover	Br	ME/S
<i>Charadrius vociferous</i>	killdeer	YR	A/C/G, FS, WS/S, W
<i>Philohelo minor</i>	American woodcock	YR	WS/S, WF, OS
<i>Capella gallinago</i>	common snipe	W	WB, FM, B/IM, A/C/G
<i>Limnodromus griseus</i>	short-billed dowitcher	W	WB, FM, B/IM, FS
<i>Calidris canutus</i>	red knot	W	M/ES, FS
<i>Catoptrophorus semipalmatus</i>	willet	YR	FM, B/IM, SM, M/ES, WB
<i>Tringa melanoleuca</i>	greater yellowlegs	W	FM, WB, FS, W, OS, WF, WS/S
<i>Tringa flavipes</i>	lesser yellowlegs	W	FM, WB, FS, W, WF, WS/S, M/ES, B/IM, SM
<i>Calidris alba</i>	sanderling	W	FS, M/ES
<i>Calidris alpina</i>	dunlin	W	WB, M/ES, FS
<i>Actitis macularia</i>	spotted sandpiper	W	WS/S, FS
<i>Calidris minutilla</i>	least sandpiper	W	WB, FM, W, FS
<i>Calidris mauri</i>	western sandpiper	W	WB, M/ES, FS

*Br = present during breeding season (generally spring and/or summer)
W = present in winter
YR = present year round

Table B- 9: Common Birds of Louisiana and their Associated Habitats – Raptors

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Elanoides forficatus</i>	swallow-tailed kite	Br	WF, OS, WS/S
<i>Ictinia mississippiensis</i>	Mississippi kite	Br	WF, OS, WS/S
<i>Accipiter striatus</i>	sharp-shinned hawk	W	WF, UF, OS, WS/S, US/S
<i>Accipiter cooperii</i>	Cooper's hawk	YR	WF, UF, OS, WS/S, US/S
<i>Circus cyaneus</i>	northern harrier	W	FM, B/IM, A/C/G
<i>Buteo jamaicensis</i>	red-tailed hawk	YR	A/C/G, WF, OS, UF, FM, WS/S
<i>Buteo lineatus</i>	red-shouldered hawk	YR	A/C/G, WF, OS, UF, FM, WS/S
<i>Buteo platypterus</i>	broad-winged hawk	Br	WF, UF, OS
<i>Haliaeetus leucocephalus</i>	bald eagle	Br	WF, UF
<i>pandion</i>	osprey	YR	WF, FS, M/ES
<i>Cathartes aura</i>	turkey vulture	YR	U, WF, UF
<i>Coragyps atratus</i>	black vulture	YR	U, WF, UF
<i>Falco sparverius</i>	American kestrel	YR	A/C/G, U, WF, UF
<i>Falco columbarius</i>	merlin	W	UF, WF, FM, A/C/G
<i>Falco peregrinus</i>	peregrine falcon	W	A/C/G, U
<i>Asio flammeus</i>	short-eared owl	W	A/C/G, FM, B/IM, SM
<i>Otus asio</i>	common screech owl	YR	WF, UF, A/C/G, US/S, WS/S, OS
<i>Asio otus</i>	long-eared owl	W	WF, UF, WS/S, US/S
<i>Bubo virginianus</i>	great horned owl	YR	WF, UF, WS/S, US/S, A/C/G
*Br = present during breeding season (generally spring and/or summer) W = present in winter YR = present year round			

Table B- 10: Common Birds of Louisiana and their Associated Habitats - Non-Perching Land Birds

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Zenaida macroura</i>	mourning dove	YR	A/C/G, U, UF, US/S
<i>Columbina passerine</i>	common ground dove	YR	A/C/G, UF
<i>Coccyzus americanus</i>	yellow-billed cuckoo	Br	UF, US/S, A/C/G
<i>Geococcyx californianus</i>	greater roadrunner	YR	A/C/G, US/S
<i>Chordeiles minor</i>	common nighthawk	Br	A/C/G, UF, U
<i>Caprimulgus vociferous</i>	whip-poor-will	W	UF, WF
<i>Caprimulgus carolinensis</i>	chuck-will's-widow	Br	WF, UF, WS/S, US/S, OS
<i>Archilochus colubris</i>	ruby-throated hummingbird	Br	U, A/C/G, UF
<i>Megaceryle alcyon</i>	belted kingfisher	YR	FS, M/ES, W, FM, B/IM, SM
<i>Melanerpes erythrocephalus</i>	red-headed woodpecker	YR	A/C/G, U, UF, US/S
<i>Dryocopus pileatus</i>	pileated woodpecker	YR	UF, WF
<i>Colaptes auratus</i>	common flicker	YR	UF, WF, U, A/C/G
<i>Melanerpes carolinus</i>	red-bellied woodpecker	YR	WF, UF, U, A/C/G
<i>Sphyrapicus varius</i>	yellow-bellied sapsucker	W	WF, UF,
<i>Picoides pubescens</i>	downy woodpecker	YR	WF, UF, OS, WS/S, US/S
<i>Picoides villosus</i>	hairy woodpecker	YR	WF, UF, OS, WS/S, US/S
*Br = present during breeding season (generally spring and/or summer) W = present in winter YR = present year round			

Table B- 11: Common Birds of Louisiana and their Associated Habitats - Seabirds and Gulls

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Pelecanus erythrorhynchos</i>	white pelican	W	W, FS, M/ES, FM, B/IM
<i>Pelecanus occidentalis</i>	brown pelican	YR, Br	SM, B/IM, FM, FS, M/ES, W
<i>Fregata magnificens</i>	magnificent frigatebird	Br	SM, M/ES
<i>Morus bassanus</i>	northern gannet	W	M/ES
<i>Larus spp.</i>	gulls	W	SM, B/IM, FM, M/ES, FS, W, N/VU, A/C/G
<i>Sterna spp.</i>	terns	W, Br	SM, B/IM, FM, WB, W, M/ES, FS
<i>Rynchops niger</i>	black skimmer	Yr	SM, B/IM, WB, W, M/ES
*Br = present during breeding season (generally spring and/or summer) W = present in winter YR = present year round			

Table B- 12: Common Birds of Louisiana and their Associated Habitats - Perching Birds

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Tyrannus tyrannus</i>	eastern kingbird	Br	UF, WF, WS/S, A/C/G, U
<i>Muscivora forficata</i>	scissor-tailed woodpecker	W, Br	A/C/G, U
<i>Myiarchus crinitus</i>	great crested flycatcher	Br	UF, WF
<i>Contopus virens</i>	eastern pewee	Br	UF, WF, WS/S, US/S
<i>Empidonax virescens</i>	Acadian flycatcher	Br	UF, WF, OS
<i>Anthus spinoletta</i>	water pipit	W	FS, M/ES, A/C/G
<i>Anthus spragueii</i>	Sprague's pipit	W	A/C/G
<i>Progne subis</i>	purple martin	Br	FS, A/C/G, U
<i>Hirundo rustica</i>	barn swallow	Br	A/C/G, FM, FS, W, U
<i>Iridoprocne bicolor</i>	tree swallow	W	A/C/G, FS, WB, FM, WF, U
<i>Stelgidopteryx ruficollis</i>	rough-winged swallow	YR, Br	FS, WS/S, FM
<i>Chaetura pelagica</i>	chimney swift	Br	U
<i>Corvus ossifragus</i>	fish crow	YR	FS, A/C/G, M/ES
<i>Corvus brachyrhynchos</i>	American crow	YR	UF, WF, A/C/G, WS/S, FS
<i>Cyanocitta cristata</i>	blue jay	YR	UF, A/C/G, U
<i>Parus carolinensis</i>	Carolina chickadee	YR	UF, A/C/G, U
<i>Parus bicolor</i>	tufted titmouse	YR	WF, UF, U, A/C/G
<i>Sitta carolinensis</i>	white-breasted nuthatch	YR	WF, UF, U, OS
<i>Sitta Canadensis</i>	red-breasted nuthatch	W	UF, WF, U
<i>Sitta pusilla</i>	brown-headed nuthatch	YR	UF, WF
<i>Certhia familiaris</i>	brown creeper	W	WF, UF, WS/S, US/S, U
<i>Troglodytes aedon</i>	house wren	W	A/C/G, U, US/S, UF
<i>Troglodytes troglodytes</i>	winter wren	W	UF
<i>Thryomanes bewickii</i>	bewick's wren	W	A/C/G, U
<i>Thryothorus ludovicianus</i>	Carolina wren	YR	U, A/C/G, US/S
<i>Cistothorus platensis</i>	sedge wren	W	A/C/G, FM
<i>Regulus satrapa</i>	golden-crowned kinglet	W	UF, WF
<i>Regulus calendula</i>	ruby-crowned kinglet	W	UF, WF
<i>Poliotilta caerulea</i>	blue-gray gnatcatcher	YR, Br	UF, WF, US/S, WS/S
<i>Toxostoma rufum</i>	brown thrasher	YR	US/S, WS/S
<i>Dumetella carolinensis</i>	gray catbird	W, YR	US/S, WS/S, A/C/G, U
<i>Mimus polyglottos</i>	northern mockingbird	YR	US/S, UF, A/C/G, U
<i>Sialia sialis</i>	eastern bluebird	YR	A/C/G, US/S, WS/S, U
<i>Turdus migratorius</i>	American robin	YR	U, A/C/G, UF
<i>Catharus guttatus</i>	hermit thrush	W	UF, WF, US/S, WS/S, A/C/G
<i>Hylocichla mustelina</i>	wood thrush	Br	UF, WF
<i>Lanius excubitor</i>	loggerhead shrike	YR	A/C/G
<i>Bombycilla cedrorum</i>	cedar waxwing	W	UF, WF, US/S, A/C/G
<i>Vireo spp.</i>	vireos	Br, W, YR	UF, US/S, U, UB
<i>Protonotaria citrea</i>	prothonotary warbler	Br	WF, OS, WS/S
<i>Parula americana</i>	northern parula warbler	Br	WF, OS
<i>Dendroica dominica</i>	yellow-throated warbler	YR, Br	UF, U
<i>Mniotilta varia</i>	black-and-white warbler	W, Br	UF
<i>Dendroica coronata</i>	yellow-rumped warbler	W	UF, WF, US/S, WS/S
<i>Setophaga ruticilla</i>	American redstart	Br	UF, US/S
<i>Dendroica pinus</i>	pine warbler	YR	UF
<i>Dendroica discolor</i>	prairie warbler	Br	US/S
<i>Dendroica palmarum</i>	palm warbler	W	A/C/G, UF, U, US/S
<i>Limnothlypis swainsonii</i>	Swainson's warbler	Br	WF, OS, WB, WS/S
<i>Helmitheros vermivorus</i>	worm-eating warbler	Br	UF, US/S, UB

*Br = present during breeding season (generally spring and/or summer)
W = present in winter
YR = present year round

Table B- 12: Common Birds of Louisiana and their Associated Habitats - Perching Birds (continued)

Scientific Name	Common Name	Season*	Habitats (see Table B-13 for key)
<i>Vermivora celata</i>	orange-crowned warbler	W	US/S
<i>Wilsonia pusilla</i>	Wilson's warbler	W	WS/S, OS
<i>Wilsonia citrine</i>	hooded warbler	Br	WF, OS, WS/S
<i>Oporornis philidelphia</i>	Kentucky warbler	Br	A/C/G, UB, US/S
<i>Geothlypis trichas</i>	common yellowthroat	YR	FW, OS, FM, WS/S
<i>Icteria virens</i>	yellow-breasted chat	Br	WS/S, US/S
<i>Seiurus motacilla</i>	Louisiana waterthrush	Br	WF, OS, FS, WS/S
<i>Seiurus aurocapillus</i>	ovenbird	W	UF, US/S
<i>Agelaius phoeniceus</i>	red-winged blackbird	YR	FM, WF, OS, A/C/G, FS, WS/S
<i>Molothrus ater</i>	brown-headed cowbird	YR	A/C/G, WS/S, WF, US/S, UF
<i>Euphagus carolinus</i>	rusty blackbird	W	WS/S, WF, OS
<i>Euphagus cyanocephalus</i>	Brewer's blackbird	W	A/C/G, U
<i>Quiscalus quiscula</i>	common grackle	YR	A/C/G, U, WS/S
<i>Quiscalus major</i>	boat-tailed grackle	YR	SM, M/ES
<i>Sturnella magna</i>	eastern meadowlark	YR	A/C/G
<i>Sturnella neglecta</i>	western meadowlark	W, Br	A/C/G
<i>Sturnus vulgaris</i>	European starling	YR	U, A/C/G
<i>Icterus spurius</i>	orchard oriole	Br	A/C/G, UF, US/S
<i>Icterus galbula</i>	Baltimore oriole	W, Br	UF, U
<i>Piranga rubra</i>	summer tanager	Br	UF, U
<i>Passer domesticus</i>	house sparrow	YR	A/C/G, U
<i>Spiza americana</i>	dickcissel	Br	A/C/G
<i>Calcarius lapponicus</i>	lapland longspur	W	A/C/G
<i>Junco hyemalis</i>	northern junco	W	UF, US/S, U, A/C/G
<i>Cardinalis cardinalis</i>	northern cardinal	YR	U, A/C/G, UF, US/S
<i>Carpodacus purpureus</i>	purple finch	W	UF
<i>Carduelis tristis</i>	American goldfinch	W, Br	US/S, A/C/G, U, UF
<i>Carduelis pinus</i>	pine siskin	W	UF, A/C/G, US/S
<i>Guiraca caerulea</i>	blue grosbeak	Br	US/S, WS/S, A/C/G
<i>Passerina cyanea</i>	indigo bunting	Br	A/C/G, US/S
<i>Passerina ciris</i>	painted bunting	Br	US/S, UF, U, A/C/G
<i>Pipilo erythrophthalmus</i>	rufous-sided towhee	YR, W	UF, US/S
<i>Zonotrichia spp.</i>	sparrows	W, YR, Br	UF, WF, US/S, WS/S, U, A/C/G, FM, B/IM, SM
*Br = present during breeding season (generally spring and/or summer) W = present in winter YR = present year round			

Table B- 13: Key for Habitat Type Abbreviations in Tables 3-12.

