

*Coast 2050:
Toward a Sustainable
Coastal Louisiana,
The Appendices*

Appendix F — Region 4 Supplemental Information

This document is one of three that outline a jointly developed, Federal/State/Local, plan to address Louisiana's massive coastal land loss problem and provide for a sustainable coastal ecosystem by the year 2050. These three documents are:

- ! Coast 2050: Toward a Sustainable Coastal Louisiana,

- ! Coast 2050: Toward a Sustainable Coastal Louisiana, An Executive Summary,

- ! Coast 2050: Toward a Sustainable Coastal Louisiana, The Appendices.



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Appendix F—Region 4 Supplemental
Information

report of the

Louisiana Coastal Wetlands Conservation
and Restoration Task Force

and the

Wetlands Conservation and Restoration Authority

Louisiana Department of Natural Resources
Baton Rouge, La 1999

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CONTENTS

SECTION 1: INTRODUCTION	1
SECTION 2: REGION 4 COAST 2050 REGIONAL PLANNING TEAM (RPT) MEMBERS (DURING PLAN DEVELOPMENT)	3
Parish Representatives	3
Agency Representatives	3
Academic Representatives	3
Other Representatives	3
SECTION 3: MAPPING UNIT SUMMARIES	5
Mermentau Basin	5
Calcasieu-Sabine Basin	47
SECTION 4: PRIOR AND PREDICTED LAND LOSS, PREVIOUS STRATEGIES AND COAST 2050 STRATEGIES	103
Wetland Table	103
Previously Proposed Strategies Table	106
Region 4 Coast 2050 Strategies Table	107
SECTION 5: INFRASTRUCTURE	147
Roads	147
Railroads	147
Pipelines	147
Oil and/or Natural Gas Wells	147
Drainage Pump Stations	148
Water Intakes	148
Navigation Channels	148
Port Installations	149
Region 4 Mapping Unit Infrastructure Summaries (In Alphabetical Order)	150
SECTION 6: WETLAND DEVELOPMENT/PERMITTED ACTIVITIES	197
SECTION 7: FISH AND WILDLIFE	199
Methodology for Historic Trends in Fisheries Production	199
Methodology for Wildlife Functions, Status, Trends, and Projections	200

FIGURES AND TABLES

Figures

1-1	Regions used in the Coast 2050 plan	1
1-2	Region 4 mapping units	2

Tables

4-1	Region 4 wetland loss	108
4-2	Region 4 previously proposed strategies	128
4-3	Region 4 regional ecosystem strategies	137
4-4	Region 4 mapping unit strategies	138
4-5	Region 4 programmatic recommendations	145
	Region 4 mapping unit infrastructure summaries (in alphabetical order)	150
7-1	Region 4 fish and invertebrate population status and 2050 change	203
7-2	Region 4 wildlife functions, status, trends, and projections	207

SECTION 1

INTRODUCTION

Region 4 extends from the western bank of the Freshwater Bayou Canal westward to Sabine Lake, and from the marsh areas just north of the Gulf Intracoastal Waterway south to the Gulf of Mexico. It includes all or parts of Vermilion, Cameron, and Calcasieu parishes. The region encompasses the coastal areas of the Mermentau and Calcasieu/Sabine hydrologic basins.

This appendix contains information and data, collected by the Region 4 Regional Planning Team (RPT), that was used in the formulation of the Coast 2050 Plan. In order to organize the information during this planning effort, the RPT used “mapping units” which are depicted and summarized here (Figure 1-2).

Within each mapping unit, wetland loss

trends and habitat shifts, fish and wildlife resources, infrastructure, and previously proposed strategies were assessed by the RPT, and this information is presented here. Based upon these analyses and in conjunction with regional habitat objectives, strategies were developed for each mapping unit by the RPT, in association with the Planning Management Team (PMT) and others participating in the 2050 process. The PMT took the lead in developing the regional ecosystem strategies but were greatly assisted by the RPT and others. The final regional ecosystem and mapping unit strategies, as well as programmatic recommendations, are also included in this appendix.

Mapping unit map



Figure 1-1. Regions used in the Coast 2050 plan.

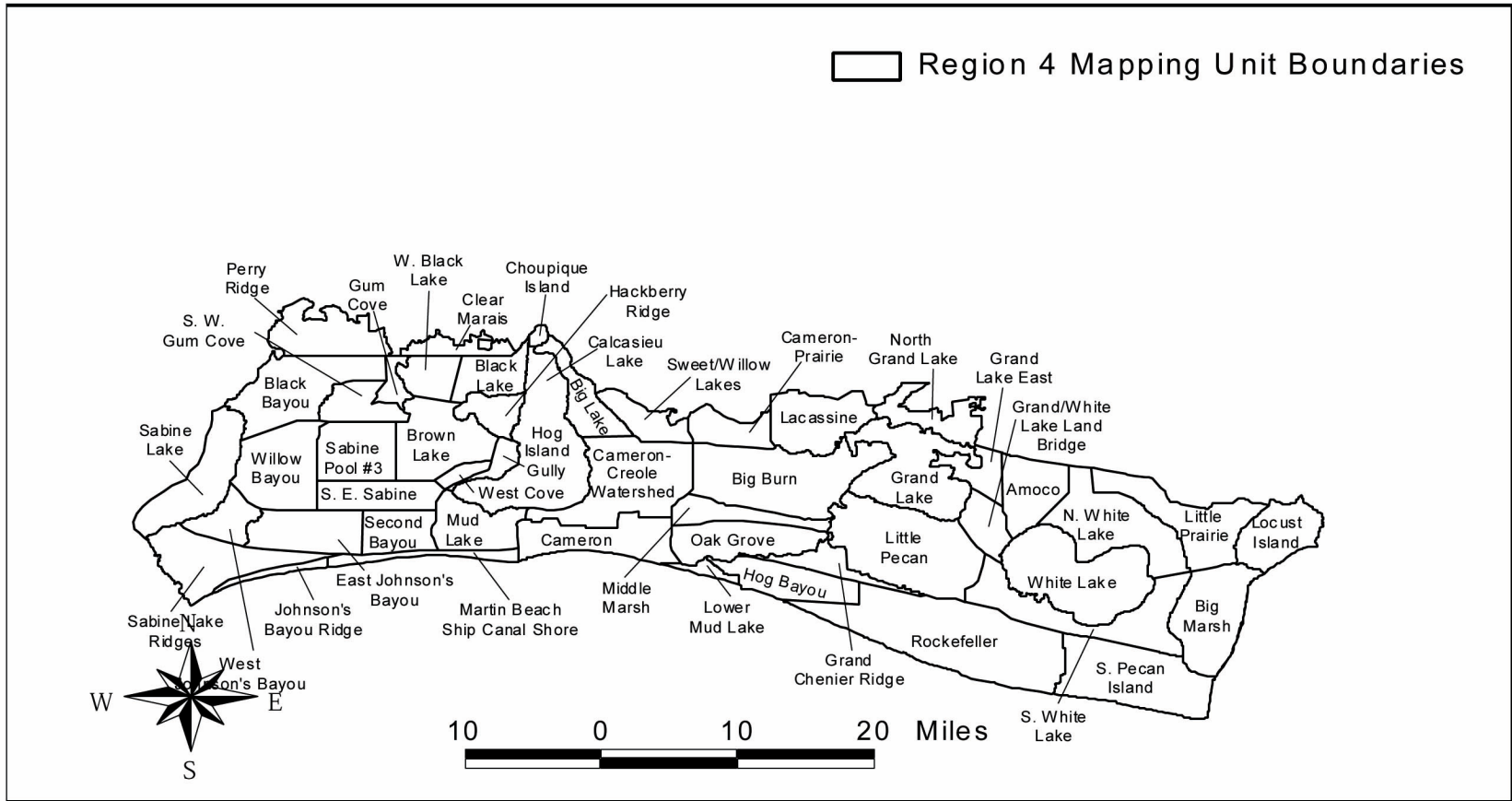


Figure 1-2. Region 4 mapping units.

