

SECTION 905(B) (WRDA 86) ANALYSIS
LOUISIANA COASTAL AREA, LOUISIANA -- ECOSYSTEM RESTORATION

1. STUDY AUTHORITY:

a. This study is authorized through Resolutions of the U.S. House of Representatives and Senate Committees on Public Works, 19 October 1967 and 19 April 1967.

“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors created under Section 3 of the River and Harbor Act approved June 13, 1902, be, and is hereby requested to review the reports of the Chief of Engineers on the Mermentau River and Tributaries and Gulf Intracoastal Waterway and connecting waters, Louisiana, published as Senate Document Numbered 231, Seventy-ninth Congress, on the Bayou Teche, Teche-Vermilion Waterway and Vermilion River, Louisiana, published as Senate Document Numbered 93, Seventy-seventh Congress, on the Calcasieu River salt water barrier, Louisiana, published as House Document Numbered 582, Eighty-seventh Congress, and on Bayous Terrebonne, Petit Caillou, Grand Caillou, DuLarge, and connecting channels, Louisiana, and the Atchafalaya River, Morgan City to the Gulf of Mexico, published as House Document Numbered 583, Eighty-seventh Congress, and other pertinent reports including that on Bayou Lafourche and Lafourche-Jump Waterway, Louisiana, published as House Document Numbered 112, Eighty-sixth Congress, with a view to determining the advisability of improvements or modifications to existing improvements in the coastal area of Louisiana in the interest of hurricane protection, prevention of saltwater intrusion, preservation of fish and wildlife, prevention of erosion, and related water resource purposes.”

b. The District conducted several interim studies under this authority (see paragraph below), but has not received funding to date to conduct this interim study.

2. STUDY PURPOSE:

The purpose of this study would be to evaluate the Coast 2050 Plan (enclosure 1) as a whole and select specific features to be analyzed in feasibility level detail. Ecosystem management strategies for restoration and protection are described in Chapter (p. 79 through p. 126) of the Coast 2050 Plan. These strategies form the basis of measures that would be studied for feasibility of implementation.

3. LOCATION OF PROJECT/CONGRESSIONAL DISTRICT:

a. The study area is Louisiana's coastal area from Mississippi to Texas (see Figure 1). Louisiana parishes included in the study area include Ascension, Assumption, Calcasieu, Cameron, Iberia, Jefferson, Lafourche, Livingston, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Martin, St. Mary, St. Tammany, Tangipahoa, Terrebonne, and Vermilion.

b. The study area is located in the jurisdiction of the following legislators:

US Senator John Breaux (D)

US Senator Mary Landrieu (D)

US Representative, 1st District - Robert Livingston (R) - Vacancy

US Representative, 2nd District - William Jefferson (D)

US Representative, 3rd District - William Billy Tauzin (R)

US Representative, 5th District - John Cooksey (R)

US Representative, 6th District - Richard Baker (R)

US Representative, 7th District - Chris John (R)

4. DISCUSSION OF PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS:

A number of studies and reports on water resources development in the study area have been prepared by the US Army Corps of Engineers (USACE), other Federal, state, and local agencies, research institutes, and individuals. Several Federal and non-Federal erosion control projects have been constructed in the area. Previous studies established an extensive database for this study. Historical trends and existing conditions were identified to provide insight into future conditions and help insolate the problems. The more relevant studies, reports, and projects are described in the following.

Previous partial responses to the Louisiana Coastal Area study authorization that have been completed to the present time are summarized in that to follow.

- As part of the Louisiana Coastal Area Study, USACE prepared a report on a Freshwater Diversion to the Barataria and Breton Sound Basins, in April 1983. The report recommends diverting Mississippi River water into Breton Sound Basin near Caernarvon and into Barataria Basin near Davis Pond to enhance habitat conditions and improve fish and wildlife resources.

- An initial evaluation study entitled Louisiana Coastal Area, Louisiana, Shore and Barrier Island Erosion, dated September 1984, reports investigative findings which indicate that Louisiana's beaches and barrier islands act as buffers for coastal marshes and communities, absorbing much of the wave action from the Gulf of Mexico. However, most of the shoreline is receding. Continued retreat will expose valuable marshes to direct attack from the gulf. Loss of the marshes would have a severe impact on existing coastal development and fish and wildlife resources important to the state and nation.

- The USACE conducted a reconnaissance study under the Louisiana Coastal Authority entitled Mississippi River Delta Study. The purpose of this study was to determine the feasibility of realigning the lower Mississippi River channel to increase its marsh-building capacity. The general study finding was that there are no economically justified alternatives for making realignments to the Mississippi River.

- An initial evaluation report, Louisiana Coastal Area, Louisiana, Water Supply, prepared in September 1984, investigated the advisability of improvements or modification of existing improvements, in the interest of water supply, in the coastal area of Louisiana. The report recommended that five of the six problem areas identified be further investigated in the cost-shared feasibility phase of the study.

- The USACE prepared a reconnaissance report, Louisiana Coastal Area, Hurricane Protection, which investigated hurricane induced surges associated with anticipated future losses of coastal wetlands and barrier islands in Louisiana. The report, certified in March 1989, recommended that the study proceed into the cost shared feasibility phase.

- In April 1990, the USACE published a report entitled Land Loss and Marsh Creation, St. Bernard, Plaquemines, and Jefferson Parishes, Louisiana, under the Louisiana Coastal Area Authority. The report presents the findings of feasibility phase investigations of many of the problems associated with the loss of vegetated wetlands in coastal Louisiana.

Other pertinent studies, reports, and projects not prepared under the Louisiana Coastal Area study authority include the following. A report on the Mississippi River and Tributaries project, published as House Document No. 308, 88th Congress, 1st Session, recommended construction of the Mississippi Delta Region project. The project provided for four salinity control structures to introduce freshwater into the delta region. These improvements were authorized by the Flood Control Act of 1965.

- A report entitled Barataria Bay, Louisiana, was published as House Document No. 82, 85th Congress, 1st Session. The project provides for a 12- by 125-foot channel approximately 37.0 miles long beginning at the Gulf Intracoastal Waterway and extending to Grand Isle, Louisiana. These improvements were authorized by the River and Harbor Act of 3 July 1958. All work was completed in December 1967.

- A report, Mississippi River-Gulf Outlet, was published as House Document No. 245, 82nd Congress, 1st Session. The report recommends an additional outlet from New Orleans to the Gulf of Mexico with a channel 36 feet deep and 500 feet wide. The improvements were authorized by the River and Harbor Act of 29 March 1956. Construction was completed in July 1963.