Habitat Type	Abbreviation
Saltwater Marsh	SM
Brackish/Intermediate Marsh	B/IM
Freshwater Marsh	FM
Wetland Forest	WF
Wetland Scrub-Shrub	WS/S
Mangrove Swamp	MS
Upland Forest	UF
Marine/Estuarine SAV	M/ESAV
Freshwater SAV	FSAV
Other Swamps (black willow & batture)	OS
Agriculture-Cropland-Grassland	A/C/G
Freshwater Shore	FS
Marine/Estuarine Shore	M/ES
Vegetated/Non-Vegetated Urban	U
Upland Scrub/Shrub	US/S
Wetland Barren	WB
Upland Barren	UB
Water	W
Marine/Estuarine Benthic Subtidal	M/EBS
Freshwater Benthic	FB
Marine/Estuarine Encrusting Communities	M/EEC
Living Reefs	LR

Brackish/Intermediate Marsh

Found along the margins of sounds and estuaries somewhat removed from connection with the sea, so that salinity is diluted by freshwater inflow and tidal range is generally less than in salt marshes. Those marshes in areas with substantial regular lunar tides have a regular input of nutrients which makes them highly productive. In addition to high inflow of nutrients, regularly flooded marshes are typically supplied with abundant sediment and may produce tidal mud flats and estuarineward progradation of the marsh. Areas with only irregular wind tidal flooding have much less nutrient input, less mineral sedimentation, and accumulate relatively more organic matter. They lack mud flats and their estuarine edges are scaped and erosional. As sea level rises, mineral or organic sedimentation causes the marsh surface to rise, the landward edge will migrate landward, and changes in tidal inlets may cause changes in salinity.

Brackish marshes are distinguished by their tidal environment and usually by the dominance of *Juncus roemerianus*. There is a primary difference in dynamics between the regularly flooded marshes in the southern portion of the coastal zone and the predominantly irregularly flooded marshes in the northern coastal zone. Areas exposed to wave action from large estuaries may also be different in dynamics from narrow marshes in small tributaries.

Tidal Freshwater Marsh

Found at the margins of estuaries, or drowned rivers and creeks, they are regularly or irregularly flooded with freshwater tides. Historically in Louisiana, this marsh type was extensive, but its range has steadily reduced since the mid-1950's due to numerous factors including subsidence, sea-level rise, salt water intrusion, and altered hydrology as a result of river leveeing and oil and gas access canals. Tidal freshwater marshes are sustained largely through tidal flooding which brings in nutrients derived from seawater and varying amounts of sediment to the community. Regularly flooded marshes are

reported to have high productivity, equivalent to salt marshes at the same latitude (Odum et al. 1984). Irregularly flooded marshes and marshes in areas with little mineral sediment are assumed less productive. Tidal freshwater marsh is distinguished from adjacent swamp forest and upland forests by the lack of a dominant tree or shrub layer.

Floating or “Flotant” Marsh

Contrary to the stationary marshes outlined above, flotant marshes are produced independently of external influences (autogenic processes). In interior marshes that salt does not reach or have been cut off from riverine inputs, the fullest expression of autogenic development occurs. With the substrates supply of new sediments almost entirely cut off, the cumulative vertical accretion becomes increasingly organic (as the elevation is contributed to or maintained by the build-up of organic matter). As a result, the marsh becomes increasingly light until the whole mat becomes buoyant enough to float. When that occurs the flooding regime is no longer unpredictable, but is now a stable one in which the sediment is always saturated but the surface nearly never flooded. Because the surface is nearly never flooded, the major source of nutrients – waterborne sediments – is lost. To adapt, the plants colonizing the mat have high belowground productivity (dense root system) to “wick up” nutrients from the organic saturated solution between the mat and the substrate. Species typically found on a floating mat are *Eleocharis* sp., *Hydrocotyle* sp., *Panicum hemitomon*, *Sagittaria* sp., as well as many others.

Wetland Forest (Evergreen, Deciduous, and Mixed)

Wetland forests, besides being broken into evergreen, deciduous, and mixed are segmented by their flooding frequency. Those areas that experience permanent to semi-permanent flooding are deepwater swamps while those receiving only seasonal riverine pulses are generally characterized as bottomland hardwood (BLH) forests. The distinction is not only made because of flooding regime, but the species composition that occurs as a result. In Louisiana, the cypress (*Taxodium* sp.) and tupelo/gum swamps are the major deepwater forested wetlands and are characterized by bald cypress – water tupelo communities with permanent or near permanent standing water (Mitsch and Gosselink 1987). Bottomland hardwood forests usually occur as an ecotone between aquatic and upland ecosystems but have distinct vegetation and soil characteristics. The vegetation in BLH forests is dominated by diverse trees that are adapted to the wide variety of environmental conditions on the floodplain. Typical species are black willow (*Salix nigra*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), laurel oak (*Quercus laurifolia*), American elm (*Ulmus americana*), and sweetgum (*Liquidambar styraciflua*), to name a few.

Wetland Shrub/Scrub (Evergreen, Deciduous, and Mixed)

A scrub-shrub wetland typifies a community in transition and exemplifies the dynamic nature of wetlands in general. Many emergent wetlands, if positively accreting and left undisturbed, will gradually be replaced through succession by woody vegetation that will in time climax with the scrub-shrub phase. The scrub-shrub wetland is often found grading shoreward from an emergent wetland which borders a lake, bayou, or pond. The woody vegetation accounts for at least 30% of the vegetation present, and must be less than 20 feet (6 meters) tall. Species composition is dependent on the length of inundation, with black willow (*Salix nigra*) and dogwood (*Cornus* sp.) growing in the temporarily to seasonally wet areas and buttonbush (*Cephalanthus occidentalis*) in semipermanently flooded areas. The soils in this community typically are wet phases of alluvial soils. They may have been cropland at one time, particularly where they border large constructed reservoirs. They also may be present along the flanks of spoil disposal

areas particularly spoil banks along canals dredged through marsh. Soils range in reaction from strongly acid to neutral.

Upland Forest (Evergreen, Deciduous, and Mixed)

On the tertiary hills of northwest Louisiana and the Pleistocene terraces, southern pine forest is most common on the sandy hill soils. The southern pine forest in Louisiana has three major belts: the shortleaf pine-hardwoods, the longleaf pine, and the flatwoods. Shortleaf pine-hardwood forests are a mixed composition consisting of shortleaf pine (*Pinus echinata*) and loblolly pine (*Pinus taeda*), oak (*Quercus* sp.), and hickory (*Carya* sp.). Longleaf pine (*Pinus palustris*) forests have historically been over-cut and over utilized due to their importance as a marketable timber and use as naval stores before the advent of non-wooden ships in the naval fleet. Restoration of longleaf stands has begun, though it is slow to return due to the trees growth rate and lack of protected sites. Once established, longleaf pine has a strong resistance to fire damage. In fact, its original dominance was attributed to repeat fires and its unique reproductive strategy as the mature forests are fire climax communities. Longleaf pine forests are dominated by near monocultures of *P. palustris* in the overstory. The understories, however, are known for their high species richness and diversity and are typically the site of many rare species with strict edaphic requirements. Flatwoods are mixed forests of longleaf pine (*P. palustris*) and hardwoods or slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), and an undergrowth of woody shrubs, notably palmetto (*Sabal* spp.) and waxmyrtle (*Myrica cerifera*). In the western flatwoods, slash pine (*P. elliottii*) and numerous shrubs in the mid-story are absent. Upland hardwoods are found along the bluffs of Louisiana's alluvial plains and consist of oak (*Quercus* spp.), hickory (*Carya* spp.), gum (Tupelo spp.), magnolia (*Magnolia* spp.), dogwood (*Cornus* spp.), and holly (*Ilex* spp.). These species dominate the higher ground of blufflands adjacent to the alluvial plains. The most extensive such forests in Louisiana are along the western fringes of the Florida Parishes, on Macon Ridge, and along the eastern edge of the Southwest prairie.

Upland Shrub/Scrub (Evergreen, Deciduous, and Mixed)

This habitat is generally found on rolling to more steeply sloping sandy sediments with a clay layer near the surface, or with sandy to loamy well drained soils. Sites are terrestrial, usually dry to xeric, but may have a perched water table for brief periods. A clay layer may restrict rooting depth, making deeper moisture unavailable to plants during dry periods. Contrary to coastal areas, scrub/shrub is typically an understory/midstory component of a *Pinus palustris* (longleaf pine) dominated overstory forest. The diversity of variations within this community is high, therefore, naming the species inclusive of scrub/shrub would be too lengthy for the purposes of this document. However, the generally occurring genus' in these communities are oak (*Quercus* sp.), sassafras (*Sassafras* sp.), dogwood (*Cornus* sp.), and persimmon (*Diospyros* sp.).

Dense Pine Thicket

Dense pine thickets are composed primarily of upland shrub/scrub needle-leaf evergreen communities which are predominantly young (from approximately 10 to 15 years and less in age) pine plantations. Due to intensive management of these areas, the understory is relatively clear of vegetation except for occasionally occurring smaller shrub/scrub and vines. Significant areas of pine thickets are composed of loblolly (*Pinus taeda*) and slash pine (*Pinus elliottii*) regeneration – the primary marketable timber species in Louisiana.

Agriculture-Cropland-Grassland

Agriculture-cropland-grassland is made-up of diverse land cover and land uses. Uses and crops typical of this habitat type are orchards (primarily pecan), vineyards,

experimental plots, plant nurseries, yards, and right of ways. Row and cover crops consist of various grain crops, cotton, sweet potatoes, soy beans and gardens. Aquaculture consists of crawfish (also rice farming) and catfish ponds. Grasslands are dominated by perennial gramminoids.

Wetland Barren

Wetland barrens are exposed areas that are inundated annually and located or associated primarily in flood plain or river basins, streams, lakes, ponds and impoundments. These areas are typically the result of dredge material unsuitable for growth (usually with a high shell content) being deposited in localized areas. They remain unvegetated if located about the range of active sediment deposition. If they are located at an elevation suitable for sediment deposition, primary succession of vegetative communities may begin but will likely be influenced by the underlying and previously barren substrate.

Upland Barren

Upland barrens consist primarily of exposed areas that are not inundated annually and are not located in flood plains or river basins, streams, lakes, ponds and impoundments. Some areas consist of active or inactive gravel or burrow pits, landfills, erosional scars, soil parking areas/logging landings or recently cleared areas.

Open Water

Open water surfaces areas (natural or man-made structures) are rivers, streams, canals, ditches, lakes, reservoirs, and ponds.