SECTION 2

REGION 4 COAST 2050 REGIONAL PLANNING TEAM (RPT) MEMBERS (DURING PLAN DEVELOPMENT)

Parish Representatives

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Coastal Advisory Committee
Rodney Guilbeaux - Cameron Parish
Gravity Drainage Dist. No. 7
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Tommy Price - Concerned Citizens for the
Mermentau Basin
David Richard - Stream Property
Management Corp., Cameron Parish
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SECTION 3

MAPPING UNIT SUMMARIES

Mermentau Basin

Locust Island

Location - The Locust Island mapping unit is bordered on the south by Freshwater Bayou Canal and Schooner Bayou, on the east by the Vermilion River, on the north by the Kaplan Canal, and on the west by North Prong and Seventh Ward canals. This unit is entirely located within Vermilion Parish and contains 24,024 acres.

Habitat Description and Landscape Change - The current habitats located within the Locust Island unit include approximately 9% (2,160 acres) fresh marsh, 31% (7,530 acres) intermediate marsh, 13% (3,020 acres) brackish marsh, nominal swamp (20 acres), and 9% water. The remainder of the unit consists of agricultural development. There was a shift to more fresh marsh from 1949 to 1968. In 1949, the unit was composed of 20% agricultural development, 40% brackish marsh, and 40% fresh marsh. By 1968, the unit had converted from brackish marsh to intermediate marsh with increased areas of agricultural development.

Historic Land Loss - In 1932, this unit had 14,365 acres of marsh. Total marsh loss was 1,655 acres from 1932-1990. The majority of land loss within this unit (1,195 acres) occurred between 1983 and

1990 as a result of wake erosion along the unit's waterways and impoundment due to the construction of numerous crawfish farms. This area is geologically stable and is experiencing very low subsidence.

Future Land Loss Projections - In 1990, the Locust Island unit had 12,710 acres of marsh. An additional loss of 1,870 acres of marsh (33% fresh and intermediate, and 34% brackish) is projected to occur by 2050. This is 14.7% of the remaining 1990 marsh. Future land loss will mostly occur as a result of continued wake erosion at a projected rate of 6 ft/year along the Gulf Intracoastal Waterway (GIWW) and Freshwater Bayou Canal.

Fish and Wildlife Resources - Most estuarine fishery populations for this unit are currently unknown, except for those of largemouth bass and channel catfish, which are steady. Both species are projected to increase by 2050. This mapping unit is partially impounded and influenced by locks, which affect the distribution of various fish species within this area.

This mapping unit contains open water; fresh, intermediate, and brackish marshes; and agricultural and upland habitats. Currently steady populations of seabirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots,

other marsh and open water resident and migrant birds, furbearers, rabbits, and deer are expected to remain steady through 2050. Populations of wading birds and shorebirds are currently steady, but are expected to decline in marsh habitats and remain steady in upland/agricultural habitats. Increasing populations of American alligators are projected to stabilize in the open water and marsh habitats, while stable upland/agricultural populations are expected to remain steady through 2050.

Infrastructure - The GIWW (including the Leland Bowman Lock), Freshwater Bayou Canal, and Schooner Bayou are all located within this unit and are Federally maintained for navigation and flood control. This mapping unit contains no primary roads or railroads, 2.2 miles of secondary roads, 60.2 miles of tertiary roads, 5.4 miles of natural gas pipeline (largest diameter four inches), 98 oil and/or natural gas wells, 14 drainage pump stations, and four groundwater intakes. This area is bordered on the southeast by Freshwater Bayou Canal, which undergoes maintenance dredging every three to four years. This unit received the beneficial use of dredged material during fiscal years 1992 and 1995 as a means of stabilizing shoreline.

Previously Proposed Strategies - Strategies proposed in the past for this unit included stabilizing the banks of the GIWW and managing the fresh to intermediate marsh hydrology throughout the area.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has

indicated that its priorities for coastal resource usage emphasize management of this unit's fresh marsh and developed/fastlands, which include American alligators, furbearers, and waterfowl. This area is also important for agriculture and grazing; storm buffering; navigation and port facilities; and roads, levees, and bridges servicing the communities within the unit.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies that would benefit this mapping unit. Maintaining Atchafalaya River water and sediment inflow from the GIWW is also expected to benefit this unit.

Benefits of Regional Strategies - These strategies are intended to reduce flooding and minimize saltwater intrusion. This is expected to enhance the fresh marshes and forested wetlands and their associated aquatic habitats. Lessening saltwater intrusion would also be beneficial to agriculture. Animals which depend on fresher habitat, such as alligators, furbearers, and waterfowl, would also benefit, as would infrastructure associated with oil and gas production, navigation and ports, and communities. Lowered water levels would also increase flood water holding capacity. These strategies are expected to reduce land loss in this unit by greater than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include rebuilding the bank along Freshwater Bayou Canal and

beneficially utilizing material dredged from the GIWW and Freshwater Bayou Canal. These would also serve to prevent saltwater intrusion around the locks during high water events. Other mapping unit strategies include maintaining freshwater and sediment inflows from the Vermilion River, through the GIWW and Freshwater Bayou Canal, in order to protect the freshwater marshes south of the GIWW, and maintaining freshwater and sediment inflows from the GIWW on the west. No programmatic strategies have been developed for this unit.

Little Prairie

Location - This mapping unit is bordered on the south by Schooner Bayou Canal; on the west by Louisiana Highway 82, Warren, Pipeline, and Florence canals; on the east by North Prong and Seventh Ward canals; and on the north by the GIWW and Louisiana Highway 82. The entire unit is located within Vermilion Parish and contains 36,569 acres.

Habitat Description and Landscape Change - The current habitat in this unit includes approximately 30% (10,620 acres) fresh marsh, minimal intermediate marsh (50 acres), and 5% open water, with the remainder consisting of agriculture and developed land. There was a shift of fresh marsh to agricultural and developed land from 1949-1968. The 1949 map indicates that the unit was composed of 85% fresh marsh, whereas the 1968 map revealed that 40% of the freshwater marsh habitat had been converted into developed land.