- A report entitled Louisiana-Texas Intracoastal Waterway, New Orleans, Louisiana to Corpus Christi, Texas, was published as House Document No. 230, 76th Congress, 1st Session. The report and prior River and Harbor Acts provide for the construction of a 384.1 mile channel 12 feet deep by 125 feet wide from the mouth of the Rigolets to the Sabine River. The project was authorized for construction by the River and Harbor Act of 23 July 1942. The main stem of the project was completed in 1944.

- The NOD published the Grand Isle and Vicinity Louisiana, Phase II General Design Memorandum in June 1980. The report contains detailed studies of a combined beach erosion and hurricane protection plan for the shore of Grand Isle. Design features include beach fill, vegetated dunes, and a jetty.
- A report entitled Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, was completed in July 1981. The report recommends deepening the Mississippi River to a project depth of 55 feet from the Gulf of Mexico to the Ports of New Orleans and Baton Rouge. The Board of Engineers for Rivers and Harbors approved the report in March 1982.
- A USACE report entitled New Orleans to Venice, Louisiana Hurricane Protection, was published as House Document 550, 87th Congress, 2nd Session. The project provides hurricane protection to developed areas in Plaquemines Parish along the Mississippi River. The locally constructed back levee from City Price to Venice, Louisiana, on the west bank would be brought up to grade. The General Design Memorandum Supplement No. 5, dated October 1983, provides for the creation of 297 acres of marsh in the Delta-Breton National Wildlife Refuge as mitigation for marsh loss caused by the levees.
- The Lake Pontchartrain and Vicinity, Louisiana, project was authorized by the Flood Control Act of 1965. The project provides for hurricane protection for the Metropolitan New Orleans area by constructing hurricane protection levees and barriers at the entrance to Lake Pontchartrain. Construction was initiated in 1967, but construction of the barriers was halted in 1978 by court injunction until a new environmental impact statement could be prepared. Construction is continuing on other portions of the project.
- A feasibility report entitled Mississippi and Louisiana Estuarine Areas was completed in 1984. The report recommended the diversion of Mississippi River water into the Lake Pontchartrain Basin and wildlife resources. The report recommended the diversion of Mississippi River water into Lake Pontchartrain Basin and Mississippi Sound to enhance habitat conditions and improve fish and wildlife resources. The project was authorized by the Water Resources Development Act of 1988.
- A USACE report entitled New Orleans-Baton Rouge Metropolitan Area, Louisiana, was completed in 1981. The report contains a comprehensive plan for development and conservation of water and related land resources in a 21-parish area. The report includes 10 parishes in the current study and data was incorporated where appropriate.
- A report entitled Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, was completed in 1981. The report recommended deepening the Mississippi River to a project depth of 55 feet from the Gulf of Mexico to the Ports of New Orleans and Baton Rouge. Dredged material would be placed in subsiding areas east and west of the river below Venice to create 11,600 acres of marsh over a 50-yr period. The project was authorized by the 1985 Supplemental Appropriations Act of 1986, dated 17 November 1986. Construction of Phase I of the project, a 45-foot channel to mile 181 Above Head of Passes, was completed in December 1988.

- A report entitled Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana, was published as House Document 215, 76th Congress, 1st Session. The report recommended a navigation channel 35 to 40 feet deep by 800 to 1,000 feet wide. Construction of the channel was completed in 1963. The General Design Memorandum Supplement No. 2, dated April 1984, provides for the restoration of deteriorated bank lines below Venice, Louisiana, and along Southwest Pass with rock foreshore dikes and hydraulic fill to reduce shoaling.
- A USACE feasibility report entitled Mississippi and Louisiana Estuarine Areas was completed in 1984. The report recommends the diversion of Mississippi River water into Lake Pontchartrain Basin and Mississippi Sound to enhance habitat conditions and improve fish and wildlife resources. The final feasibility report and EIS was submitted to the Mississippi River Commission in May 1984.
- The USACE prepared a final feasibility report and EIS entitled Atchafalaya Basin Floodway System, Louisiana, in 1982. The report recommended a plan to satisfy the flood control needs of southeastern Louisiana and optimize the environmental protection of the lower Atchafalaya Basin Floodway.
- The reconnaissance report entitled Mississippi River-Gulf Outlet, St. Bernard Parish, Louisiana (Bank Erosion), was published by the USACE in January 1994. The report assessed navigation channel shoaling, marsh loss, and other erosion-related problems along the Mississippi River-Gulf Outlet. The report recommends constructing bank protection and erosion abatement structures at several locations and the inland portion of the waterway. The studies are currently underway to evaluate the cost effectiveness of structural bank protection measures as a possible modification of the Mississippi River-Gulf Outlet Navigation Project.
- The Center for Wetland Resources, Louisiana State University, performed studies of the hydrologic and geologic characteristics of coastal Louisiana under a contract with USACE. The studies examined and identified trends in the coastal area resulting from natural processes and human activities, identified significant environmental parameters, determined the fresh water required to implement changes for fish and wildlife enhancement, and developed management and structural approaches to problem-solving in the estuarine environment. The findings and recommendations of the studies are included in a series of 18 published reports, the last one published in 1973.
- The Louisiana Department of Natural Resources contracted with Coastal Environments, Inc., to publish a report entitled Louisiana's Eroding Coastline: Recommendations for Protection, in June 1982. The report recognizes that future losses of coastal wetlands are unavoidable and will require either retreat of development from the coastal zone of increasingly greater levels of protection. Areas with erosion problems were identified and ranked according to severity. The report recommends a number of pilot projects using water and sediment diversions, dredged material placement, and planted vegetation as ways to reduce erosion. A study to determine future coastal conditions including changes in shoreline configuration and impacts on developed areas is also recommended. Information on erosion and shoreline changes was used in defining problem areas and evaluating alternative plans.

- The USFWS produced a report entitled Mississippi Deltaic Plain Region Ecological Characterization. Published in 1980, the report supplies information about the biological, physical, and social parameters in the Mississippi Deltaic Plain region of Louisiana. Portions of the USFWS report were used in the present study.

- A report sponsored by USFWS, An Ecological Characterization Study of the Chenier Plain Coastal Ecosystem of Louisiana and Texas, was published in 1979. This report also contains information on the biological, physical, and social parameters in the Chenier Plain of Louisiana and Texas.