Marine/Estuarine Shore

Unvegetated shorelines of Louisiana's estuaries and coast are characterized both by the substratum type and the organisms that live on and within the sediments (or soils). Sediment characteristics (e.g., grain size, organic content, etc.) play a large role in determining the species composition and abundance, as well as the feeding strategies of the organisms that inhabit a given area of shoreline. Estuarine beaches may be composed of organic material, although most are largely inorganic sediments. This habitat is a transition zone between the marine and estuarine aquatic habitats and upland or wetland habitats. It provides many ecological services to other resources, such as feeding and loafing areas for birds and other wildlife. Plant debris and dead organisms that form a wrack-line provide additional food sources for larger organisms, as well as habitat for smaller ones. As considered here, this resource category includes the sediments (mud, sand, etc.) and organic debris, and associated invertebrates, bacteria, and algae, and the services that this habitat provides to other resources.

Freshwater Shore

Unvegetated shorelines of Louisiana's rivers, streams, bayous, ponds, lakes, and other fresh waterbodies are characterized both by the substratum type and the organisms that live on and within the sediments (or soils). This habitat also includes gravel and sandbars in rivers and streams. Sediment characteristics (e.g., grain size, organic content, etc.) play a large role in determining the species composition and abundance, as well as the feeding strategies of the organisms that inhabit a given area of shoreline. This habitat is a transition zone between the freshwater aquatic habitats and upland or wetland habitats. It provides many ecological services to other resources, such as feeding and loafing areas for birds and other wildlife. Plant debris and dead organisms that wash up on freshwater shorelines provide additional food sources for larger organisms as well as habitat for smaller ones. As considered here, this resource

category includes the sediments (mud, sand, gravel, etc.) and organic debris, and associated invertebrates, bacteria, and algae, and the services that this habitat provides to other resources.

Marine/Estuarine and Freshwater Benthic (soft-sedimentary)

Benthic soft-sedimentary habitat (hereafter “benthic habitat”) in the Gulf of Mexico along the Louisiana coast and in Louisiana estuaries is characterized both by the substratum type and the organisms that live on and within the sediments. Sediment characteristics (e.g., grain size, organic content, etc.) play a large role in determining the species composition and abundance, as well as the feeding strategies of the benthic organisms that inhabit a given area. Benthic organisms, in turn, influence the chemistry and structure of the sediments in which they live through activities such as burrowing, deposit feeding, and tube building. An important function of benthic habitat is the decomposition of particulate organic material that enters the sediments as fecal pellets, dead phytoplankton, zooplankton, and other water column organisms, and plant matter from submerged aquatic vegetation and marshes. The bacteria that feed on this organic matter are consumed by meiofauna and deposit-feeding organisms, such as some polychaete worm and bivalve species. The organisms that inhabit benthic environments are important food sources for many juvenile fishes, as well as brown and white shrimp, and blue crabs, among other organisms. Therefore benthic habitats provide many services to the marine and estuarine ecosystem.

Marine/Estuarine Encrusting Community (natural/artificial substrates)

Wide varieties of organisms settle and attach to hard substrates (both natural and artificial) and provide shelter or a feeding location or both for other organisms. The composition of the encrusting community differs depending on whether it is subtidal or intertidal, and if intertidal, the location within the intertidal zone. Apart from barnacles that are commonly found in the intertidal zone, this habitat is also inhabited by species of algae, crabs, tube-building worms, anemones, starfish, and many others. Organisms in this habitat exhibit a number of feeding strategies, including grazing on algae and bacteria, suspension feeding on phytoplankton and particulate organic matter, and predation on organisms living on, or associated with, the hard substrate. This resource category includes the substrate itself, the attached organisms, and the closely associated mobile organisms that depend on this habitat.

Living Reefs

Living reefs are present in both marine and freshwater environments and are three-dimensional structures formed by living organisms such as oysters, mussels, and corals. Living reefs provide primary production through algae and other plants that are present in this habitat. Reefs also provide valuable habitat and refuge for fish and other animals. Their physical presence can create up-wellings with associated nutrients which increase productivity of these areas. Organisms in this habitat exhibit a number of feeding strategies, including grazing on algae and bacteria, suspension feeding on phytoplankton and particulate organic matter, and predation on organisms living on, or associated with, the hard substrate. This resource category includes the organisms forming the primary skeleton of the reef itself, the attached plants and animals, and the closely associated mobile organisms that depend on this habitat.

Marine/Estuarine Submerged Aquatics Vegetation

Submerged aquatic vegetation (SAV) is comprised of rooted vascular plants located in areas continually covered with very shallow water. These communities are found throughout coastal Louisiana where the water is clear and wave or other disturbances are

low. Species composition shifts as salinity regimes change through time. Submersed aquatic wetlands have many functions including: providing habitat for invertebrate species; providing food or shelter or both for juvenile and adult fish, waterfowl, and other wildlife; retarding flow velocities, stabilizing bottom sediments, and slowing erosion; and oxygenating the water and recycling nutrients and heavy metals.

Freshwater Submerged Aquatics Vegetation

Submerged freshwater aquatic vegetation (SAV) is comprised of vascular plants located in areas continually covered with water. Submersed aquatic vegetation in wetlands have many functions including: providing habitat for invertebrate species; providing food or shelter or both for juvenile and adult fish, waterfowl, and other wildlife; retarding flow velocities, stabilizing bottom sediments, and slowing erosion; and oxygenating the water and recycling nutrients and heavy metals. The State of Louisiana is actively trying to control the abundance of exotic and native aquatic vegetation species. At a moderate level of abundance, freshwater SAV provide important habitat services; however, an overabundance speeds eutrophication, contributes to fish population imbalances, and impedes navigation.

Mangrove Swamp

The mangrove swamp is an association of halophytic trees, shrubs, and other plants growing in brackish to saline tidal waters of tropical and sub-tropical coastlines. These communities have been well studied, and researchers have established the importance of mangrove swamps in exporting organic matter to adjacent coastal food chains, in providing physical stability to certain shorelines to prevent erosion, in protecting inland areas from severe damage during hurricanes and tidal waves, and in serving as sinks for nutrients and carbon.

Like the adjacent coastal salt marsh, mangrove swamps can develop only where there is adequate protection from wave action. Several physiographic settings favor the protection of mangrove swamps, including (1) protected shallow bays, (2) protected estuaries, (3) lagoons, (4) the leeward sides of peninsulas and islands, (5) protected seaways, (6) behind spits, and (7) behind offshore shell or shingle islands.

In addition to the required physical from wave action, the range and the duration of the flooding of tides exert a significant influence over the extent and functioning of the mangrove swamp, importing nutrients, aerating the soil water, and stabilizing soil salinity. Salt water is important to the mangroves in eliminating competition from freshwater species. The tides provide a subsidy for the movement and distribution of the seeds of several mangrove species. They also circulate the organic sediments in some fringe mangroves for the benefit of filter feeding organisms such as oysters, sponges, and barnacles and for deposit feeders such as snails and fiddler crabs.

The development of mangrove swamps is the result of topography, substrate, and freshwater hydrology as well as tidal action. Only the most cold tolerant mangrove, *Avicennia germinans* (black mangrove) is found in Louisiana. It periodically suffers die back in years in which severe periods of cold weather occur.

Batture

The strip of land between the Mississippi River and the levee is referred to as batture. Batture comprises thousands of acres of land, with some large individual tracts in places where the levee is set back at some distance from the river. They differ in characteristics from cypress-tupelo (*Taxodium-Nyssa*) swamps in that their soils and soil moisture are

influenced by steep elevation gradients and the Spring flood pulses of the Mississippi River, they process large fluxes of energy and materials from upstream, and are comprised of different overstory vegetation (Mitsch and Gosselink 1991). The unpredictable flooding and drying sequence supports a vegetative community dominated by black willow (*Salix nigra*) and other woody species with equivalent morphological and/or physiological adaptations to survive, achieve maturity, and reproduce in a habitat where the soils within the root zone may become anaerobic for various periods during the growing season or not at all for years. As with most types of swamps, batture has high natural resource and wildlife habitat values as it is used by a number of plant, invertebrate, mammal, fish, and bird species, and is an important migratory flyway. In addition to biotic importance, batture also provides beneficial functions to downstream communities such as water quality improvement, nutrient cycling and retention, and floodwater storage through the seasonal collection of fine sediments from floodwaters and the increased basin area the swamps provide.

Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 (16 USC 1531, et seq.) is administered by the U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (FWS) and the U.S. Department of Commerce (DOC), National Marine Fisheries Service (NMFS). The FWS is primarily responsible for terrestrial and freshwater species and migratory birds and the NMFS for anadromous and marine fish species. The FWS and NMFS share the responsibility for conservation of marine mammals. The FWS has responsibility for walrus, all other marine mammals (such as sea otters, polar bears, and manatees) anadromous fish, and marine reptiles. The NMFS conserves and manages most pinnipeds and all whales. The ESA directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authorities to further these purposes. The purpose of the ESA is to conserve “the ecosystems upon which endangered and threatened species depend” and to conserve and recover listed species (Endangered Species Act [16 USC 1531, et seq.]). Endangered species are species in danger of extinction throughout all or a significant portion of its range. Threatened species are defined as species likely to become endangered within the foreseeable future.

Under Section 4 of the ESA, plant and animal species are listed solely on the basis of the species’ biological status and threats to its existence. A species that closely resembles an endangered or threatened species may be listed due to similarity of appearance. Candidate species are listed and are species for which there is enough information to warrant proposing them for listing as endangered or threatened, but these species have not yet been proposed for listing. Section 4 of the Act provides for designations of critical habitat for listed species and includes geographic areas “on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection” (Endangered Species Act [16 USC 1531, et seq.]).

The published list for the State of Louisiana includes 23 animal and three plant species (see Appendix C) (U.S. Department of the Interior, Fish and Wildlife Service 2003). One candidate species is listed for the state (U.S. Department of the Interior, Fish and Wildlife Service 2003).

Section 6 of the ESA encourages each state to develop and maintain conservation programs for resident federally-listed threatened and endangered species. Species listed

as threatened and endangered in Louisiana are maintained by the Louisiana Natural Heritage Program, Louisiana Department of Wildlife and Fisheries (LDWF).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801, et seq.) provides for stewardship of the nation's fishery resources within the Exclusive Economic Zone, covering all U.S. coastal waters 200 miles seaward from the boundary of state territorial waters. The resource management goal is to achieve and maintain the optimum yield from U.S. marine fisheries. The Act also establishes a program to promote the protection of Essential Fish Habitat (EFH) throughout state and federal waters in the planning of federal actions. 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 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.

Congress defined EFH as "those waters and substrate to fish for spawning, breeding, feeding, or growth to maturity" (Magnuson-Stevens Fishery Conservation and Management Act [16 USC 1802(10)]). The EFH regulations go on further to define *waters* to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; *substrate* includes sediment, hard bottom, structures underlying the waters, and associated biological communities; *necessary* means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Cultural Resources

Louisiana has been inhabited for at least the last 12,000 years. From approximately 12,000 to 8,000 BC, early people hunted large Pleistocene mammals. With the end of the Ice Age and changes in climate, inhabitants adapted to hunting smaller game and to gathering plants. The advanced cultures of Poverty Point, Tchefuncte, and Marksville developed between 2000 BC and first century AD. Beginning around 700 AD, the cultures of Troyville-Coles Creek, Plaquemine, Caddoan, and Mississippian developed successively. The nine cultural units mentioned above are termed prehistoric meaning prior to contact with the Europeans.

The arrival of the Europeans and subsequent disease and westward expansion in the sixteenth century caused the demise of large Indian population centers. Plantation-based agriculture (cotton and sugarcane) and small-scale farming developed in the 1700s and 1800s, respectively. The Civil War radically changed Louisiana's culture and labor base, developing the oil, gas, and lumbering industries (Smith et al. 1983). Louisiana's five historic cultural units are termed Historic Contact, Exploration and Colonization, Antebellum, War and Aftermath, and Industrialization and Modernization.

Louisiana's prehistoric and historic sites have been selected for historical, cultural, and/or architectural value. Presently, there are 16 prehistoric and historic sites, which may also be referred to as State Commemorative Areas, within the state. Sites include, but are not limited to, buildings and associated grounds, military post/forts, cemetery, Civil War battlefields, ancient civilization grounds, Native American grounds, and water control structures. Of the 16 sites, three are located in West Feliciana Parish, three in Natchitoches Parish, two in East Feliciana Parish, one in Sabine Parish, one in Orleans

Parish, one in St. Martin Parish, one in De Soto Parish, one in Avoyelles Parish, one in Iberville Parish, one in West Carroll Parish, and one in Tensas Parish. Additional information is available from the Louisiana Department of Culture, Recreation and Tourism (LCRT), Office of State Parks.