Historic Land Loss - In 1932, this unit had 11,970 acres of marsh. A total of 1,320 acres has been lost since 1956, largely as a result of wake erosion along the GIWW and impoundment due to the construction of crawfish farms. This equates to a land loss rate of 38.2 acres/year. The area is geologically stable and experiencing very low subsidence.

Future Land Loss Projections - An additional loss of 740 acres of fresh marsh is projected to occur by 2050. This is 7% of the remaining 1990 marsh (10,670 acres). All future loss probably will occur along the facing bank of the GIWW at a rate of 3 ft/year.

Fish and Wildlife Resources - Estuarine fish species are not applicable to this mapping unit; however, populations of channel catfish and largemouth bass are steady throughout the area and are projected to remain so through 2050. This mapping unit is impounded and influenced by the Leland Bowman Lock and the Schooner Bayou Control Structure, which reduce saltwater intrusion and the occurrence of estuarine fish species.

In this mapping unit, there are four habitat types: open water, fresh marsh, hardwood forest, and agricultural/upland. Populations of seabirds, wading birds, shorebirds, dabbling and diving ducks, rails, gallinules, coots, other marsh/open water residents and migrants, furbearers, rabbits, and deer are currently steady and expected to remain steady through 2050. Currently steady populations of other woodland resident birds are expected to decline in the hardwood forest, although

they are projected to remain stable in the upland/agricultural regions. Currently increasing open water and fresh marsh populations of American alligators are expected to stabilize. Currently steady hardwood forest and upland/agricultural American alligator populations are expected to remain steady through 2050.

Infrastructure - The GIWW and Schooner Bayou Canal are located within this unit and are Federally maintained for navigation and flood control. The Warren Canal is locally maintained for flood control. This mapping unit contains no primary roads, pipelines, or railroads, 14.1 miles of secondary and 54.2 miles of tertiary roads, 55 oil and/or natural gas wells, nine drainage pump stations, and one groundwater intake.

Previously Proposed Strategies - Strategies proposed in the past for this unit include bank stabilization along the GIWW and management of the fresh to intermediate marsh hydrology.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marsh and developed/fastlands, which include American alligators, furbearers, and waterfowl. Other important resources and functions of this unit include agriculture and grazing, recreation and tourism, usefulness as a storm buffer, and maintenance of a freshwater supply for agriculture. This mapping unit also contains navigation and port facilities and roads, levees, and bridges

surrounding nearby communities within the unit.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies that would benefit this mapping unit. Maintaining Atchafalaya River water and sediment inflow from the GIWW is also expected to benefit this unit.

Benefits of Regional Strategies - These strategies are intended to reduce flooding and minimize saltwater intrusion. This is expected to enhance the fresh marshes and their associated aquatic habitats. Lessening saltwater intrusion would also be beneficial to agriculture. Animals which depend on fresher habitat, such as alligators, furbearers, and waterfowl, would also benefit, as would infrastructure associated with oil and gas production, navigation and ports, and communities. Lowered water levels would also increase flood water holding capacity. These strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategies recommended for this unit include maintaining the freshwater inflows from the GIWW and Vermilion River on the west, maintaining freshwater inflows through the marsh, and the beneficial use of dredged material. The new marsh would prevent the locks from being bypassed and prevent saltwater intrusion during storm events. Programmatic strategies include straightening the "wiggles" in the GIWW to provide navigation safety and protecting wildlife

and fisheries from potential damages from contamination via spills.

Big Marsh

Location - This mapping unit is bordered on the east by Freshwater Bayou Canal, on the north by Schooner Bayou Canal, on the west by Louisiana Highway 82, and on the south by Humble Canal. The entire unit is located within Vermilion Parish and totals 37,380 acres.

Habitat Description and Landscape Change - The current habitats located within the unit include approximately 57% (21,360 acres) fresh marsh, 3% (1,180 acres) brackish marsh, 25% (9,330 acres) intermediate marsh, and 10% open water, with the remainder incorporating upland, swamp, forest, or developed land. There was a shift to more fresh marsh from 1949-1968. In 1949 the unit was 45% fresh marsh, 45% brackish marsh, and 10% saline marsh. The 1968 map, however, shows 40% fresh marsh and 60% intermediate marsh. This could have been due to excessive ponding and fresh water from the north lowering salinity within the unit, as well as the presence of the Freshwater Bayou Canal Lock.

Historic Land Loss - In 1932, the Big Marsh unit had 35,680 acres of marsh. Total marsh lost within this unit from 1932-1990 was 3,810 acres. The majority of this loss, 2,610 acres, occurred from 1956-1974 as a result of the dredging of Freshwater Bayou Canal followed by subsequent wake erosion, altered hydrology, and loss related to storm activity. Before this period, no land loss had been detected. Marsh

deterioration had significantly decreased to 220 acres between 1974 and 1990; however, this unit still suffers from wave and wake erosion, and altered hydrology. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 3,000 acres (80% intermediate marsh and 20% fresh marsh) will be lost within the Big Marsh unit by 2050. This is 9.4% of the remaining 1990 marsh acreage (31,870 acres). Altered hydrology and wave and wake erosion will most likely be the leading causes of future land loss. To minimize this land loss, Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) and USACE projects within the area are expected to protect approximately 2,470 acres of intermediate marsh.

Fish and Wildlife Resources - This unit contains fresh and intermediate marshes, which sustain steady populations of red and black drum, white and brown shrimp, blue crab, largemouth bass, and channel catfish. The spotted seatrout population in this unit is not yet known. The populations of red drum, black drum, spotted seatrout, Gulf menhaden, white shrimp, and blue crab are projected to be steady through 2050. By 2050, brown shrimp will decline while largemouth bass and channel catfish will increase.

The open water, fresh marsh, and intermediate marsh populations, with a few exceptions, have maintained, and are projected to maintain, stable populations of avifauna. Seabirds, rails, coots, and gallinules, other resident avifauna, and furbearers have had steady populations

and are expected to remain steady by 2050 in all three habitats. Shorebirds, raptors, other migrant avifauna, rabbits, and deer have been, and are projected to remain, steady until 2050 in the marsh habitats. Other open water migrant avifauna, although historically steady, are expected to decline. Wading birds have been increasing in the marsh habitats and are expected to remain steady by 2050. American alligators have been increasing in all three habitats and are expected to continue this increase. Dabbling and diving duck and goose populations have been declining and are expected to continue to decline.