- The USFWS published the Proceedings of the Conference on Coastal Erosion and Wetland Modification in Louisiana: causes, consequences, and options, edited by D.F. Boesch (1982). The proceedings provide a current compendium of information on the natural and man-induced causes of land loss, their impacts on natural resources production and man's use of the area, and possible means of reducing land loss.

Under the authority of the Coastal Wetlands Planning, Protection, and Restoration Act of 1990 (Public Law 101-646, Title III – CWPPRA), otherwise termed the Breaux Act of 1990, studies have been conducted and projects implemented, for the restoration and prevention of Louisiana coastal wetland loss. The Breaux Act called for the development of a comprehensive Louisiana Coastal Wetlands Restoration Plan. The first such plan was completed in 1993 and has been in use since that time. The Louisiana Coastal Wetlands Restoration Plan was prepared in November, 1993, by the Louisiana Coastal Wetlands Conservation and Restoration Task Force. This plan is a product of communication, coordination, and cooperation among the designated participants from the state and federal agencies, and through formal and informal involvement of numerous local government agencies, the academic community, private environmental and business groups, and countless motivated individuals. There are two important findings that form the core of the Restoration Plan.

- First, by phasing in an adequate investment now, it is technically feasible to significantly slow or reverse coastal wetlands loss and thereby protect, sustain, and enhance the most valuable environmental and economic assets of the region.
- Second, the no-action alternative condemns the Nation to a far more expensive course of uncoordinated and increasingly futile emergency efforts to protect existing investments in the economic infrastructure without hope of achieving sustainability.

During the preparation of this plan, the Task Force has actively pursued its mission, fulfilling a second CWPPRA directive of submitting a series of annual Priority Project Lists. To date eight of these lists have been submitted, authorizing 81 active projects for construction to hold the line against wetland loss. The Act has begun the prudent process of reinvesting a small portion of the hugely diverse harvest of this region to assure the sustainability of this uniquely productive system. The process laid out in the Act has produced results, both tangible and intangible, within the nine years that have surprised many and increased confidence of future success.

The Mississippi River Sediment, Nutrient and Freshwater Redistribution Feasibility Study is currently being conducted under the CWPPRA authority. The purpose of this study is to: (1) determine means to quantify and optimize the available resources of the Mississippi River to create, protect and enhance coastal wetlands and dependent fish and wildlife populations in coastal Louisiana, and (2) to plan, design, evaluate and recommend for construction projects utilizing the natural resources of the Mississippi River in order to abate continuing measured loss of this habitat and restore a component of wetland growth.

The Louisiana Barrier Shoreline Feasibility Study is also a CWWPRA-authorized study, which was conducted to assess and quantify wetland loss problems linked to protection provided by barrier formations along the Louisiana coast. The study identified solutions to these problems, attached an estimated cost to these solutions, and determined the barrier configuration that will best protect Louisiana's significant coastal resources from saltwater intrusion, storm surges, wind/wave activity and oil spills. These resources include, but are not limited to, oil and gas production and exploration facilities, the Strategic Petroleum Reserve, pipelines, navigable waterways, and fragile estuarine and island habitats.

In addition, the Governor's Office of Coastal Activities Science Advisory Panel prepared a plan for the coast in 1994 for the Wetlands Conservation and Restoration Authority (State Wetlands Authority), constituted under Act 6 (R.S. 49:213.1 et seq.). At about the same time, other plans were developed, as the need for action became widely apparent.

The Coast 2050 Plan, completed in December 1998, has been developed under the legislative mandates described above and is a result of recognition by Federal, State, and local agencies that a single plan is needed. The plan incorporates a clear vision for the coast, builds on previous work, integrates coastal management and coastal restoration approaches, and adopts a multiple-use approach to restoration planning. The Coast 2050 Plan serves as the joint coastal restoration plan of the Breaux Act Task Force and the State Wetlands Authority. The Coast 2050 Plan was completed in December 1998, through a joint effort of the Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Louisiana Wetlands Conservation and Restoration Authority. Coast 2050 is a planning effort inspired by the severity of the problems facing south Louisiana, as well as an increased level of confidence in our ability to understand the ecosystem and to implement effective restoration projects. The plan combines elements of all previous efforts, along with new initiatives from private citizens, local governments, State and Federal agency personnel, and the scientific community. For the first time, as explicitly called for by the Coalition to Restore Coastal Louisiana in 1997, diverse groups have come together to develop one shared vision for the coast expressed in this overarching goal: 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. The first step in achieving this goal is to produce a technically sound plan based upon managing ecosystems with three clear strategic objectives:

- To sustain a coastal ecosystem with the essential functions and values of the natural ecosystem,
- To restore the ecosystem to the highest practicable acreage of productive and diverse wetlands, and
- To accomplish this restoration through an integrated program that has multiple use benefits; benefits not solely for wetlands, but for all the communities and resources of the coast.

Important new information has been developed in this innovative approach to planning. Among other contributions, the Coast 2050 Plan provides new quantitative techniques for projecting land loss patterns into the future, the first coast-wide assessment of subsidence rates and patterns, and the first comprehensive consideration of changes in fish and wildlife populations. Also new is the extent to which the planning process has involved the affected public at the local level. Indeed, many of the ecosystem restoration strategies included in this plan are not new, but recently they have received far wider understanding and endorsement. The participation of local governments and private citizens in plan development has made an essential contribution to the plan.

5. PLAN FORMULATION:

a. Identified problems: Coastal land loss in Louisiana began to exceed levels normally associated with the delta cycle and natural coastal ecosystem change during the 1950's (Britsch and Dunbar 1993). The magnitude of the changes in the landscape and their pervasive nature became clear during the 1970's when the first of several mapping studies (Gagliano and van Beek 1970) quantified the scale of the problem. The recognition of the problem led to growing public concern that coastal land loss be addressed.

(1) Existing Conditions: The Louisiana coastal plain remains the largest expanse of coastal wetlands in the contiguous United States. It comprises 25 and 69 percent of the fresh and salt marshes, respectively, found on the gulf coast. This respectively translates to 15 and 40 percent of those ecotypes remaining in the contiguous United States. The future of Louisiana's coastal marshes is therefore vitally important to the ecological future of the Nation.