The National Register of Historic Places is the nation's official listing of buildings, structures, objects, sites, or districts worthy of preservation because they illustrate something about our nation's history or culture at the national, state, or local level. Enacted by the U.S. Congress (National Historic Preservation Act of 1966, 16 USC 470, et seq.), the National Register of Historic Places is administered by the states. In the State of Louisiana, the National Register of Historic Places is administered by the LCRT, Office of Cultural Development, Division of Historic Preservation.

The National Register of Historic Places recognizes five significant properties, classified as buildings, structures, objects, sites, or districts. The following terms were set forth by the USDO, National Park Service (NPS), Interagency Resources Division. A building is created principally to shelter any form of human activity and/or to refer to a historically and functionally related unit. A structure is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter. An object is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed; associated with a specific setting or environment. A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possess historic, cultural, or archeological value regardless of the value of any existing structure. A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

When evaluated within its local, state, or national historic context, a property must be significant for one or more of four criteria for evaluation as set forth by the USDO, NPS, Interagency Resources Division. Associative value (Criteria A and B): properties significant for their association or linkage to events or persons important in the past. Design or construction value (Criteria C): properties significant as representatives of the manmade expression of culture or technology. Information value (Criteria D): properties significant for their ability to yield important information about prehistory or history. Properties achieving significance within the last 50 years are excluded unless they are of exceptional importance, as 50 years is a general estimate of time needed to develop historical perspective and to evaluate significance.

Presently, the State of Louisiana has 1,161 properties listed on the National Register of Historic Places. Properties by parish are broken down as follows: six in Acadia; three in Allen; 21 in Ascension; nine in Assumption; 27 in Avoyelles; ten in Beauregard; 12 in Bienville; four in Bossier; 63 in Caddo; 14 in Calcasieu; nine in Caldwell; two in Cameron; ten in Catahoula; ten in Claiborne; 11 in Concordia; 29 in De Soto; 75 in East Baton Rouge; five in East Carroll; 26 in East Feliciana; three in Evangeline; six in Franklin; four in Grant; 25 in Iberia; 18 in Iberville; four in Jackson; 16 in Jefferson Davis; 18 in Jefferson; 22 in Lafayette ; 17 in Lafourche; three in LaSalle; 26 in Lincoln; 11 in Livingston; 12 in Madison; five in Morehouse; 27 in Natchitoches; 121 in Orleans; 28 in Ouachita; eight in Plaquemines; 29 in Pointe Coupee; 69 in Rapides; two in Red River; nine in Richland; seven in Sabine; seven in St. Bernard; six in St. Charles; two in St. Helena; 17 in St. James; 12 in St. John the Baptist; 34 in St. Landry; 24 in St. Martin; 26 in St. Mary; 32 in St. Tammany ; 28 in Tangipahoa; nine in Tensas; 17 in Terrebonne; ten

in Union; 16 in Vermilion; seven in Vernon; 14 in Washington; 17 in Webster; ten in West Baton Rouge; one in West Carroll; 30 in West Feliciana; and six in Winn. Additional information is available from the LCRT, Office of Cultural Development, Division of Historic Preservation.

Population

The nationwide census of the year 2000 (United States Department of Commerce, Census Bureau 2000) recorded the population of the State of Louisiana at 4,468,976, indicating a 5.9% increase in growth from the 1990 census. The majority of the population, approximately 69%, lived in the eight Metropolitan Statistical Areas (MSAs) as defined by the U.S. Census Bureau. The eight MSAs are the greater Alexandria, Baton Rouge, Houma, Lafayette, Lake Charles, Monroe, New Orleans, and Shreveport areas. The eight MSAs recorded a slight relative population increase of 0.7% from the 1990 census. The remaining 31% of the populous lived in cities, towns, and rural communities outside of MSA boundaries.

Race was reported as follows: 63.9% (2,856,161) Caucasian or white; 32.5% (1,451,944) African-American or black; 1.2% (54,758) Asian; 0.57% (25,477) American Indian or Alaska native; 0.03% (1,240) Native Hawaiian or Pacific Islander; 0.7% (31,131) other race; and 1.1% (48,265) reported two or more races. The population was 51.6% female and 48.4% male.

The 2000 census recorded a labor force in Louisiana of 2,012,831 persons, of which 91.9% were employed, 7.3% were unemployed, and 0.8% were employed in the armed services. The average household income for the state was \$30,466 and the average per capita income was \$17,131. In Louisiana, 20.3% of the total populous and 27.1% of children under the age of 18 were living at or below the poverty level. Education was reported as 76.7% of residents having completed high school and 19.4% having completed four or more years of upper level schooling.

The census recorded 27 different ancestral backgrounds and 8.5% of households reported speaking another language in the home besides English. A large percentage of residents, 80.2%, were born in and resided in the state, 19.1% migrated from other states, and 0.7% emigrated from other countries.

Infrastructure and Public Services

Physical infrastructure and public services include commonly provided federal, state, parish, municipal, and/or private facilities that support development and protect public health and safety, including (but not limited to) transportation (highways, roads, bridges, ferries, rails, airports, ports, and navigation), flood protection (levees, floodways, channel improvement and stabilization, and principal tributary basin improvements), solid waste disposal and treatment, water supply and wastewater disposal, drainage, electricity, housing, educational facilities, health care facilities, and police and fire protection. Infrastructure and public service development depend heavily on levels of population, migration patterns, and employment trends (particularly trends in the oil and gas industry and support services, which can fluctuate dramatically).

The following information was largely extracted from Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998*Coast 2050: Toward a Sustainable Coastal Louisiana*; 1997 *Roads of Louisiana*; and Calhoun 2002*Louisiana Almanac 2002-2003 Edition*. Louisiana has more than 60,000 miles of roads in interstate highways, U.S. highways, state

highways, parish roads, and city streets. Louisiana's interstate system is comprised of six routes and six connecting routes and bypasses. Interstate highways 10, 12, and 20 are primary west-east routes across the state. Interstates 49, 55, and 59 are primary north-south routes across the state. Several state highways, Highways 1, 23, 27, 39, and 82, serve as evacuation routes from the coastal zone. State and parish maintained bridges number greater than 13,000 and include over 150 movable bridges (swing-span, lift-span, bascule, and pontoon). Approximately 15 state and parish operated ferries provide service across water bodies. Southern Pacific, Kansas City Southern, Amtrak, Illinois Central, and Union Pacific are primary rail lines. Louisiana has approximately 450 publicly and privately owned and used airports, heliports, and seaplane bases. Louisiana ranks first in the nation in total shipping tonnage, handling over 450 million tons of cargo each year through public and private installations located within the state's jurisdiction of six deep-draft ports: New Orleans, Greater Baton Rouge, Lake Charles, South Louisiana, Plaquemines Parish, and St. Bernard. Fifteen smaller ports are situated within the coastal zone and primarily serve the oil and gas and fishing industries. The privately owned Louisiana Offshore Oil Port (LOOP) offloads approximately ten to 13% of the countries imported crude petroleum. The GIWW is a critical shallow-draft transportation link that carries an annual average of 70 millions tons of freight (primarily liquid bulk items such as petroleum and petroleum products, industrial chemicals, pipe and other supplies for the oil fields, and sulfur) between the Mississippi and Texas state lines. An alternate GIWW route, linking Morgan City and Port Allen, averages 25 million tons of cargo shipped per year.

The following information was summarized from the U.S. Army Corps of Engineers New Orleans District (USACE NOD) homepage *The Mississippi River and Tributaries Project* (1999). The Flood Control Act of 1928 committed the federal government to a program of flood control and authorized the Mississippi River and Tributaries (MR & T) Project. The four major elements of the project are: levees for containing flood flows; floodways for the passage of excess flows past critical reaches of the Mississippi; channel improvement and stabilization for stabilizing the channel in order to provide an efficient navigation alignment, increase the flood-carrying capacity of the river, and for protection of the levees system; and tributary basin improvements for major drainage and for flood control, such as dams and reservoirs, pumping plants, and auxiliary channels.

The Mississippi River main stem levee system, comprised of levees, floodwalls, and various control structures is 2,203 miles in total length. Approximately 1,607 miles lie along the Mississippi River itself and 596 miles lie along the south banks of the Arkansas and Red Rivers and in the Atchafalaya Basin.

Project floodwaters are diverted to the Atchafalaya River via the Morganza and West Atchafalaya floodways and the Old River Control Structure. At their terminus, a broad floodway passes flow to the Gulf of Mexico through the Wax Lake and Berwick Bay outlets. Floodwaters flowing down the main channel are diverted into Lake Pontchartrain and the Gulf through the Bonnet Carre spillway and continue down river to the Gulf.

Channel improvements and stabilization are accomplished by cutoffs (shorten river/reduce flood heights), revetments (stop meandering), dikes (direct flow), and improvement dredging (realign channels).

Two of the four major drainage basins in the lower Mississippi River Valley Project are located in Louisiana, the Tensas in northeast Louisiana and the Atchafalaya in south Louisiana.

There are approximately 26 landfill service areas, which include both industrial and municipal waste sites, in the state.

Education consists of (but is not limited to) state elementary and secondary schools, charter schools (independent public schools), nonpublic independent academies or religions institutions, four-year and two-year public universities/colleges, four-year nonpublic universities/colleges, state vocational-technical schools, approved special state schools, approved proprietary schools, approved flight training schools, public libraries, and museums and exhibition spaces (Calhoun 2002).

The Department of Health and Hospitals (LDHH) provides all public health services for the State of Louisiana through four program offices (Office of Charity Hospital of Louisiana at New Orleans, Office of Hospitals, Office of Human Services, and Office of Public Health) under a two-office administrative arm (Office of the Secretary and Office of Management and Finance) (Calhoun 2002). There are approximately 174 hospitals, 72 alcohol/drug abuse facilities, 23 community health centers, nine state developmental centers, 43 mental health clinics, 61 rural health clinics, 109 public health units, and 352 nursing homes in Louisiana (Calhoun 2002).

Industry

Commercial Fisheries and Aquaculture

The inland waters, costal marshes, and offshore waters of Louisiana support fishing and aquaculture industries. The shrimp fishery is Louisiana's largest commercial fishery, accounting for over 85% of the value of the state's edible fisheries production (Louisiana Department of Wildlife and Fisheries 2000). The shrimp industry is based on the brown and white shrimp (*Penaeus aztecus* and *Penaeus setiferus*), harvested inshore in the spring and fall respectively, which accounts for 93 to 96% of landings by poundage (Louisiana Department of Wildlife and Fisheries 2000). The seabob (*phopenaeus kroyeri*), pink shrimp (*Penaeus Duorarum*), and royal red shrimp (*Pleoticus robustus*) account for the remaining four to seven percent (Louisiana Department of Wildlife and Fisheries 2000). On average, 40% of Louisiana landings were taken in inshore state waters, 43% were taken in the state's offshore waters, and 17% were taken in federal waters off of Louisiana's coast from 1976 to 1990 (Louisiana Department of Wildlife and Fisheries 2000). White shrimp landings for the year 2000 totaled 75,864,278 pounds (34,411.8 metric tons) for a value of \$152,374,346 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). The total take of brown shrimp for the year 2000 was 62,115,422 pounds (28,175.4 metric tons) for a value of \$96,514,340 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). Processing industries are a source of additional employment.

The shrimp fishery, as mandated by the Louisiana Legislature, is under the supervision and control of the Louisiana Wildlife and Fisheries Commission. The commission has been given the authority to set seasons based on technical and biological data that indicates when marketable shrimp, in sufficient quantities, are available for harvest. The Louisiana Legislature dictates legal gear, licenses and fees, legal sizes, and other aspects of the shrimp fishery.

Oyster production in Louisiana is a \$30 million dockside industry (Louisiana Department of Wildlife and Fisheries 2002). Louisiana's coastal waters produce an average of 13 million pounds of oysters annually, of which 60% are shipped to other states and

countries (Louisiana Department of Wildlife and Fisheries 2002). Eastern oyster (*Crassostrea virginica*) landings for the year 2000 totaled 11,513,438 pounds (5,222.5 metric tons) for a value of \$24,614,159 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). The cultivation of oysters is a partnership between the state and private oysterman through the use of both public seed grounds and privately leased state water bottoms for \$2.00 per acre per year (Louisiana Department of Wildlife and Fisheries 2001). Oysters are harvested and sold by the sack for a current selling price of between \$10 and \$20 (Louisiana Department of Wildlife and Fisheries 2001).

The blue crab (*Callinectes sapidus*) is the only crab of commercial importance in the State of Louisiana. Blue crab landings for the year 2000 totaled 51,430,385 pounds (23,328.7 metric tons) for a value of \$36,770,381 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). Peeler blue crab landings for the year 2000 totaled 544,716 pounds (247.1 metric tons) for a value of \$906,196 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). The total take of soft blue crab for the year 2000 was 56,887 pounds (25.8 metric tons) for a value of \$262,140 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000).