Infrastructure - This mapping unit contains no primary or tertiary roads, pipelines, or railroads, but has 5.9 miles of secondary roads, 91 oil and/or natural gas wells, and two groundwater intakes. Schooner Bayou Control Structure, maintained by the USACE, is within the northern boundary of this unit. The USACE also has dredging schedules for both Schooner Bayou Canal and Freshwater Bayou Canal.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the function of the ridge, stabilizing the banks of the Freshwater Bayou Canal, and managing the fresh to intermediate marsh hydrology within the unit.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh and intermediate marsh habitat and developed lands, which in part include American

alligators, furbearers, and waterfowl. The committee has also indicated the importance of this unit to agriculture and grazing interests, as a freshwater supply and storm buffer, for navigation, and as a port facility.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, operating Calcasieu Lock specifically to evacuate excess water after building a new lock on a parallel channel, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of Louisiana Highway 82 are regional ecosystem strategies that would benefit this mapping unit. Maintaining Atchafalaya River water and sediment inflow from the GIWW is also expected to benefit this unit.

Benefits of Regional Strategies - These strategies are intended to reduce flooding and minimize saltwater intrusion. This is expected to enhance the fresh and intermediate marshes and their associated aquatic habitats. Lessening saltwater intrusion would also be beneficial to agriculture. Animals which depend on fresher habitat, such as alligators, furbearers, and waterfowl, would also benefit, as would infrastructure associated with oil and gas production, navigation and ports, utilities, and communities. Freshwater finfish and recreational fisheries are expected to benefit as well. Lowered water levels would also increase flood water holding capacity. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic

Strategies - The mapping unit strategy of maintaining the CWPPRA Freshwater Bayou (ME-04) hydrologic restoration and bank protection project has been adopted for this unit. No programmatic strategies have been recommended for this unit.

North White Lake

Location - This mapping unit is bordered on the south by White Lake and Schooner Bayou Canal, on the west by Florence Canal, on the east by Warren Canal, and on the north by the GIWW. The entire unit is located within Vermilion Parish and contains 43,150 acres, of which 38,830 acres are fresh marsh.

Habitat Description and Landscape

Change - There has been a shift to more fresh marsh in this unit from 1949 to present. The 1949 map indicates the occurrence of 55% fresh marsh, 40% brackish, and 5% beach or chenier habitat. By 1968, the unit was composed of 90% fresh marsh and 10% unknown, and no brackish marsh was observed within the unit. The current habitat map indicates approximately 90% (38,830 acres) fresh marsh and 2% open water, with the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, this unit had 41,610 acres of marsh. Total marsh loss within this unit has been 2,780 acres. The majority of this loss, 1,190 acres, occurred from 1956-1974. The leading causes of marsh loss in this area have been direct removal via canal construction, wave and wake erosion along the GIWW and White Lake

shorelines, and altered hydrology. Natural land loss from 1974-1990 decreased slightly to 1,220 acres, with a loss rate of 0.16% per year within this unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 3,560 acres of fresh marsh will occur by 2050. This is 9.2% of the remaining 1990 marsh (38,830 acres). The majority of future loss within this unit will most likely take place along the GIWW and White Lake shorelines.

Fish and Wildlife Resources - The North White Lake unit is composed of fresh marsh that is influenced by the control structures located along the GIWW and Schooner Bayou Canal. The area maintains steady populations of blue crab, largemouth bass, and channel catfish. Since organism ingress/egress within this unit is somewhat dependent upon water structure openings, several of the categorized fish species are not found in this area. The white shrimp population has decreased, and the status of the brown shrimp population within the unit is not currently known. Populations of white shrimp and blue crab are projected to remain steady by 2050, while largemouth bass and channel catfish are projected to increase.

In the fresh marsh and hardwood forest habitats, formerly steady populations of seabirds, shorebirds, dabbling and diving ducks, geese, rails, gallinules, coots, other open water/fresh marsh resident and migrant birds, furbearers, and game mammals are expected to remain steady through 2050 in the habitat types in

which they are found. Formerly increasing fresh marsh populations of wading birds and American alligators are projected to be steady through 2050. Formerly steady hardwood forest populations of American alligators and steady fresh marsh populations of raptors and other resident and migrant woodland birds are projected to remain steady. Steady hardwood forest populations of raptors and other resident and migrant woodland birds are expected to decline by 2050.

Infrastructure - The USACE has indicated that its only projects within this mapping unit are the maintenance of the GIWW and Schooner Bayou Canal. These projects are necessary to enhance navigation and reduce flooding within the region. This mapping unit also contains 1.1 miles of tertiary roads and 52 oil and/or natural gas wells, but no primary or secondary roads, railroads, or pipelines.

Previously Proposed Strategies - Strategies proposed in the past for this unit include stabilizing the banks of the above listed canals, managing the fresh to intermediate marsh hydrology within the unit, and protecting the facing shoreline of White Lake.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marshes and developed/fastlands, which include furbearers, crawfish, and waterfowl. This unit is also important for agriculture and grazing, providing a freshwater supply, and acting as a storm buffer.

The committee also indicated an interest in recreation and tourism, as well as navigation and port facilities within the unit.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of Louisiana Highway 82 are regional ecosystem strategies that would benefit this mapping unit. Stabilizing the White Lake shoreline and preventing the coalescence of Grand and White lakes are other regional strategies that should also benefit this unit.

Benefits of Regional Strategies - These strategies are intended to reduce flooding, minimize wave attack on the lake shoreline, and prevent the exposure of fragile interior marsh to greater erosive forces. This is expected to enhance the fresh marshes and their associated aquatic habitats. Animals which depend on fresher habitat, such as alligators, furbearers, and waterfowl, would also benefit, as would infrastructure associated with oil and gas production, navigation and ports, and communities. Freshwater finfish and recreational fisheries are expected to benefit as well. Lowered water levels would also increase flood water holding capacity. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies within this unit include bank stabilization where necessary along the

GIWW, vegetative plantings where feasible, and sand pumping to restore the historical northern shoreline of White Lake. No programmatic strategies have been developed for this unit.

White Lake

Location - Containing 55,917 acres, this mapping unit includes the open water area of White Lake, which is located within the southwestern portion of Vermilion Parish northwest of Pecan Island.

Habitat Description and Landscape Change - The current habitats located within the unit include approximately 98% open water, with the remainder incorporating fragments of fresh marsh and submerged aquatics. There has been no change in marsh type from 1949 to the present. Both maps (1949 and 1968) indicate that the unit was 100% fresh.

Historic Land Loss - The USACE has not collected information about historic land loss within this unit. Land loss along the shoreline of White Lake has been incorporated into adjacent mapping units.

Future Land Loss Projections - The Region 4 Technical Team has not projected future land loss for this unit. Any future land loss along the White Lake shoreline has been incorporated into adjacent mapping units.

Fish and Wildlife Resources - The White Lake unit is a fresh to low salinity lake that is influenced by USACE maintained and private water control structures. The unit sustains steady populations of red and black drum,

spotted seatrout, southern flounder, Gulf menhaden, blue crab, largemouth bass, and channel catfish. White and brown shrimp populations have declined within this unit. All populations are expected to remain steady through 2050. Steady populations of seabirds, dabbling and diving ducks, and other resident and migrant birds will remain steady through 2050.

