

STATE OF TEXAS

COASTAL NONPOINT POLLUTION

CONTROL PROGRAM

ENVIRONMENTAL ASSESSMENT

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DESIGNATION: Environmental Assessment

TITLE: State of Texas Coastal Nonpoint Pollution Control Program

ABSTRACT: This environmental assessment is prepared pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 *et seq.* to assess the environmental impacts associated with the approval and implementation of the Coastal Nonpoint Pollution Control Program (coastal nonpoint program) submitted to NOAA and EPA by the State of Texas. Section 6217 of the Coastal Zone Act Reauthorization Amendments

(CZARA), 16 U.S.C. 1455b, requires states and territories with coastal zone management programs that have received approval under section 306 of the Coastal Zone Management Act to develop and implement coastal nonpoint programs.

For purposes of this environmental assessment, the proposed action is the conditional approval of the Texas coastal nonpoint program. The Texas program includes management measures for agricultural, forestry, and marina nonpoint source categories and for protection of wetlands, riparian areas, and vegetated treatment systems and for many aspects of the urban development and hydromodification categories. Texas requested an exclusion for the dryland rowcrop subcategory of the agricultural source category in a portion of its 6217 management area. NOAA and EPA find that the State has provided sufficient justification for this exclusion.

NOAA and EPA find that the Texas program meets many of the requirements of section 6217 and their proposed action is to approve the program with conditions. To receive final approval of its program, Texas will need to meet the conditions, which include completing development of certain aspects of its program addressing urban and hydromodification sources and providing a revised legal opinion that the State has the authority that can be used to prevent nonpoint pollution and require management measure implementation, as necessary.

NOAA and EPA have determined that the conditional approval of the Texas coastal nonpoint program will not result in any significant environmental impacts different from those analyzed in the Programmatic Environmental Impact Statement prepared for the 6217 program and will have an overall beneficial effect on the environment.

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COASTAL NONPOINT POLLUTION CONTROL PROGRAM

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The National Oceanic and Atmospheric Administration (NOAA) has prepared this environmental assessment to assess the environmental impacts associated with the approval and implementation of the coastal nonpoint pollution control program (coastal nonpoint program) submitted to NOAA and the Environmental Protection Agency (EPA) by the State of Texas. Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA), 16 U.S.C. section 1455b, requires states and territories with coastal zone management programs that have received approval under section 306 of the Coastal Zone Management Act (CZMA) to develop and implement coastal nonpoint programs. These programs were required to be submitted to NOAA and EPA in July 1995. Once approved, these programs will be implemented through changes to the state nonpoint source program approved by EPA under section 319 of the Clean Water Act and through changes to the state coastal zone management program approved by NOAA under the CZMA.

For purposes of this environmental assessment, the proposed action is the conditional approval of the Texas coastal nonpoint program. The alternatives to the proposed action are to approve the program or to deny approval of the program.

The Texas program includes management measures for agricultural, forestry, and marina nonpoint source categories and for protection of wetlands, riparian areas, and vegetated treatment systems, and for many aspects of the urban development and hydromodification categories. Texas requested an exclusion for the dryland rowcrop subcategory of the agricultural source category in a portion of its 6217 management area. NOAA and EPA find that the State has not provided sufficient justification for this exclusion.

Texas has proposed a 6217 management area smaller than that recommended by NOAA. The boundary is coincident with the existing coastal zone boundary, which is based upon the Oil Spill Prevention and Response Act (OSPRA) line but also encompasses additional lands landward of the OSPRA line, generally within one mile of tidal rivers. The OSPRA line was chosen as Texas's coastal management program boundary in 1995 after an extensive, multiyear review of land and water uses that could reasonably be expected to have significant impact on Texas coastal waters. Based on this review, Texas adopted an inland program boundary encompassing the 19 first-tier counties with tidewater influence.

NOAA and EPA find that the Texas program meets many of the requirements of section 6217 and their proposed action is to approve the program with conditions. To receive final approval of its program, Texas will need to meet the conditions, which include completing development of certain aspects of its program addressing urban and hydromodification sources.

NOAA and EPA have determined that the conditional approval of the Texas coastal nonpoint program will not result in any significant environmental impacts different from those analyzed in the Programmatic Environmental Impact Statement prepared for the 6217 program and that this alternative will have an overall beneficial effect on the environment.

1. OVERVIEW

1.A Background

In 1990, Congress enacted section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA), entitled "Protecting Coastal Waters", to help address the problem of nonpoint source pollution and its effect on coastal waters. The purpose of the section is to strengthen the links between Federal and state coastal zone management and water quality programs in order to enhance state and local efforts to manage land use activities that degrade coastal waters and habitats. Section 6217 requires states and territories with federally approved coastal management programs to develop coastal nonpoint pollution control programs (coastal nonpoint programs) and submit them to the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA) in July 1995 for approval. Once approved,

these programs will be implemented through changes to the state nonpoint pollution program approved by EPA under section 319 of the Clean Water Act (CWA) and through changes to the state or territorial coastal zone management program approved by NOAA under the CZMA.

Section 6217 utilizes a two-tiered management approach for the control of nonpoint sources of pollution. The purpose of the first tier is to protect coastal waters generally. It requires that states and territories implement, at a minimum, management measures in conformity with guidance (known as the 6217 (g) guidance, or management measures guidance) that was developed by EPA in consultation with NOAA and other Federal agencies. The management measures developed by EPA address the nonpoint pollution source categories of agricultural runoff, urban runoff, forestry runoff, hydromodification, and marinas. Management measures must also be implemented for wetlands protection, riparian areas, and vegetated filter strips. Once the first tier of management measures are implemented to protect coastal waters generally, the state or territory will need to develop additional management measures to apply, as necessary, to meet water quality standards and protect designated uses.

1.B Purpose and Need for Action

In March 1996, NOAA published a programmatic environmental impact statement (PEIS) that assessed the environmental impacts associated with the approval of state and territory coastal nonpoint programs (NOAA, 1996). The PEIS forms the basis for the environmental documents NOAA is preparing on each state and territorial coastal nonpoint program submitted for approval. In the PEIS, NOAA determined that the approval and conditional approval of coastal nonpoint programs will not result in any significant adverse environmental impacts and that these actions will have an overall beneficial effect on the environment. The analyses presented in the PEIS are incorporated by reference into this environmental assessment (EA).

NOAA has prepared this EA to assess the environmental impacts associated with the approval and implementation of the coastal nonpoint program submitted to NOAA and EPA by the State of Texas in December 1998 (including supplemental material submitted subsequently). The Texas program will be approved after a joint NOAA/EPA review if it meets all of the requirements of section 6217 as specified in the statute and in the guidance documents for the program. The analysis in this EA also serves to determine whether the impacts associated with program approval are significantly different from those analyzed in the PEIS, so as to require the preparation of an environmental impact statement (EIS).

In August 1996, NOAA prepared a final environmental impact statement (Texas Coastal Management Program FEIS, 1996) on the Texas coastal management program submitted for approval under the CZMA. The Texas coastal management program establishes the boundaries of the coastal area within which the program applies; describes the organizational structure to implement the program; and provides a set of statewide policies applicable to all state and Federal agencies which manage resources along the state's coastline. The information in the FEIS is relevant to this analysis because the section 6217 coastal nonpoint program is to be implemented through the Texas coastal zone management program, as well as its section 319 Clean Water Act program. Therefore, the Texas FEIS is incorporated by reference into this EA.

2. ALTERNATIVES

For purposes of this environmental assessment, the proposed action is the conditional approval of the Texas coastal nonpoint program. The alternatives to the proposed action are to approve the program without conditions or to deny approval of the program. The proposed action, its alternatives, and a summary of their environmental consequences are described below.

2.A Approval of the Texas Coastal Nonpoint Program

To assist states and territories in the development of their coastal nonpoint programs, NOAA and EPA jointly published a guidance document, Program Development and Approval Guidance (NOAA/EPA, 1993). The state and territory programs will be approved after a joint NOAA/EPA review if they meet all of the requirements of section 6217 as specified in the statute and in the program guidance documents. Specifically, the Texas program must contain the following components:

- o Coordination with Existing State Programs
- o Determination of the 6217 Management Area
- o Implementation of Management Measures in Conformity with (g) Guidance
- o Identification and Implementation of Additional Management Measures
- o Technical Assistance
- o Public Participation
- o Administrative Coordination
- o Identification of Enforceable Policies and Mechanisms

The alternative of approving the Texas coastal nonpoint program would generally be expected to have a beneficial effect on the environment because the program would help to control sources of nonpoint pollution and would result in fewer pollutants reaching the state's coastal waters. For example, the nonpoint program will help to control urban runoff of fecal coliform bacteria and nutrients from the cities of Spring, Tomball, The Woodlands, and Houston which is listed as contributing to violations of water quality standards in 69 miles of Spring Creek. The program will help to control leakage from septic systems that add pollutants, including coliform bacteria, that are responsible for the closing of shellfishing waters in Texas. The nonpoint program will also make existing programs more effective by strengthening the link between Federal and Texas state coastal zone management and water quality programs. In their review of the Texas program, NOAA and EPA have found that the program does not meet all of the requirements of section 6217. Therefore, full approval of the Texas coastal nonpoint program is not a feasible alternative. The rationale for this decision is discussed below under the conditional approval alternative. However, as discussed below, the conditional approval alternative is expected to result in the same environmental benefits as the approval alternative, provided Texas satisfies the conditions.

2.B Conditional Approval of the Texas Coastal Nonpoint Program [Preferred Alternative]

While NOAA and EPA expect the coastal nonpoint programs submitted for approval to meet all of the requirements of section 6217, NOAA and EPA realize that in some situations, a program may require changes before final approval can be granted. In these situations, NOAA and EPA will grant conditional approval in order to provide states and territories an opportunity to make necessary changes. Conditional approvals are intended primarily to provide additional time to:

- (1) address identified gaps, including obtaining new statutory or regulatory authority, if necessary;
- (2) demonstrate that existing authorities are adequate for ensuring implementation of the management measures; and
- (3) develop other incomplete program components.

NOAA and EPA will provide up to five years from the time of conditional approval for completion of a coastal nonpoint program. The length of the conditional approval will depend on which program components are subject to conditions and how long it will take to finalize those components.

NOAA and EPA find that the Texas coastal nonpoint program meets many of the section 6217 requirements and adequately addresses all program components with the exception of the following components. The state will be able to receive final approval of these components, and therefore final approval of its program, by meeting the conditions described below for each component.

(1) *Urban Runoff - New Development and Site Development Management Measures*

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. In order to receive final approval, the program must meet the following conditions:

- Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for new development and site development. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the new development and site development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

(2) *Urban Runoff - Watershed Protection and Existing Development Management Measures*

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. In order to receive final approval, the program must meet the following condition:

- Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for watershed protection and existing development. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the watershed protection and existing development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

(3) *Urban Runoff - Construction Site Chemical Control Management Measures*

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. In order to receive final approval, the program must meet the following conditions:

- Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will

use to encourage implementation of the construction site chemical control management measure, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

(4) *Urban Runoff - New Onsite Disposal Systems and Operating Onsite Disposal Systems (OSDS) Management Measures*

The Texas program includes management measures in conformity with the 6217(g) guidance except it does not include a measure for 1) inspecting OSDS at a frequency adequate to ascertain whether OSDS are failing or (2) replacing or upgrading OSDS near nitrogen-limited surface waters. The State's program includes enforceable policies and mechanisms to ensure implementation throughout the management area. In order to receive final approval, the program must meet the following conditions:

- Within two years, Texas will include in its program management measures for inspection of existing OSDS and replacing or upgrading OSDS near nitrogen-limited surface waters in conformity with the 6217(g) guidance.

(5) *Roads, Highways, and Bridges Management Measures*

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The program includes backup enforceable policies and mechanisms to implement the measures, but the State has not yet demonstrated the ability of the authorities to ensure implementation throughout the 6217 management area. In order to receive final approval, the program must meet the following conditions:

- Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for roads, highways and bridges. Within one year Texas will develop a strategy (in accordance with the 15 Year Program Strategy pg. 38) to implement these management measures throughout the 6217 management area.

(6) *Hydromodification*

Texas's program does not include management measures in conformity with the 6217(g) guidance. Texas has identified enforceable policies and mechanisms to implement the measures, but has not yet demonstrated the ability of the authorities to ensure implementation throughout the 6217 management area. In order to receive final approval, the program must meet the following conditions:

- Within two years, Texas will include in its program management measures that are in conformity with the 6217 (g) guidance for hydromodification. Within one year, Texas will develop a strategy to implement the management measures throughout the 6217 management area.

The alternative of conditionally approving the Texas coastal nonpoint program is expected to have the same beneficial results as would full approval and will avoid the adverse impacts associated with denial of approval, provided Texas satisfies the conditions. The immediate implementation of the completed portions of the program will begin to fulfill the intent of section 6217 by helping to control sources of nonpoint pollution thus resulting in a reduction of pollution reaching coastal waters. Positive socioeconomic benefits will accrue as improvements in coastal water quality resulting from controlling nonpoint pollution increase the aesthetic value of coastal areas thereby benefitting tourism and providing enhanced opportunities for boating and swimming and other water related activities. Improvements in water quality are also likely to improve shellfish harvesting and fisheries. There may be some slight and localized socioeconomic impacts from implementation of management measures because of restrictions that may result from designation of critical coastal areas.

2.C *Deny Approval of the Texas Coastal Nonpoint Program [No Action]*

The decision to deny approval of a coastal nonpoint program has the same effect as the "no action" alternative under the National Environmental Policy Act. Although section 6217 requires states to develop and implement coastal nonpoint programs, approval of the programs is not assured until NOAA and EPA find that all the

requirements of section 6217 have been met. Denial of approval of a program will have the effect of relying on existing nonpoint control efforts and levying financial penalties on both the state's coastal zone management program under the CZMA and the state's nonpoint pollution program under section 319 of the Clean Water Act. The schedules for such penalties are stipulated in section 6217(c) of the CZARA. The denial of program approval and the imposition of financial penalties may have an adverse environmental effect because it may cause Texas not to implement management measures that are meant to control coastal nonpoint pollution, restore degraded waters, and protect critical coastal areas.

There are many specific examples of how nonpoint pollution has caused water quality problems in the coastal waters of Texas. The Texas 1998 section 303(d) list of impaired water bodies states that nonpoint pollution contributed to the impairment of 60 of the 71 coastal water body segments listed as not supporting or partially supporting their designated water uses. Septic systems and urban runoff are the nonpoint sources most responsible for the closing of shellfishing waters in Texas. Water quality problems in portions of the Houston Ship Channel/Buffalo Bayou are related to runoff of heavy metals, organic chemicals, and nutrients from Jacinto City, Deer Park, Galena Park, South Houston, Baytown, Pasadena, and Houston. Water quality degradation caused by agricultural runoff has caused restrictions in the harvesting of shellfish in Bastrop Bayou, Nicks Lake, Salt Lake and Wolf Lake.

NOAA and EPA have reviewed the Texas coastal nonpoint program and found that the program meets many of the requirements of section 6217. Therefore, denying approval of the program is not the preferred alternative.

3. AFFECTED ENVIRONMENT

As required by section 6217(a) of the CZARA, the geographic scope of each coastal nonpoint program must be sufficient to ensure implementation of management measures to "restore and protect coastal waters." Pursuant to section 6217(e), NOAA, in consultation with EPA, made recommendations to each state and territory on the geographic scope of its program (also known as the "6217 management area"). This recommendation was based on the extent of coastal watersheds in each state and territory. States or territories were not required to adopt NOAA's exact boundary recommendation; they could propose an alternative 6217 management area at the time of program submission.

NOAA and EPA recommended a 6217 management area that encompasses all lands draining into coastal areas, including rural upland areas. Based on a review of population densities and land uses, the state's coastal zone management agency (General Land Office) and the water quality agencies (Natural Resource Conservation Agency and State Soil and Water Conservation Board) do not expect the rural upland areas to have a significant impact on coastal waters. Texas has proposed a 6217 management area smaller than that recommended by NOAA, but coincident with the existing coastal zone boundary, which is based upon the Oil Spill Prevention and Response Act (OSPRA) line but also encompasses additional lands landward of the OSPRA line, generally within one mile of tidal rivers. The OSPRA line, also referred to as the coastal facilities designation line, was drawn to delineate inland areas that might generate water pollution threats to coastal waters. The OSPRA line was chosen as Texas's CMP boundary in 1995 after an extensive, multiyear review of land and water uses that could reasonably be expected to have significant impact on Texas coastal waters. In 1992, at the request of the Coastal Coordination Council's Executive Committee, an interagency work group of biologists, geologists, hydrologists, and attorneys representing the member agencies of the State Agency Task Force was formed to research and recommend boundary options within a 33-county planning area. The work group evaluated the planning area to determine the location of coastal natural resource areas (CNRAs) and the types and locations of activities having adverse effects on CNRAs. Based on the information provided by the interagency work group, the Council adopted an inland program boundary encompassing the 19 first-tier counties with tidewater influence. Through this analysis, the State presents the case that the proposed 6217 management area encompasses the entire geographic area that would have significant impact on Texas coastal waters.

The Coastal Coordination Council, the body responsible for implementation of the coastal nonpoint pollution control program will monitor the progress of the program according to interim milestones and benchmarks. In cases where nonpoint pollution

sources are identified outside of the 6217 management area, the State has a plan in place to address those sources. The Council will monitor the effectiveness of the networked programs such as the Section 319 Program, within a Supplemental Planning Area that will encompass the 33 counties contained within the coastal watersheds. The Council will evaluate whether these programs have adequately addressed actual and potential nonpoint pollution sources in the Supplemental Planning Area that may be reasonably expected to have significant impact on coastal waters. The Council's evaluation of the effectiveness of the networked programs in the Supplemental Planning Area will be included in the Council's 5-year Progress Report to NOAA and EPA. Based on its evaluation, when developing the subsequent 5-year implementation plan, the Council will determine whether any additional management measures need to be implemented and how such management measures should be applied within the larger 33 county Supplemental Planning Area.

Because the actual geographic scope of each coastal nonpoint program was unknown during the preparation of the PEIS, that document used NOAA's original recommendation - coastal watersheds - for purposes of generally describing the environment to be affected. The description of the environment in the PEIS was of a general nature because of the widely diverse areas encountered across all of the twenty-nine states and territories that were expected to submit coastal nonpoint programs. The following is a more specific description of the environment in the Texas 6217 management area, based on the PEIS, the EIS prepared by NOAA during approval of Texas's coastal zone management program, and the Texas coastal nonpoint program submission.