The deterioration of these wetlands is now understood to be greatly accelerated by human activities, which is critical to the economic growth of the Nation. The unforeseen loss of these coastal wetlands now threatens the future of this region and is a national tragedy in the making. Arresting and reversing the loss of the Mississippi River's deltaic wetlands has become a new national priority, as witnessed by the statement made by the Honorable Bruce Babbitt, Secretary of the Interior, at the April 17, 1993, signing ceremony for the first CWPPRA projects:

“The coastal wetland issue I would characterize as simply the single most important environmental issue of our times. The wetlands are, without any question, the richest and most threatened ecosystem in this country. And in turn the coastal wetlands, where fresh water meets salt water, where land meets sea, are truly the most fragile, delicate, and important link of all.”

The cumulative effect of human activities has been to tilt the balance between land building and land loss drastically in the direction of loss. As recently as the 1970's the loss rate for Louisiana's coastal wetlands was as high as 40 square miles per year. The current rate of loss is about 25 square miles per year, much of which is due to the residual effects of past human activity.

Present-day Louisiana, which contains about 40 percent of the estuarine wetlands in the lower forty-eight states, is suffering 80 percent of all coastal wetlands losses. Currently, land building has virtually stopped in the deltaic plain and amounts to only a few hundreds of acres each year in the Atchafalaya River delta and along the eastern shoreline of the chenier plain. Land loss, while most dramatic in several inland hot spots, is ubiquitous and takes many forms, including the destruction of barrier islands; shoreline retreat along the margins of lakes, canals, and the gulf coast; and, perhaps more importantly, in the formation, expansion, and coalescing of ponds in the marsh. Paradoxically, deterioration of the system is believed to have contributed to a short-term increase in fisheries production, but the long-term prospect is for catastrophic decline (more than 70 percent over the next 50 years) and a future shoreline far inland of its present location.

The State of Louisiana's recognition of this problem can be traced through the success of its Coastal Zone Management program, established in 1980. Since its inception, the program has helped reduce wetlands loss due to development from 3,000 to 800 acres per year. The concern of private citizens and landowners was made clear in 1989 when an amendment to the Louisiana constitution establishing a dedicated trust fund for coastal wetlands restoration was adopted by a three to one margin. Congress, recognizing the environmental and economic threat posed by the continued loss of these coastal wetlands, was quick to act on this declaration of public support through the passage of the Coastal Wetlands Planning, Protection and Restoration Act.

(2) Expected Future Conditions: When Louisiana became a state in 1812, over 16 million acres of wetlands were incorporated into the resources of the United States. Approximately 4.5 million acres of this total were what would now be considered coastal wetlands. Approximately 74 percent, or 3.3 million acres, of Louisiana's coastal wetlands were still inventoried as such in 1989. However, more than a million acres of coastal wetlands have been lost just within the last 60 years. Current estimates of the loss rate range between 25 and 35 square miles annually (16,000 to 22,000 acres), or about an acre every 25 minutes. This accounts for nearly 80 percent of all coastal wetlands loss in the United States today. Even with current restoration efforts, Louisiana is projected to lose nearly 400,000 acres of marsh and 232,000 acres of swamp by the year 2050.

Louisiana's coastal wetland losses will have impacts well beyond the borders of Louisiana. The impact on commercial fisheries alone will be enormous: by the year 2041, the harvest will decline by 70 percent. Loss of this resource will aggravate our Nation's trade deficit and place at risk the nearly 50,000 jobs directly related to fishing, processing, and wholesaling activities. In addition, populations of migratory birds and other animals directly dependent on the marsh and swamp will decrease dramatically, an impact which will be felt in much of North America, where these species spend part of their life cycle.

A number of other food staples or basic minerals, such as sugar, rice, salt, sulphur, and lime, are also produced in coastal Louisiana. Lost production of these basic items will impact national markets.

The coastal marshes help protect southern Louisiana from flooding and are integral to the design of the \$12 billion worth of flood control works that protect the regional infrastructure. Continued loss of these wetlands will lead to loss or increased maintenance and replacement costs for highways, ports, waterways, railroads, pipelines, oil and gas facilities, and other features. As the coast deteriorates, billions of dollars of infrastructure will be surrendered to the Gulf of Mexico, and billions more will be spent protecting the remainder. Ultimately, consumers and taxpayers will pay these costs.

The consequence of not meeting this challenge would be the loss, forever, of an additional 630,000 acres of wetlands over the next 50 years. Along with this natural asset would go their potential to produce billions of dollars in renewable resources on into the future. Ultimately, the Nation would lose billions more in commercial productivity and infrastructure. Fifty years from today, the same decision will have to be addressed, but with far fewer options. By acting now, there are more choices available, and the information to make an informed decision.

The Mississippi River built the coastal wetlands of Louisiana by depositing enormous volumes of sediment and nutrients, eroded from the vast interior of North America, on the continental shelf at its mouth. For the last several thousand years, dominance of the building process resulted in a net increase of more than four million acres of coastal wetlands. In addition, there was the creation of an extensive skeleton of higher natural levee ridges along past and present channels in the deltaic plain and the beaches of the chenier plain. The landscape this produced gave rise to one of the most productive ecosystems on earth. Only the most intensively managed agricultural systems, artificially subsidized by large inputs of energy and fertilizer, can rival the ability of these estuarine wetlands to convert sunlight and carbon dioxide into food.

The natural processes that produced the Mississippi River deltaic plain, first through the creation of the land and later through its maintenance by overflow of sediments and nutrients, are at odds with man's desire to comfortably inhabit the area and develop its economic resources. In the eighteenth century, when Europeans began settling in significant numbers along the region's numerous low natural ridges, they began constructing local levees to protect themselves from the annual floods of the river. Later, in the nineteenth century, when the power of steam was harnessed for navigation, Congress initiated actions to clear the Mississippi and maintain it as the nation's most important commercial waterway. In the twentieth century, oil and gas exploration, land reclamation projects, and construction of ports and navigation channels further developed the economic potential of the region and the Nation. By the 1940's, massive flood control levees along the entire course of the Lower Mississippi had effectively confined it to a single channel and controlled the threat posed by annual river floods.

Today, flood control projects (such as levees), serve in large measure as an artificial constraint to deltaic processes. Most fresh water and sediment now bypass the area where they would naturally build and nourish wetlands. These valuable resources, by virtue of flood control project construction, are channeled out to the deep waters of the Gulf of Mexico. The wetlands continue to sink or subside as they have always done. Deprived of their natural sustenance, the plants that define the surface of the land die off, unable to maintain themselves within the intermittently flooded zone in which they are adapted to live. Once denuded, the fragile substrate is left exposed to the erosive tidal environment.