Infrastructure - Infrastructure located within this unit includes an oil and/or natural gas field in the northwestern portion of the lake, 279 oil and/or natural gas wells, and the Inland Waterway (former GIWW). There are no roads, railroads, or pipelines located in this unit.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the shoreline surrounding White Lake to keep the lake from breaching into nearby, smaller open water areas within adjoining marshes.

Coastal Use and Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priority for coastal resource usage in this unit is to maintain the low salinity nature of White Lake and maintain its benefits to freshwater and low salinity fisheries and wildlife. It is also important to maintain this freshwater reservoir.

Regional Ecosystem Strategies - There is no wetland habitat in this unit, so no regional strategies apply directly to this unit. However, if lake-bottom sediments are used as a source of spoil for dedicated dredging for marsh creation, portions of the unit will be affected.

Benefits of Regional Strategies - The effects of dredging lake-bottom sediments for marsh creation will have to be addressed on a case-by-case basis.

Mapping Unit and Programmatic Strategies - Programmatic strategies attributed to this unit include 1) allowing for limited estuarine organism access into the lake at the Schooner Bayou Control Structure and the Leland Bowman Lock, 2) maintaining the lake as a low salinity, fresh to intermediate ecosystem, 3) maintaining the Lakes Subbasin target water level, and 4) monitoring fisheries access at the locks. No mapping unit strategies have been developed for this unit.

South White Lake

Location - This mapping unit is bordered on the north by White and Turtle lakes, on the south and east by Louisiana Highway 82, and on the west by the Superior Canal system. The entire unit is located within Vermilion Parish and contains 42,460 acres.

Habitat Description and Landscape Change - The current habitat in this unit includes approximately 71% fresh marsh (29,950 acres), minimal intermediate (240 acres) and brackish (80 acres) marsh, and 7% open water (2,972 acres), with the remainder incorporating upland, swamp, forest, or developed land. There has been no significant change in marsh type in this unit from 1949 to present.

Historic Land Loss - In 1932, this unit had approximately 36,795 acres of marsh. Total marsh lost within this unit from 1932-1990 was 6,525 acres. Much of this loss, 2,740 acres, occurred from

1956-1974. Historic marsh loss has been attributed to wave erosion along White Lake, high water levels, and altered hydrology. Marsh loss continues to be high within this area; 2,760 acres deteriorated between 1974 and 1990. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 4,220 acres of fresh marsh is projected to occur by 2050. This future land loss is 13.9% of the remaining 1990 marsh (30,270 acres). Approximately three acres of fresh marsh will be preserved in this area due to current CWPPRA restoration efforts. Future loss will most likely occur along the White Lake shoreline and in the areas of loss from 1983-1990.

Fish and Wildlife Resources - The South White Lake mapping unit is mainly composed of fresh marsh that sustains stable populations of red and black drum, Gulf menhaden, southern flounder, white and brown shrimp, and blue crab. Also located within this unit are stable populations of largemouth bass and channel catfish. All populations are expected to decrease by 2050, with the exception of largemouth bass and channel catfish, which are expected to increase.

In open water habitats, stable populations of seabirds, rails, gallinules, coots, other resident birds, and furbearers are currently stable and are expected to remain stable; stable populations of other migrant birds are expected to decline; declining populations of dabbling and diving ducks and geese are expected to continue declining; and increasing populations of

American alligators are projected to stabilize by 2050. In the fresh marsh areas, stable populations of raptors, rails, gallinules, coots, other resident and migrant birds, furbearers, rabbits and deer are expected to remain stable, whereas stable populations of seabirds, wading birds, and shorebirds are expected to decline through 2050. Declining populations of diving and dabbling ducks and geese are projected to continue declining. Increasing populations of bald eagles are expected to maintain the increase, while increasing American alligator populations are expected to stabilize. In the hardwood forest habitat, stable populations of other marsh/open water resident and migrant birds, furbearers, rabbits, deer, and American alligators are expected to remain stable. In the agricultural/upland habitats, stable populations of wading and shore birds, diving and dabbling ducks, geese, raptors, rails, gallinules, coots, other resident and migrant open water/marsh and woodland birds, furbearers, rabbits, deer, and American alligators are all expected to remain stable through 2050.

Infrastructure - There are no USACE projects within the unit. This mapping unit contains no primary roads or railroads, 19.4 miles of secondary roads, 15.9 miles of tertiary roads, and one crude oil pipeline (six inches diameter), 0.4 miles in length. Additionally located in the unit are 197 oil and/or natural gas wells, three drainage pump stations, and one groundwater intake, operated by Waterworks District No. 1.

Previously Proposed Strategies - Previous restoration strategies proposed for this unit include protecting the

function of Pecan Island Chenier, managing the fresh to intermediate marsh hydrology within the unit, and protecting the shoreline of White Lake.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marshes and developed lands and fastlands, areas that include American alligators, furbearers, crawfish, and waterfowl. This unit is also important for agriculture and grazing, as a freshwater supply, and for storm buffering. The committee also indicated the presence of oil and gas infrastructure and several roads, bridges, and communities within the unit.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of Louisiana Highway 82 are regional ecosystem strategies that would benefit this mapping unit. Stabilizing the White Lake shoreline and preventing the coalescence of Grand and White lakes are regional strategies that should also benefit this unit.

Benefits of Regional Strategies - These strategies are intended to reduce flooding, minimize wave attack on the lake shoreline, and prevent the exposure of fragile interior marsh to greater erosive forces. This is expected to enhance the fresh marshes and their associated aquatic habitats. Animals

which depend on fresher habitat, such as alligators, furbearers, and waterfowl, would also benefit, as would infrastructure associated with oil and gas production, navigation and ports, and communities. Freshwater finfish and recreational fisheries are expected to benefit as well. Lowered water levels would also increase flood water holding capacity. These strategies are expected to achieve no net loss in this unit.

Mapping Unit and Programmatic

Strategies - The mapping unit strategy for this unit is sand pumping to restore the historic beach line along the southern shore of White Lake. Programmatic strategies for this unit include allowing for limited estuarine organism access into White Lake (at Schooner Bayou Control Structure and the Leland Bowman Lock), monitoring fisheries access at the structures, and managing the lake as a low salinity, fresh to intermediate ecosystem.

South Pecan Island

Location - This mapping unit is bordered on the south by the Gulf of Mexico, on the east by Freshwater Bayou Canal, on the north by Louisiana Highway 82, and on the west by Rollover Bayou. The entire unit is located within Vermilion Parish and contains 49,257 acres.