3.A The Physical Environment

1. The Texas 6217 Management Area

As stated above, NOAA selected coastal watersheds as its basic recommendation for all state and territory 6217 management areas. After evaluating all coastal watersheds in Texas for significant indicators of pollution potential, NOAA and EPA recommended to Texas that a 6217 management area which included all drainage basins adjacent to the coast (including upland areas) was necessary "to control sources of pollution that, individually or cumulatively, significantly impact the state's coastal waters". Texas proposed utilizing the existing coastal zone boundary to define the 6217 management area. NOAA and EPA find that Texas's proposed boundary is sufficient to control the land and water uses that have or are reasonably expected to have a significant impact on the coastal waters of Texas.

2. Coastal Environment

The Texas coast has a tidal shoreline length of about 367 miles, a total shoreline, including bays, sounds, and rivers of 3,359 miles, and a coastal land area of 20,784 square miles (COPR, 1992). Eight percent of the state lies in the coastal zone.

Much of the mainland is separated from the Gulf of Mexico by a chain of barrier islands that extend 367 miles along the Texas shoreline. The islands are separated from the mainland by a relatively narrow body of fresh, brackish or saltwater, or a wetland, with a series of passes that connect the bays with the Gulf. Barrier islands such as North and South Padre Islands, San Jose Island, Matagorda Island, Mustang Island and Galveston Island act as buffers against coastal storms, protect wetlands, and restrict salt water intrusion into estuarine areas.

The Texas coastal region is mainly located in the Louisianian biogeographic province. This province, which extends from Cedar Key, Florida to Port Aransas, Texas, is characterized by extensive marshes and well-developed barrier islands. From the Louisiana border to Galveston, the coastline consists of a marshy plain with low, narrow beach ridges. From Galveston to Mexico the coastline consists mainly of long, narrow barrier islands with shallow lagoons. Broad belts of mostly flat coastal prairies, chaparral pastureland, and farmlands adjacent to expansive bays characterize the transition zone between the mid- and lower-coast (Coastal Bend Bays Plan, 1998). The biota ranges from temperate to subtropical. The tidal range in the estuaries varies from 0.7 feet to 2.6 feet. The

tidal range along the Gulf shoreline varies from 2.6 feet in the Sabine Pass area to 1.3 feet near Brownsville (TCMP, 1996).

The coastal climate varies from warm and humid in the Beaumont-Port Arthur and Galveston-Houston area to semiarid along the lower coast in the Kingsville and Brownsville area.

The climate along the middle coast from the Bay City-Freeport area to Corpus Christi changes to subhumid to dry subhumid. Rainfall and freshwater inflow varies greatly along the coast and influences the environment of estuarine and inner continental shelf waters. High freshwater inflow causes near freshwater conditions to exist in the Sabine Lake Estuary while low rainfall and low freshwater inflow cause hypersaline conditions in Laguna Madre (TCNSPC Program, 1998). Hurricanes or tropical storms, which strike the Texas coast about once every two years, have a major effect on Gulf of Mexico estuaries because of storm surges and increased freshwater inflow from heavy rainfall.

NOAA's National Estuarine Inventory (NOAA, 1990a) classifies Texas as being part of the Gulf of Mexico Estuarine Drainage Area (EDA). The Gulf of Mexico EDA extends from the southern tip of Florida west to the Texas/Mexico border. The Texas estuaries in this EDA include: Sabine Lake, Galveston Bay, Brazos River, Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, Upper Laguna Madre, Baffin Bay, and Lower Laguna Madre. Galveston Bay and Corpus Christi Bay are two of the 28 estuaries participating in the U.S. Environmental Protection Agency's National Estuary Program. These estuarine systems exhibit high biological productivity and diversity. The estuaries and adjacent marshes provide habitat for migrating and nesting waterfowl and shorebirds and contribute directly to the productivity of the Texas and Gulf of Mexico commercial and recreational fisheries. Texas's estuaries support important species such as bay anchovy, sheepshead minnow, spot, croaker, redfish, menhaden, speckled trout, crabs, crawfish, oysters, and shrimp. Estuaries and their associated wetlands provide important habitat in the life cycle of shrimp, an important commercial fishery resource in the Gulf of Mexico. Young shrimp, for example, migrate from offshore areas to grow and mature in the shallow estuaries.

Texas contains approximately 1,659,000 acres of wetlands. This total includes 432,100 acres of salt marsh, 530,300 acres of fresh marsh, 421,300 acres of forested and scrub marsh, and 275,300 acres of tidal flats (COPR, 1992). Texas contains more tidal flats than any other state; the Laguna Madre estuary contains 14 percent of the nation's tidal flats (Field et al., 1991). The Texas Parks and Wildlife Department estimates that 35 percent of the state's coastal marshes were lost between 1950 and 1979 (Texas Wetlands Plan, 1988). There are approximately 235,000 acres of submerged seagrass meadows in the middle and lower coastal bays and estuaries. Wetlands loss and degradation has resulted from both natural and man-induced causes. Natural causes include the wind and wave action of storms, droughts, erosion and sea level rise. Man-made causes include land subsidence caused by the withdrawal of oil, gas, and groundwater; channelization of estuaries; filling with dredged spoil and other solid waste disposal; construction of dikes, dams, levees, and seawalls; dredging of canals through wetlands for navigation; and drainage for crop production, mosquito control, and oil and gas exploration.

3.B The Social and Economic Environment

1. Population

Data from the 2000 Census indicates that Texas has a population of 20,851,820 people (U.S. Census Bureau, 2000a). That is a statewide increase in population of approximately 23 percent since 1990. Projections are for a statewide population of 27,183,000 by the year 2025, a growth rate of 30.4 percent.

Approximately 4,719,127 people or 22.6 percent of the Texas population live in the coastal zone. Table 1 shows the population and population density of the 18 counties in the coastal zone. As the data indicate, several counties had very large increases in population between 1990 and 1999. Aransas County had an estimated population gain of 29.3 percent, the largest in the state. Cameron County was next with a 26.5 percent increase. Only three counties lost population during that time period. Kenedy County had a 5.2 percent loss of population while Refugio and Kleberg had losses of 3.0 and 2.0 percent, respectively. Harris, Galveston, Nueces, Cameron and Brazoria Counties are all among the Gulf of Mexico's top 15 coastal counties in terms of projected population growth, population rate increase, or population density (NOAA, 1990b).

TABLE 1. POPULATION STATISTICS FOR COASTAL COUNTIES

| COUNTY | POPULATION (1999 est) | PERSONS/ sq mi | COUNTY | POPULATION (1999 est) | PERSONS/ sq mi |
|--------|--------------------------|-------------------|--------|--------------------------|-------------------|
| | | | | | |

| | | | | | |
|--------------|-----------|--------|-----------|--------|------|
| Harris | 3,250,404 | 1879.9 | Matagorda | 37,828 | 33.9 |
| Cameron | 329,131 | 363.4 | Kleberg | 29,680 | 34.1 |
| Nueces | 315,469 | 377.4 | Chambers | 23,993 | 40.0 |
| Galveston | 248,469 | 623.2 | Aransas | 23,129 | 91.8 |
| Jefferson | 241,332 | 267.1 | Calhoun | 20,426 | 39.9 |
| Brazoria | 234,303 | 168.9 | Willacy | 19,650 | 32.9 |
| Orange | 85,240 | 239.2 | Jackson | 13,648 | 16.5 |
| Victoria | 82,087 | 93.0 | Refugio | 7,735 | 10.0 |
| San Patricio | 71,636 | 103.6 | Kenedy | 436 | 3.3 |

SOURCE: U.S. Census Bureau, 2000b

2. Agriculture

Agricultural production and related activities make up the state's second largest economic sector, accounting for 20 percent of the state's employment and \$75 billion in annual economic impact (Hightower, 1990). The counties in the Texas coastal area comprise a total of 11 million acres, 60 percent of which is currently in agricultural production (cropland, rangeland, or timber).

Coastal areas support a diverse agricultural industry. The heavy rainfall and thick clay soils found on the upper Texas coast supports the cultivation of rice. Dryland row crops of cotton, grain sorghum and corn are grown farther south along the coast as the amount of rainfall decreases. Irrigation in the semiarid Lower Rio Grande Valley supports growing of citrus, vegetables, sugar cane and aloe vera (TCMP, 1996). Rangeland is found scattered throughout the coastal area. It is dominated by grasses, forbs, and shrubs and is used for grazing by livestock.

Important agricultural products include beef and milk cows, sheep, hay, poultry, hogs, goats, corn, oats, wheat, sugar cane, peanuts, soybeans, sorghum, cotton and rice. Brazoria and Matagorda counties are among the leading counties in the nation in inventory of beef cows. In January 2000, Brazoria had 55,000 beef cows and Matagorda had 42,000 (Cattle County Estimates, 1999-2000). Harris, Jackson, Jefferson, and Victoria counties also have large numbers of beef cows. Table 2 lists the leading coastal counties in the production of various agricultural commodities.

The number of farms, total cropland, and market value of agricultural products varied widely in the coastal counties. Brazoria and Harris counties, each with over 1,700 farms, had the highest number of farms while Kenedy and Aransas counties had only 31 and 54, respectively (Census of Agriculture, 1997). Nueces County had a total of 350,756 acres in cropland, the highest in the state. Cameron County was the leading county in market value of all agricultural products sold with a value of almost 80 million dollars.

| COUNTY | COMMODITY | YIELD | COUNTY | COMMODITY | YIELD |
|-----------|-----------|-------------------|--------------|---------------|------------------|
| Kleberg | Corn | 4,730,000 bushels | Chambers | Wheat | 14,000 bushels |
| Harris | Goats | 2,900 head | Cameron | Sugarcane | 335,300,000 tons |
| Victoria | Soybeans | 617,600 bushels | Nueces | Sorghum | 5,900,000 cwt |
| Matagorda | Rice | 1,875,000 cwt | San Patricio | Upland Cotton | 189,200 bales |
| Harris | Peanuts | 528,000 lbs | Kleberg | Oats | 1,800 acres |

SOURCE: Texas Agricultural Statistics Service, 1999

3. Forestry

East Texas, with nearly 12 million acres of timberland, contains most of the state's timberland. Much of this timberland is actively managed for the sustainable production of timber by forest industries, nonindustrial private forest landowners, and public agencies. Approximately 648,000 acres undergo timber harvesting, site preparation or prescribed burning each year (Nonpoint Source Program, 1997). Chambers, Jefferson and Orange Counties are the only counties in the coastal zone that

have significant forest activities. Orange County has 126,900 acres of timberland, followed by Jefferson with 72,300 acres, and Chambers with 12,900 acres. The total amount of timberland in these counties is 212,100 acres or 1.8 percent of the entire coastal zone (TCNSPC Program, 1998).

4. Urban

Although rangeland and agricultural lands comprise about 46 percent of the total land use/land cover in the coastal area, there are four major urban and industrial centers: the Beaumont-Port Arthur-Orange, Houston-Galveston, Corpus Christi, and the Lower Rio Grande Valley (TCMP, 1996). With the exception of the Lower Rio Grande Valley, the other 3 centers are home to a large oil refining and petrochemical industry. Approximately 45 percent of all U.S. petrochemical production is in the area around Houston. The Lower Rio Grande Valley is primarily an agricultural center that is now experiencing a large growth in development. This development is occurring within 50 miles of the Gulf of Mexico and along most bay shorelines. Public water supplies, transportation systems, schools, public buildings, electric and gas utilities, and sewage and solid waste facilities are all required to meet the needs of expanding development.

As previously mentioned, the 2000 population of the 18 coastal counties located in whole or in part in the coastal area was approximately 4,719,127. More than one-third of the state's permanent population and 70 percent of its economic activity are located within 100 miles of the Texas coastline (TCNSPC Program, 1998). Continued economic and population growth are projected for the coast. It is estimated that the coastal population will grow to 6.6 million in the year 2020. The Galveston Bay complex ranks first among urbanized areas in the state and is the eighth largest in the United States. Twenty percent of the total state population lives within the four coastal counties of Chambers, Brazoria, Galveston, and Harris (TCMP, 1996).

In addition to population data, development activity is also indicative of growth in coastal areas. According to the NOAA report *Building Along America's Coast, 20 Years of Building Permits, 1970-1989* (NOAA, 1992a), Texas issued building permits for 772,279 residential units and 43,171 non-residential units in coastal counties during these 20 years. Harris County was the leading county for permits issued with 509,622 residential and 20,437 non-residential permits issued. Nueces County and Galveston County had 42,744 residential and 3,128 non-residential, and 35,814 residential and 2,237, non-residential permits issued, respectively.

5. Marinas

Recreational boating activities are a major use of Texas's coastal waters. In 1999, Texas ranked 5th in the nation with 629,640 recreational boats registered statewide, an increase of 18,266 boats since 1996 (NMMA, 1999). The four counties in the Houston metropolitan area (Brazoria, Fort Bend, Galveston and Harris) have more than 105,000 boats registered (TCNSPC Program, 1998). A large number of boaters use marinas, mooring fields, and public launching ramps to access the water. In 1991, recreational boating facilities in Texas consisted of 298 marinas; 36,919 slips; 1,596 moorings, 4,124 dry storage bays, and 448 ramps (COPR, 1992). Thirty percent of the total number of marinas and 63 percent of the total wet slips in commercial marinas are found in Galveston Bay (TCMP, 1996). In addition, of the more than 600,000 boats registered in the state, one-tenth of them are docked in Clear Lake.

6. Fisheries

Recreational and commercial fishing are important activities along the Texas coast. In 1992, there were 5,093 vessels in Texas's commercial fishing fleet and 147 fish processors and wholesalers (Coast Alliance, 1995). The most recent commercial fishery data from the National Marine Fisheries Service state that 89,289,429 pounds of all species of fish with a value of \$218,584,947 were landed in Texas in 1999 (NOAA, 2001). Table 3 shows the commercial fish landings at Texas ports. The port of Brownsville-Port Isabel was the leading port in Texas and was the 35th leading port in the nation with 22.2 million pounds of fish landed in 1999. Galveston, Palacios, Port Arthur, Aransas Pass-Rockport and Seabrook are also leading ports.

TABLE 3. COMMERCIAL FISHERY LANDINGS FOR 1999

| PORT | MILLIONS OF POUNDS | MILLIONS OF DOLLARS |
|------|--------------------|---------------------|
|------|--------------------|---------------------|

| | | |
|-------------------------|------|------|
| Brownsville-Port Isabel | 22.2 | 65.2 |
| Galveston | 18.0 | 33.1 |
| Palacios | 12.8 | 35.9 |
| Port Arthur | 8.9 | 22.4 |
| Aransas Pass-Rockport | 6.4 | 15.0 |
| Seabrook | 3.8 | 9.6 |

SOURCE: NOAA, 2001

The shrimping industry is the most important commercial fishing industry in Texas. Brown, white, and pink shrimp are the primary species caught. During 1993, harvest of these shrimp totaled 74 million pounds, valued at \$131 million. Brown shrimp predominate in both pounds landed and value of the annual catch (Texas Shrimpers, 2001).

Blue crabs and oysters are commercial and recreational species that are important to the Texas economy. In 1993, commercial blue crab landings totaled 3.9 million pounds valued at \$8.2 million. Recreational pursuits of blue crabs are intense, although no complete documentation of recreational catch and value is available. Oysters thrive in the bays and estuaries behind barrier islands separating the Texas mainland from the Gulf of Mexico. Harvest, confined to natural reefs in state-approved waters, takes place on public reefs in the bay system from November 1 – May 1. The rest of the year harvest occurs on private oyster leases, mainly in Galveston Bay, home to 60-70 percent of the oyster crop. Smaller catches are made from Matagorda and San Antonio bays. In 1993, commercial landings of 4.1 million pounds of oysters were valued at \$2.6 million. According to the *National Shellfish Register of Classified Estuarine Waters* (NOAA, 1991), Texas was the fifth leading producer of oysters in the nation from 1985 through 1989. Oyster landings peaked at almost 5.65 million pounds in 1986 and then declined to 1.98 million pounds in 1989. This decline in landings is attributed to disease, loss of habitat, and declines in waters approved for shellfishing. No clams were commercially landed during these years. Scallops were commercially harvested only in 1986 and 1989.

Another significant commercial fishery is that of the Gulf menhaden. The fishing is done by vessels using purse seines in shallow waters of the upper coast between Sabine Pass and Galveston. Landings in 1993 totaled 51.9 million pounds valued at \$2.5 million (Texas Shrimpers, 2001).

Recreational finfishing and shellfishing are also important to the Texas economy. Port Isabel, Aransas Pass, Palacios, and Freeport all depend on fishing to support their local economies. Recreational saltwater anglers primarily seek spotted and sand seatrout, red drum, flounder, black drum, and Atlantic croaker while fishing in coastal bays.

In 1998, there were 81 freshwater and saltwater aquaculture farms producing fish (food, bait, sport or game, and ornamental), crustaceans, mollusks, algae, and sea vegetables (Census of Aquaculture, 1998). The top aquaculture product in terms of value with almost \$11 million in sales were the food fish (catfish, salmon, perch, carp). Crustaceans such as shrimp had almost \$9 million in sales.

4. ENVIRONMENTAL CONSEQUENCES

Management measures are defined in section 6217 as economically achievable measures to control the addition of pollution to coastal waters, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. As required by the statute, EPA developed guidance (USEPA, 1993) specifying management measures for the following nonpoint pollution source categories: agricultural runoff, urban runoff, forestry runoff, marinas, hydromodification, and wetlands, riparian areas, and vegetated treatment systems. Coastal nonpoint programs must provide for the implementation of management measures that are in conformity with this guidance. The guidance also lists and describes management practices that EPA has found to be representative of the types of practices that can be applied successfully to achieve the management measures. State

and territory programs are not required to specify practices, but must include a process for selection of practices that will achieve the measures.

NOAA's PEIS discussed the fifty-six management measures and their function in preventing environmental degradation caused by the pollutants associated with each nonpoint source category. Each coastal nonpoint program must address each of the management measures by either: (1) providing for the implementation of that measure or an alternative as effective, or (2) justifying why the management measure is not included in the program. States and territories may exclude nonpoint source categories or subcategories where the sources do not exist or do not, individually or cumulatively, present significant impacts to coastal waters.