The Atlantic menhaden (*Brevoortia tyrannus*) is by far the most prolific commercial finfish caught in Louisiana's waters. Atlantic menhaden landings for the year 2000 totaled 1,111,978,535 pounds (504,390.2 metric tons) for a value of \$68,586,452 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). In addition, there are important fisheries for sand seatrout (*Cynoscion arenarius*), spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellatus*), and southern flounder (*Paralichthys lethostigma*). Freshwater species of commercial importance include blue catfish (*Ictalurus furcatus*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), yellow bullhead (*Ameiurus natalis*), bowfin (*Amia calva*), carp (*Cyprinus carpio carpio*), gar (*Lepisosteus oculatus* and *Lepisosteus spatula*), and buffalo (bigmouth *Ictiobus cyprinellus* and smallmouth *Ictiobus bubalus*). The total take of all species combined for the year 2000 was 1,357,933,958 pounds (615,954.8 metric tons) for a value of \$418,917,774 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). The Finfish Management Program within the LDWF has developed a comprehensive monitoring program for the purpose of making recommendations for the management of coastal finfish stocks. The department issued 19,438 commercial fisherman's licenses in 2000 to 2001 (Landry, personal communication 2001).

The farm value for Louisiana's aquaculture crops in the year 2000 was estimated at \$121 million (Calhoun 2002). Louisiana is the fourth leading state in the production of catfish and year 2000 total landings (of blue catfish [*Ictalurus furcatus*], channel catfish [*Ictalurus punctatus*], and flathead catfish [*Pylodictis olivaris*]) were 6,216,318 pounds (2819.7 metric tons) valued at just over \$3 million (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). The number of farm-raised American alligators (*Alligator mississippiensis*) in 2000 approached all-time highs, although poundage and dollars are unknown. Crawfish acreage and production declined sharply in 2000. Landings totaled 392,875 pound (178.2 metric tons) for a value of \$677,116 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 2000). Crawfish landings for the year 1999 totaled 13,226,019 pounds (5,999.3 metric tons) for a value of \$10,479,528 (National Oceanic and Atmospheric Administration, National Marine Fisheries Service 1999).

Forestry

The forests and woodlands of Louisiana are managed by the Louisiana Department of Agriculture and Forestry (LDAF), Office of Forestry. Forestland comprises 48% of the state's total area or approximately 13.8 million acres, a decline of 4.5% since 1974 (Calhoun 2002). The decline is due to the conversion of land to agriculture, urban expansion and infrastructure development, and mineral development (Calhoun 2002). There are 148,000 owners of Louisiana forestland, of which private, non-industrial landowners own 62%, forest products industries own 29%, and the general public owns nine percent (Louisiana Department of Agriculture and Forestry 2002). Fifty-nine of the state's 64 parishes contain commercial forest acreage.

Louisiana's forest products industries are the second largest manufacturing employer in the state with over 900 firms that directly employ over 25,000 people (Louisiana Department of Agriculture and Forestry 2002). An additional 8,000 people are employed in industries that support harvesting and transportation of forest products (Louisiana Department of Agriculture and Forestry 2002). Forestry in Louisiana generates an economic impact (4.4 billion in 1999) greater than all other agricultural products combined (Calhoun 2002). The estimated 2000 value of timber resources (value received by landowners from the sale of timber) was \$654 million (University of Louisiana at Monroe 2000).

Sawtimber production for the year 2000 totaled 1,312,371,139 Board Feet (Doyle Scale) (University of Louisiana at Monroe 2000). Cordwood (pine and hardwood pulpwood and chip-n-saw) production for the year 2000 totaled 6,065,787 cords (University of Louisiana at Monroe 2000). Non-timber forestry (Christmas trees, pine straw, firewood, and tree seedlings) generated an estimated income of 11.3 million in 2000 (Calhoun 2002).

Agriculture

Agricultural data were synthesized from the University of Louisiana at Monroe, Center for Business and Economic Research, Louisiana Electronic Assistance Program and Calhoun 2002 *Louisiana Almanac 2002-2003 Edition*.

Animal production in Louisiana produces over a billion dollars in farm income annually and nearly a billion dollars in value added worth. The Louisiana poultry industry is the largest animal agricultural business in the state, with more than 550 commercial producers in 12 parishes. Gross farm value exceeds 730 million dollars annually.

The beef industry is a 300 million dollar business in the state, with producers numbering greater than 12,000.

Milk is produced in 23 Louisiana parishes, with Tangipahoa, Washington, De Soto, St. Helena, and Beauregard Parishes accounting for over 88% of total production. There are more than 400 dairy farms and 54,000 milk cows in the state. On-farm value of milk is estimated at greater than 110 million dollars annually.

Louisiana has more than 500 pork producers in 53 parishes. Total pig production has a gross farm value of nearly seven million dollars and a value added total greater than one million dollars.

Plant production in Louisiana produces over two billion dollars in gross farm income annually and greater than five billion annually in value added worth. Sugarcane is grown

on approximately 490,000 acres by 785 producers in 24 parishes. Total production of processed sugar is nearly 1,550,000 tons with a gross farm value of greater than \$362,700,000 annually.

Louisiana's cotton industry has suffered in recent years due to drought conditions. More than 2,600 cotton farmers plant approximately 690,000 acres of cotton annually. Total crop is valued at approximately 235 million dollars.

The rice industry is nearly a 200 million dollar business. Acreage approximates 478,000, and the crop is planted and harvested by close to 1,900 producers.

Louisiana citrus is grown on more than 1,300 acres and has a gross farm value of nearly six million dollars annually. Peaches, strawberries, blueberries, blackberries, figs, muscadine grapes, mayhaws, pears, plums, apples, persimmons, and pecans are also commercially grown and sold in Louisiana.

Soybeans are an 87 million dollar business in the state, with production on more than 907,000 acres by 4,500 producers.

Sweet potatoes are planted on 27,000 acres and have a gross farm value of more than 57 million dollars with a value added of more than 41 million dollars.

The three primary feed grains grown in Louisiana are corn, grain sorghum, and oats. The gross farm value for feed grains was greater than 105 million dollars.

Wheat is harvested on approximately 161,000 acres by 600 producers. Total production approximates eight million bushels annually. Gross farm value is estimated at greater than 19 million.

Louisiana's commercial vegetable industry employs nearly 2,300 growers and produces 45 different vegetable crops on approximately 6,500 acres. The crops combined have a gross farm value of more than 29 million. Field tomatoes, fresh mustard, southern peas, Irish potatoes, and cucumbers are important crops.

The commercial production of nursery crops has a total value of 166 million dollars. Woody ornamental plants, floriculture and bedding plants, foliage plants, and fruit trees are important commercial nursery crops.

Oil & Gas

Louisiana's oil and natural gas industry began in Jennings in 1901 when the Heywood well produced oil in commercial quantities. In 1908 the first natural gas pipeline was laid in Louisiana, transporting gas from Caddo Field to Shreveport, Louisiana. In 1909 the "new refinery" (as it was named then) in Baton Rouge became operational. Today the refinery is owned and operated by Exxon-Mobil and is one of the largest on the North American continent. Construction commenced on the first long-distance oil pipeline in 1909. Crude oil was being transported from Caddo Parish in northwestern Louisiana to the "new refinery" in Baton Rouge, Louisiana by 1910. About 1910, the first over-water drilling occurred on Caddo Lake near Shreveport, Louisiana. The next 40 years were dominated by the discovery of the large fields of Bull Bayou, Monroe Gas, Haynesville Gas, Olla, Lake St John, Main Mass, Eugene Island, Bay Marchand, Vermillion, South Pass, and West Cameron. The year 1947 marked the birth of the offshore oil and gas industry. In 1969 Louisiana oil production peaked at 728,494,272 barrels of crude and

condensate. Louisiana's oil and natural gas reserves declined in 1969 to 1970 for the first time since their discovery. The decline initiated the exploration of resources further offshore. Throughout the 1990s deepwater discoveries and the development of new technology resulted in an industry rebound. Today the world record for deepwater drilling occurs off of the coast of Louisiana in 9,727 feet of water.

Louisiana's vast oil and natural gas reserves support one of the state's largest industries. Including offshore holdings, Louisiana ranks second in total energy produced, second in natural gas produced, and first in crude oil production (Louisiana Mid-Continent Oil and Gas Association 2002). Excluding offshore, Louisiana ranks seventh in total energy, third in natural gas and fourth in crude oil production (Louisiana Mid-Continent Oil and Gas Association 2002). In 2000 Louisiana produced over 75 million barrels of crude oil and over 1.4 billion metric cubic feet of natural gas (Louisiana Mid-Continent Oil and Gas Association 2000).

The following statistics were synthesized from Dr. Loren Scott's 1996 study, *The Energy Sector: A Giant Economic Engine for the Louisiana Economy*, and Louisiana Mid-Continent Oil and Gas Association's 1995 *Refinery Impact Study*. Louisiana had over 36,000 miles of above and underground pipelines that transported crude petroleum, natural gas, and condensate from fields to refineries and storage areas. Louisiana ranked number two in the nation in total refining capacity with 19 large-scale refineries that were able to process 2.76 million barrels of oil per day. The 19 refineries accounted for 15% of the nation's total refining capacity.

The Louisiana oil and gas industry is comprised of the exploration and production, refining, marketing, and transportation industries. In 2001 the oil and gas industry directly employed 82,408 persons (Louisiana Mid-Continent Oil and Gas Association 2001). In 1996 jobs in the energy sector and earnings were found in at least 54 of Louisiana's 64 parishes and through both their direct and multiplier effects the industry supported \$65.2 billion in sales in Louisiana firms and over \$8 billion in household earnings (Scott 1996).

Tourism

Tourism was an \$8.7 billion industry in Louisiana in the year 2000, surpassing previous figures with increased visitation, visitor spending, employment, and payroll and travel generated tax revenue (Louisiana Department of Culture, Recreation and Tourism 2001). Approximately 23.7 million domestic and international travelers visited the state, generating \$216.6 million locally, \$397.3 million for the state, and \$627.7 million for the federal government (Louisiana Department of Culture, Recreation and Tourism 2001). The increase in visitor spending is attributed to the promotion of Louisiana's diverse culture and to the opening of new attractions and hotel properties across the state (Louisiana Department of Culture, Recreation and Tourism 2001). Tourism in Orleans parish dominated the industry with nearly \$4 billion in visitor spending, followed by Jefferson, East Baton Rouge, Caddo, and Bossier Parishes (Louisiana Department of Culture, Recreation and Tourism 2001). Catahoula, Natchitoches, Sabine, Evangeline, St. Landry, and East Baton Rouge Parishes recorded modest growth in visitor spending (Louisiana Department of Culture, Recreation and Tourism 2001). Travel spending directly generated 120,600 jobs and nearly \$2 billion in wage and salary income in 2000 (Louisiana Department of Culture, Recreation and Tourism 2001).

Land Management and Ownership

Parks

Louisiana's State Parks, Historic Sites, and Preservation Area have been chosen for their scenery and historical, cultural, architectural, and/or archeological significance. The state manages 56 sites, of which 34 are operational and include 17 State Parks, 16 Historic Sites (State Commemorative Areas), and one Preservation Area. Total state holdings approximate 38,573 acres. This information and additional information on Louisiana's State Parks, Historic Sites, and Preservation Area is available from the LCRT, Office of State Parks.

The USDOJ, NPS operates three National Historical Parks/Preserves/Heritage Areas and one National Monument in Louisiana. The Jean Lafitte National Historical Park and Preserve consists of six units. Established in 1978, the six units include sites of natural, historical, cultural, and archeological significance in the Mississippi River deltaic region. The Cane River Creole National Historical Park and Heritage Area is significant for its rural, agricultural landscape and associated plantations, structures, people, and culture. The New Orleans Jazz National Historical Park was established to celebrate and to preserve information and resources associated with the origins and evolution of jazz. The Poverty Point National Monument is managed by the State of Louisiana and commemorates an advanced "prehistoric" culture that thrived during the first and second millennia BC. This information and additional information is available from the USDOJ, NPS.

The USACE manages lakeside recreational areas that are generally moderate in size and offer a full range of facilities such as campgrounds, picnic areas, boat ramps, marinas, and hiking trails. Corps projects in Louisiana include the 520-acre Bayou Bodcau Dam and the Ouachita-Black Rivers Navigation Project, which consists of 17 recreational areas along the 322-mile navigation system. The Columbia Lock 8 Dam Pool, Jonesville Lock and Dam Pool, and Pearl River Lock Number 1 are sites within the Ouachita-Black Rivers Navigation Project. This information and additional information is available from the USACE.