Habitat Description and Landscape

Change - This unit has shifted to more brackish marsh from 1949 to present. In 1949, the unit had 45% fresh marsh, 40% brackish marsh, 5% saline marsh, and 5% beach or chenier. The 1968 map reveals a shift of the previous fresh marsh to intermediate marsh, with the

other categories remaining approximately the same. This shift reflects saltwater intrusion from the gulf, and the lack of freshwater input from north of Pecan Island Chenier. The current habitats located within the South Pecan Island unit include approximately 61% brackish marsh (29,990 acres), 5% intermediate marsh (2,590 acres), 2% saline marsh (1,720 acres), minimal fresh marsh (550 acres), and 26% open water (12,807 acres). The remainder incorporates upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, this mapping unit had 46,370 acres of marsh. Total marsh lost within this unit from 1932-1990 was 11,520 acres. The majority of this loss, 6,320 acres, occurred from 1956-1974. Historical land loss in this unit has been attributed to impoundment, saltwater intrusion, and storm related loss. Land loss has decreased to 1,650 acres between 1983 and 1990, which may be in part a result of increased management throughout the area. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 6,980 acres of brackish marsh is projected to occur by 2050. This is 20% of the remaining 1990 marsh (34,850 acres). Future land loss will most likely occur in areas of existing loss and may become more apparent along Louisiana Highway 82. The leading cause of future land loss will most likely be attributed to wave erosion along the gulf shoreline and interior ponds.

Fish and Wildlife Resources - This unit contains fresh to saline marsh, which has

sustained steady populations of species such as red and black drum, spotted seatrout, Gulf menhaden, and southern flounder. This unit also contains stable populations of white and brown shrimp, blue crab, largemouth bass, and channel catfish. All populations are expected to decline by 2050, with the exception of largemouth bass and channel catfish, which will increase.

In the open water habitat, stable populations of seabirds, dabbling and diving ducks, geese, raptors, rails, gallinules, and coots are projected to remain stable through 2050; increasing populations of pelicans are expected to continue to increase; and increasing American alligator populations are projected to stabilize. In the intermediate and brackish marsh habitats, stable populations of seabirds, shorebirds, wading birds, dabbling and diving ducks, raptors, rails, coots, gallinules, other resident and migrant avifauna, rabbits, and deer are expected to decline by 2050. In the marsh habitats, stable goose populations and increasing American alligator populations are projected to remain stable through 2050.

Infrastructure - There are two USACE projects in this unit to enhance navigation in Freshwater Bayou Canal. The channel is maintained at 12 ft deep and 125 ft wide, for six miles. Saltwater intrusion is regulated on the gulf end by the Freshwater Bayou Canal Lock. This project is also shared with Region 3. This unit contains no primary roads, pipelines, or railroads, 4.3 miles of secondary and 8.8 miles of tertiary roads, as well as 124 oil and/or natural gas wells, and three drainage pump stations.

This unit is bordered on the east by Freshwater Bayou Canal, which undergoes maintenance dredging every three to four years. In FY 1990, approximately 275,000 cubic yards of dredged material were beneficially used to stabilize a portion of the gulf shoreline at the mouth of the canal. In FY 1994, 400,000 cubic yards of material were placed along the same stretch of gulf shoreline. This area received an additional 1,000,000 cubic yards of dredged material in FY 1997.

Previously Proposed Strategies -

Projects proposed in the past to rehabilitate this unit include stabilizing the banks of the Freshwater Bayou Canal, installing freshwater diversions from White Lake to the south of Pecan Island Chenier, managing hydrology within the unit's marshes, and using dredged material beneficially.

Coastal Use/Resource Objectives -

The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's intermediate to brackish marshes, developed lands or fastlands, and chenier shorelines – areas that include American alligators, furbearers, and waterfowl. This unit is also critical for agriculture and grazing, recreation and tourism, oil and gas infrastructure, and storm buffering. The roads, levees, and bridges associated with the communities in this unit are also important.

Regional Ecosystem Strategies -

Moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of the

highway, dedicated dredging of sediment for wetland creation, maintaining Atchafalaya River water and sediment flow through the GIWW are regional ecosystem strategies that would directly affect the interior marshes of this unit. Stabilizing the Gulf of Mexico shoreline in the vicinity of Rockefeller Refuge and maintaining the Atchafalaya River mudstream in the Gulf of Mexico are regional ecosystem strategies proposed to benefit the gulf barrier shoreline.

Benefits of Regional Strategies - These strategies should benefit fresh, intermediate, brackish, and saline marshes in the area by mitigating saltwater intrusion effects. Dedicated dredging in failed impoundment and other open water areas could potentially create substantial areas of emergent marsh, which should help to protect roads, levees and bridges, infrastructure associated with the oil and gas industry, communities, and utilities located on Pecan Island. Improved marshes will substantially benefit all estuarine and freshwater assemblages that utilize habitats in this mapping unit. These strategies are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include dedicated dredging for marsh creation with material from White Lake or the Gulf of Mexico, stabilizing the gulf shoreline, and terracing and vegetative plantings along the northern boundary of the unit. No programmatic strategies have been developed for this unit.

Amoco

Location - This mapping unit is owned by Amoco Corporation. It is bordered on the north by the GIWW, on the east by Florence Canal, on the south by White Lake, and on the west by the Cameron-Vermilion Parish boundary. The entire unit is located within Vermilion Parish and totals 23,000 acres.

Habitat Description and Landscape Change - There has been no change in marsh type from 1949 to the present. Both the 1949 and 1968 habitat maps indicated that the unit was composed of 100% fresh marsh. The current habitats include 72% (16,500 acres) fresh marsh and 13% open water, with the remainder incorporating upland, swamp, forest, or developed land. Since this is a managed unit, the water to marsh ratio fluctuates according to the unit's management plan.

Historic Land Loss - In 1932, this unit had 23,560 acres of marsh. Total marsh lost in this unit from 1932-1990 has been 7,060 acres. The majority of this loss, 3,940 acres, occurred from 1974-1983, as the marsh suffered from altered hydrology, excessive flooding and drainage problems, and wake erosion along the waterways. These problems continued from 1983-1990, when 1,650 acres were lost. This equates to an annual land loss rate of 345 acres between 1974 and 1990. Although this unit has undergone management, significant land loss continues to occur within the upper area of this unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 6,000 acres of fresh marsh are projected to be lost by 2050. This is 36.4% of the remaining 1990 marsh acreage (16,500 acres). This projection takes into account the possibility of “false loss” as a result of Amoco’s management plan. Future loss will occur in the areas of previous loss from 1983-1990 (within the unit’s upper area bordering the GIWW).

Fish and Wildlife Resources - This mapping unit is a privately managed unit of fresh marsh, developed lands, and fastlands that have sustained steady populations of largemouth bass and channel catfish. Both populations are expected to decrease by 2050.

In open water areas, populations of seabirds, dabbling and diving ducks, rails, gallinules, coots, other open water resident and migrant avifauna, and furbearers have been steady and are projected to remain steady through 2050. Populations of geese and American alligators have been increasing and are projected to continue this increase through 2050. In fresh marsh areas, populations of seabirds, dabbling and diving ducks, raptors, rails, gallinules, coots, other marsh resident and migrant avifauna, furbearers, rabbits, and deer have remained steady, and all but shorebirds and other resident marsh and migrant birds are expected to remain steady. Shorebird and other resident and migrant bird populations are expected to decline. Wading bird, goose, and American alligator populations have been increasing, and all are expected to continue this trend until 2050, except the wading birds, which will remain steady.