4.A MANAGEMENT MEASURES IMPLEMENTATION

1. ENVIRONMENTAL IMPACTS

The Texas coastal nonpoint program provides for the implementation of management measures for many aspects of the agriculture, forestry, urban development, marinas, and hydromodification nonpoint source categories, and for the protection of wetlands, riparian areas, and vegetated treatment systems. In some cases, NOAA and EPA have attached conditions to ensure that the state's program will conform to the guidance documents published by EPA and NOAA. The full text of all management measures and a statement of their applicability can be found in Appendix A.

a. Agricultural Nonpoint Pollution Source Category

Agriculture is of critical importance to the State's economy and is a source of nonpoint pollution to coastal waters. Agricultural production and related activities make up the state's second largest economic sector, accounting for 20 percent of the state's employment and \$75 billion in annual economic impact (Hightower, 1990). The counties in the Texas coastal area comprise a total of 11 million acres, 60 percent of which is currently in agricultural production (cropland, rangeland, or timber). Important agricultural commodities produced in coastal areas are sugar cane, rice, grain sorghum, wheat, peanuts, soybeans, hay, corn, citrus, vegetables, cotton, poultry, sheep, and beef and milk cows.

The level topography of the Texas coastal zone and the semi-arid conditions that exist along the southern coast tend to reduce the potential for sheet and rill erosion and limit the transport of nutrients and pesticides to coastal waters. According to the section 305(b) water quality assessment report (Texas Water Quality Inventory, 1998), although less than 0.8 percent of stream miles had known impacts, agriculture was the source of 16 percent of nonpoint source pollutants to streams. The section 305(b) report and the 1998 section 303(d) list do not identify rangeland or dryland rowcrop agriculture as a key contributor of nonpoint source pollutants.

Agricultural runoff is a factor contributing to harvest limitations in shellfishing waters in Texas. According to the *National Shellfish Register of Classified Growing Waters* (NOAA, 1995), harvesting of shellfish was restricted in 2,067 acres of classified shellfish waters in Bastrop Bayou, Nicks Lake, Salt Lake and Wolf Lake because of water quality degradation caused by agricultural runoff. Turtle Bay, Upper Carancahua Bay, and Upper Lavaca Bay also had shellfishing restrictions in 21,795 acres of waters. The Coast Alliance (1995) states that agricultural runoff adversely affected 220,000 acres of classified shellfishing waters in 1990.

Management measures for the following six subcategories of sources of agricultural nonpoint pollution that affect Texas's coastal waters will be implemented as part of the State's coastal nonpoint program:

- o Erosion and sediment control
- o Confined animal facilities
- o The application of nutrients
- o The application of pesticides
- o Grazing management
- o Irrigation water management

The Environmental Consequences section of the PEIS contains a description of the primary pollutants in agricultural runoff and an analysis of the impacts of these

pollutants on water quality. The management measures are designed to prevent the environmental degradation caused by these pollutants.

The implementation of agricultural management measures will reduce the generation of nonpoint source pollutants from agricultural activities and minimize the delivery of pollutants from agricultural lands to surface and ground waters. Agricultural management measures emphasize the control and removal of the sediment, nutrients, and pesticides entrained in runoff before they enter coastal waters. The management measures for confined animal facilities are intended to eliminate the pollutants leaving a facility by storing runoff and reducing the amount of facility wastewater and manure reaching a waterbody. The nutrient and pesticide management measures will promote a more efficient use of fertilizers and pesticides by limiting the amount of nitrogen, phosphorus, and chemicals applied to agricultural lands thereby reducing their runoff and leaching into surface and ground waters. Management measures for grazing and irrigation will protect sensitive areas such as streambanks and wetlands from damage by grazing of domestic livestock and promote the more efficient use of irrigation water. This will improve aquatic habitat and reduce the total pollutant discharge from irrigation systems.

The implementation of agricultural management measures in conformity with the 6217(g) guidance throughout the 6217 management area based on the existing state programs listed below will result in a more consistent, widespread implementation of Texas's programs with the resulting environmental benefits associated with a reduction in agricultural nonpoint pollution.

Management Measures for Agricultural Sources

Texas's program includes management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217; a description of the voluntary or incentive based programs the State will use to encourage implementation agricultural management measures; a description of the mechanism or process linking the implementing agency with the enforcement agency; and a commitment to use the enforcement authority where necessary. Texas has not provided sufficient justification for a sub-categorical exclusion of dryland rowcrop agriculture for the 6217 management area within Kleberg, Nueces, and San Patricio counties. The management measures for agricultural sources are discussed together because the State intends to implement them using the same existing programs and authority:

Subject to the condition noted, Texas intends to rely principally on the following programs and authorities to implement the agricultural management measures:

The Texas State Soil and Water Conservation Board (TSSWCB), one of the networked agencies in the Texas CZM program, is the lead agency to control agricultural nonpoint source pollution in Texas.

- The State of Texas Agricultural/Silvicultural Nonpoint Source Management Program is the primary program used to implement the agricultural management measures. Texas implements the agricultural management measures through a voluntary Water Quality Management Plan (WQMP) certification program (SB 503 Water Quality Management Plan Program, TX Agricultural Code 201.026). The WQMPs, which are based upon the NRCS Field Office Technical Guide, encompass all aspects of agricultural management measures and are in compliance with the 6217 (g) management measures. Under this program, producers are eligible for cost-share assistance to aid in implementing WQMPs that include management measures based upon the NRCS Field Office Technical Guide.

- Texas Water Code Section 26.121 is proposed as the enforceable policy where an actual water quality violation has occurred. Through SB 503 a complaint resolution process was established for agriculture and forestry nonpoint sources of pollution, and provides cost-share assistance as an incentive for implementing WQMPs and to aid cooperators in the implementation of practices required by WQMPs. To date a total of 3554 WQMPs have been certified statewide, and of these, 762 were in the coastal zone. The TSSWCB has the authority to ensure implementation of BMPs throughout the 6217 management area. To date, the TSSWCB has investigated 157 complaints, 77 were deemed valid, 46 water quality management plans were developed to correct violations, 20 minor modifications were made, and 11 referrals were made to the TNRCC for additional enforcement. The TSSWCB maintains two offices in the coastal zone to assist with implementation of

this program. Annual status reviews are conducted on 10% of all active WQMPs to verify compliance. Less than 1 percent of WQMPs developed were the result of complaints.

Condition

These management measures are approved with the following condition:

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary.

1. Erosion and Sediment Control Management Measure

This management measure is intended to be applied to activities that cause erosion on agricultural lands and lands converted from other uses to agricultural lands. This includes cropland; irrigated cropland; range and pasture; orchards; permanent hayland; specialty crop production; and, nursery crop production. Application of this management measure will reduce the mass load of sediment and associated pollutants (e.g., nitrogen, pesticides) reaching a waterbody.

2. Management Measure for Facility Wastewater and Runoff from Confined Animal Facility Management (Large and Small units)

These management measures are intended to be applied to confined animal facilities. Application of these measures will reduce the volume of runoff, manure, and facility wastewater reaching a waterbody.

3. Nutrient Management Measure

This management measure is intended to be applied to activities associated with the application of nutrients to agricultural lands. Application of this measure will reduce the amount of nutrients entering both ground and surface waters.

4. Pesticide Management Measure

This management measure is intended to be applied to activities associated with the application of pesticides to agricultural lands. This measure will reduce contamination of surface and ground water by fostering effective and safe use of pesticides without causing environmental degradation.

In addition to the programs and authorities mentioned above, Texas will use the following existing authority to implement the pesticide management measure:

- The Texas Department of Agriculture (TDA) is the State's lead agency responsible for agricultural pesticide regulation. The Texas pesticide and herbicide laws grant TDA the authority to enforce the provisions of the law pertaining to the registration, distribution, and use of all agricultural pesticides. TDA is responsible for enforcement of federal pesticide laws under a cooperative agreement with the EPA.

5. Grazing Management Measure

This management measure is intended to be applied to activities on range, irrigated and nonirrigated pasture, and other grazing lands used by domestic livestock. Its focus is on the riparian zone, but this measure also encourages the control of erosion from range, pasture, and other grazing lands above the riparian zone. Application of this management measure will improve aquatic habitat by reducing the amount of pollutants entering waters through proper livestock management.

6. Irrigation Water Management Measure

This management measure is intended to be applied to activities on irrigated lands,

including agricultural crop and pasture land (except for isolated fields of less than 10 acres in size that are not contiguous to other irrigated lands); orchard land; specialty cropland; and nursery cropland. Application of this management measure will reduce the waste of irrigation water, improve water use efficiency, and reduce the total pollutant discharge from an irrigation system.

b. Urban Nonpoint Pollution Source Category

Section 3.B of this EA provides information on the population and growth patterns in Texas. Increased development has resulted in the conversion of rural and agricultural areas into urban, suburban and industrial land uses. A large portion of the population and much of the new development is located in the communities surrounding the four major urban and industrial centers of Beaumont-Port Arthur-Orange, Houston-Galveston, Corpus Christi, and the Lower Rio Grande Valley. Increased urban and suburban development is accompanied by an extensive oil refining and petrochemical industry in the first three centers mentioned above. The Lower Rio Grande Valley is primarily an agricultural center but is also experiencing a large increase in population.

The large population growth that is occurring along most bay shorelines has resulted in an increase in the number of on-site septic systems. According to the section 305(b) water quality assessment report (Texas Water Quality Inventory, 1998), although less than 0.8 percent of stream miles had known impacts, urban areas were the source of 32 percent of nonpoint source pollutants to streams. Texas Department of Agriculture data indicate that residential runoff transports more pesticides into waterways than runoff from farmland (TCMP, 1996). This runoff is a major contributor to seagrass decline. In Galveston Bay, 5,200 acres of seagrasses have been lost since the 1950's (McFarlane et al., 1988).

Pollutants found in urban runoff include heavy metals, petroleum products, organic chemicals, sediments, nutrients, pathogens, and suspended solids. Texas's 1998 305(b) report identifies land development, sewer/stormwater overflow, urban runoff, storm sewers, septic tanks, and highway/road/bridge construction and maintenance as sources of urban nonpoint pollution. In the San Jacinto River Basin, urban runoff from the cities of Spring, Tomball, The Woodlands, and Houston is listed as a source of fecal coliform bacteria and nutrients that cause violation of water quality standards in 69 miles of Spring Creek. Runoff from Jacinto City, Deer Park, Galena Park, South Houston, Baytown, Pasadena, and Houston are listed as sources of heavy metals, organic chemicals, and nutrients that cause violations of water quality standards in 14 miles of the Houston Ship Channel/Buffalo Bayou. Septic systems and urban runoff are the nonpoint sources most responsible for the closing of shellfishing waters in Texas. According to the Coast Alliance (Coast Alliance, 1995), in 1990, 471,000 acres of classified shellfish harvesting waters in Texas were adversely affected by septic systems; urban runoff affected more than 135,000 acres.

Management measures have been developed for the following six subcategories of sources of urban nonpoint pollution that affect Texas's coastal waters:

- o Runoff from developing areas
- o Runoff from construction sites
- o Runoff from existing development
- o On-site disposal systems
- o General sources (households, commercial, and landscaping)
- o Roads, highways, and bridges

The Environmental Consequences section of the PEIS contains a description of the primary pollutants in urban runoff and an analysis of the impacts on water quality. The management measures are designed to prevent the environmental degradation caused by these pollutants.

The implementation of management measures for urban runoff will reduce the generation of nonpoint source pollutants from existing development and control runoff and treat pollutants associated with new development and redevelopment. The measures emphasize the control and removal of sediment and other suspended solids and pollutants entrained in runoff. The measures will minimize the transport of sediment and other pollutants (pesticides, fertilizers, petrochemicals, road salt, wood, garbage, paints and sealers) from new and existing development. The management measures pertaining to new and existing OSDS will reduce nutrient and pathogen loadings by: preventing the installation of conventional OSDS in areas where soil absorption systems will not provide adequate treatment of effluents; and, requiring that

existing OSDS be modified, operated, repaired, and maintained to reduce pollutant loadings. The measures will require that roads, highways, and bridges are sited, constructed, operated, and maintained in order to protect sensitive ecosystems and reduce the generation and runoff of sediment, road salt, and other pollutants.

The implementation of management measures for urban runoff using the State programs and authorities discussed below will result in more consistent and widespread implementation of existing programs. The requirement for Texas to include in its 6217 program management measures in conformity with the 6217(g) guidance for the inspection of existing OSDS and replacing or upgrading OSDS near nitrogen-limited surface waters will provide an increased level of environmental protection by reducing loadings of nitrogen and bacteria to coastal waters.

Management Measures for Urban Areas

1. New Development and Site Development Management Measures

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The State needs to strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the new development and site development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

These two management measures are discussed together because the State intends to implement them using the same state programs.

The New Development management measure is intended to be applied to control urban runoff and treat associated pollutants generated from new development, redevelopment, and new and relocated roads, highways, and bridges. The net result of this management measure will be increased watershed protection and a reduction in the erosion, flooding, and pollutants associated with poorly planned development.

The Site Development management measure is intended to be applied to all site development activities including those associated with roads, highways, and bridges. Application of this management measure will reduce the generation of nonpoint source pollution and mitigate the impacts of urban runoff through proper design and development of individual sites.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the new development and site development management measures:

- The primary means by which Texas proposes to implement these management measures is through the Texas Nonpoint Sourcebook and the Nonpoint Source Pollution Prevention Model Ordinance for Galveston County Health District (which is under development) with dissemination to cities, nongovernmental organizations, and other interested parties. Additionally, Texas has inventoried the number and types of local ordinances that address nonpoint source pollution.

The Texas Nonpoint Sourcebook provides detailed information on BMPs, implementation strategies, funding mechanisms, and strategies for measuring program effectiveness. While it is a good document which provides many of the management measures which are in conformity with the (g) measures, no plan has been provided for how the information will be disseminated to local municipalities and governments charged with developing local ordinances, or how overall implementation of management measures will be tracked over time.

With regard to nonpoint source model ordinances, currently only a few cities within the 6217 management area which do not fall under the Phase I NPDES requirements are known to have ordinances addressing nonpoint pollution or urban runoff management measures. Texas has inventoried the number and types of local ordinances that address nonpoint source pollution, but has not provided information on how the ordinances might be used or disseminated to other municipalities. Many of these cities will be required to develop urban runoff management programs through Phase II which will address Construction Site Erosion and Sediment Control management measures.

Conditions

These management measures are approved with the following conditions:

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for new development and site development. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the new development and site development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

2. Watershed Protection and Existing Development Management Measures

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The State needs to strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the watershed protection and existing development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

These two management measures are discussed together because the State intends to implement them using the same state programs.

The Watershed Protection management measure is intended to be applied to new development or redevelopment including construction of new and relocated roads, highways, and bridges that generate nonpoint source pollutants. Application of this management measure will reduce the generation of nonpoint source pollutants and mitigate the impacts of urban runoff.

The Existing Development management measure is intended to be applied to all urban areas and existing development in order to reduce surface water runoff pollutant loadings from such areas. Application of this measure will protect or improve surface water quality by developing and implementing watershed management programs.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the watershed protection and existing development management measures:

- The Memorandum of Agreement between the Texas Parks and Wildlife Department (TPWD) and TxDOT which allows TPWD to have active input into TxDOT activities which threaten fish and wildlife habitat.
- If the model local nonpoint source programs and ordinances, which are still under development, contain appropriate provisions for identifying pollution reduction opportunities and establishing watershed protection plans at the local level, and there is a plan to ensure that model ordinances will be adopted by municipalities, these could be used to address the management measures.
- TxDOT Guidance Documents call for identification and consideration of water pollution sensitive areas when selecting route locations and establishing control measures, but these apply only to roads, highways, and bridge construction projects under TxDOT jurisdiction and not all other existing development and road, highway and bridge construction not under TxDOT jurisdiction.

Conditions

These management measures are approved with the following conditions:

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for watershed protection and existing development. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will

use to encourage implementation of the watershed protection and existing development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

3. Construction Site Erosion and Sediment Control Management Measure

The Construction Site Erosion and Sediment Control management measure is intended to be applied to all construction activities on sites less than five acres in areas that do not have an NPDES permit in order to control erosion and sediment loss from those sites. This measure does not apply to: (1) construction of a detached single family home on a site of one-half acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. Application of this management measure will minimize the sediment being transported outside the perimeter of a construction site by reducing erosion and retaining sediment onsite.

Texas intends to rely on the following programs and authorities for implementation of the construction site erosion and sediment control management measure:

- The policy of NOAA and EPA is to defer to NPDES Phase II Permits for Construction Site Erosion and Sediment Control management measures. Currently, only 38 of 73 cities in the 6217 management area have received Phase II permits. Texas needs to provide NOAA and EPA with a schedule of when the remaining cities will implement Phase II permits. In addition the Texas Nonpoint Sourcebook addresses many of the BMPs in conformity with the (g) measures for Construction Site Erosion and Sediment Control.

4. Construction Site Chemical Control Management Measure

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The State needs to strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the construction site chemical control management measure, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

The Construction Site Chemical Control Management Measure is intended to be applied to all construction sites less than five acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. This management measure does not apply to: (1) construction of a detached single family home on a site of one-half acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. Application of this management measure will prevent the generation of pollutants at construction sites due to improper handling and usage, and prevent their movement from the construction site.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the construction site chemical control management measure:

- Texas has proposed to use a variety of regulatory authorities and voluntary mechanisms to address this management measure. They include Watershed Action Plans, TxDOT Guidance Documents, and Model Local NPS Programs and Ordinances. This management measure is intended to be applied to all construction sites less than 5 acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. As with other urban management measures, the TxDOT Guidance Documents are only applicable to construction projects under the jurisdiction of TxDOT.

Conditions

This management measure is approved with the following conditions:

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will include in its

program management measures in conformity with the 6217(g) guidance. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the construction site chemical control management measure, the description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

5. New Onsite Disposal Systems Management Measure and Operating Onsite Disposal Systems Management Measure

These two management measures are discussed together because the State intends to implement them using the same State programs.

The New Onsite Disposal System management measure is intended to be applied to all new OSDS including package plants and small-scale or regional treatment facilities not covered by NPDES regulations in order to manage the siting, design, installation, and operation and maintenance of all such OSDS. Application of this measure will prevent the installation of conventional OSDS in areas where soil absorption systems will not provide adequate treatment of effluents prior to entry into surface or ground waters.

The Operating Onsite Disposal Systems management measure is intended to be applied to all operating OSDS. This measure will minimize pollutant loadings from operation OSDS by requiring that they be modified, operated, repaired, and maintained to reduce nutrient and pathogen loadings in order to protect and enhance surface waters.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the new and operating onsite disposal systems management measures:

- Texas proposes to use the General Land Office (GLO) Beachfront Construction Regulations and the TNRCC On-Site Wastewater Program, which establishes standards for installation and maintenance of On-Site Disposal Systems (OSDS) to address these management measures. The GLO Beachfront Construction Regulations require minimum setbacks from Gulf beaches by prohibiting any part of the system from being located seaward of the structures they service. The TNRCC On-Site Wastewater Program establishes standards for installation of On-Site Sewage Facilities (OSSFs) and outlines educational requirements for installers. The TNRCC adopted rules (30 TAC Chapter 285) to provide minimum levels of acceptable criteria to ensure that the proper on site sewage facilities will be installed in the State in order to eliminate and prevent health hazards for the public and the waters of the State. For instance, the State has a minimum required separation distances from lakes, rivers, or salt water bodies.