Refuges

The LDWF is responsible for the establishment and development of the Wildlife Management Area (WMA) system throughout the state. The department presently manages 48 WMAs in seven regions, comprising a total of 1,231,913 acres. Initiated in the early 1950s, the state's management areas represent every habitat type found throughout the state; coastal marshes, bottomland hardwoods, cypress tupelo swamps, mixed pine hardwoods, longleaf pine savannahs, upland hardwood forests, upland longleaf pine forests, and shortleaf pine/oak/hickory forests. This information and additional information on Louisiana's WMAs is available from the LDWF, WMA Program.

The USDOJ, USFWS manages 24 National Wildlife Refuges (NWR) in Louisiana. Management ranges from preservation to active manipulation of habitats and population. Hunting, fishing, wildlife observation, photography, interpretation, and education, when compatible, are legitimate and appropriate uses of the refuge system. This information and additional information is available from the USDOJ, USFWS.

Forests

The LDAF, Office of Forestry, is mandated "...to protect, conserve, and replenish the natural resources of the state" (Louisiana Revised Statutes 3:4271). Forestland comprises 48% of the state's total area, or approximately 13.8 million acres. There are 148,000 owners of Louisiana forestland, of which private, non-industrial landowners own

62%, forest products industries own 29%, and the general public owns nine percent. The Office of Forestry operates and maintains the Alexander State Forest and associated Indian Creek Recreation Area. The Alexander State Forest is Louisiana's only state owned demonstration forest and is managed under the multiple-use concept; providing timber production, improved wildlife habitat, hunting, recreational opportunity, water and soil conservation, forest management research, and endangered species habitat. The Alexander State Forest was established in 1923. Nine subsequent purchases of adjacent properties have expanded the forest to its present size of approximately 8,000 acres. This information and additional information on the Alexander State Forest is available from the LDAF, Office of Forestry.

The U.S. Department of Agriculture (USDA), Forest Service, manages Louisiana's only National Forest (NF), the Kisatchie National Forest. The forest is located in central and northern Louisiana and is comprised of five managed Ranger Districts totaling approximately 604,000 acres. Forest management practices emphasize natural resource restoration and conservation. Two National Wildlife Preserves (Catahoula and Red Dirt) are located within the Kisatchie National Forest. This information and additional information is available from the USDA, Forest Service.

Large Private Land Holdings

Forest statistics for the State of Louisiana were derived from data obtained during a 1991 inventory of the 64 parishes by Vissage et al. (1992). Of the state's 26,265,400 acres, 4,472,100 acres were owned by the forest industry, defined as lands owned or leased by companies or individuals operating wood-using plants (either primary or secondary). Farmer-owned lands, defined as lands operated as a unit of 10 acres or more and from which the sale of agricultural products totals \$1,000 or more annually, totaled 724,900 acres. Nonindustrial private land (corporate), defined as lands privately owned by private corporations other than forest industries and incorporated farms, totaled 2,064,100 acres. Nonindustrial private land (individual), defined as lands privately owned by individuals other than forest industries, farmers, or miscellaneous private corporations, totaled 5,282,800 acres.

Farm statistics for the State of Louisiana were obtained from the 1997 Census of Agriculture compiled by the USDA, National Agricultural Statistics Service (NASS) and the Louisiana Agricultural Statistics Service. In 1997, land in farms totaled 7,876,528 acres. The average size of farms was 331 acres. Full time farms numbered 11,281.

Approximately 80% of the Louisiana Coastal Zone is privately owned (Hinds, personal communication 2002).

Tribal Lands

The four federally recognized American Indian Tribal Reservations are: the Chitimacha Tribe of Louisiana (Charenton); the Coushatta Tribe of Louisiana (Elton); the Jena Band of Choctaw Indians (Jena); and the Tunica-Biloxi Indians of Louisiana (Marksville). The five state recognized American Indian Tribal Service Areas are: Caddo Adai Indians of Louisiana (Robeline); the Choctaw-Apache Tribe of Ebarb (Zwolle); the Clifton Choctaw Tribe of Louisiana (Clifton); the Four-Winds Cherokee (Slagle); and the United Houma Indians (Golden Meadow). The Apalachee Tribe of Louisiana is recognized as an Indian Tribal Community. Additional information is available from the State of Louisiana, Office of the Governor, Office of Indian Affairs.

Recreation and Tourism

Parks, Wildlife Management Areas/Refuges, and Forests

Louisiana's State and National Parks (State Historic Sites, State Preservation Area, and National Preserve/Heritage Areas) provide for the recreational use of and/or preservation of the state's abundant natural and cultural resources. State and National Parks provide fishing, boating, swimming, hiking, biking, birding, camping, and picnicking opportunities. State Historic Sites, the State Preservation Area, and National Preserve/Heritage Areas educate visitors through structures, museums, artifacts, outdoor displays, and interpretive programs. This information and additional information on Louisiana's State Parks, Historic Sites, and Preservation Area is available from the LCRT, Office of State Parks. This information and additional information is available from the USDOJ, NPS.

A press release by the Louisiana Office of State Parks in July 2001, reported a record number of visitors for the fiscal year 2000 to 2001. The 1.9 million visitor total broke the previous year's record of 1.7 million (Louisiana Department of Culture, Recreation and Tourism 2001). The increase is attributed to the acquisition of additional properties and the improvement of park facilities and the park system's central reservation system (Louisiana Department of Culture, Recreation and Tourism 2001).

The USACE manages lakeside recreational areas that are generally moderate in size and offer a full range of facilities such as campgrounds, picnic areas, boat ramps, marinas, and hiking trails. In Louisiana, the Bayou Bodcau Dam is a waterfowl and hunting area open to the public. The Ouachita-Black Rivers Navigation Project consists of two navigation pools with 17 recreational areas that provide river access, day-use facilities, and activities such as picnicking, swimming, hunting, fishing, boating, and bird watching. This information and additional information is available from the USACE.

Louisiana's State WMAs and NWRs provide recreational use of habitat types located throughout the state. All state areas are presently open. Annually, state areas provide approximately 1 million outdoor trips to hunters, fisherman, boaters, campers, bird watchers, and outdoor enthusiasts. This information and additional information on Louisiana's WMAs is available from the LDWF, WMA Program. This information and additional information is available from the USDOJ, USFWS.

The Alexander State Forest is Louisiana's only state owned demonstration forest and is managed under the multiple-use concept. Approximately 75 percent of the forest's 8,000 acres are managed for hunting and other recreational activities. The Indian Creek Lake and Recreation Area is located within the forest and is comprised of a 2,250-acre lake, 100 acres of developed recreational facilities, and a 250-acre primitive camping area. The lake offers freshwater fishing and developed recreational facilities include campsites, picnic sites, a covered pavilion, beaches for swimming, bath houses, and a boat launch. A hiking trail provides access to and viewing of a variety of habitats supporting numerous plant and animal species. This information and additional information on the Alexander State Forest is available from the LDAF, Office of Forestry.

The Kisatchie National Forest is Louisiana's only National Forest and is comprised of five Ranger Districts throughout central and northern Louisiana. Recreational opportunities include fishing and hunting on four lakes and within an 8,700-acre wilderness, and 355 miles of trails for camping, picnicking, hiking, mountain biking, horseback riding, and/or off road vehicle riding. This information and additional information is available from the USDA, Forest Service.

Natural and Scenic River Systems

The LDWF is responsible for the administration of the Natural and Scenic Rivers and Historic and Scenic Rivers System as mandated by the Louisiana Scenic Rivers Act (Acts 1998, No. 947, Section 1, effective July 27, 1988, or L.R.S. 56:1840, et seq.).

Regulations “establish procedures and provide a mechanism whereby the Department of Wildlife and Fisheries can preserve, protect, develop, reclaim and enhance the wilderness qualities, scenic beauties and ecological regime of rivers and streams or segments thereof included within the Louisiana Natural and Scenic Rivers and Historic and Scenic Rivers System and for the further purposes of preserving aesthetic, scenic, recreational, fish, wildlife, ecological, archaeological, geological, botanical and other natural and physical features and resources found along these rivers and streams or segments thereof” (Louisiana Scenic Rivers Act [Acts 1998, No. 947, Section 1, effective July 27, 1988, or L.R.S. 56:1840, et seq.]). The LDWF manages 52 natural, undeveloped rivers and streams.

The National Wild and Scenic Rivers Act (P.L.90-542 as amended; 16 USC1271-1278) was passed by Congress in 1968 so “that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.” Saline Bayou is Louisiana’s only designated national wild and scenic river and is located within the Kisatchie National Forest unit. The U.S. Forest Service (USFS) is responsible for managing the 6,030-acre Saline Bayou.

Hunting

Louisiana’s diverse habitat types support an abundance of wildlife and provide for hunting on both public and private lands. The LDWF manages approximately 1.4 million acres of land in WMAs and refuges throughout the state with the goals of providing quality examples of Louisiana’s habitats, insuring viability of these lands’ wildlife populations, and providing the opportunity for a quality outdoor recreational experience. The department’s Deer Program was established with the objectives to manage and maintain a healthy population of whitetail deer (*Odocoileus virginianus*) in Louisiana and to provide quality outdoor recreation and a harvest of 200,000 deer annually. A game harvest survey dated 1996 to 1997 indicated 180,200 deer hunters spent more than 3.7 million days afield during the deer season and harvested 234,700 deer (Louisiana Department of Wildlife and Fisheries 2000). Within the past five years, values cited have remained relatively stable to slightly increasing (Louisiana Department of Wildlife and Fisheries 2000). Yearly managed hunts to allow for the harvest of surplus deer and to prevent the overbrowsing of habitats are conducted in state WMAs and on USFS, USFWS, and USACE designated lands.

Common small game species include squirrel, rabbit, wild turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), woodcock (*Scolopax minor*), ring-necked pheasant (*Phasianus colchicus*), and snipe (*Gallinago gallinago*). In order to meet public demands, the LDWF established a Small Game Program and a Turkey Program for the purposes of species management, research and population monitoring, restoration, and habitat improvement.

Louisiana is an important waterfowl wintering area due in part to its semitropical climate and geographical position. Louisiana is located in the Mississippi and Central flyways, by

which waterfowl migrate from northern nesting grounds to Louisiana and locations south thereof. Migrants winter in coastal marshes, freshwater swamps, and agricultural fields. Waterfowl provide economically important activities. In order to meet public demands, the LDWF has established a Waterfowl Program with the objectives to manage waterfowl resources and wetlands and to provide for optimum wildlife benefits and quality outdoor experiences.

The LDWF issued 589,234 hunting licenses and 9,673 lifetime licenses in 2000 to 2001 (Hinds, personal communication 2002).

The number of landowners leasing land for recreational hunting, primarily of Whitetail Deer, in 2000 was 5,653 for a total of 6,872,351 acres (Calhoun 2002).

The Fur and Refuge Division of LDWF is responsible for the management and supervision of indigenous furbearer species and alligator, reptile, and amphibian resources. The division manages a total of approximately 428,000 acres of coastal marsh on five refuges and four WMAs, all of which are open for various forms of public recreation. Pelts of the muskrat (*Ondatra zibethicus*), nutria (*Myocastor coypus*), raccoon (*Procyon lotor*), mink (*Mustela vison*), and otter comprise the bulk of the fur harvest. Raccoon, opossum, fox, bobcat (*Lynx rufus*), and coyote (*Canis latrans*) are important upland habitat furbearer species. The LDWF issued 982 trapping licenses in 2000 to 2001 (Hinds, personal communication 2002).

Fishing

Numerous accessible waterways and abundant freshwater and marine game fish species has made the waters of Louisiana the destination of choice for fresh and saltwater fishermen. During the 2000 to 2001 season, 815,180 recreational fishing licenses were sold in the State of Louisiana (Hinds, personal communication 2002).

The freshwater regions of Louisiana include over 40,000 miles of rivers, bayous, and streams; nearly 450,000 acres of lakes and ponds; and over 3.5 million acres of marsh. Louisiana has 22 families and 148 species of freshwater fish. The following list of freshwater species includes only those which have significant sport fishing value: largemouth bass (*Micropterus salmoides*) (most highly prized recreational game fish), spotted bass (*Micropterus punctulatus*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), white bass (*Morone chrysops*), and the recently introduced striped bass (*Morone saxatilis*).