Infrastructure - The USACE has indicated that its only project in the unit is maintenance of the GIWW. There are no roads, pipelines, or railroads located in this unit. There are two oil and/or natural gas platforms, 64 wells, and three pumps in this area.

Previously Proposed Strategies - Several past strategies for this unit have included bank stabilization of the GIWW, Florence Canal, and other navigation channels, in addition to managing the fresh marsh hydrology within the unit.

Coastal Use/Resource Objectives - The Vermilion Parish Coastal Zone Management Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit’s freshwater marsh habitat that includes freshwater finfish, American alligators, and waterfowl. Also important to the Amoco unit is continued management of navigation and port facilities, and roads, levees, and bridges located within the unit.

Regional Ecosystem Strategies - Operation of locks to evacuate excess water from the Lakes Subbasin and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies that are expected to benefit this unit. Since much of this unit is impounded, however, the effects will vary based on management practices. Stabilizing the White Lake shoreline is a regional ecosystem strategy that is expected to benefit this unit regardless of management practices.

Benefits of Regional Strategies - These strategies are expected to enhance the fresh marshes of this unit and their associated water bodies. This would benefit the fresh marsh species, such as alligators, furbearers, and waterfowl, while protecting the infrastructure associated with the oil and gas industry; roads, levees, and bridges; and navigation ports and facilities. These strategies are expected to slightly reduce marsh loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include shoreline stabilization along the southern bank of the GIWW (where necessary) and stabilization of the north shore of White Lake. No programmatic strategies have been recommended for this unit.

Grand Lake East

Location - This mapping unit is bordered on the west by Grand Lake, on the north by Grand Lake and the GIWW, on the east by the Cameron-Vermilion Parish boundary line, and on the south by Black Fish Canal. The entire unit is located within Cameron Parish and contains 11,444 acres, of which 6,970 acres are fresh marsh.

Habitat Description and Landscape Change - In 1932, this unit consisted of 9,770 acres of fresh marsh. There was no change in marsh type from 1949 to present. All maps indicate that the unit was composed of 100% fresh marsh. The current habitats in this unit include approximately 64% fresh marsh and 14% open water, with the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - Total marsh loss within this unit has been 2,800 acres. The majority of this loss, 1,670 acres, occurred from 1956-1974. The main causes of land loss in this unit are flooding, altered hydrology, wave erosion (along the Grand Lake shoreline), and herbivory. Marsh loss from 1974-1999 was 940 acres, with a loss rate of 59 acres of marsh per year. Subsidence in this area is estimated at 0-1.0 ft/century.

Future Land Loss Projections - In 1990, this unit had 6,970 acres of marsh. An additional loss of 2,200 acres of fresh marsh will occur by 2050. This is 31.5% of the remaining 1990 marsh (6,970 acres). The majority of loss within this unit will occur along the Grand Lake shoreline and the eastern portion which is composed of Allemands muck soils.

Fish and Wildlife Resources - This unit contains freshwater marsh that sustains steady populations of Gulf menhaden, blue crab, largemouth bass, and channel catfish. This unit, however, has marked population declines for red and black drum, spotted seatrout, flounder, and white and brown shrimp. All populations are expected to decline by 2050, except largemouth bass and channel catfish, which will remain stable.

Steady populations of seabirds and other resident and migrant birds will remain steady in the open water habitats through 2050, as will steady populations of rails, gallinules, coots, and furbearers in open water, aquatic bed, and fresh marsh areas. Furbearers are currently steady and will remain steady in the hardwood forest habitats, as will populations of

rabbits, squirrels, deer, and American alligators. Steady fresh marsh populations of seabirds and shorebirds will begin to decline by 2050, as will other resident and migrant bird populations in the aquatic bed and fresh marsh habitats. Presently declining populations of dabbling and diving ducks and geese will continue to decline in the open water, aquatic bed, and fresh marsh habitats through 2050, as will declining populations of rabbits and deer in the fresh marsh habitat. Increasing populations of fresh marsh wading birds will level off by 2050, as will American alligator populations in the open water, aquatic bed, and fresh marsh habitats.

Infrastructure - The USACE has indicated that its only project within the unit is the maintenance of the GIWW. This unit contains no roads, railroads, or pipelines, and 65 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit include stabilizing the banks of the GIWW, managing the fresh to intermediate marsh hydrology in the unit, and protecting the facing shoreline of Grand Lake and the smaller lakes inside the unit.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marshes, which include American alligators and waterfowl. The Grand Lake East unit contains oil and gas infrastructure, and is also important for agriculture and grazing.

Regional Ecosystem Strategies - Operation of locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock specifically to evacuate excess water after building a new navigation lock on a parallel channel, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of the highway are regional ecosystem strategies that are expected to benefit this unit. In addition, stabilization of the Grand Lake shoreline and prevention of the coalescence of Grand and White lakes have been proposed to protect this unit.

Benefits of Regional Strategies - These strategies are expected to enhance the fresh marshes in this unit by reducing flooding and wave attack on interior marshes. This would in turn enhance the habitat for alligators and waterfowl, while allowing for agriculture and grazing and protection of oil and gas infrastructure. These strategies are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - The mapping unit strategies attributed to this unit include shoreline stabilization along the GIWW and Umbrella Bay in Grand Lake, vegetative terracing at Bird Island between Mallard Bay and Grand Lake, and vegetative plantings in Mallard Bay. No programmatic strategies have been developed for this unit.

Grand/White Lake Land Bridge

Location - This mapping unit includes the smaller lakes and broken marsh connecting Grand and White lakes. This unit is bordered on the west by Grand Lake, on the east by White Lake, on the south by Collicon Lake and Grand Lac L'Huit, and on the north by Round Lake and Lake Le Bleu. This unit is located in both Cameron and Vermilion parishes and contains 13,281 acres, of which 7,090 acres is fresh marsh.

Habitat Description and Landscape Change - There has been no change in marsh type from 1949 to present. All habitat maps indicate a unit with 100% fresh marsh. The current habitats in this unit include approximately 53% (7,090 acres) fresh marsh, 35% water, with the remainder incorporating primarily scrub-shrub habitat along canal spoil banks.

Historic Land Loss - In 1932, this unit had approximately 8,935 acres of marsh. Total marsh lost within this unit from 1932-1990 was 1,845 acres. The majority of this loss (990 acres) occurred from 1956-1974 as a result of altered hydrology, excessive water levels and lack of drainage, and wave erosion within the lakes. From 1974-1990, 295 acres of marsh were lost, resulting in an annual land loss rate of 18.4 acres. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 1,030 acres of fresh marsh is projected to occur by 2050. This is 14.5% of the remaining 1990 marsh acreage (7,090 acres). The leading causes of future land loss within this unit will most likely be wave erosion

along the lakes' shorelines and excessive marsh inundation.

Fish and Wildlife Resources - Several fresh to intermediate fish species have steady populations within this unit (Gulf menhaden, blue crab, largemouth bass, and channel catfish). Other species are declining (red and black drum, spotted seatrout, southern flounder, and white and brown shrimp). All species, except largemouth bass and channel catfish, are expected to decline by 2050. Bass and catfish will remain steady.