- Chapter 366 of the Texas Health and Safety Code authorizes the TNRCC to regulate the on-site wastewater program for the State of Texas and to develop minimum standards, which are set forth in 30 TAC Chapter 285. The State has the ability to require a property owner to repair a malfunctioning OSDS (Texas Health and Safety Code 366.017). The property owner may be assessed a penalty for each day the system remains unrepaired.

Condition

These management measures are approved with the following condition:

- Within three years, Texas will include in its program management measures for inspection of existing OSDS and replacing or upgrading OSDS near nitrogen-limited surface waters in conformity with the 6217(g) guidance.

6. Pollution Prevention Management Measure

This management measure is intended to be applied to reduce the generation of nonpoint source pollution throughout the section 6217 management area by preventing and reducing pollutant loadings generated from a variety of activities within urban areas not addressed by other management measures in this source category. It is meant to ensure that communities implement solutions that may result in behavioral changes that reduce the generation of pollutants, thus reducing water quality impacts from these sources.

This measure does not require enforceable policies.

Texas has a variety of pollution prevention and education programs including TNRCC's Office of Pollution Prevention and Recycling (OPPR) pollution prevention

workshops, the Clean Industries 2000 program, the Lake and River Cleanup Program, Texas Recycles Day, Clean Star Texas, OPPR's Clean Cities 2000, Household Hazardous Waste Collection, NPS Video for the Clean Texas Reporter, Governor's Award for Environmental Excellence, OPPR Resource Documents, and the Galveston Bay and Coastal Bend Bays Estuaries Programs public education and outreach programs.

7. Management Measures for Roads, Highways and Bridges

The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217; a description of the voluntary or incentive-based programs the State will use to encourage implementation of the roads, highways and bridges management measures; a description of the mechanism or process linking the implementing agency with the enforcement agency; and a commitment to use the enforcement authority where necessary, but the State has not yet demonstrated the ability of the authorities to ensure implementation throughout the 6217 management area.

The six management measures pertaining to roads, highways, and bridges are discussed together because the State intends to implement them using same state programs.

The management measure for Planning, Siting, and Developing is intended to be applied to site development and land disturbing activities for new, relocated, and reconstructed roads and highways in order to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff from such activities. This measure emphasizes the importance of planning to identify potential problems early in the design process.

The management measure for Bridges is intended to be applied to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities. This will ensure that bridges will not be sited over sensitive waters and tributaries in the coastal zone.

The management measure for Construction Projects is intended to be applied to new, replaced, restored, and rehabilitated road, highway, and bridge construction projects in order to control erosion and offsite movement of sediment from such project sites. This measure emphasizes the importance of erosion and sediment control plans as effective methods in mitigating erosion problems at construction sites before any land-disturbing activity begins.

The management measure for Construction Site Chemical Control is intended to be applied to new, resurfaced, restored, and rehabilitated road, highway, and bridge construction projects in order to reduce toxic and nutrient loadings from such project sites. The objective of this measure is to safeguard surface and ground waters from toxic spills and hazardous loadings at construction sites from equipment and fuel storage, and also from road salt, fertilizers, and pesticides stored at maintenance areas.

The management measure for Operation and Maintenance is intended to be applied to existing, restored, and rehabilitated roads, highways, and bridges. This measure will ensure that pollutants generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures, are minimized through the development and implementation of a program that includes standard operating procedures and maintenance guidelines.

The management measure for Road, Highway, and Bridge Runoff Systems is intended to be applied to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse impacts to surface waters. Surface waters will be protected through the use of runoff management systems such as vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the six management measures for roads, highways, and bridges:

- TxDOT Guidance Documents, including the Storm Water Management Guidelines for Construction Activities, which apply only to roads, highways and bridges under TXDOT jurisdiction, and exclude all other roads, highways and bridges.
- The Memorandum of Agreement between the Texas Parks and Wildlife Department (TPWD)

and TxDOT which allows the department to have active input into TxDOT activities which threaten habitat of fish and wildlife,

- Texas will continue to pursue efforts to provide technical assistance through a pilot training program for representatives responsible for the planning, siting, and development of local roads and bridges outside of TxDOT jurisdiction. In addition, the State of Texas, in cooperation with the Texas Transportation Institute of Texas A&M University is developing a program for training local governments in the best management practices for road construction and maintenance. Together, these programs would help to implement management measures for roads, highways and bridges in the 6217 management area outside the authority of TxDOT.

Conditions

These management measures are approved with the following conditions:

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for roads, highways and bridges. Within one year Texas will develop a strategy (in accordance with the 15 Year Program Strategy pg. 38) to implement the management measures throughout the 6217 management area.

c. Forestry Nonpoint Pollution Source Category

Texas has more than 23,000,000 acres of land that is forested. Half of this area, roughly 11.8 million acres, lies in East Texas and is considered to be commercial timberland capable of growing timber crops. Although approximately 46 percent of land in the coastal zone is used for agricultural, less than 2 percent is used for forestry. Chambers, Jefferson and Orange Counties are the only counties that have significant forestry activities. Orange County has 126,900 acres of timberland, followed by Jefferson with 72,300 acres, and Chambers with 12,900 acres. The total amount of timberland in these counties is 212,100 acres or 1.8 percent of the entire coastal zone (TCNSPC Program, 1999). Section 3.B.2.b of this EA discusses forestry activities in Texas.

The Texas 1998 305(b) water quality assessment report (Texas Water Quality Inventory, 1998) does not identify any waterbodies in the state that are impaired by silviculture and forest management. The 1998 303(d) List of Impaired Waterbodies does not list any waterbodies with impairments from forestry activities.

The implementation of forestry management measures will reduce the runoff of pollutants to surface waters and mitigate the impacts associated with forestry activities. The forestry management measures emphasize advanced planning for forest harvesting and for locating, designing, and managing forest road systems. The management measures provide for the establishment of streamside management areas along surface waters to buffer against detrimental changes to the streams caused by sediment and loss of canopy species. The management measures for road construction and road management will reduce erosion and runoff of sediment by minimizing the disturbance of soils and by maintaining road stability. Management measures for site preparation, forest regeneration, and revegetation of disturbed areas will help to stabilize disturbed soils, control erosion, increase rainfall infiltration, and prevent sediment and associated pollutants from entering nearby surface waters. Implementation of the forest chemical management measure will ensure that the application of fertilizers and pesticides during forestry operations will not adversely affect water quality. The management measure for wetlands forests addresses the special operating circumstances and management practices appropriate for forested wetlands in order to maintain their ability to alter flood flow, remove nutrients, and provide habitat.

The environmental benefits that result from the implementation of management measures for forestry will be a more widespread and more consistent implementation of existing forestry management practices specified in the Texas Forestry Best Management Practices Handbook.

Management measures have been developed for the following six subcategories of sources of forestry nonpoint pollution that affect coastal waters:

- o Road construction and use

- o Timber harvesting
- o Regeneration methods
- o Site preparation
- o Prescribed burning
- o Application of forest chemicals

The Environmental Consequences section of the PEIS contains an analysis of the impacts of these pollutants on water quality. The management measures are designed to prevent the environmental degradation caused by these pollutants.

Management Measures for Forestry

Texas's program includes management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217; a description of the voluntary or incentive-based programs the State will use to encourage implementation of the forestry management measures; a description of the mechanism or process linking the implementing agency with the enforcement agency; and a commitment to use the enforcement authority where necessary.

The management measures for forestry sources are discussed together because the State intends to implement them using the same programs.

Subject to the condition noted, Texas intends to rely principally on the following programs and authorities for implementation of the agricultural management measures:

- The State of Texas Agricultural/Silvicultural Nonpoint Source Management Program is the primary program used to implement the forestry management measures. Texas implements the forestry management measures through a voluntary Water Quality Management Plan (WQMP) certification program (SB 503; TX Agricultural Code 201.026) administered by the Texas State Soil and Water Conservation Board. Each Soil and Water Conservation District (SWCD) annually reviews and adopts the Natural Resource Conservation Service's Field Office Technical Guide as the criteria for use within the district. Individual growers receive approval and certification by the TSSWCB for BMP practices which are in compliance with the (g) management measures. Annual status reviews are conducted to verify compliance. Under this authority, foresters are eligible for cost-share assistance to aid in implementing WQMPs that are in conformity with the 6217 (g) management measures.

- The Texas Forest Service's nonpoint source pollution prevention program promotes and monitors the use of voluntary best management practices in forestry operations throughout East Texas. Monitoring data supplied by the TFS shows that 87 percent of producers have adopted BMPs. On forestland owned by the forest industry, implementation of BMPs is 98 percent. Approximately 80 percent of the timber harvested in the 6217 management area comes from logging contractors trained in BMPs. The effectiveness of these programs in reducing nonpoint source pollution from forestry operations is demonstrated by the fact that not a single water body segment on the state's 303(d) list has an impairment due to forestry activity. The program has won the Governor's Clean Texas 2000 Environmental Excellence Award, a state water quality award, for its effective implementation of BMPs and highly successful cooperation among various groups and agencies.

- Texas Water Code Section 26.121 is proposed as a primary as well as back-up authority for the prevention and abatement of pollution from forestry. The TSSWCB investigates water quality complaints when forestry is the suspected cause, and refers cases to the TNRCC for enforcement when a producer fails to take the prescribed corrective action. This mechanism is delineated in a 1997 Memorandum of Agreement between the TSSWCB and TNRCC. The TSSWCB maintains two regional offices in the coastal area to provide technical assistance and aid in the implementation of the program.

Condition

These management measures are approved with the following condition:

Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary.

1. Preharvest Planning

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. The planning process components of this management measure are intended to apply to commercial harvesting on areas greater than 5 acres and any associated road system construction or reconstruction conducted as part of normal silvicultural activities. Through its advance planning process, this measure will ensure that silvicultural activities, including timber harvesting, site preparation, and associated road construction, are conducted without significant nonpoint source pollution delivery to streams and coastal areas.

2. Streamside Management Areas (SMAs)

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to surface waters bordering or within the area of operations. The vegetation in SMAs will protect water quality and aquatic habitat by reducing runoff and trapping sediment and nutrients before they reach surface waters.

Canopy species serve to moderate water temperatures by providing shade. They also provide the detritus for the detrital food chain, stabilize stream banks, and provide habitat for aquatic and terrestrial organisms.

3. Road Construction/Reconstruction

This management measure is intended for application on lands where silvicultural or forestry operations are planned or conducted. It applies to the clearing, pioneering, construction, and surfacing phases of road development. This management measure will reduce erosion and the runoff of sediment to surface waters by minimizing the disturbance of soil and rock during road development.

4. Road Management

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It applies to active and inactive roads constructed or used for silvicultural activities. This management measure will protect water quality by managing existing roads to maintain stability and utility in order to minimize sedimentation and pollution from runoff-transported materials.

5. Timber Harvesting

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all harvesting, yarding, and hauling conducted as part of normal silvicultural activities on harvest units larger than 5 acres. This management measure will protect water quality by locating landings according to preharvest planning thus minimizing sedimentation resulting from the siting and harvesting of timber, and by properly managing petroleum products.

6. Site Preparation and Forest Regeneration

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all site preparation and regeneration activities conducted as part of normal silvicultural activities on harvested units larger than 5 acres. Regeneration of harvested forest lands provides water quality protection by stabilizing disturbed soils. Tree roots hold soil in place and aid soil aggregation, decreasing the potential for slope failure. Vegetation decreases erosion by slowing storm runoff. Maintenance of an unbroken forest litter layer prevents raindrop detachment, maintains infiltration, and slows runoff.

7. Fire Management

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all prescribed burning conducted as part of normal silvicultural activities on harvested units larger than 5 acres and for wildfire suppression and rehabilitation on forest lands. This management measure will minimize potential nonpoint source pollution by reducing erosion and sedimentation resulting from these operations.

8. *Revegetation of Disturbed Areas*

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all disturbed areas resulting from harvesting, road building, and site preparation conducted as part of normal silvicultural activities. Disturbed areas are those localized areas within harvest units or road systems where mineral soil is exposed or agitated (e.g., road cuts, fill slopes, landing surfaces, cable corridors, or skid trail ruts). Revegetation of disturbed areas will prevent sediment and associated pollutants from entering nearby surface waters. Vegetation controls erosion by dissipating the erosive forces of raindrops, reducing the velocity of runoff, stabilizing soil particles, and increasing soil infiltration rates.

9. *Forest Chemical Management*

This management measure pertains to lands where silvicultural or forestry operations are planned or conducted. It is intended to apply to all fertilizer and pesticide applications (including biological agents) conducted as part of normal silvicultural activities.

Chemicals can directly enter surface waters through five major pathways: direct application, drift, mobilization in ephemeral streams, overland flow, and leaching. Direct application is the most important pathway and is one of the most easily prevented by this management measure. Providing buffer areas around streams and waterbodies is an example of an effective method of preventing the chemicals from adversely affecting water quality.

10. *Wetlands Forest*

This management measure is intended for forested wetlands where silvicultural or forestry activities are planned or conducted. It is intended to apply specifically to forest management activities in forested wetlands and to supplement the previous management measures by addressing the operational circumstances and management practices appropriate for forested wetlands. This management measure will help to reduce incidental or indirect effects on forested wetlands whose beneficial functions include flood flow alteration, sediment trapping, nutrient retention and removal, and provision of habitat.

d. Marinas and Recreational Boating Nonpoint Source Category

Section 3.B.2.d of this EA provides information on the extent of marina activities in Texas. Because of the extent of recreational boating activities and the large number of marinas in Texas, nonpoint source pollution from these activities poses a threat to coastal waters in certain areas. The 298 marinas and the 629,640 boats registered in 1999 are an indication of the extent of this source category activity in Texas.

Potential nonpoint source problems can be attributed to poor marina siting and design, maintenance dredging, routine marina operation, and boat operations. Pollutants from the operation and maintenance of marinas can also combine with other upland sources such as stormwater runoff and leachate from septic systems to cause significant water quality problems in localized areas. Pollutants such as heavy metals, toxins, hydrocarbons, bacteria, and nutrients can enter coastal waters as a result of marina and boating activities.

Texas's 1998 305(b) water quality inventory report identifies Clear Lake as a waterbody that is impacted by nonpoint pollution from marinas and boating activities. Data from a study (Special Report D7-001, *Marina Impacts in Clear Lake and Galveston Bay*, in TNRCC, 1998) indicate that

the concentration of dissolved oxygen in Clear Lake is sometimes lower than the standard established to assure optimum habitat conditions for aquatic life in or near marinas. Low dissolved oxygen concentrations are most likely to occur in marina basins and connecting access channels that are located in areas with minimum water circulation. This condition often results in large fish kills in the summer months. Data collected for the above mentioned study and for the EPA Regional Environmental Monitoring and Assessment Program indicated that levels of tributyl tin concentrations in Clear Lake were sometimes higher than the EPA screening level (1.0 microgram per liter) or the Texas Water Quality Standards for protection of aquatic life. Marina and boating activities have been responsible for the closing of shellfishing waters in Texas. According to the Coast Alliance (Coast Alliance, 1995), in 1990, 225,000 acres of classified shellfish harvesting waters in Texas were adversely affected by boating activities.

Management measures have been developed for the following five subcategories of sources of nonpoint pollution from marinas and recreational boating that affect Texas's coastal waters:

- o Poorly flushed waterways where dissolved oxygen deficiencies exist,
- o Pollutants discharged from boats,
- o Pollutants transported in storm water runoff from parking lots, roofs, and other impervious surfaces,
- o The physical alteration or destruction of wetlands and of shellfish and other bottom communities during the construction of marinas, ramps, and related facilities, and
- o Pollutants generated from boat maintenance activities on land and in the water

Fifteen management measures specified for this source category are grouped under two broad headings: (1) siting and design, and (2) operation and maintenance. Effective implementation of these measures will avoid impacts associated with marina siting and prevent the introduction of nonpoint source pollutants.

The six main impacts from the pollutants associated with marina and boating activities that affect water quality include: toxicity in the water column; increased pollutant levels in aquatic organisms; increased pollutant levels in sediments; increased levels of pathogen indicators; disruption of sediment and habitat; and, shoaling and shoreline erosion. The Environmental Consequences section of the PEIS contains an analysis of the impacts of these pollutants on water quality. The management measures are designed to prevent the environmental degradation caused by these pollutants.

The implementation of management measures for marinas and recreational boating will reduce the runoff of pollutants to marina waters and mitigate the impacts associated with the siting and design and the operation and maintenance of new and expanding marinas. Management measures for siting and design will control stormwater runoff from marina parking lots and hull maintenance areas thereby reducing the amount of suspended solids, oil, and grease entering marina waters. The measures will protect wetlands, shellfish beds and submerged aquatic vegetation during marina construction; will provide for water quality assessments to determine whether the marina design will affect water quality; will ensure proper circulation for flushing of the marina basin; and will reduce turbidity and shoaling by protecting against shoreline erosion. The measures for operation and maintenance emphasize the proper disposal of fish and solid wastes and the storage, transfer, containment, and disposal of sewage, oil, antifreeze, solvents, and paints. Restrictions on boating activities in shallow non-marina waters will protect shallow-water habitats and prevent resuspension of sediments and damage to submerged aquatic vegetation.

The environmental benefits that result from the implementation of management measures based on the existing State programs and authorities discussed below will be enhanced by the Best Management Practices for Marinas and Recreational Boating which was developed in conformity with the (g) guidance. The use of this document in reviewing permits for new and expanding marinas and for use at existing marinas will ensure compliance with State water quality and sanitary code provisions.