The ecosystem problems are compounded by existing and continued infrastructure and inland waterways development. This is especially detrimental, where in many locales artificial channels dredged for navigation and oil and gas development provide efficient conduits for seawater to penetrate far inland. Also, adverse impact is experienced in coastal wetlands that receive either too much or limited amounts of fresh water provided by local rainfall. Due to disturbance of natural conditions, in these respective cases, there is either ponding or rapid water draining seaward. The banks of dredged material piled along man-made channels, water control structures, as well as embankments constructed for roads and railroads, obstruct natural cycles of flooding and draining and isolate large areas of estuaries from the remaining non-riverine sources of sediments and nutrients. Many coastal Louisiana resources have been affected by USACE projects as well as by channels constructed for oil and gas exploration and extraction. These affects include: saltwater intrusion; freshwater marsh loss; deterioration of mature stands of cypress; disruption of natural drainage patterns and tidal exchange processes; escalation of bank erosion as a result of navigation traffic wave action; and restriction of natural tidal flows. Several projects constructed by the USACE have contributed to these effects, such as the: Mississippi River – Gulf Outlet, Gulf Intracoastal Waterway and navigation lock system, Calcasieu River and Pass Ship Channel, along with the water control structures in the Mermentau Basin.

(a) Constraints: The integrated multiple use approach of the Coast 2050 plan provides a significant planning constraint; that the sustenance of coastal wetlands be harmoniously considered, along with other coastal uses and resources such as infrastructure, fish and wildlife resources, public safety, and navigation, and oil and gas industries.

(b) Objectives: The first objective is to perform a detailed review of pertinent past studies and existing projects, with a view towards developing a comprehensive, large-scale, systemic approach to a sustainable ecosystem restoration in coastal Louisiana that supports and protects the regional and national economy. The vision of this approach is to establish a system of over-arching and collaborative ecosystem projects in the study area, for conservation, restoration, and protection, that would together act with more accentuation than that possible by smaller, separately operating, and non-connected efforts.

A second study objective would be to provide synchronization of project implementation. As partial responses to the feasibility study are completed, there would expedition for construction projects to quickly embark on the ecosystem restoration process. In the short-term, strategic restoration projects of a less complex nature would be quickly planned, implemented and operated effectively.

Study efforts would be directed also toward a third objective: to explore the extent and timeliness to which regulatory and infrastructure programs can be aligned toward the restoration goals outlined in the Coast 2050 report.

In the long-term, success of projects resulting from this study would be measured by the quantity, diversity, and quality of wetland acreage, and the resulting benefits from various services to Louisiana and the nation. This being the case, a fourth objective of project implementation would be to provide the maximum acreage and productivity from the coastal ecosystem. These benefits include protection against storms and floods, production of fisheries and wildlife resources, protection of water supply and wastewater assimilation capacity, and support to activities such as oil and gas development, navigation, and ecotourism. This would be best assimilated through the development of a coordinated approach to evaluation of ecosystem value and restoration including, but not limited to, wetland acreage, measures of secondary productivity, biodiversity indices, and population/infrastructure development. These measures—strategic projects, regulatory reform, and wetlands benefits— will be the focus of the implementation effort.

The unprecedented scale of action required will test our ability to understand, predict, and manage the effects of restoration actions on coastal ecosystems. In response to this, another objective of this effort would be to expand the knowledge base, develop the predictive tools, and make the technological advances necessary to implement Coast 2050 strategies. It will be imperative to support the study process through an extensive study management program that: (1) catalogues lessons learned that would be queried and selectively employed in the study process, in order to make future planning and implementation efforts more effective, (2) acquires data on coastal resources, processes, and existing restoration project performance, (3) interprets these data through state-of-the-art hydrologic and ecological models, (4) develops safety net features to address risks and unintended consequences, and (5) applies the results of our knowledge through adaptive management of restoration projects and activities. In addition, a state-of-the-art approach must be used to facilitate overcoming the impediments to the implementation of restoration projects, such as: (1) determination of land ownership, (2) resolution of surface-mineral rights conflicts, (3) compensation for damages, and (4) access to public resources. In order to address all of the issues and concerns of the former, it is envisioned that a multi-dimensional Geographic Information System technology would be employed to manage the effective and efficient use of data and information acquired through both routine- and research and development-level efforts.

Decisions on specific Coast 2050 actions will require a planning and implementation process that has extensive public involvement and effective incorporation of public values. Therefore, a process-oriented objective of this study would be to integrate the restoration program into the entire fabric of coastal activities. This would be geared towards ensuring that restoration is accomplished with impacts on coastal communities and the coastal economy that are acceptable, or that are dealt with equitably through compensation and other programs. There would be a steering committee organized to guide the study, which would include members of the public, and Federal, state, and local representatives.

(4) Concise Statements of Specific Problems and Opportunities Warranting Federal Interest: By themselves, these economic and habitat values, which depend on the biological productivity of Louisiana's coastal wetlands, merit national attention. An equally important dimension of their value derives from the fact that these wetlands protect an internationally significant commercial-industrial complex from the destructive forces of storm-driven waves and tides. This complex includes deep-draft ports carrying 25 percent of the nation's export commodities by tonnage, and the most active segment of the nation's intracoastal waterways. Natural gas fields in the coastal zone and adjacent offshore areas produce 21 percent of the nation's annual output, valued at \$7.4 billion. Petroleum refining industries in the coastal zone produce \$30 billion annually for the domestic market nation-wide. In addition, coastal Louisiana is home to over 2 million people who, ultimately, convert these resources into the products the nation consumes. When investments in facilities, supporting service activities, and the urban infrastructure are totaled, the capital investment in the Louisiana coast adds up to more than \$100 billion. The benefit to all these factors of protecting and restoring the coastal Louisiana ecosystem are assessed to far exceed the cost.

b. Alternative Plans: A wide variety of projects would be investigated, aimed at addressing the problems facing Louisiana's coastal wetlands, from both a defensive, protective posture and a more pro-active, restorative stance. It was recognized early in the development of the Coast 2050 report that the small project orientation of the priority project program could not, of itself, give rise to a comprehensive coast-wide restoration. Accordingly, a regional planning initiative, distinct from the priority project program, was initiated. Nine watersheds, or basins, were distinguished in Louisiana's coastal zone on the basis of their geology and hydrology (see Figure 2), which were assimilated to develop restoration strategies. These nine basins are grouped into four regions, as shown in Figure 2, based on geological/hydrological inter-functionality, in order to sustain their respectively similar ecosystems. A team of academic scientists was retained to facilitate and advise this process, and an extensive effort was undertaken to solicit input from local government officials and the public. The result was a set of nine distinct strategic plans reflecting the significant differences among the region. Through this process the restoration priorities in each region were established. Marsh restoration tools such as hydrologic restoration, shoreline protection, marsh creation with dredged material, marsh management, etc. will be used in each region to preserve or create marsh. In most regions, there are major projects that collectively form the major long-term components geared toward ecosystem restoration.