Recreational fishing in Louisiana's coastal marshes and marine waters is extremely popular among residents and tourists alike. Along the Louisiana coastline, recreational fisherman land finfish, crustaceans, and benthos. Port Fourchon and Grand Isle are popular destinations for landing redfish (*Sciaenops ocellatus*), blacktip shark (*Carcharhinus limbatus*), speckled trout (*Cynoscion arenarius*), black drum (*Pogonias cromis*), and shrimp. Offshore recreational anglers fish artificial reefs created by oil and gas platforms, which support a large variety of marine life and big game fish such as the bluefish (*Pomatomus saltatrix*), dolphin (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), red snapper (*Lutjanus campechanus*), bonita, jackfish, marlin, tuna, mackerel, and cobia/lemonfish/ling.

Bird Watching

Louisiana's semitropical climate and position at the southern terminus of the Mississippi and Central flyways provide habitat for both permanent and migratory bird species. Bird

watching is an economically important activity in coastal Louisiana. Louisiana State Park holdings, WMAs, and NWRs promote birding and conduct annual bird counts.

Boating

Louisiana's four million acres of water provide the public the opportunity to engage in numerous water-related activities. As of December 31, 2000, the LDWF had registered 330,293 boats (Hinds, personal communication 2002). Public launch ramps are located throughout the state.

Federal Facilities

Federal facilities are defined as lands owned, leased, held in trust or whose use is otherwise by law subject solely to the discretion of the federal government, its officers or agents. See Table B-14 for a list of federal facilities in Louisiana

Table B- 14: Federal Facilities in Louisiana

Department	Agency	Type	Name	Acres
USDOJ	USFWS	National Wildlife Refuge	Texas Point National Wildlife Refuge	8996
	USFWS	National Wildlife Refuge	Saint Catherine Creek National Wildlife Refuge	10622
	USFWS	National Wildlife Refuge	Catahoula National Wildlife Refuge	10740
	USFWS	National Wildlife Refuge	Cameron Prarie National Wildlife Refuge	18132
	USFWS	National Wildlife Refuge	D'Arbonne National Wildlife Refuge	20593
	USFWS	National Wildlife Refuge	Grand Cote National Wildlife Refuge	22399
	USFWS	National Wildlife Refuge	Lacassine National Wildlife Refuge	34418
	USFWS	National Wildlife Refuge	Upper Ouachita National Wildlife Refuge	35227
	USFWS	National Wildlife Refuge	Bogue Chitto National Wildlife Refuge	36699
	USFWS	National Wildlife Refuge	Lake Ophelia National Wildlife Refuge	37476
	USFWS	National Wildlife Refuge	Bayou Sauvage National Wildlife Refuge	42521
	USFWS	National Wildlife Refuge	Delta National Wildlife Refuge	53519
	USFWS	National Wildlife Refuge	Atchafalaya National Wildlife Refuge	57064
	USFWS	National Wildlife Refuge	Breton National Wildlife Refuge	63323
	USFWS	National Wildlife Refuge	Tensas River National Wildlife Refuge	79760
	USFWS	National Wildlife Refuge	Sabine National Wildlife Refuge	145224
	USDOD	BIA	Indian Reservation	Chitamacha Indian Reservation
NPS		National Historical Park	Jean Lafitte National Historical Park and Preserve	15803
NPS		National Monument	Poverty Point National Monument	931896
Navy		N/A	New Orleans Naval Air Station	98
USACE		N/A	Bonnett Carre Spillway	154
USDA	Army	N/A	Louisiana Ordnance Plant	620
	Air Force	N/A	Barksdale Air Force Base	684
	Army	N/A	Fort Polk Military Reservation	4122
USDA	USFS	National Forest	Sabine National Forest	6136
	USFS	National Forest	Kisatchie National Forest	6981

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APPENDIX C: T AND E SPECIES, ESSENTIAL FISH HABITAT, AND OTHER RELATED INFORMATION

The following appendix includes information on federal threatened and endangered species (T&E) and essential fish habitat (EFH) throughout the coastal and upland regions of Louisiana. Threatened and endangered species are grouped by animal or plant and are listed in alphabetical order. Essential fish species and habitats are divided into specific areas of concern. This appendix separates those species and habitats managed under the Fisheries Management Plan for the Gulf of Mexico as well as the species managed under the federally implemented Fisheries Management Plan.

THREATENED AND ENDANGERED SPECIES (FEDERAL) as of February 26, 2003

ANIMALS (23)

Status	Listing
T(S/A)	Alligator, American (<i>Alligator mississippiensis</i>)
T(S/A)	Bear, American black (County range of LA b. bear) (<i>Ursus americanus</i>)
T	Bear, Louisiana black (<i>Ursus americanus luteolus</i>)
T	Eagle, bald (lower 48 States) (<i>Haliaeetus leucocephalus</i>)
T	Heelsplitter, Alabama (=inflated) (<i>Potamilus inflatus</i>)
E	Mucket, pink (pearly mussel) (<i>Lampsilis abrupta</i>)
T	Pearlshell, Louisiana (<i>Margaritifera hembeli</i>)
E	Pelican, brown (except U.S. Atlantic coast, FL, AL) (<i>Pelecanus occidentalis</i>)
T	Plover, piping (except Great Lakes watershed) (<i>Charadrius melodus</i>)
T	Sea turtle, green (except where endangered) (<i>Chelonia mydas</i>)
E	Sea turtle, hawksbill (<i>Eretmochelys imbricata</i>)
E	Sea turtle, Kemp's ridley (<i>Lepidochelys kempii</i>)
E	Sea turtle, leatherback (<i>Dermochelys coriacea</i>)
T	Sea turtle, loggerhead (<i>Caretta caretta</i>)
T	Sturgeon, gulf (<i>Acipenser oxyrinchus desotoi</i>)
E	Sturgeon, pallid (<i>Scaphirhynchus albus</i>)
E	Tern, least (interior pop.) (<i>Sterna antillarum</i>)
T	Tortoise, gopher (W. of Mobile/Tombigbee Rs.) (<i>Gopherus polyphemus</i>)
T	Turtle, ringed map (<i>Graptemys oculifera</i>)
E	Vireo, black-capped (<i>Vireo atricapillus</i>)
E	Whale, finback (<i>Balaenoptera physalus</i>)
E	Whale, humpback (<i>Megaptera novaeangliae</i>)
E	Woodpecker, red-cockaded (<i>Picoides borealis</i>)

PLANTS (3)

Status	Listing
T	<i>Geocarpon minimum</i> (No common name)
E	Quillwort, Louisiana (<i>Soetes louisianensis</i>)
E	Chaffseed, American (<i>Schwalbea americana</i>)

T = Threatened

E = Endangered

T(S/A) = Similarity of Appearance to a Threatened Taxon

ESSENTIAL FISH HABITAT

Fishery Management Plans and Managed Species for the Gulf of Mexico Managed by the Gulf of Mexico Fishery Management Council

Shrimp Fishery Management Plan

brown shrimp - *Penaeus aztecus*
pink shrimp - *P. duorarum*
royal red shrimp - *Pleoticus robustus*
white shrimp - *Penaeus setiferus*

Red Drum Fishery Management Plan

red drum - *Sciaenops ocellatus*

Reef Fish Fishery Management Plan

black grouper - *Mycteroperca bonaci*
gag grouper - *M. microlepis*
gray snapper - *Lutjanus griseus*
gray triggerfish - *Balistes capriscus*
greater amberjack - *Seriola dumerili*
lane snapper - *L. synagris*
lesser amberjack - *S. fasciata*
red grouper - *Epinephelus morio*
red snapper - *L. campechanus*
scamp grouper - *M. phenax*
tilefish - *Lopholatilus chamaeleonticeps*
yellowtail snapper - *Ocyurus chrysurus*
vermillion snapper - *Rhomboplites aurorubens*

Stone Crab Fishery Management Plan

stone crab - *Menippe spp.*

Spiny Lobster Fishery Management Plan

spiny lobster - *Panulirus argus*

Coral and Coral Reef Fishery

Management Plan

varied coral species and coral reef communities
comprised of several hundred species

Coastal Migratory Pelagic Fishery

Management Plan

bluefish - *Pomatomus saltatrix*
dolphin - *Coryphaena hippurus*
cobia - *Rachycentron canadum*
king mackerel - *Scomberomorus cavalla*
little tunny - *Euthynnus alleteratus*
Spanish mackerel - *S. maculatus*

National Marine Fisheries Service. 1999. Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies.
<http://galveston.ssp.nmfs.gov/efh/EFHprimer2.pdf>

Species Managed under the Federally-Implemented Fishery Management Plans Managed by National Marine Fisheries Service

Billfish

blue marlin - *Makaira nigricans*
longbill spearfish - *Tetrapturus pfluegeri*
sailfish - *Istiophorus platypterus*
white marlin - *T. albidus*

Swordfish

swordfish - *Xiphias gladius*

Tuna

albacore - *Thunnus alalunga*
Atlantic bigeye - *T. obesus*
Atlantic yellowfin - *T. albacares*
skipjack - *Katsuwonus pelamis*
western Atlantic bluefin - *T. thynnus*

Sharks

Atlantic angel shark - *Squatina dumerili*
Atlantic sharpnose shark - *Rhizoprionodon terraenovae*
basking shark - *Cetorhinus maximus*
bigeye sand tiger - *Odontaspis noronhai*
bigeye sixgill shark - *Hexanchus vitulus*
bigeye thresher shark - *Alopias superciliosus*
bignose shark - *Carcharhinus altimus*
blacknose shark - *C. acronotus*
blacktip shark - *C. limbatus*
blue shark - *Prionace glauca*
bonnethead - *Sphyrna tiburo*
bull shark - *C. leucas*
Caribbean reef shark - *C. perezi*
Caribbean sharpnose shark - *R. porosus*
common thresher shark - *A. vulpinus*
dusky shark - *C. obscurus*
finetooth shark - *C. isodon*
Galapagos shark - *C. galapagensis*
great hammerhead - *S. mokarran*
lemon shark - *Negaprion brevirostris*
longfin mako shark - *Isurus paucus*
narrowtooth shark - *C. brachyurus*
night shark - *C. signatus*
nurse shark - *Ginglymostoma cirratum*
oceanic whitetip shark - *C. longimanus*
porbeagle shark - *Lamna nasus*
sandbar shark - *C. plumbeus*
sand tiger shark - *O. taurus*
scalloped hammerhead - *S. lewini*
sharpnose sevengill shark - *Heptranchias perlo*
shortfin mako shark - *I. oxyrinchus*
silky shark - *C. falciformis*
sixgill shark - *H. griseus*
smalltail shark - *C. porosus*
smooth hammerhead - *S. zygaena*
spinner shark - *C. brevipinna*
Tiger shark - *Galeocerdo cuvieri*
whale shark - *Rhinocodon typus*
white shark - *Carcharodon carcharias*

National Marine Fisheries Service. 1999. Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies.
<http://galveston.ssp.nmfs.gov/efh/EFHprimer2.pdf>

Essential Fish Habitat Identified in Fishery Management Plan Amendments of the Gulf of Mexico, South Atlantic, Caribbean and Mid-Atlantic Fishery Management Councils. (Generally, EFH for species managed under the NMFS Billfish and Highly Migratory Species plans falls within the marine and estuarine water column habitats designated by the councils)

Estuarine areas

- Estuarine emergent wetlands
- Mangrove wetlands
- Submerged aquatic vegetation
- Algal flats
- Mud, sand, shell, and rock substrates
- Estuarine water column

Marine areas

- Water column
- Vegetated bottoms
- Non-vegetated bottoms
- Live bottoms
- Coral reefs
- Artificial reefs
- Geologic features
- Continental Shelf features
- West Florida Shelf
- Mississippi/Alabama Shelf
- Louisiana/Texas Shelf
- South Texas Shelf

National Marine Fisheries Service. 1999. Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies.
<http://galveston.ssp.nmfs.gov/efh/EFHprimer2.pdf>

Geographically Defined Habitat Areas of Particular Concern Identified in Fishery Management Plan Amendments Affecting the Southeast and Caribbean Areas.