Management Measures for Marinas and Recreational Boating

Texas's program includes management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The State needs to strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the marinas and recreational boating management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

The fifteen management measures pertaining to marinas are all discussed together because the State intends to implement them using the same state programs.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the management measures for marinas:

- Texas achieves the requirements of management measures for marinas and recreational boating through a combination of regulatory authorities and voluntary programs. The Texas General Land Office manages all state-owned submerged lands and has special lease conditions for construction of marinas, piers, docks and other waterfront structures that are in conformity with the (g) guidance (Texas NAT. RES. CODE ANN. 33.2053(a)(3), (5), (7), (8), and (9)). Prior to issuing a lease, the GLO has the authority to detail specific conditions to be met to assure water quality for marina flushing and water quality assessment, habitat protection, and erosion control for shoreline stabilization and protection. Specific guidelines are issued through the Coastal Permitting Assistance Program, Interagency Guidelines for Applicants.
- The Marine Association of Texas has developed a BMP manual in conformity with the (g) guidance, and provides technical assistance on storm water runoff management at hull maintenance areas, parking lots, and pollution prevention considerations for fueling station design. Through its Marine Advisory Service, the Sea Grant program provides assistance and educational materials on sanitary devices and pumpout facilities. Recycling for A Cleaner Marine Environment BMP manual is also being distributed to marinas statewide.
- The Coastal Coordination Council, in coordination with Sea Grant, has begun to implement a Clean Marina Program modeled after programs in Florida and Maryland. The pilot program, which is being initiated in the Clear Lake and Corpus Christi areas with eventual expansion to the rest of the coast, will include management measures in conformity with the 6217(g) guidance.

Conditions

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the marinas and recreational boating management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

Siting and Design

1. Marina Flushing Management Measure

This management measure is intended to be applied to new and expanding marinas.

Initial site selection is the most important factor influencing the long-term impact a marina will have on water quality within the immediate vicinity of the marina.

2. Water Quality Assessment Management Measure

This management measure is intended to be applied to new and expanding marinas. Water quality assessments such as modeling of flushing rates, measuring water quality characteristics, and monitoring may be used to determine whether a proposed marina design will adversely affect water quality.

3. Habitat Assessment Management Measure

This management measure is intended to be applied to new and expanding marinas where site changes may impact on wetlands, shellfish beds, submerged aquatic vegetation, or other important habitats. Proper siting and design can reduce short-term impacts (habitat destruction during construction) and long-term impacts (water quality, sedimentation, circulation) on the surrounding environment.

4. Shoreline Stabilization Management Measure

This management measure is intended to be applied to new and expanding marinas where site changes may result in shoreline erosion. This measure has been shown to be effective in mitigating shoreline erosion and the resulting turbidity and shoaling.

5. Storm Water Runoff Management Measure

This management measure is intended to be applied to new and expanding marinas, and to existing marinas for at least the hull maintenance areas. Pollutants can be controlled through three techniques: filtration/infiltration; retention/detention; and, physical separation.

6. Fueling Station Design Management Measure

This management measure is intended to be applied to new and expanding marinas where fueling stations are to be added or moved. Marinas should be located and designed and a spill contingency plan developed so that pollutants released during fueling operations can be contained in a limited area to minimize spread through and out of the marina.

7. Sewage Facility Management Measure

This management measure is intended to be applied to new and expanding marinas in areas where adequate marine sewage collection facilities do not exist. The availability and use of these systems will reduce discharges of sanitary wastes to coastal waters.

Operation and Maintenance

1. Solid Waste Management Measure

This management measure is intended to be applied to new and expanding marinas. If adequate disposal facilities are available there is less likelihood for disposal of solid waste in surface waters or on shore where the material may wash into the waters.

2. Fish Waste Management Measure

This management measure is intended to be applied to marinas where fish waste is determined to be a source of water pollution. Marina patrons and employees are more likely to properly dispose of fish waste if told of potential environmental effects and provided adequate and convenient disposal facilities.

3. Liquid Material Management Measure

This management measure is intended to be applied to marinas where liquid materials used in the maintenance, repair, or operation of boats are stored. This measure minimizes entry of potentially harmful liquid materials into marina and surface waters through proper storage and disposal.

4. Petroleum Control Management Measure

This management measure is intended to be applied to boats that have inboard fuel tanks. The amount of fuel and oil entering marina and surface waters can be reduced by using devices such as automatic shut-off nozzles, fuel/air separators, and oil-absorbing bilge pads.

5. Boat Cleaning Management Measure

This management measure is intended to be applied to marinas where boat topsides are cleaned and marinas where hull scrubbing in the water has been shown to result in water quality problems. This measure minimizes the use and release of potentially harmful cleaners and bottom paints to marina and surface waters.

6. Public Education Management Measure

This management measure is intended to be applied to all environmental control authorities in areas where marinas are located. The best method of preventing pollution from marinas and boating activities is to educate the public about the causes and effects of pollution and methods to prevent it.

7. Maintenance of Sewage Facilities Management Measure

This management measure is intended to be applied to marinas where marine sewage disposal facilities exist. This measure is effective in preventing failure of pumpouts and discourages improper disposal of sanitary wastes thus reducing the release of untreated sewage into marina and surface waters.

8. Boat Operation Management Measure (applies to boating only)

This management measure is intended to be applied in non-marina surface waters where evidence indicates that boating activities are impacting shallow-water habitats. Boat operation in shallow water can resuspend bottom sediment, increase turbidity, and damage submerged aquatic vegetation. This management measure will minimize damage to sensitive habitats by excluding boats from shallow-water areas not suitable for boat traffic because of their ecological importance. Establishing no-wake zones will minimize the indirect impacts of increased turbidity.

e. Hydromodification Nonpoint Pollution Source Category

Diversions, channel modifications and dam and reservoir construction projects occur in the Texas coastal zone. Channelization projects are undertaken for the purposes of flood control, drainage improvement, navigation, and the stabilization of channels and banks. A great majority of channelization projects in Texas consist of maintenance dredging. Texas bays and estuaries are criss-crossed by over 770 miles of federally maintained dredged channels (TCMP, 1996). The Houston-Galveston Navigation Channel Project is intended to improve both the Houston and Galveston Ship Channels to accommodate larger ships and to enhance navigational safety. The project will deepen the shipping channels from 40 to 45 feet. The Galveston District of the Corps of Engineers dredges about 30 to 40 million cubic yards of material annually. Approximately half of that material is placed in beach fill projects, bird island nourishment projects, partially confined or unconfined uplands, the open Gulf of Mexico, or the open bay (TCMP, 1996). Dredging is also used to maintain access to the oil and gas exploration canals; to clear local drainage ditches, bayous, and streams to ensure rapid dissipation of flood waters; and to develop berthing areas for shipping and channels and basins for commercial marinas.

There are 374 dams within the Texas coastal zone (Department of the Army, 1975).

Caddo Lake along the Texas-Louisiana border and Green Lake, in Calhoun County just outside of the coastal zone, are the only large natural lakes in Texas so the State must rely on the construction and maintenance of reservoirs for water supply and flood control. Major impoundments or diversions within the coastal zone are Lake Texana on the Navidad River, Wallisville Lake on the Trinity River, Lake Houston, and the Colorado River diversion project. Salinity barriers occur on Chocolate Bayou, Taylors Bayou, and the Neches River.

Shoreline erosion is a significant problem in Texas. The major causes of the erosion are river and tidal currents, storms, wind-generated waves, land subsidence, sea level rise, oil and gas development, digging of canals, building dams, seawalls, levees, jetties and groins, saltwater intrusion, barrier island degradation, land use change, and sediment reduction. Shoreline erosion has contributed to the loss of habitat, the highest priority problem in Galveston Bay.

Channel modification to improve navigation or flood runoff have created conditions which reduce the resident time for streamflow, allowing more pollutants to reach coastal waters. Water diverted from rivers and streams for residential, industrial, and agricultural uses that would otherwise flow to the Corpus Christi Estuary is causing pollutants to concentrate in the estuary and is contributing to the loss of oysters and white shrimp. On the upper coast, channels often allow saltwater intrusion many miles inland from the Gulf of Mexico, thus changing the natural salinity conditions (TCMP, 1996).

Management measures for the following three subcategories of sources of nonpoint pollution from hydromodification activities that affect Texas's coastal waters will be implemented as part of the State's coastal nonpoint program:

- o Channelization and channel modification
- o Streambank and shoreline erosion
- o Dams

The main effects of the pollutants associated with hydromodification activities that affect water quality include: changed sediment supply, reduced availability of fresh water, accelerated delivery of pollutants, loss of surface water contact with overbank areas, loss or alteration of wetlands and instream and riparian habitats, blocked or impeded migration routes of fish, and increased sediment and nutrient levels. The Environmental Consequences section of the PEIS contains an analysis of the impacts of these pollutants on water quality. The management measures are designed to prevent the environmental degradation caused by these pollutants.

The implementation of management measures for hydromodification activities are intended to prevent degradation of the physical and chemical characteristics of surface waters and detrimental changes to instream and riparian habitat resulting from the transport of pollutants and from alterations in the supply of sediment and freshwater. The measures will minimize erosion, control sediment runoff, prevent downstream contamination from pesticides, petrochemicals, fertilizers, lime, cement, and construction chemicals, and protect the quality of water and aquatic habitat in reservoirs. The measures will also protect eroding streambank and shorelines that constitute a nonpoint pollution source that contributes to increased turbidity and nutrient levels in coastal waters.

The implementation of management measures for hydromodification activities using the State programs and authorities discussed below will result in a more consistent and widespread implementation of the existing programs through fulfillment of the requirement for Texas to include in its 6217 program management measures in conformity with the 6217(g) guidance. Additional environmental benefits will be attained by fulfillment of the requirement for Texas to implement the management measures throughout the 6217 management area.

Management Measures for Hydromodification

The management measures pertaining to hydromodification are all discussed together because the State intends to implement them using the same state programs.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities for implementation of the hydromodification management measures:

- Many of the codes provided by the State of Texas, including Texas Water Code Chapter 51: Water Control and Improvement Districts pertain broadly to permitting of dams, in-water construction, and rules prohibiting discharge of pollutants, but most do not have language addressing the management measures. Many are implemented by Water Districts that are overseen by a Board consisting of five or more members. There are over 1300 water districts in Texas, but it is not clear how many are in the 6217 management area. NOAA and EPA recommend that the management measures in conformity with the 6217 (g) guidance for hydromodification be distributed, potentially through the TNRCC Handbook for Board Members of Texas Water Districts, to the water districts within the 6217 management area.

- Water district directors receive copies of the TNRCC District Newsletter, which provides technical guidance, updates on new regulations, and other program changes or requirements, but Texas has not yet developed a plan for incorporation of the management measures into the Newsletter or a time frame for implementation of the management measures.

- Water Control and Improvement Districts do not encompass the entire geographical range of the 6217 management area. In areas outside of WCIDs, the applicable management measures are addressed by the TNRCC through state certification of U.S. Army Corps of Engineers (USACE) 404 permits and the 401 Certification process. However, in the spring of 1999 the Texas Legislature added Rider 27 to the TNRCC's FY2000-2001 biennium appropriation, requiring that the TNRCC waive its 401 certification review of Corps of Engineers 404 permits unless the review is necessary to maintain federal delegation of a program or otherwise meet a federal requirement. In compliance with this legislative mandate, the TNRCC and the Corps of Engineers, Southwestern Division, have drafted a Memorandum of Agreement in which a 404 permit application may proceed without 401 certification for those projects affecting three acres of water or 1,500 linear feet of streams or less (Tier 1 projects).

Conditions

- Within two years, Texas will include in its program management measures that are in conformity with the 6217 (g) guidance for hydromodification. Within one year, Texas will develop a strategy (in accordance with the 15 Year Program Strategy pg. 38) to implement the management measures throughout the 6217 management area.

Channelization and Channel Modification

1. Management Measures for Physical and Chemical Characteristics of Surface Waters and Instream and Riparian Habitat Restoration

- The management measure for Physical and Chemical Characteristics of Surface Waters is intended to be applied to public and private channelization and channel modification activities in order to prevent the degradation of physical and chemical characteristics of surface waters from such activities. The purpose of this management measure is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work.

- The management measure for Instream and Riparian Habitat Restoration pertains to surface waters where channelization and channel modification have altered or have the potential to alter instream and riparian habitat such that historically present fish or wildlife are adversely affected. The purpose of this management measure is to correct or prevent detrimental changes to instream and riparian habitat from the impacts of channelization and channel modification projects.

Streambank and Shoreline Erosion

1. Management Measure for Eroding Streambanks and Shorelines

- This management measure is intended to be applied to eroding shorelines in coastal bays, and to eroding streambanks in coastal rivers and creeks. This measure applies only to eroding shorelines and streambanks that constitute a nonpoint source pollution problem in surface waters. The application of vegetative or engineering stabilization techniques are effective in controlling coastal erosion. These techniques also serve to halt the destruction of wetlands and riparian areas.

Dams

1. Management Measures for Erosion and Sediment Control, Chemical and Pollutant Control, and Protection of Surface Water Quality and Instream and Riparian Habitat

- The management measure for Erosion and Sediment Control is intended to be applied to the construction of new dams, as well as to construction activities associated with the maintenance of dams. The purpose of this measure is to prevent sediment from entering surface waters during the construction or maintenance of dams. The purpose of this measure is to prevent sediment from entering surface waters by minimizing erosion and maximizing sediment retention onsite to reduce impacts on surface water quality.

- The management measure for Chemical and Pollutant Control is intended to be applied to the construction of new dams, as well as to construction activities associated with the maintenance of dams. The purpose of this measure is to prevent downstream contamination from pollutants such as pesticides, petrochemicals, fertilizers, lime, cement, and construction chemicals. This measure will provide for retention onsite of the soluble pollutants that are not easily controlled by erosion and sediment control practices.

- The management measure for Protection of Surface Water Quality and Instream and Riparian Habitat is intended to be applied to dam operations that result in the loss of desirable surface water quality, and of desirable instream and riparian habitat. The purpose of this measure is to protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments.

f. Wetlands, Riparian Areas, and Vegetated Treatment System

Much of the original extent of coastal and freshwater wetlands in Texas have been lost or altered as a result of both natural causes and human activities. Natural causes include the wind and wave action of storms, sea level rise, erosion, sediment reduction, saltwater intrusion, and subsidence. Human activities include levee building, oil and gas development, and conversion of wetlands for agricultural, urban, and industrial uses. The Texas Parks and Wildlife Department estimates that 35 percent of the state's coastal marshes were lost between 1950 and 1979 (Texas Wetlands Plan, 1988). The Galveston, Matagorda, San Antonio, Copano, and Corpus Christi bay systems lost fringing land at gross rates of about 287 acres/year between 1930 and 1982 (Morton and Paine, in TCMP, 1996).

The Texas 1998 305(b) report does not identify the drainage and filling of wetlands, the removal of riparian vegetation, or streambank modification and destabilization as the source of impairment to any waterbodies in its coastal zone.

When hydrologic changes or pollutants exceed the natural assimilative capacity of wetlands and riparian areas, the systems become stressed and may be degraded or destroyed to the point that the wetlands and riparian areas themselves become sources of nonpoint pollution in coastal waters. A degraded wetland has less ability to remove pollutants and can deliver increased amounts of sediment, nutrients, and other pollutants to the adjoining waterbody.

Management measures for wetlands, riparian areas, and vegetated treatment systems address multiple categories of nonpoint source pollution that affect coastal waters, including the five specific categories of sources previously addressed in this chapter. These measures promote the protection and restoration of wetlands and riparian areas and the use of vegetated treatment systems as means to control the

nonpoint pollution emanating from such sources. Management measures are provided for three categories:

- o Protection of wetlands and riparian areas
- o Restoration of wetlands and riparian areas
- o Promoting the use of vegetated treatment systems, such as constructed wetlands and vegetated filter strips

The Environmental Consequences section of the PEIS contains a discussion of the functions and importance of wetlands, riparian areas, vegetated buffers, and vegetated treatment systems.

The intent of the management measures for wetlands, riparian areas and vegetated treatment systems is to ensure that the nonpoint benefits of protecting and restoring wetlands and riparian areas, and of constructing vegetated treatment systems, will be considered in all coastal watershed water pollution control activities. The implementation of management measures will protect and restore the full range of functions for wetlands and riparian areas serving a nonpoint source abatement function and ensure that they do not become a significant nonpoint source due to degradation.

The environmental benefits that result from the implementation of management measures for wetlands, riparian areas, and vegetated treatment systems using the existing programs and authorities discussed below will be enhanced by the development of the State Wetlands Conservation and Management Plan for non-coastal wetlands. This plan will further assist in protecting wetlands and riparian areas that serve a significant nonpoint source abatement function.

Texas's program includes management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority "promulgate and enforce the nonpoint source pollution provisions" of Section 6217. The State needs to strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the wetlands, riparian areas, and vegetated treatment systems management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary. The management measures for wetlands, riparian areas, and vegetated treatment systems are discussed together because the State intends to implement them using the same state programs.

Subject to the conditions noted, Texas intends to rely principally on the following programs and authorities:

- Texas has set a no net loss goal concerning wetlands and has placed a special emphasis on coastal wetlands and submerged seagrass meadows. Several new plans have been developed toward promoting conservation of wetland and riparian areas, including a State-owned Coastal Wetlands Conservation Plan that includes both regulatory and nonregulatory components (under development), a Seagrass Conservation Plan for Texas, Texas Coastal Wetlands: A Handbook for Local Governments, and a Wetlands Assistance Guide for Landowners that emphasizes landowner incentives and other nonregulatory programs.

- From a regulatory standpoint, the General Land Office writes all leases for state-owned wetlands to match the management measures. In addition, the Wetland Reserve program (USDA), TMDL development and implementation, Section 401 Certification, Water Quality Management Plans, and Coastal Management Program Grants will be utilized to address the issues of protection and restoration on private lands in order to comply with the management measures for wetlands and riparian areas.

- The Coastal Management Program Grants promotes the use VTSs by providing funding for critical areas enhancement including construction of wetlands to improve water quality. The TNRCC is working to develop a process that will allow the Commission to establish standards for the design and installation of constructed wetlands for on-site sewage disposal. Completion of these standards appears to be several years in the future. Also, the Texas Department of Transportation emphasizes the use of buffer zones.

Conditions

- Within one year, Texas will provide a revised legal opinion that the State has the authority, in accordance with NOAA and EPA's document entitled "Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), that can be used to prevent nonpoint pollution and require management measures implementation, as necessary. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the wetlands, riparian areas and vegetated treatment systems management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

Management Measures for Wetlands, Riparian Areas and Vegetated Treatment Systems

1. Management Measure for Protection of Wetlands and Riparian Areas

This management measure is intended to be applied to protect wetlands and riparian areas from adverse nonpoint source pollution impacts. The purpose is to protect the existing water quality improvement functions of wetlands and riparian areas as a component of nonpoint source programs. The overall approach is to establish a set of practices that maintains functions of wetlands and riparian areas and prevents adverse impacts to areas serving a nonpoint source pollution abatement function. These pollution abatement functions are most effective as parts of an integrated land management system that combines nutrient, sediment, and soil erosion control.