The plan presented here calls for significant changes in existing management of the lower Mississippi River, to greatly increase sediment and freshwater input into coastal estuaries and restart the natural processes of land building and maintenance. Specifically, the plan and resulting outputs include: (1) construction of new deltas in the shallow waters of Breton Sound or Barataria Bay, (2) small diversions to nourish marshes and swamps, (3) separation of navigation from riverine processes to prevent loss of sediments into deep Gulf of Mexico waters, (4) optimization of Atchafalaya River water flows to the east and west via the Gulf Intracoastal Waterway, and (5) construction of a conveyance channel parallel to Bayou Lafourche to build deltas in adjacent waters. Additionally, several large projects are identified to reverse hydrologic modifications by (6) rebuilding barrier island chains and (7) controlling tidal flows through large navigation channels. The goal is to restore the natural processes that can bring about sustainability with the lowest requirement for future manipulation. The measures recommended

in these plans will be environmentally sustainable. All this is developed based upon a realistic understanding of the countering effects of subsidence and projected sea level rise.

Implementing ecosystem strategies in coastal Louisiana would achieve the overarching goal of Coast 2050: sustaining a coastal ecosystem that supports and protects the economy and culture of southern Louisiana and contributes greatly to the economy and well being of the nation. Across the coast of Louisiana, there would be about 425,000 acres of wetlands preserved or created by the year 2050, with the implementation of ecosystem restoration measures, compared to the amount that would be lost through the year 2050 with only existing restoration efforts. The marshes that would be preserved would have the functions and values of natural ecosystems. A good estuarine gradient would be achieved in many areas of coastal Louisiana, where there would be a restoration of extensive habitat diversity. Across most of the Louisiana coastal area, there would be essentially no barriers to exchange of energy and materials between the wetlands and the estuary. The ecosystem objective of vertical accumulation would be achieved in the deltaic plain by using the Mississippi River nutrients and sediments to increase vegetative plant growth and to create and preserve marsh. Extensive use of Mississippi River water would accentuate vertical accumulation but reduce the estuarine gradient by limiting future areas of saline marsh. Coastal Louisiana would have renewed habitat diversity from bottomland hardwoods and swamps in the upper end through extensive marshes to barrier islands and shorelines near the gulf. Implementation of some strategies have the potential to produce short-term adverse impacts to fisheries, however, ecosystem restoration project implementation would prevent long-term significant decline or collapse in fisheries production.

Implementing all of the regional strategies proposed for the Lake Pontchartrain Basin (Region 1) is estimated to prevent approximately 74% of the marsh loss across the entire region by 2050, thereby saving 33,500 acres of marsh. Vertical accretion in this basin would come mainly from small river diversions that provide nutrients. Many of the strategies will provide multiple-use benefits such as providing marsh to protect the New Orleans metropolitan area.

By 2050, it is projected that there would be 189,900 additional acres of marsh in Region 2, compared to what would exist without ecosystem restoration. Not only would no net loss be achieved in the region, but there would be a 51% gain by the year 2050. Several of the strategies such as the Bayou Lafourche conveyance channel and river diversions in Plaquemines Parish, if feasible, would provide multiple-use benefits to communities and the infrastructure. The hurricane protection levees parallel to Bayou Lafourche and in Plaquemines Parish would be protected by adjacent marsh. Louisiana Highway 1 will have a strip of protective marsh to its east.

In Region 3, there would be 119,600 additional acres of marsh and 46,700 additional acres of swamp by the year 2050, compared to what would exist without the strategies. No net loss would be achieved in swamps and 91% of the predicted marsh loss would have prevented. The ecosystem objective of vertical accumulation would be achieved by using water and sediment from the Atchafalaya and Mississippi Rivers and by protecting the self-sustaining wetlands in the Teche-Vermilion system from bay and lake shoreline erosion.

The major strategies in the Mermentau Basin of Region 4 involve removing water from the Lakes Subbasin. These strategies are projected to reduce future loss by 57% in this basin, resulting in an additional 34,730 acres being present in 2050 when compared to no additional restoration efforts. In the Calcasieu-Sabine Basin (Region 4), major strategies involve controlling salinity by seasonally operated control structures on two navigation channels. If the Trans-Texas Water Supply Project (TTWP) is not implemented, and salinity control is implemented along the lake shore in the near term and at Sabine Pass in the long term, the regional strategies are projected to reduce the Calcasieu-Sabine Basin loss by 61%, resulting in an additional 24,810 acres being present in 2050. If the TTWP is implemented, regional strategies are projected to reduce marsh loss by only 31% in the Calcasieu-Sabine Basin. In this region, there is no significant source of sediments. Thus, vertical accumulation must be achieved predominately by the organic production, which could take place if excess water can be removed and salinity can be controlled. This salinity control would allow simulation of the historic estuarine gradient and maintain large areas as fresh and intermediate marsh. While the projected exchange and interface in Region 4 may be less than in other regions, a healthy ecosystem which more closely resembles the historic condition and produces the highest practicable acreage would likely exist if these strategies were implemented. These regional strategies will provide multiple-use benefits by preserving a band of marsh adjacent to highways and developed areas.