Texas/Louisiana

Flower Garden Banks National Marine Sanctuary

National Marine Fisheries Service. 1999. Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies.
<http://galveston.ssp.nmfs.gov/efh/EFHprimer2.pdf>

APPENDIX D: PROJECT SOLICITATION FORM

NRDA-RRP RESTORATION PROJECT INFORMATION SHEET

Organization:		Project Name:			
Organization Web Page:		Project Location:			
Contact Name:		Parish & Watershed:			
Contact Title:		Latitude/Longitude:			
Contact Address:					
Contact Phone:		Contact Fax:		Contact E-Mail:	

Restoration Activity

Resource/Habitat/Service	<input type="checkbox"/> Marine/Estuarine Wetland <input type="checkbox"/> Freshwater Wetland <input type="checkbox"/> Reef <input type="checkbox"/> Biological (Fish, Birds, Wildlife) <input type="checkbox"/> Upland <input type="checkbox"/> Recreational <input type="checkbox"/>				
Restoration Result	<input type="checkbox"/> Creation <input type="checkbox"/> Rehabilitation <input type="checkbox"/> Enhancement <input type="checkbox"/> Protection <input type="checkbox"/>			Project Size:	Affected Area:

Project Status (please provide as much information as is currently available)

Activity	Funded?	Completed?	Additional Notes
Planning/Design/Permitting:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Property or Resource Acquisition:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Construction:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Maintenance and Future Activities:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Future Construction & Oversight:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Restoration Monitoring:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Other (____):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	

Restoration Description and Benefits

Project Partners

Organization	Contact Information	Project Involvement

RESTORATION PROJECT INFORMATION SHEET

Guidelines for Completion

Please complete all of the information requested with the best information that you have available. Limited attachments are acceptable if they are necessary to adequately describe the project, however every effort should be made to have all pertinent information included on the Restoration Project Information Sheet. Below are specific guidelines for completion.

- Organization:** The name of the organization or agency submitting the information.
- Organization Web Page:** The web page of the above organization or agency.
- Contact Name:** The name of a person who can be contacted for additional information.
- Contact Title:** The title of the above individual.
- Contact Address:** The mailing address of the above individual.
- Phone/Fax/Email:** The Phone number, Fax and E-mail of the above individual.
-
- Project Name:** The common name of the project, usually a combination of location and restoration activity, for example the Cross Bayou Mangrove Restoration.
- Project Location:** The location where the restoration activity will take place, for example East Timbalier Island.
- Parish & Watershed:** The Parish and Watershed where the project will be completed.
- Latitude/Longitude:** The project location in Degrees/Minutes/Seconds or Decimal Degrees
-
- Resource/Habitat/Service:** The type of resource, habitat, and/or service that will be restored.
- Restoration Result:** The type of activity that will be completed as part of the restoration
Creation: Creation of a habitat, resource, or service in a area where it did not previously exist.
Rehabilitation: The reestablishment or rehabilitation of an area that once provided, but does not currently, the resource, habitat, or service in which you are trying to restore.
Enhancement: The enhancement of an existing resource, habitat, or service.
Preservation/Protection: The removal of a threat to a resource, habitat, or service.
- Project Size:** The size of the area where restoration activities will be completed.
- Affected Area (Size):** The size of the area that will be affected by the restoration activity.
-
- Project Status:** Please check the appropriate boxes concerning whether certain aspects of the project have funding from an outside source allocated to them, and/or if certain activities have been completed. Additionally if a certain activity is not required for completion of the project check the box "n/a" for not applicable.
-
- Project Description And Benefits** A 1-2 paragraph description of the project and the restoration activities to be completed, along with information on the benefits of this project to public and environment. In addition feel free to attach other information, maps, or diagrams concerning your project.
-
- Project Partners:** Please provide the name, contact, and involvement (equipment, matching funds, design, etc.) of other organizations or agencies involved with the restoration activity.

After completion, please mail or fax this form to:

Louisiana Oil Spill Coordinator's Office
Attn: Chuck Armbruster
150 Third Street, Suite 405
Baton Rouge, LA 70801
(225) 219-5802 (fax)
(225) 219-5800 (voice)
carmbruster@losco.state.la.us (e-mail)

APPENDIX E: NRDA PRELIMINARY ASSESSMENT WORKSHEET

NRDA PRELIMINARY ASSESSMENT WORKSHEET

Incident Name:				Responsible Party:			
RP Contact:				RP Contact Number:			
Parish:				City:			
Incident Date/Time:				Investigation Date/Time:			
Incident Location:							
Latitude:	°	Longitude:			°		
Product Released:				Amount Spilled:			
Habitat Affected:	Check all that apply	Oiling			Estimated size of impacted area:	Expected exposure time?: (hours, days, months)	
		L	M	H			
	Open Water						
	Bottom Sediments						
	Bay						
	River/stream						
	Gulf						
	Shoreline						
	Beach						
	Developed						
	Other						
	Marsh						
	Saline						
	Brackish						
	Fresh						
	Flotant						
	Mangrove						
	Woodland						
	Swamp						
	Bottomland Hardwood						
Shrub/scrub							
Pine							
Other: (specify)							
Samples Collected? Yes No	Sample Type/#:			Investigator:			
Photo Doc.? Yes No	35 MM/ digital/ video			Contact #:			
Observed faunal mortality?: Yes No		Observed oiled fauna?: Yes No					
Carcasses? (species/number/disposition):							
Response Impacts?: Yes No		Do you anticipate additional impacts?: Yes No					
NOTES:							

Please complete upon site visit and FAX to 225-219-5802

NRDA PRELIMINARY ASSESSMENT WORKSHEET

Guidelines for Completion

This worksheet is to be completed when an oil spill is investigated on-site. The information is to be faxed to the Louisiana Oil Spill Coordinator's Office at 225-219-5802. The data derived from this effort will be used to determine if further investigation that may lead to a Natural Resource Damage Assessment is warranted.

Incident Name: Usually comprised of the responsible party name and the location (e.g., Exxon Paradis, Chevron Dixon Bay, Apache Freshwater City, etc.). This is not a critical data field, but is used for reference purposes.

Responsible Party: Company responsible for the release.

RP Contact: Contact person with the responsible company.

RP Contact Number: Phone number of the above contact person.

Parish/City: Self-explanatory. Use the name of the nearest incorporated municipality for "city".

Incident Date/Time: Date/Time when the release occurred.

Investigation Date/Time: When the investigator arrived on-scene.

Incident Location: Description of how a reader can find the incident.

Latitude/Longitude: If the information is available and you are reasonably sure it is accurate.

Product Released: What was spilled?

Amount Spilled: How much was spilled?

Oiling: For each habitat type selected, indicate the degree of oiling by checking "L" (lightly), "M" (moderately) or "H" (heavily).

Habitat Affected: Specify the habitat type if "Other" is selected.

Estimated size of impacted area: For each habitat type selected, use your best professional judgment to estimate area of impact.

Expected exposure time: For each habitat type selected, use your best professional judgment to estimate amount of time necessary for all but trace amounts of hydrocarbons to be removed from the subject habitat.

Samples collected? Self-explanatory. Include the number and type of samples collected in the subsequent field.

Photo documentation? Self-explanatory. Include what type of photo record you took.

Investigator: Person investigating the incident and filling out the form.

Contact #: Investigator's phone number.

Observed faunal mortality?: Did the investigator see any animals dead as a result of the spill?

Observed oiled fauna?: Did the investigator see any animals oiled, but not dead, as a result of the spill?

Carcasses?: If dead animals were observed, how many of what species were observed and were there any attempts to collect, catalogue, or preserve them?

Response Impacts?: Are response activities resulting in additional impacts to the area? (e.g., clearing trees for staging areas)

Do you anticipate additional impacts?: Use your best professional judgment to determine whether additional oiling or response impacts will occur from this incident

Notes: Give a brief narrative of your observations, touching on pertinent information that may have not been included in the checklist.

When the form is completed, FAX the document to LOSCO at 225-219-5802.

APPENDIX F: COMPLIANCE STATUS OF LOUISIANA REGIONAL RESTORATION PROGRAM WITH RELEVANT FEDERAL LAWS, REGULATIONS AND PROGRAMS

LAW	SCOPE	LEAD AGENCY	COMPLIANCE REQUIREMENTS
Anadromous Fish Conservation Act, 16 USC 757	Conservation and restoration of anadromous fish resources and habitat.	NMFS, USFWS	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Clean Water Act , 33 USC 1251 et seq.; Sections 404 and 301	Regulates discharge of dredge and fill materials in waters of the U.S.; protection of wetlands.	USACE, USEPA	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies. Project-specific permit may be required.
Clean Water Act, Sections 401 and 402	Establishes state water quality standards.	USEPA	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies. Project-specific permit may be required.
Coastal Wetlands Planning, Protection and Restoration Act of 1990 (CWPPRA)	Establishes regime for protection and enhancement of wetlands.	CWPPRA, USACE, etc.	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Coastal Zone Management Act (CZMA)	Establishes protection measures for coastal zone.	NOAA, LA	Draft PEIS sent to LA CZMA Program Office for review and programmatic consistency determination. Project specific consistency determinations will also be required, as will coastal use permits if the state or a private entity is lead on project-specific implementation.
Essential Fish Habitat, Section 303(a) of the amended Magnuson-Stevens Act	Identifies and establishes protective measures for essential fish habitat.	NOAA (NMFS)	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Endangered Species Act	Identifies and establishes protective measures for endangered, and threatened species.	USFWS, NMFS	Programmatic Section 7 consultation being performed to assess consistency. Project-specific coordination will also be necessary with responsible agencies at time of implementation.
Fish and Wildlife Coordination Act	Establishes protection of fish and wildlife. Applies to federal actions only.	USFWS, NMFS	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
National Environmental Policy Act	Requires survey and disclosure of environmental impacts of proposed federal projects.	Federal lead agency, USEPA	Phased compliance in effect. Program currently in compliance. PEIS finalization and further project-specific consultation as necessary.
National Historic Preservation Act	Establishes protective regime for historic properties. Applies to federal actions.	USDOJ (Registry of Historic Places)	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Oil Pollution Act of 1990	Establishes measures for prevention and response to oil spills.	All federal and state agencies involved in oil spill prevention and response.	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Rivers and Harbors Act	Restricts obstruction or alterations of navigable waterways.	USACE	Program currently in compliance. Project-specific coordination, and additional permit, may be necessary with responsible agencies at time of implementation.
Archeological Finds on State Lands R.S. 41:1605	Permitting on sites with archaeological importance.	LCRT	Program currently in compliance. Project-specific coordination may be necessary with responsible agencies at time of implementation.

REGULATION	SCOPE	LEAD AGENCY	COMPLIANCE STATUS
NOAA's 1996 Final Rule on Natural Resource Damage Assessments	Describes procedures for performing natural resource damage assessment in accordance with OPA.	NOAA	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Executive Order 12898 B AEnvironmental Justice	Requires assessment of project impact on minority and low-income populations.	Lead federal agency.	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Executive Order 11988 B AFloodplain Management	Requires federal agencies to protect and conserve floodplain resources.	Lead federal agency	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Executive Order 11990 B AProtection of Wetlands	Requires federal agencies to protect and conserve wetland resources.	Lead federal agency	Program currently in compliance. Project-specific coordination will be necessary with responsible agencies at time of implementation.
Executive Orders 13007 B ASacred Indian Sites and 13175 B AConsultation with Tribal Governments	Requires consideration and consultation with Indian tribes over actions that may have tribal implications.	Lead federal agency	Program currently in compliance. Project-specific coordination may be necessary with Tribal Governments at time of implementation.
Louisiana Surface Water Quality Standards LAC 33.IX, Chapter 11	Permitting of wastewater discharge into state waters.	LDEQ	Program currently in compliance. Project-specific coordination may be necessary with Tribal Governments at time of implementation.
Louisiana Coastal Resources Program LAC 43:700 et seq.	Establishes state coastal program.	Various state agencies.	Program currently in compliance. Project-specific coordination may be necessary with Tribal Governments at time of implementation.
PROGRAM	SCOPE	LEAD AGENCY	COMPLIANCE REQUIREMENTS
Barataria-Terrebonne National Estuary Project	Conservation and protection of the Barataria-Terrebonne estuary ecosystem.	USACE, LA	Project-specific coordination, as appropriate, at the time of site-specific restoration implementation.
COAST 2050	Enhanced protection and conservation of Louisiana coastal resources	USACE, LDNR/CZM, others	Project-specific coordination, as appropriate, at the time of site-specific restoration implementation.
Oyster Lease Relocation Program LAC 43: I, 850-859, Subchapter B	Reduces conflicts between public coastal restoration projects and private oyster leases.	LDWF	Project-specific coordination, as appropriate, at the time of site-specific restoration implementation.
Tensas River Basin Initiative	Modeling and protection of Tensas River Watershed	USEPA, USDA, LDEQ, the Nature Conservancy, others	Project-specific coordination, as appropriate, at the time of site-specific restoration implementation.
Wetlands Reserve Program	Protection and enhancement of wetland resources	USDA (NRCS)	Project-specific coordination, as appropriate, at the time of site-specific restoration implementation.