2. Management Measure for Restoration of Wetlands and Riparian Areas

This management measure is intended to be applied to restore the full range of wetlands and riparian functions in areas where the systems have been degraded and destroyed and where they can serve a significant nonpoint source abatement function. This management measure should be used in conjunction with other measures addressing the adjacent land and water use activities in order to protect coastal water quality.

3. Management Measure for Vegetated Treatment Systems

This management measure is intended to be applied in cases where engineered systems of wetlands or vegetated treatment systems can treat nonpoint source pollution. Constructed wetlands and vegetated filter strips can serve a significant nonpoint source pollution abatement function. Vegetated filter strips can improve water quality by removing nutrients, sediment, suspended solids, and pesticides. Constructed wetlands can provide limited ecological benefits in addition to their nonpoint source control functions.

ENVIRONMENTAL CONSEQUENCES

4.A MANAGEMENT MEASURES IMPLEMENTATION, continued

2. SOCIOECONOMIC IMPACTS

a. Section 4.A.2 of the PEIS provides a summary of the economic implications of the management measures guidance as described in the Regulatory Impact Analysis prepared by EPA (EPA, 1992c). The section also summarizes the economic achievability analyses performed for all nonpoint source categories (USEPA, 1992b; Ogg, 1992; DPRA, 1992; Research Triangle Institute, 1992a, 1992b) These analyses provided a relative sense of the economic impacts of the management measures on affected households, municipalities, and commercial enterprises. The EPA determined from these studies that all the management measures specified in its guidance document are economically achievable.

In developing the (g) guidance document, EPA adopted a flexible approach that emphasized broad principles or standards for nonpoint source pollution control that can be applied nationally. This allows states to develop more specific programs that reflect the most cost-effective approaches in response to local conditions.

While the implementation of management measures will entail some economic costs to Texas, the flexibility embodied in the (g) guidance and in the NOAA/EPA Program Development and Approval Guidance will help to reduce the economic impacts associated with implementing the coastal nonpoint program. For example, Texas will have until the year 2016 to fully implement its coastal nonpoint program, including additional management measures where necessary. This ability to phase in program implementation over several years allows economic impacts to be absorbed over a longer time period. Another aspect of the flexibility in the program is that states may also exclude categories, subcategories, or individual nonpoint sources where the sources do not exist or are not anticipated to exist, or do not present a threat to coastal waters. This allows states to adopt their programs to local conditions thus implementing their programs in a more cost effective manner.

States may also adopt voluntary, education, and market-based incentive systems in addition to regulatory programs as a means of management measure implementation. For example, Texas has existing programs that implement the marinas public education management measure through education and outreach programs. For example, the Sea Grant Marine Advisory Service (MAS) is actively involved in working with and educating marinas and boat owners how to control pollutants. The MAS has developed a "Potty-Training" manual and educational programs for marine sanitation devices and distributed a BMP Manual for marina operators.

b. The implementation of management measures will also produce positive socioeconomic benefits for Texas. For example, since many of Texas's coastal water quality problems are linked to urban sources of pollutants, the urban management measures will help to reduce urban nonpoint sources such as sediment from construction sites, stormwater runoff from highways and developed areas, and leachate from septic systems. In addition, because of the large number of recreational boaters and marinas in Texas, nonpoint pollution from marinas can be expected to adversely affect coastal resources in certain areas. Management measures that result in improved marina siting and design along with the implementation of best management practices for marina operation and maintenance can reduce impacts associated with this nonpoint source. Implementation of management measures will improve water quality, enhance recreational opportunities, increase property values, provide ground water protection, benefit commercial fisheries, and reduce the risk to human health from water contact activities and consumption of shellfish. Improved water quality will increase the aesthetic value of coastal areas and thus benefit tourism.

4.B PROGRAM IMPLEMENTATION

1. ENVIRONMENTAL IMPACTS

Section 6217 requires that state and territory coastal nonpoint programs contain a number of specific components to be used in developing and implementing their programs. These components are:

- o Coordination with Existing State Programs
- o Determination of the 6217 Management area
- o Implementation of Management Measures in Conformity with (g) Guidance
- o Identification and Implementation of Additional Management Measures
- o Technical Assistance
- o Public Participation
- o Administrative Coordination
- o Identification of Enforceable Policies and Mechanisms

The environmental consequences of these components are discussed below.

a. Coordination with Existing State Programs

The statute requires that coastal nonpoint programs be closely coordinated with state and local water quality plans and programs and with state coastal zone management programs. This requirement is necessary to ensure that the new coastal nonpoint program can build upon and be integrated into existing state programs upon approval. States should develop their programs to complement and strengthen existing coastal management and nonpoint source authorities. This should produce a positive environmental consequence by minimizing unnecessary duplication or conflicts at the Federal, state, or local levels. It will also fulfill what the statute and legislative history indicate is the central purpose of section 6217, i.e., to strengthen the links between Federal and state coastal zone management and water quality programs in order to enhance state and local efforts to manage land use activities that degrade coastal waters.

The Texas General Land Office (GLO) is the agency with primary responsibility for the coastal nonpoint program's development and implementation. Other agencies with responsibilities include the Texas Natural Resources Conservation Commission (TNRCC), the Texas State Soil and Water Conservation Board (TSSWCB), the Texas Department of Transportation (TxDOT), the Texas Parks and Wildlife Department (TPWD) and the Railroad Commission of Texas (RRC).

The nonpoint program will be implemented through several programs which address nonpoint pollution and water quality throughout the state, including:

- Texas' Watershed Management Approach (including the TMDL process and development of Watershed Action Plans)
- Section 319 Nonpoint Source Program
- SB 503 Water Quality Management Plan Program (Texas Agricultural Code section 2201.026)
- Texas Pollutant Discharge Elimination System/National Pollutant Discharge Elimination System Program
- Section 401 Water Quality Certification
- Water Pollution Control and Abatement Program under Texas Water Code section 26.177

The nonpoint program will be coordinated with numerous state programs and activities, including:

- Texas Department of Transportation's "Don't Mess with Texas" anti-litter campaign
- The General Land Office's Adopt-A-Beach Program and Beach Watch Program
- The Texas Natural Resource Conservation Commission's Rural Outreach Program, Clean Texas 2000 Program, and the Texas Watch Program
- The Galveston Bay Estuary Program and the Coastal Bend Bays and Estuaries Program

b. 6217 Management Area

As directed by section 6217, NOAA, in consultation with EPA, reviewed each state's existing coastal zone boundary established under the CZMA, and made recommendations to the states on the geographic scope of their programs, i.e., the 6217 management area. This boundary recommendation, which was based on coastal watersheds, is a guide for states to use during program development. States may propose an alternative 6217 management area at the time of program submission. This proposal will then be evaluated by NOAA and EPA as part of the program review and approval process.

This provision has a positive environmental effect because it recognizes that land and water uses both within and outside of the existing coastal zone have the potential to degrade coastal waters. Evaluating coastal watersheds, whether or not those watersheds are completely encompassed within a state's existing coastal zone, ensures that all potential sources of nonpoint pollution that significantly affect coastal waters are included in the coastal nonpoint programs.

Texas has proposed a 6217 management area smaller than that recommended by NOAA and EPA, but coincident with the existing coastal zone boundary, which is based on the Oil Spill Prevention and Response Act (OSPRA) but also encompasses additional lands landward of the OSPRA line, generally within one mile of tidal rivers. The OSPRA line, also referred to as the coastal facilities designation line, was drawn to delineate inland areas that might generate water pollution threats to coastal waters. The OSPRA line was chosen as the boundary for the Texas Coastal Management Program in 1995 after an extensive, multi-year review of land and water uses that could reasonably be expected to have a significant impact on coastal waters.

The Coastal Coordination Council will monitor the progress of coastal nonpoint program implementation, including an ongoing evaluation of existing and future land and water use impacts. If such evaluation indicates that activities within coastal watersheds (but outside of the State's 6217 management area) are significantly impacting coastal waters, the State will extend the management area inland to address these sources. In addition, the Council will monitor the effectiveness of the other "networked" nonpoint source programs (such as the Section 319 Program) within a "Supplemental Planning Area" that encompasses the 33 counties contained within the coastal watersheds. The Council will evaluate whether these programs have adequately addressed actual and potential nonpoint pollution sources in the Supplemental Planning Area. The Council's evaluation of the effectiveness of the networked programs in the

Supplemental Planning Area will be included in the Council's 5-year Progress Report to NOAA and EPA. Based on its evaluation, when developing the subsequent 5-year implementation plan, the Council will determine whether any additional management measures need to be implemented and how such management measures should be applied within the larger 33 county Supplemental Planning Area.

c. Implementation of Management Measures in Conformity with (g) Guidance

For program approval, each coastal nonpoint program must provide for the implementation, at a minimum, of management measures in conformity with the guidance published by EPA under section 6217(g). As discussed in section 4.A, this guidance addresses five categories of nonpoint pollution: agricultural runoff, urban runoff, forestry runoff, marinas, and hydromodification. Guidance is also provided for wetlands, riparian areas, and vegetated filter strips. The environmental consequences of implementing each of these management measures is discussed above in section 4.A.1. In order to satisfy statutory requirements, state programs must identify the nonpoint source categories that will be addressed; management measures for those categories; and the process by which the state will ensure the implementation of the management measures. Each coastal nonpoint program must address each of the management measures by either implementing that measure (or an equally effective alternative), or justifying why the management measure is not included in the program.

The requirement that states implement the appropriate measures should have a positive environmental effect because the management measures are designed to reduce pollution from categories and sources of nonpoint pollution that can adversely impact a state's coastal waters. In addition, a state may include management measures for sources not identified in the 6217(g) guidance, if it determines such measures are necessary to protect coastal waters.

Texas has provided justification for a sub-categorical exclusion for dryland rowcrop agriculture. The Texas program includes management measures in conformity with the (g) guidance for agriculture, forestry, the urban construction site erosion and sediment control, marinas and for wetlands, riparian areas, and vegetated treatment systems source categories. Upon fulfillment of the conditions listed in Section 2.B of this environmental assessment, the Texas program will include management measures for the rest of urban and hydromodification nonpoint source categories.

d. Requirements for Implementation of Additional Management Measures

For program approval, coastal nonpoint programs must provide for the implementation of additional management measures where coastal water quality is impaired or threatened even after the implementation of the management measures specified in the (g) guidance. These additional management measures are to be applied both to existing land and water uses that are found to cause or contribute to water quality impairment and to new or substantially expanding land uses within critical coastal areas adjacent to impaired or threatened coastal waters.

This requirement should have a beneficial environmental effect because it will provide a second tier of protection where necessary to attain and maintain water quality standards and protect critical areas against future pollution problems.

Texas has developed a process for the identification and establishment of critical coastal areas and its program provides for the implementation and continuing revision of additional management measures applicable to critical coastal areas and to cases where (g) measures are fully implemented but water quality threats or impairments persist. The Texas Coastal Preserves program has been used to designate four critical coastal areas: Welder Flats in San Antonio Bay, South Bay in Laguna Madre, and Christmas Bay and Armand Bayou in Galveston Bay. Additional management measures can be implemented through the Watershed Action Plans that are developed for all 303(d) listed waters.

e. Technical Assistance

For program approval, coastal nonpoint programs are required to provide for technical and other assistance to local governments and the public for implementing the additional management measures. States are also encouraged to provide assistance to local governments and the public for the implementation of the (g) guidance measures. Assistance may be provided in developing ordinances and regulations, technical guidance, training, financial incentives, or demonstration projects.

This requirement will be environmentally beneficial because the technical assistance will enable the management measures to be better implemented at the

regional or local level. The assistance will address local needs with respect to implementation and will provide a better understanding of what the measures are trying to accomplish and how to best accomplish it. EPA has assembled a great deal of technical information during the development of its guidance document. This information will be available to the states in a variety of formats, including bibliographies and summaries, and by electronic bulletin boards.

The Texas program outlines technical assistance efforts, such as conducting educational programs and workshops on pollution prevention; disseminating agricultural information; conducting demonstrations of Best Management Practices; providing education and training on logging and forest resources; and assisting dam owners and operators in the use and maintenance of the structures. Texas has developed technical guidance materials such as the Manual for Conducting a Watershed Land Use Survey, a storm drain stenciling manual, and an integrated landscape management brochure.

f. Public Participation

For program approval, states must provide opportunities for public participation in all aspects of the coastal nonpoint program. Congress intended that the public be involved in the development and implementation of the program, calling not only for public participation, but also for public education.

Involving the public early in the development of the program should help improve acceptance of the program and promote and maintain the public's long-term commitment to support the goals of section 6217. Specifically providing opportunities for public comment, especially by those regulated or affected by the program, prior to program development and implementation can ensure that the program will be accepted, and therefore more effective in controlling nonpoint pollution. The public education aspect of the requirement will be beneficial by making individuals more aware of the impact of their actions on coastal waters and by generating support for pollution control efforts at the state and local level.

Texas's program submittal describes activities that provide opportunities for public participation in the development and implementation of the coastal nonpoint program. The State has utilized its existing outreach, education, and technical assistance programs to explain the coastal nonpoint program and provide for public input and feedback. In 1997 the State set up a Coastal Nonpoint Source work group which includes a public member of the Coastal Coordination Council and representatives of the line agencies responsible for Coastal Nonpoint Program development. Basin steering committees provide the primary forum for coordinating stakeholder involvement at the basin level. Texas provided a 30-day public comment period during which it received two comment letters.

g. Administrative Coordination

For program approval, the coastal nonpoint program must include administrative coordination mechanisms. At a minimum, the program must include a list of state, regional and local agencies and the role that they will play in developing and implementing the program.

This requirement will be environmentally beneficial because it will help avoid conflicts and duplication of effort among the agencies involved in the coastal nonpoint program and ensure that the various agencies are fulfilling their responsibilities to implement the program. In recognizing their specific responsibilities, agencies will be able to refine policies and procedures and maximize limited resources to more effectively support the goals of section 6217.

As discussed in section 4.B.1.a above, the General Land Office (GLO) is the agency with primary responsibility for the coastal nonpoint program's development and implementation. The GLO is also the lead state agency for the Texas Coastal Management Program and for receiving and administering Federal Coastal Zone Management Act funds. Since the Coastal Nonpoint Program will be a part of the Texas Coastal Management Program, the general administration of the Coastal Nonpoint Program will be the responsibility of the GLO. The GLO also manages development in the beach/dune system and administers state-owned submerged lands with specific lease conditions for construction of waterfront facilities, dredging and fill.

The Texas program submission describes the state and local agencies and programs and their role in developing and implementing the state nonpoint program. The TNRCC is the lead state agency for the management of urban and other non-agricultural and non-silvicultural nonpoint source pollution, which includes activities related to implementation of management measures, complaint investigations, education, and technical assistance. The TNRCC, as the state's lead water quality

agency, has overall responsibility for maintaining the state's section 303(d) list and is also responsible for administering the on-site sewage (septic) system program, wetland certification under section 401 of the Clean Water Act, water quality monitoring and assessment activities, and establishment of water quality standards.

The TSSWCB is the lead state agency for the management of agricultural and silvicultural nonpoint source pollution, which includes activities related to implementation of management measures, complaint investigations, education, and technical assistance. The TSSWCB has overall responsibility for developing and implementing provisions of TMDL's relating to agricultural and silvicultural nonpoint sources.

The Texas Department of Transportation (TxDOT) is the lead state agency for construction and maintenance of state roads, which includes responsibility for the management of road and highway nonpoint sources of pollution.

The Texas Parks and Wildlife Department (TPWD) is the lead state agency for the protection of fish and wildlife, which includes participation in the review of Clean Water Act section 404 permits and section 401 wetland certifications. TPWD also works on programs to enhance, create and conserve wetlands and provides technical and/or financial assistance to private wetland owners. It is also responsible for enforcing boat sewage rules.

The Railroad Commission of Texas (RRC) is the lead state agency for section 401 water quality certifications for oil and gas exploration and development activities.

Memoranda of Agreement/Understanding describing specific agency roles and mechanisms are also used to ensure coordination between the state agencies involved in the coastal nonpoint program.

h. Monitoring

For program approval, the coastal nonpoint program must contain a description of any necessary monitoring techniques to accompany the management measures to assess over time the success of the measures in reducing pollution loads and improving water quality. The EPA (g) guidance provides guidance for measuring changes in pollution loads and in water quality that may result from the implementation of management measures and for ensuring that the measures are implemented, inspected, and maintained properly.

This requirement should have a beneficial environmental effect because water quality monitoring is the most direct and defensible tool available to evaluate water quality and its response to management measures and other factors. By tracking management measures and water quality simultaneously, states will be able to evaluate the performance of the management measures and determine the need for additional management measures to meet water quality objectives.

Texas's program includes a plan to assess over time the success of the management measures in reducing pollution loads and improving water quality. There are several agencies and organizations involved in both regional and statewide water quality monitoring efforts. The TNRCC maintains 352 stations, the USGS maintains 73 stations, and by contact with regional water control agencies, 905 stations are maintained. In addition, Texas has a Clean Rivers Program which creates partnerships

between local water quality agencies and state and local funding sources to monitor and assess water quality.

i. Enforceable Policies and Mechanisms

For program approval, the coastal nonpoint program must contain enforceable policies and mechanisms to implement the applicable requirements of section 6217, i.e., the (g) measures and additional management measures. The term "enforceable policy" is defined in the CZMA to mean state policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a state exerts control over private and public land and water uses and natural resources in the coastal zone. Voluntary approaches, including economic incentives, may be used to implement management measures as long as they are backed by enforceable authorities.

This requirement will be environmentally beneficial because states will be able to use a variety of regulatory and/or non-regulatory approaches in order to ensure implementation of the management measures. In addition, the selection and design of enforceable policies can be tailored to specific state or local circumstances. The success of the implementation of the policies can also be enhanced through public education and technical assistance programs.

The Texas State Soil and Water Conservation Board, one of the networked agencies in the Texas CZM program, is the lead agency for controlling agricultural and forestry nonpoint source pollution in Texas. Management measures for agricultural and forestry runoff will be implemented principally through a voluntary Water Quality Management Plan certification program (SB 503 Water Quality Management Plan Program, Texas Agricultural Code 201.026) and the Texas pesticide and herbicide laws.

Management measures for urban runoff will be implemented principally through the Texas Nonpoint Sourcebook and the Nonpoint Source Pollution Prevention Model Ordinance for Galveston County Health District; the Memorandum of Agreement between the Texas Parks and Wildlife Department and Texas Department of Transportation (TxDOT); TXDOT Guidance Documents; NPDES Phase II Permits for Construction Site Erosion and Sediment Control; Watershed Action Plans; Model Local NPS Programs and Ordinances; the General Land Office Beachfront Construction Regulations; the Texas Natural Resource Conservation Commission On-Site Wastewater Program; Chapter 366 of the Texas Health and Safety Code; and Storm Water Management Guidelines for Construction Activities.