Although designed to work largely within the constraints of the existing infrastructure, regional-scale projects cannot be implemented without accompanying harmonious modifications to vital navigation, transportation, flood protection, and oil and gas extraction and conveyance systems. Various existing USACE projects will be modified. These modifications would be a cost effective means to contribute to the restoration of the ecosystem resources of coastal Louisiana. Regional projects, therefore, require urgent additional investigation and involve funding well beyond that currently authorized. With the likelihood that many of these projects will provide benefits that exceed costs, the relationship between the costs and benefits of implementation would be confirmed in the feasibility study phase to determine which projects to recommend for implementation. Measures that would address ecosystem protection and restoration in coastal Louisiana include those ranging in operation and maintenance from minor to significant. The projects to be studied for implementation would be selected and sequenced in partnership with the non-Federal sponsor, where the costs for O&M of these projects would be borne by the non-Federal sponsor.

c. Preliminary Evaluation of Alternatives: Study of measures for ecosystem restoration in the Louisiana coastal area will include: (1) interdisciplinary planning, (2) inter-agency and public involvement, and (3) a rigorous approach of plan formulation, incremental analyses of alternative plans, and comparison of alternative plans, with respect to environmental benefits.

The Coast 2050 Plan will serve as a framework for the definition of ecosystem resources and the identification of activities, in order to develop an ecosystem benefit evaluation framework process. The Louisiana coastal resources will be inventoried, and existing conditions will be surveyed, with the Coast 2050 Plan used as a basis for beginning. A forecast (1) without-alternative plans conditions and (2) with-plan conditions will each be conducted incrementally, in order to respectively identify, describe, determine the relative significance of, and assess the effects. Appraisal of these effects will be completed next, in order to establish benefits and/or consequences of action/non-action.

Formulation and comparison of alternative plans for ecosystem restoration will be conducted using IWR-PLAN Decision Support Software, which was developed by the USACE Institute for Water Resources. Briefly, IWR-PLAN assists with plan formulation by combining user-defined solutions to planning problems and calculating the effects of each combination, or "plan." The program can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are best financial investments and displaying the effects of each on a range of decision variables.

IWR-PLAN employs user-defined solutions for planning problems and externally-generated estimates of each solution's effects to formulate all possible combinations of those solutions, considering user-defined relationships between solutions. IWR-PLAN will then identify which combinations are the best financial investments through cost effectiveness and incremental cost analyses. Each combination of solutions is an alternative plan. If alternative plans have already been formulated outside IWR-PLAN, the user can bypass the routine for building combinations and still use IWR-PLAN to assist in identifying which plans are the best investments.

In the implementation phase of constructed projects, there would be a detailed monitoring program established for the restoration projects, which will ensure accountability by objectively determining the degree to which programmatic and project-specific goals are achieved. The plan would also provide a basis for improved project design and operation. Monitoring should adhere to rigorous protocols, with input from a steering committee. Monitoring and research results would be incorporated into the GIS for the study, so that the ecosystem management techniques developed in Louisiana can be made available to, and be peer-reviewed by, a national and international audience.

The final obstacles that must be addressed in the implementation of many projects involve social and legal issues. As a result, it is imperative that emphasis be placed on actively involving the public and all stakeholders in the restoration process to retain and build public support and confidence as difficult decisions are faced.

6. FEDERAL INTEREST: Despite the losses of the past century, the wetlands built by the Mississippi River contain an extraordinary diversity of estuarine habitats that range from narrow levee and beach ridges to expanses of forested swamps and fresh, brackish, and saltmarsh prairies. Taken as a whole, the unique interplay of habitats, with their watery connections to each other, upland areas, the Gulf of Mexico, and migratory routes of birds, fish, and other species, combine to place the coastal wetlands created by the Mississippi River among the Nation's most productive and important natural assets. In human terms, these wetlands have historically been a culturally diverse center for social development. More than two million people live within this region. The economic and environmental futures of all residents, whether in the City of New Orleans or in the homesteads of southwest Acadiana, are threatened by the loss of the coastal marshes.

One important interest in south Louisiana's coastal wetlands productivity is the fact that these threatened habitats support a commercial harvest of fish and shellfish comparable in volume to that of the entire Atlantic Seaboard. The market value of the fisheries harvest supported by the state's wetlands averages almost \$1 billion annually. Recreational activities, tourism, and other uses of the resource add several hundred million more dollars to the economy

each year. These values do not count the intangible worth of an incredibly diverse wildlife habitat, which is home to 100 bald eagle nesting pairs, hundreds of thousands of nesting wading birds and seabirds, and five million wintering waterfowl whose summer homes extend over much of North America. Based on these factors, it is assessed that the benefits of coastal Louisiana ecosystem restoration would exceed the cost.

7. PRELIMINARY FINANCIAL ANALYSIS: The strategies set forth in this plan constitute the nation’s (and world’s) largest and most ambitious program of ecosystem restoration. One measure of the scale of this undertaking is to compare the investment that is now being made in coastal restoration to the amount of funds needed to accomplish Coast 2050. Construction aspects of the Coast 2050 Plan would likely require spending about \$14 billion or more over the next 30 years. Table 1 contains a breakdown by study area region of estimated unindexed first costs for construction. The costs shown in Table 1 are based on measures that would be implemented based on Coast 2050 strategies for restoration and protection of the Louisiana coastal area ecosystem. The non-Federal cost share sponsor, the State of Louisiana, has primarily generated its portion of cost-share funding for USACE projects, from revenues received on oil and gas production in the state. The State of Louisiana is presently exploring added funding sources that could be gained from oil production revenues derived from off the Louisiana continental shelf drilling activity, in order to supplement an expanded cost-sharing program.

Table 1
Estimated Construction Cost by Study Area Region

<u>Region</u>	<u>Cost (\$million)</u>
Region 1	439.0
Region 2	9,765.5
Region 3	2,835.5
Region 4	<u>900.0</u>
	Total = 13,940.0

The current Breaux Act program invests less than 10% of that amount, which is a primary reason why it can achieve only limited and localized restoration benefits. Thus, it is envisioned that through this feasibility study, at least a tenfold increase in the effort that will be made to restore Louisiana’s coastal wetlands. The large increase in effort is required because the current CWPPRA program, plus two large fresh-water diversions, will address only 22% of the land loss problems. The strategies put forth in Coast 2050 are larger, more ambitious, more productive, and more costly than projects that can be funded under the current program. The implementation effort must emphasize steps needed to construct large, strategic projects.