Management measures for marinas will be implemented principally through the Texas General Land Office special lease conditions for construction of marinas, piers, docks and other waterfront structures; a BMP manual developed by the Marine Association of Texas; the Marine Advisory Service and Sea Grant program, which provide assistance and educational materials on sanitary devices and pumpout facilities; and the Coastal Coordination Council, which has begun to implement a Clean Marina Program modeled after programs in Florida and Maryland.

Management measures for hydromodification will be implemented principally through the Texas Water Code Chapter 51: Water Control and Improvement Districts; technical guidance provided by the TNRCC District Newsletter; and the TNRCC through state certification of U.S. Army Corps of Engineers (USACE) 404 permits and the 401 Certification process.

Management measures for wetlands, riparian areas, and vegetated treatment systems will be implemented principally through a State-owned Coastal Wetlands Conservation Plan that includes both regulatory and nonregulatory components (under development); a Seagrass Conservation Plan for Texas, Texas Coastal Wetlands: A Handbook for Local Governments, and a Wetlands Assistance Guide for Landowners that emphasizes landowner incentives and other nonregulatory programs; through the General Land Office, which writes all leases for state-owned wetlands to match the management measures; the Wetland Reserve program (USDA), TMDL development and implementation, Section 401 Certification, Water Quality Management Plans, and Coastal Management Program Grants, which promote the use of VTSs by providing funding for critical areas enhancement including construction of wetlands to improve water quality.

PROGRAM IMPLEMENTATION

2. SOCIOECONOMIC IMPACTS

There should not be any significant socioeconomic impacts associated with the specific components required to be used in developing and implementing the Texas coastal nonpoint program. However, some localized impacts may result from efforts to protect and restore coastal waters.

The designation of critical coastal areas and the implementation of additional management measures may prohibit development and certain land and water uses in some areas.

The Texas Coastal Preserves program has been used to designate four critical coastal areas: Welder Flats in San Antonio Bay, South Bay in Laguna Madre, and Christmas Bay and Armand Bayou in Galveston Bay. Using a ten-year rotation schedule, Texas will evaluate all of its basins to determine the results of (g) measure implementation and water quality monitoring efforts. Based on these evaluations, appropriate additional management measures, if required, will be developed and implemented on a site-specific basis.

Additional technical assistance may be required by local governments and the public in applying additional management measures. However, because Texas currently has a number of technical assistance programs available to the public through local governments, nonprofit organizations, and state agencies responsible for implementing the nonpoint pollution control program, no significant additional socioeconomic impacts should result. The State's submittal provided listings of the key

nonpoint source-related technical assistance programs, the targeted user groups, and the agencies responsible for implementation of the program.

A positive impact will be attained through Texas's existing and planned public participation efforts. These efforts give the public the opportunity to participate in the development of the program and help to improve public acceptance of the program. These efforts should also lead to attitude and behavior changes as people become more aware of the environmentally beneficial goals of the coastal nonpoint program. This will produce an increased public awareness of the potential impacts of their activities on the environment and lead to less pollution and lower socioeconomic costs.

4.C ENVIRONMENTAL / SOCIOECONOMIC IMPACTS OF ALTERNATIVES

a. Approval of Texas Coastal Nonpoint Program

As discussed in the preceding sections, the approval of the Texas coastal nonpoint program would have a beneficial effect on the environment because the program would help to control sources of nonpoint pollution and would result in fewer pollutants reaching coastal waters. For example, because urban runoff is a major source of nonpoint pollution in Texas, the nonpoint program could help to control runoff of pollutants such as oil, grease, and organics from petroleum activities that contaminate the Houston Ship Channel/Buffalo Bayou. The program could also control stormwater runoff and seepage from septic systems that are responsible for the closing of shellfishing waters in Texas. The coastal nonpoint program would make existing programs more effective by strengthening the links between Federal and Texas state coastal zone management and water quality programs, thereby improving state and local efforts to manage land use activities that degrade coastal waters and habitats.

The requirement for the program to develop additional management measures, to identify critical coastal areas and coastal waters that are not attaining water quality standards, and to identify the land uses that cause or threaten those coastal waters would have a positive environmental effect by focusing attention on existing or potential problem areas that could degrade coastal waters. Texas's 305(b) Report, the nonpoint source assessment of surface waters, identifies and contains descriptions of the state's waterbodies that are threatened and impaired by nonpoint source pollution. A number of cooperative efforts (e.g., the Clean Cities 2000 program, the Lake and River Cleanup program, and the Texas Recycles Day) are underway to prevent and mitigate nonpoint sources of pollution to these identified areas where nonpoint pollution impacts are known to exist or threaten water quality.

The approval of the Texas coastal nonpoint program would also have positive socioeconomic benefits. The improvements in coastal water quality that would result from controlling nonpoint source pollution would increase the aesthetic value of coastal areas, and would help ensure that beaches and shellfishing areas remain open, thus benefitting tourism and providing opportunities for boating and swimming and other water-related activities.

b. Conditional Approval of Texas Coastal Nonpoint Program

The conditional approval of the Texas coastal nonpoint program would have a beneficial effect on the environment because it would produce the same beneficial results as approval, provided Texas satisfies the conditions, and would, at least temporarily, avoid the adverse impacts of denying approval. The implementation of portions of a conditionally approved program would begin to fulfill the intent of section 6217 by helping to control sources of nonpoint pollution and will result in fewer pollutants reaching coastal waters. The same socioeconomic impacts resulting from changes in land and water uses that are associated with approval of the Texas program should also result from conditional approval.

c. Deny Approval of Texas Coastal Nonpoint Program

The denial of approval of the Texas coastal nonpoint program would result in a reliance on existing programs to control nonpoint source pollution. It would result in the loss of a portion of Federal funds awarded under section 306 of the CZMA and section 319 of the CWA. This may produce adverse environmental impacts because it may cause the state not to implement management measures that are meant to control nonpoint pollution.

Nonpoint pollution has caused significant environmental problems in Texas. Water quality has continued to deteriorate in many coastal waters. For example, 60 of 71 coastal water body segments listed on the Texas 1998 section 303(d) list of impaired waterbodies do not support or only partially support their designated water uses. The major cause of impairment is fecal coliform bacteria. Elevated levels of bacteria from failed septic systems and from stormwater runoff has caused closure of shellfishing areas in Texas.

The denial of approval might also have an adverse economic impact because the continued degradation of water quality will affect the recreational and commercial uses and users of coastal waters. Denying approval might also cause the state not to implement a second tier of pollution control provided by additional management measures that are meant to restore degraded coastal waters and protect critical coastal areas against future pollution.

4.D UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

The conditional approval of the Texas coastal nonpoint pollution control program and the implementation of management measures should not produce any unavoidable adverse environmental impacts. The Texas coastal nonpoint program is intended to protect the environment by controlling nonpoint pollution and protecting and restoring coastal waters. There may be some changes in the patterns of land and water uses in order to avoid activities that degrade coastal waters and habitats. These changes in activities, such as directing development away from critical coastal areas, should not result in any unavoidable adverse environmental impacts. In addition, section 6217(g) requires a description of any necessary monitoring techniques to accompany the management measures to assess over time the success of the measures in reducing pollution loads and improving water quality. The Texas program addresses the required monitoring program in Volume I, chapter 9 of its program submission.

4.E RELATIONSHIP BETWEEN SHORT-TERM USES OF ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The overall purpose of section 6217 and the Texas coastal nonpoint pollution control program is to protect and restore coastal waters and thus to enhance the long-term productivity of all coastal resources. The NOAA/EPA review of the Texas program and preparation of this environmental assessment have not indicated that the Texas program includes any short-term uses of the environment that may reduce long-term productivity. Some short-term uses of the environment may have to be modified in response to implementation of management measures. This may result in short-term costs to the users, but will result in long-term benefits to the environment through cleaner coastal waters, protected resources, and increased productivity.

4.F IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NOAA does not anticipate any irreversible or irretrievable commitment of resources as a result of the conditional approval of the Texas coastal nonpoint program. However, the section 6217 requirements for states and territories to establish a 6217 management area, to implement management measures in this area, and to identify and map critical coastal areas that need additional measures to protect them against present and future nonpoint pollution problems, may have the effect of reallocating resources for an indefinite period of time. The identification of critical areas may also have the effect of restricting development or other activities in the critical areas and concentrating these activities in other locations. Although development activity results in the affected site being committed to the new use for an indefinite period of time, and can practically be considered an irretrievable commitment of resources, the amount of resources is expected to be minimal. Also, although critical areas may need special controls such as setbacks and low density zoning to protect coastal waters, these designations may change in the future.

5. LIST OF PREPARERS

Joseph P. Flanagan - Environmental Protection Specialist, Coastal Programs Division in the Office of Ocean and Coastal Resource Management, had lead responsibility for the preparation of the Texas environmental assessment. He has been involved in the preparation of environmental impact statements and assessments since 1980 in NOAA's Ocean Minerals and Energy Division, Marine Sanctuaries Division, and Coastal Programs Division. He has a B.S. in Geology/Chemistry from the University of Miami and an M.S. in Environmental Systems Management from the American University.

6. LIST OF AGENCIES AND PERSONS CONSULTED

The following Federal and Texas agencies were consulted during the preparation of the environmental assessment and during the review of the Texas coastal nonpoint program. These agencies also received a copy of the environmental assessment.

Federal Agencies

Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Office of Ecosystem Protection
Region 6 - Nonpoint Source Coordinator
Department of Commerce
National Marine Fisheries Service
Department of the Interior
U.S. Fish and Wildlife Service

Texas Agencies

General Land Office
Coastal Coordination Council
Railroad Commission of Texas
Natural Resource Conservation Commission
State Soil and Water Conservation Board
Department of Transportation
Parks and Wildlife Department

7. FINDING OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

Having reviewed the environmental assessment and the available information relating to the proposed action, I have determined that there will be no significant environmental impacts resulting from the action different from those analyzed in the Programmatic Environmental Impact Statement prepared for the 6217 program. Preparation of an environmental impact statement on the action is not required by Section 102 (2) (c) of the National Environmental Policy Act or its implementing regulations.

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APPENDIX A. MANAGEMENT MEASURES FOR SOURCES OF NONPOINT POLLUTION IN COASTAL WATERS

1. Management Measures for Agricultural Sources

1. *Erosion and Sediment Control Management Measure*

Apply the erosion component of a Conservation Management System (CMS) as defined in the Field Office Technical Guide of the U.S. Department of Agriculture Natural Resources Conservation Service to minimize the delivery of sediment from agricultural lands to surface waters, or

Design and install a combination of management and physical practices to settle the settleable solids and associated pollutants in runoff delivery from the contributing area for storms of up to and including a 10-year, 24-hour

frequency.

2a. Management Measure for Facility Wastewater and Runoff from Confined Animal Facility Management (Large Units).

Limit the discharge from the confined animal facility to surface waters by:

(1) Storing both the facility wastewater and the runoff from confined animal facilities that is caused by storms up to and including a 25-year, 24-hour frequency storm.

Storage structures should:

(a) Have an earthen lining or plastic membrane lining, or

(b) Be constructed with concrete, or

(c) Be a storage tank; and

(2) Managing stored runoff and accumulated solids from the facility through an appropriate waste utilization system.

This management measure is intended to be applied to all new facilities regardless of size and to all new or existing confined animal facilities that contain the following number of head or more:

| | Head | Animal Units |
|------------------|--------|------------------|
| Beef Feedlots | 300 | 300 |
| Stables (horses) | 200 | 400 |
| Dairies | 70 | 98 |
| Layers | 15,000 | 150 ¹ |
| | | 495 ² |
| Broilers | 15,000 | 150 ¹ |
| | | 495 ² |
| Turkeys | 13,750 | 2,475 |
| Swine | 200 | 80 |

This measure does not apply to those facilities that are defined as concentrated animal feeding operations by Federal regulation 40 CFR 122 and are required to obtain NPDES discharge permits. This regulation allows the Director of a NPDES discharge program to designate any animal feeding operation as a concentrated animal feeding operation (thus subjecting the operation to NPDES program requirements) upon determining that it is a significant contributor of pollution. If an NPDES permit is issued, the terms of the permit apply and this management measure is not required.

A confined animal facility is a lot or facility (other than an aquatic animal production facility) where the following conditions are met:

- Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and
- Crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

2b. Management Measure for Facility Wastewater and Runoff from Confined Animal Facility Management (Small Units)

Design and implement systems that collect solids, reduce contaminant concentrations, and reduce runoff to minimize the discharge of contaminants in both facility wastewater and in runoff that is caused by storms up to and including a 25-year, 24-hour frequency storm.

Implement these systems to substantially reduce significant increases in pollutant loadings to ground water. Manage stored runoff and accumulated solids from the facility through an appropriate waste utilization system.

This management measure is intended to be applied to all existing confined animal facilities that contain the following number of head:

| | Head | Animal Units |
|------------------|--------------|----------------------|
| Beef Feedlots | 50-299 | 50-299 1b |
| Stables (horses) | 100-199 | 200-399 |
| Dairies | 20-69 | 28-97 |
| Layers | 5000-14,999 | 50-149 ³ |
| | | 165-494 ⁴ |
| Broilers | 5,000-14,999 | 50-149 ³ |

Turkeys 5,000-13,749 900-2,474

Swine 100-199 40-79

³ If facility has a liquid manure system, as used in 40 CFR Section 122, App.B.

⁴ If facility has continuous overflow watering, as used in 40 CFR Section 122, App.B.

This measure is subject to the same NPDES designation criteria mentioned for large unit animal facilities. Facilities containing fewer than the number of head listed above are not subject to this management measure. Existing facilities that meet the requirements of management measures for large units are in compliance with the requirements of this measure. Existing and new facilities that already minimize the discharge of contaminants to surface waters, protect against contamination of ground water, and have an appropriate waste utilization system may already meet the requirements of this measure. Such facilities may not need additional controls for the purposes of this measure.

3. Nutrient Management Measure

Develop, implement, and periodically update a nutrient management plan to:

(1) apply nutrients at rates necessary to achieve realistic crop yields, (2) improve the timing of nutrient application, and (3) use agronomic crop production technology to increase nutrient use efficiency. When the source of the nutrients is other than commercial fertilizer; determine the nutrient value and the rate of availability of the nutrients. Determine and credit the nitrogen contribution of any legume crop. Soil and plant tissue testing should be used routinely.

Nutrient management plans contain the following core components:

(1) Farm and field maps showing acreage, crops, soils, and waterbodies.

(2) Realistic yield expectations for the crop(s) to be grown, based primarily on the producer's actual yield history, State Land Grant University yield expectations for the soil series, or SCS Soils-5 information for the soil series.

(3) A summary of the nutrient resources available to the producer, which at a minimum include:

- Soil test results for pH, phosphorus, nitrogen, and potassium;*
- Nutrient analysis of manure, sludge, mortality compost or effluent;*
- Nitrogen contributions to the soil from legumes grown in the rotation;*
- Other significant nutrient sources (e.g., irrigation water).*

(4) An evaluation of field limitations based on environmental hazards or concerns, such as,

- Sinkholes, shallow soils over fractured bedrock, and soils with high leaching potential,*
- Lands near surface water;*
- Highly erodible soils, and,*
- Shallow aquifers.*

(5) Use of the limiting nutrient concept to establish the mix of nutrient sources and requirements for the crop based on a realistic yield expectation.

(6) Identification of timing and application methods for nutrients to: provide nutrients at rates necessary to achieve realistic crop yields; reduce losses to the environment; and avoid applications as much as possible to frozen soil and during periods of leaching and runoff.

(7) Provisions for the proper calibration and operation of nutrient application equipment.

4. Pesticide Management Measure

To reduce contamination of surface water and ground water from pesticides:

- (1) Evaluate the pest problems, previous pest control measures, and cropping history;*
- (2) Evaluate the soil and physical characteristics of the site including mixing, loading, and storage areas for potential leaching or runoff of pesticides. If leaching or runoff is found to occur, steps should be taken to prevent further contamination;*
- (3) Use integrated pest management (IPM) strategies that:*

- (a) Apply pesticides only when an economic benefit to the producer will be*

- achieved (i.e., applications based on economic thresholds); and*
- (b) Apply pesticides efficiently and at times when runoff are unlikely;*
 - (4) When pesticide applications are necessary and a choice of registered materials exists, consider the persistence, toxicity, runoff potential, and leaching potential of products in making a selection;*
 - (5) Periodically calibrate pesticide spray equipment; and*
 - (6) Use anti-backflow devices on hoses used for filling tank mixtures.*

5. Grazing Management Measure

Protect range, pasture and other grazing lands:

(1) By implementing one or more of the following to protect sensitive areas (such as streambanks, wetlands, estuaries, ponds, lake shores, and riparian zones):

- (a) Exclude livestock,*
 - (b) Provide stream crossings or hardened watering access for drinking,*
 - (c) Provide alternative drinking water locations,*
 - (d) Locate salt and additional shade, if needed, away from sensitive areas, or*
 - (e) Use improved grazing management (e.g., herding)*
- to reduce the physical disturbance and reduce direct loading of animal waste and sediment caused by livestock; and*

(2) By achieving either of the following on all range, pasture, and other grazing lands not addressed under (1):

- (a) Implement the range and pasture components of a Conservation Management System (CMS) as defined in the Field Office Technical Guide of the USDA-SCS by applying the progressive planning approach of the USDA Soil Conservation Service (SCS) to reduce erosion, or*
- (b) Maintain range, pasture, and other grazing lands in accordance with activity plans established by either the Bureau of Land Management of the U.S. Department of the Interior or the Forest Service of the USDA.*

6. Irrigation Water Management

To reduce nonpoint source pollution of surface waters caused by irrigation:

(1) Operate the irrigation system so that the timing and amount of irrigation water applied match crop water needs. This will require, as a minimum: (a) the accurate measurement of soil-water depletion volume and the volume of irrigation water applied, and (b) uniform application of water.

(2) When chemigation is used, include backflow preventers for wells, minimize the harmful amounts of chemigated waters that discharge from the edge of the field, and control deep percolation. In cases where chemigation is performed with furrow irrigation systems, a tailwater management system may be needed.

The following limitations and special considerations apply:

(1) In some locations, irrigation return flows are subject to other water rights or are required to maintain stream flow. In these special cases, on-site reuse could be precluded and would not be considered part of the management measure for such locations.