8. SUMMARY OF FEASIBILITY STUDY ASSUMPTIONS: The primary assumption is that the study, design, and implementation of this endeavor would take place over the next 20 to 50 years, to return Louisiana’s coastal wetlands, with all their human and non-human resources, to a self-maintaining and sustaining future. A technically sound strategy, outlined below, presents an approach assumed necessary for accomplishing this vision in the most aggressive manner of implementation possible.

a. Short Term Strategy: The annual Priority Project List Projects of CWPPRA would continue, to form the initial elements of an overarching, comprehensive plan. These lists provide a fast-track process through which relatively small-scale projects can be rapidly constructed and monitored. Priority list projects can be implemented in a fairly short period of time with no requirement for additional Congressional action. The CWPPRA Task Force would also investigate and refine the streamlining of project development, selection, and implementation, in order to increase the efficiency with which the current funding stream is applied.

b. Long-term Strategy: Projects with costs of tens of millions of dollars are not easily accommodated by the present CWPPRA funding stream of about \$40 million per year (including State contributions). The second phase of implementation for large, regional elements will begin as feasibility study phases near completion. The second phase of study includes all elements necessary to place feasible projects in competition for federal civil works and water resources funds.

9. FEASIBILITY PHASE MILESTONES: The elements of the ecosystem restoration effort is envisioned for implementation over the next 10 years, as phases of an approximate ten year cycle of study are completed. A detailed implementation plan still needs to be developed. However, there are many issues which local, State, and Federal interests can address immediately.

10. FEASIBILITY PHASE COST ESTIMATE:

<u>Summarized Financial Data:</u>	<u>\$ Feasibility</u>
Estimated Federal Cost	17,500,000
Estimated Non-Federal Cost	17,500,000
Total Estimated Cost	35,000,000
Allocation through FY 1998	0
Allocation for FY 1999	0
Budget Request for FY 2000	0
Balance to Complete After FY 2000	17,500,000
Amount That Could Be Used in FY 2000	1,750,000

Funds in the amount of \$1,750,000 could be used to initiate a feasibility level analysis of large-scale project features necessary to effectively address Louisiana's critical loss of coastal landscape. It is expected that numerous features evaluated during the study would be recommended for separate authorization and funding during the 10-year duration of study.

11. RECOMMENDATIONS: On the basis of the aforementioned findings, I recommend that this Reconnaissance Study be certified as being in accordance with current policy and that a feasibility study be conducted. The estimated feasibility study cost is \$35,000,000 over a ten-year period. A Project Study Plan is currently being developed.

12. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE: None.

13. VIEWS OF OTHER RESOURCE AGENCIES: The Louisiana Department of Natural Resources fully supports this study (see enclosure 2), along with other Federal resources agencies. The State of Louisiana has indicated their willingness to cost-share construction of projects that would be recommended as a result of feasibility studies.

14. PROJECT AREA MAP: Figure 1 presents the project study area, and Figure 2 illustrates the 4 regions of coastal Louisiana.

/s/

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COL, EN

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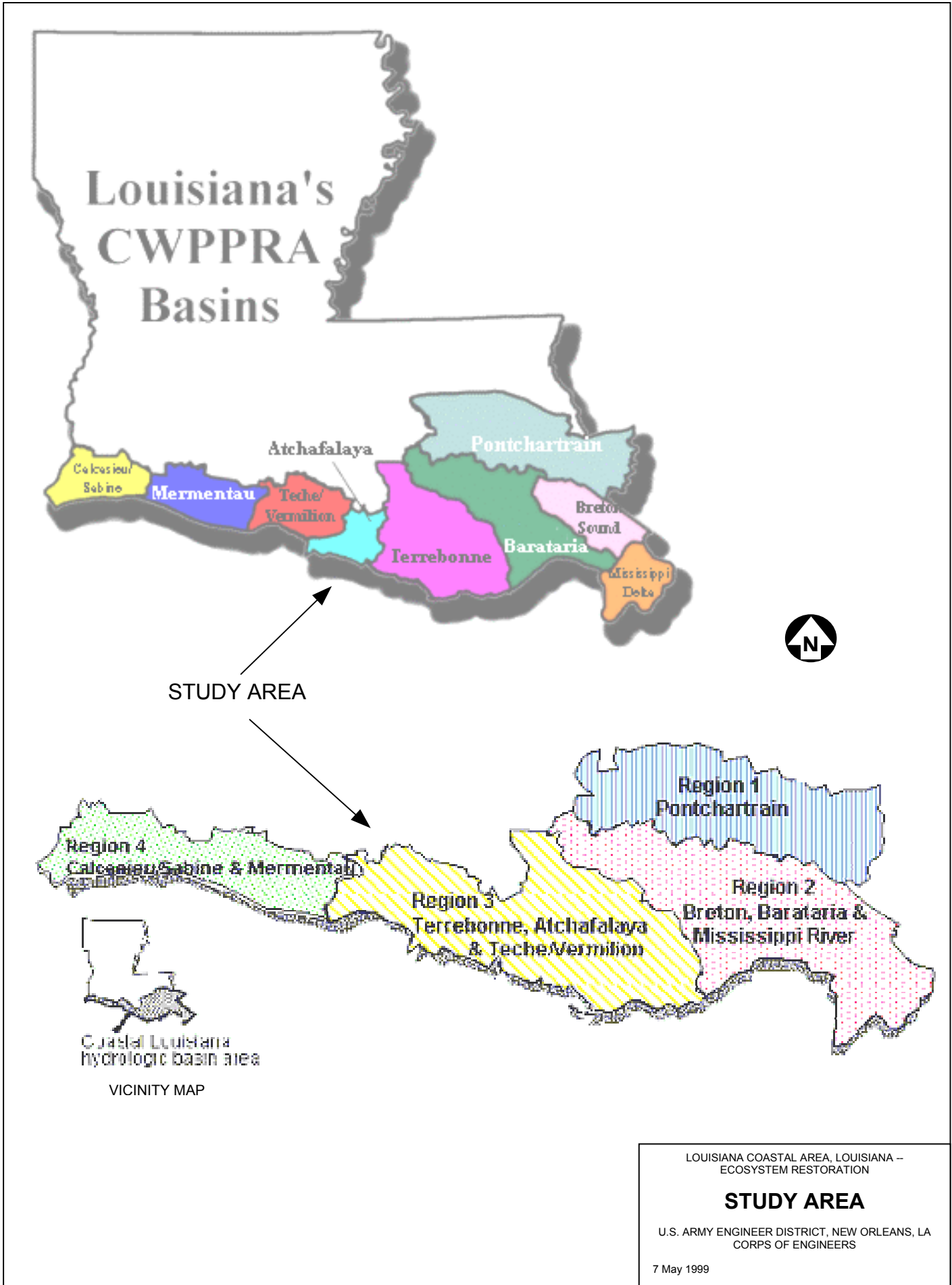


FIGURE 2