(2) By increasing the water use efficiency, the discharge volume from the system will usually be reduced. While the total pollutant load may be reduced somewhat, there is the potential for an increase in the concentration of pollutants in the discharge. In these special cases, where living resources or human health may be adversely affected and where other management measures (nutrients and pesticides) do not reduce concentrations in the discharge, increasing water use efficiency would not be considered part of the management measure.

(3) In some irrigation districts, the time interval between the order for and the delivery of irrigation water to the farm may limit the irrigator's ability to achieve the maximum on-farm application efficiencies that are otherwise possible.

(4) In some locations, leaching is necessary to control salt in the soil profile.

Leaching for salt control should be limited to the leaching requirement for the root zone.

(5) Where leakage from delivery systems or return flows supports wetlands or wildlife refuges, it may be preferable to modify the system to achieve a high level of efficiency and then divert the "saved water" to the wetland or wildlife refuge. This will improve the quality of water delivered to wetlands or wildlife refuges by

preventing the introduction of pollutants from irrigated lands to such diverted water.
(6) In some locations, sprinkler irrigation is used for frost or freeze protection, or for crop cooling. In these special cases, applications should be limited to the amount necessary for crop protection, and applied water should remain on-site.

2. Management Measures for Urban Areas

1. New Development Management Measure

(1) By design or performance:

(a) After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent.

For the purposes of this measure, an 80 percent TSS reduction is to be determined on an average annual basis,* or

(b) Reduce the postdevelopment loadings of TSS so that the average annual TSS loadings are no greater than predevelopment loadings, and

(2) To the extent practicable, maintain postdevelopment peak runoff rate and average volume at levels that are similar to predevelopment levels.

Sound watershed management requires that both structural and nonstructural measures be employed to mitigate the adverse impacts of storm water. Nonstructural Management Measures 11.B and 11.C can be effectively used in conjunction with Management Measure 11.A to reduce both the short-and long-term costs of meeting the treatment goals of this management measure.

* Based on the average annual TSS loadings from all storms less than or equal to the 2-year/24 hour storm. TSS loadings from storms greater than the 2-year/24 hour storm are not expected to be included in the calculation of the average annual TSS loadings.

2. Watershed Protection Management Measure

Develop a watershed protection program to:

(1) Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;

(2) Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and

(3) Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of waterbodies and natural drainage systems

3. Site Development Management Measure

Plan, design, and develop sites to:

(1) Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;

(2) Limit increases of impervious areas, except where necessary;

(3) Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and

(4) Limit disturbance of natural drainage features and vegetation.

4. Construction Site Erosion and Sediment Control Management Measure

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

(2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

5. Construction Site Chemical Control Management Measure

(1) Limit application, generation, and migration of toxic substances;

(2) Ensure the proper storage and disposal of toxic materials; and

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

6. Existing Development Management Measure

Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development:

(1) Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures;

(2) Contain a schedule for implementing appropriate controls;

(3) Limit destruction of natural conveyance systems; and

(4) Where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries.

7. New Onsite Disposal Systems Management Measures

(1) Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and postconstruction.

(2) Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas with floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies;

(3) Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site development with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance.

(4) Establish protective separation distances between OSDS system components and groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS;

(5) Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.

8. Operating Onsite Disposal Systems Management Measure

(1) Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the

ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, or threatens or impairs surface waters;

(2) Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing:

(3) Consider replacing or upgrading OSDS to treat influent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:

- (a) where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS;*
- (b) where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.*

9. Pollution Prevention Management Measure

Implement pollution prevention and education programs to reduce nonpoint source pollutants generated from the following activities, where applicable:

- o The improper storage, use and disposal of household hazardous chemicals, including automobile fluids, pesticides, paints, solvents, etc.,*
- o Lawn and garden activities, including the application and disposal of lawn and garden care products, and the improper disposal of leaves and yard trimmings;*
- o Turf management on golf courses, parks, and recreational areas;*
- o Improper operation and maintenance of onsite disposal systems;*
- o Discharge of pollutants into storm drains including floatables, waste oil, and litter;*
- o Commercial activities including parking lots, gas stations, and other entities not under NPDES purview; and*
- o Improper disposal of pet excrement.*

10. Management Measure for Planning, Siting, and Developing Roads and Highways

Plan, site, and develop roads and highways to:

- (1) Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss; and*
- (2) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and*
- (3) Limit disturbance of natural drainage features and vegetation.*

11. Management Measure for Bridges

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

12. Management Measure for Construction Projects

- (1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction and;*
- (2) Prior to land disturbance, prepare and implement an approved erosion control plan or similar administrative document that contains erosion and sediment control provisions.*

13. Management Measure for Construction Site Chemical Control

- (1) Limit the application, generation, and migration of toxic substances;*

(2) Ensure the proper storage and disposal of toxic materials; and

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water. .

14. Management Measure for Operation and Maintenance

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

15. Management Measure for Road, Highway, and Bridge Runoff Systems

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

(1) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and

(2) Establish schedules for implementing appropriate controls.

3. Management Measures for Forestry

1. Preharvest Planning

Perform advance planning for forest harvesting that includes the following elements where appropriate:

(1) Identify the area to be harvested including location of waterbodies and sensitive areas such as wetlands, threatened or endangered aquatic species habitat areas, or high-erosion-hazard areas (landslide-prone areas) within the harvest unit.

(2) Time the activity for the season or moisture conditions when the least impact occurs.

(3) Consider potential water quality impacts and erosion and sedimentation control in the selection of silvicultural and regeneration systems, especially for harvesting and site preparation.

(4) Reduce the risk of occurrence of landslides and severe erosion by identifying high-erosion-hazard areas and avoiding harvesting in such areas to the extent practicable.

(5) Consider additional contributions from harvesting or roads to any known existing water quality impairments or problems in watersheds of concern.

Perform advance planning for forest road systems that includes the following elements where appropriate:

(1) Locate and design road systems to minimize, to the extent practicable, potential sediment generation and delivery to surface waters. Key components are:

o locate roads, landings, and skid trails to avoid to the extent practicable steep grades and steep hillslope areas, and to decrease the number of stream crossings;

o avoid to the extent practicable locating new roads and landings in Streamside Management Areas (SMAs); and

o determine road usage and select the appropriate road standard.

(2) Locate and design temporary and permanent stream crossings to prevent failure and control impacts from the road system. Key components are:

o size and site crossing structures to prevent failure;

o for fish-bearing streams, design crossings to facilitate fish passage.

(3) Ensure that the design of road prism and the road surface drainage are appropriate to the terrain and that road surface design is consistent with the road drainage structures.

(4) Use suitable materials to surface roads planned for all-weather use to support truck traffic.

(5) Design road systems to avoid high erosion or landslide hazard areas.

Identify these areas and consult a qualified specialist for design of any roads that must be constructed through these areas.

Each state should develop a process (or utilize an existing process) that ensures that the management measures in the chapter are implemented. Such a process should include appropriate notification, compliance audits, or other mechanisms for forestry activities with the potential for significant adverse nonpoint effects based on the type and size of operation and the presence of stream crossings or SMAs.

2. Streamside Management Areas (SMAs)

Establish and maintain a streamside management area along surface waters, which is sufficiently wide and which includes a sufficient number of canopy species to buffer against detrimental changes in the temperature regime of the waterbody, to provide bank stability, and to withstand wind damage. Manage the SMA in such a way as to protect against soil disturbance in the SMA and delivery to the stream of sediments and nutrients generated by forestry activities, including harvesting. Manage the SMA canopy species to provide a sustainable source of large woody debris needed for instream channel structure and aquatic species habitat.

3. Road Construction/Reconstruction

(1) Follow preharvest planning (as described under Management Measure 1) when constructing or reconstructing the roadway.

(2) Follow designs planned under Management Measure 1 for road surfacing and shaping.

(3) Install road drainage structures according to designs planned under Management Measure 1 and regional storm return period and installation specifications. Match these drainage structures with terrain features and with road surface and prism designs.

(4) Guard against the production of sediment when installing stream crossings.

(5) Protect surface waters from slash and debris material from roadway clearing.

(6) Use straw bales, silt fences, mulching, or other favorable practices on disturbed soils on unstable cuts, fills, etc.

(7) Avoid constructing new roads in SMAs to the extent practicable.

4. Road Management

(1) Avoid using roads where possible for timber hauling or heavy traffic during wet or thaw periods on roads not designed and constructed for these conditions.

(2) Evaluate the future need for a road and close roads that will not be needed. Leave closed roads and drainage channels in a stable condition to withstand storms.

(3) Remove drainage crossings and culverts if there is a reasonable risk of plugging or failure from lack of maintenance.

(4) Following completion of harvesting, close and stabilize temporary spur roads and seasonal roads to control and direct water away from the roadway. Remove all temporary stream crossings.

(5) Inspect roads to determine the need for structural maintenance. Conduct maintenance practices, when conditions warrant, including cleaning and replacement of deteriorated structures and erosion controls, grading or seeding of road surfaces, and, in extreme cases, slope stabilization or removal of road fills where necessary to maintain structural integrity.

(6) Conduct maintenance activities, such as dust abatement, so that chemical contaminants or pollutants are not introduced into surface waters to the extent practicable.

(7) Properly maintain permanent stream crossings and associated fills and approaches to reduce the likelihood (a) that stream overflow will divert onto

roads, and (b) that fill erosion will occur if the drainage structures become obstructed.

5. Timber Harvesting

The timber harvesting management measure consists of implementing the following:

(1) Timber harvesting operations with skid trails or cable yarding follow layouts determined under Management Measure 1.

(2) Install landing drainage structures to avoid sedimentation to the extent practicable. Disperse landing drainage over sideslopes.

(3) Construct landings away from steep slopes and reduce the likelihood of fill slope failures. Protect landing surfaces used during wet periods. Locate landings outside of SMAs.

(4) Protect stream channels and significant ephemeral drainages from logging debris and slash material.

(5) Use appropriate areas for petroleum storage, draining, dispensing. Establish procedures to contain and treat spills. Recycle or properly dispose of all waste materials.

For cable yarding:

(1) Limit yarding corridor gouge or soil plowing by properly locating cable yarding landings.

(2) Locate corridors for SMAs following Management Measure 2.

For groundskidding:

(1) Within SMAs, operate groundskidding equipment only at stream crossings to the extent practicable. In SMAs, fell and endline trees to avoid sedimentation.

(2) Use improved stream crossings for skid trails which cross flowing drainages. Construct skid trails to disperse runoff and with adequate drainage structures.

(3) On steep slopes, use cable systems rather than groundskidding where groundskidding may cause excessive sedimentation.

6. Site Preparation and Forest Regeneration

Confine on-site potential NPS pollution and erosion resulting from site preparation and the regeneration of forest stands. The components of the management measure for site preparation and regeneration are:

(1) Select a method of site preparation and regeneration suitable for the site conditions.

(2) Conduct mechanical tree planting and ground-disturbing site preparation activities on the contour of sloping terrain.

(3) Do not conduct mechanical site preparation and mechanical tree planting in streamside management areas.

(4) Protect surface waters from logging debris and slash material.

(5) Suspend operations during wet periods if equipment used begins to cause excessive soil disturbance that will increase erosion.

(6) Locate windrows at a safe distance from drainages and SMAs to control movement of the material during high runoff conditions.

(7) Conduct bedding operations in high-water-table areas during dry periods of the year. Conduct bedding in sloping areas on the contour.

(8) Protect small ephemeral drainages when conducting mechanical tree planting.

7. Fire Management

Prescribe fire for site preparation and control or suppress wildfire in a manner which reduces potential nonpoint source pollution of surface waters:

- (1) Intense prescribed fire should not cause excessive sedimentation due to the combined effect of removal of canopy species and the loss of soil-binding ability of subcanopy and herbaceous vegetation roots, especially in SMAs, in streamside vegetation for small ephemeral drainages, or on very steep slopes.*
- (2) Prescriptions for prescribed fire should protect against excessive erosion or sedimentation to the extent practicable.*
- (3) All bladed firelines, for prescribed fire and wildfire, should be plowed on contour or stabilized with water bars and/or other appropriate techniques if needed to control excessive sedimentation or erosion of the fireline.*
- (4) Wildfire suppression and rehabilitation should consider possible NPS pollution of watercourses, while recognizing the safety and operational priorities of fighting wildfires.*

8. Revegetation of Disturbed Areas

Reduce erosion and sedimentation by rapid vegetation of areas disturbed by harvesting operations or road construction:

- (1) Revegetate disturbed areas (using seeding or planting) promptly after completion of the earth-disturbing activity. Local growing conditions will dictate the timing for establishment of vegetative cover.*
- (2) Use mixes of species and treatments developed and tailored for successful vegetation establishment for the region or area.*
- (3) Concentrate revegetation efforts initially on priority areas such as disturbed areas in SMAs or the steepest areas of disturbance near drainages.*

9. Forest Chemical Management

Use chemicals when necessary for forest management in accordance with the following to reduce nonpoint source pollution impacts due to the movement of forest chemicals off-site during and after application:

- (1) Conduct applications by skilled and, where required, licensed applicators according to the registered use, with special consideration given to impacts to nearby surface waters.*
- (2) Carefully prescribe the type and amount of pesticides appropriate for the insect, fungus, or herbaceous species.*
- (3) Prior to applications of pesticides and fertilizers, inspect the mixing and loading process and the calibration of equipment, and identify the appropriate weather conditions, the spray area, and buffer areas for surface waters.*
- (4) Establish and identify buffer areas for surface waters. (This is especially important for aerial applications.)*
- (5) Immediately report accidental spills of pesticides or fertilizers into surface waters to the appropriate State agency. Develop an effective spill contingency plan to contain spills.*

10. Wetlands Forest

Plan, operate, and manage normal, ongoing forestry activities (including harvesting, road design and construction, site preparation and regeneration, and chemical

management) to adequately protect the aquatic functions of forested wetlands.

4. Management Measures for Marinas and Recreational Boating

Siting and Design

1. Marina Flushing Management Measure

Site and design marinas such that tides and/or currents will aid in flushing of the site or renew its water regularly.

2. Water Quality Assessment Management Measure

Assess water quality as part of marina siting and design.

3. Habitat Assessment Management Measure

Site and design marinas to protect against adverse effects on shellfish resources, wetlands, submerged aquatic vegetation, or other important riparian and aquatic habitat areas as designated by local, State, or Federal governments.

4. Shoreline Stabilization Management Measure

Where shoreline erosion is a nonpoint source pollution problem, shorelines should be stabilized. Vegetated methods are strongly preferred unless structural methods are more cost effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other shorelines and offshore areas

5. Storm Water Runoff Management Measure

Implement effective runoff control strategies which include the use of pollution prevention activities and the proper design of hull maintenance areas. Reduce the average annual loadings of total suspended solids (TSS) in runoff from hull maintenance areas by 80 percent. For the purposes of this measure, an 80 percent reduction of TSS is to be determined on an average annual basis.

6. Fueling Station Design Management Measure

Design fueling stations to allow for ease in cleanup of spills.

7. Sewage Facility Management Measure

Install pumpout, dump station, and restroom facilities where needed at new and expanding marinas to reduce the release of sewage to surface waters. Design these facilities to allow ease of access and post signage to promote use by the boating public.

Operation and Maintenance

1. Solid Waste Management Measure

Properly dispose of solid wastes produced by the operation, cleaning, maintenance, and repair of boats to limit entry of solid wastes to surface waters.

2. Fish Waste Management Measure

Promote sound fish waste management through a combination of fish-cleaning restrictions, public education, and proper disposal of fish waste.

3. Liquid Material Management Measure

Provide and maintain appropriate storage, transfer, containment, and disposal facilities for liquid material, such as oil, harmful solvents, antifreeze, and paints, and encourage recycling of these materials.

4. Petroleum Control Management Measure

Reduce the amount of fuel and oil from boat bilges and fuel tank air vents entering marina and surface waters.

5. Boat Cleaning Management Measure

For boats that are in the water, perform cleaning operations to minimize, to the extent practicable, the release to surface waters of (a) harmful cleaners and solvents and (b) paint from in-water hull cleaning.

6. Public Education Management Measure

Public education/outreach/training programs should be instituted for boaters, as well as marina owners and operators, to prevent improper disposal of polluting material.

7. Maintenance of Sewage Facilities Management Measure

Ensure that sewage pumpout facilities are maintained in operational condition and encourage their use.

8. Boat Operation Management Measure (applies to boating only)

Restrict boating activities where necessary to decrease turbidity and physical destruction of shallow-water habitat.

5. Management Measures for Hydromodification

Channelization and Channel Modification

1. Management Measure for Physical and Chemical Characteristics of Surface Waters

(1) Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters in coastal areas;

(2) Plan and design channelization and channel modification to reduce undesirable impacts; and

(3) Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

2. Instream and Riparian Habitat Restoration Management Measure

(1) Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat in coastal areas;

(2) Plan and design channelization and channel modification to reduce undesirable impacts; and

(3) Develop an operation and maintenance program with specific timetables for existing modified channels that includes identification of opportunities to restore instream and riparian habitat in those channels.

Dams

1. Management Measure for Erosion and Sediment Control

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

(2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

2. Management Measure for Chemical and Pollutant Control

(1) Limit application, generation, and migration of toxic substances;

(2) Ensure the proper storage and disposal of toxic materials; and,

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

3. Management Measure for Protection of Surface Water Quality and Instream and Riparian Habitat

Develop and implement a program to manage the operation of dams in coastal areas that includes an assessment of:

(1) Surface water quality and instream and riparian habitat and potential for improvement and

(2) Significant nonpoint source pollution problems that result from excessive surface water withdrawals.

Streambank and Shoreline Erosion

1. Management Measure for Eroding Streambanks and Shorelines

(1) Where streambank or shoreline erosion is a nonpoint source pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas.

(2) Protect streambank and shoreline features with the potential to reduce NPS pollution.

(3) Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

6. Management Measures for Wetlands, Riparian Areas and Vegetated Treatment Systems

1. Management Measure for Protection of Wetlands and Riparian Areas

Protect from adverse effects wetlands and riparian areas that are serving a significant NPS abatement function and maintain this function while protecting the other existing functions of these wetlands and riparian areas as measured by characteristics such as vegetative composition and cover; hydrology of surface water and ground water; geochemistry of the substrate, and species composition.

2. Management Measure for Restoration of Wetland and Riparian Areas

Promote the restoration of the preexisting functions in damaged and destroyed wetlands and riparian systems in areas where the systems will serve a significant NPS pollution abatement function.

3. Management Measure for Vegetated Treatment Systems

Promote the use of engineered vegetated treatment systems such as constructed wetlands or vegetated filter strips where these systems will serve a significant NPS pollution abatement function.