Populations of furbearers are expected to remain steady through 2050 in the open water, fresh marsh, and hardwood forest habitats. In open water habitats, this trend also holds for seabird, shorebird, and other resident and migrant avifauna populations. A steady trend through 2050 also holds for seabird, shorebird, raptor, rail, gallinule, coot, and other resident and migrant avifauna populations in the fresh marsh habitat. The steady population of American alligators in the hardwood forest habitat will remain steady. Currently steady populations of raptors and other resident and migrant birds in the hardwood forest habitat are projected to decline in the future. Declining populations of dabbling and diving ducks and geese will continue their decline in the open water and fresh marsh areas, as will the declining populations of rabbits and deer in the marsh and hardwood forest habitats. Increasing fresh marsh wading bird populations will level off by 2050. Increasing American alligator populations in open water and fresh marsh areas will continue to increase.

Infrastructure - The only USACE project within this mapping unit is maintenance of the Inland Waterway. This unit contains no roads, railroads, or pipelines, and five oil and/or natural gas wells.

Previously Proposed Strategies - Several strategies have been proposed in the past for this unit, including preserving the function of the land bridge, stabilizing the banks of navigation channels within the unit, managing the fresh to intermediate marsh hydrology, and protecting the facing shorelines of Grand and White lakes.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marsh habitat, which includes freshwater finfish, American alligators, and waterfowl. This unit is critical as a storm buffer and for navigation and port facility usage.

Regional Ecosystem Strategies - Operation of locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock specifically to evacuate excess water after building a new navigation lock on a parallel channel, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of the highway are regional ecosystem strategies that are expected to benefit this unit. In addition, stabilization of the Grand Lake shoreline and prevention of the coalescence of

Grand and White lakes have been proposed to protect this unit.

Benefits of Regional Strategies - These strategies are expected to enhance the fresh marshes in this unit by reducing flooding and wave attack on interior marshes. This would in turn enhance the habitat for freshwater finfish, furbearers, alligators and waterfowl, while allowing for enhanced freshwater supply and storm buffering capacity. These strategies are expected to result in a no-net loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies within this unit include terracing and vegetative plantings, dedicated dredging (from either Grand or White lake) into open water areas of the land bridge, the placement of structures and hydrologic management at the Inland Waterway which presently connects both lakes, and protecting the shoreline of this unit. No programmatic strategies have been developed within this unit.

North Grand Lake

Location - This mapping unit is bordered on the south by Grand Lake, and on the west, east, and north by the Coastal Zone boundary. This unit is located within Cameron Parish and contains 17,457 acres, of which 10,640 acres are fresh marsh.

Habitat Description and Landscape Change - The current habitats in this unit include approximately 61% fresh marsh (10,460 acres), nominal swamp (50 acres), and 20% open water, with the remainder incorporating upland, swamp, forest, or developed land. Despite

development throughout this unit, the marsh has remained 100% fresh since 1949.

Historic Land Loss - In 1932, the North Grand Lake unit had 17,000 acres of marsh. Total marsh acreage lost in this unit from 1932-1990 has been 6,360 acres. Much of this loss (2,560 acres) occurred from 1956-1974, when much of the oil and gas infrastructure was installed. Marsh loss during this time was a factor of wave and wake erosion within Grand Lake and the Mermentau River, altered hydrology, and excessive ponding throughout the unit. Less land loss (600 acres) occurred between 1983 and 1990, when this unit underwent management and the marsh was partly stabilized. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 1,700 acres of fresh marsh will be lost by 2050. This is 16% of the existing 1990 marsh habitat (10,640 acres). The majority of this loss will occur along the North Grand Lake shoreline and in two areas north of the GIWW, as a result of increased wake erosion.

Fish and Wildlife Resources - This unit contains developed lands, agriculture, and some freshwater marsh. In this marsh are steady populations of blue crab, largemouth bass, and channel catfish. The current trend, however, reveals a decrease in the white shrimp population and an unknown status on brown shrimp productivity. White shrimp and blue crabs will decrease by 2050, while largemouth bass and channel catfish will increase.

Open water, fresh marsh, and hardwood forest habitats are all found within this mapping unit. Steady populations of seabirds, dabbling and diving ducks, geese, rails, gallinules, coots, furbearers, rabbits, and deer are all currently steady and are projected to remain steady through 2050. Increasing fresh marsh populations of wading birds are expected to steady by 2050, while steady populations of shorebirds are expected to decline in the fresh marsh. Steady raptor populations in the fresh marsh habitat are projected to decline, as are steady populations of raptors and other resident and migrant woodland birds in the hardwood forest habitat. Steady populations of other marsh/open water residents and migrant avifauna are expected to remain steady in the open water habitat and decline in the fresh marsh habitat through 2050. Increasing populations of American alligators are expected to stabilize in open water and fresh marsh areas, while stable populations of American alligators in the hardwood forest habitat are expected to remain stable through 2050.

Infrastructure - The USACE has indicated that it has implemented projects in the unit along the GIWW, the Mermentau River, and bayous Nezpique and Des Cannes. The purpose of these projects is to remove navigation obstructions and control water levels. This mapping unit contains no primary or secondary roads, but has 8.6 miles of tertiary roads, 15.6 miles of crude oil and natural gas pipelines (largest diameter 30 inches), and 52 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this

unit include stabilizing the banks of the GIWW and protecting the northern shoreline of Grand Lake.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal use and resource management in this unit include management of freshwater marsh and forested wetland habitats, which include American alligators, waterfowl, non-game fish and wildlife, and agriculture and grazing. The committee also listed a specific interest in maintaining a freshwater supply for agriculture and management of navigation and port facilities.

Regional Ecosystem Strategies - Operation of locks to evacuate excess water from the Lakes Subbasin and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies that are expected to benefit this unit. In addition, stabilization of the Grand Lake shoreline, prevention of the coalescence of Grand Lake and the GIWW, and prevention of the coalescence of Grand and White lakes have been proposed to protect this unit.

Benefits of Regional Strategies - These strategies are expected to enhance the fresh marshes and forested wetlands and their associated aquatic habitats in this unit by reducing flooding and wave attack on interior marshes. This would in turn enhance the habitat for non-game fish and wildlife, alligators and waterfowl, while allowing for enhanced agriculture and grazing and freshwater supply, and protecting navigation ports and facilities. These strategies are

expected to achieve no-net loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include bank stabilization along the GIWW where necessary, vegetative plantings to further secure the shoreline, and improving hydrology by restricting the Mermentau River Ship Channel at its confluence with the Gulf of Mexico. No programmatic strategies have been developed for this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its “authorized dimensions” of 15 x 100 feet because the channel must have a minimum cross-section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Grand Lake

Location - This mapping unit is entirely encompassed by Grand Lake, which is located within the northeast corner of Cameron Parish and contains 45,991 acres.

Habitat Description and Landscape Change - Comparing the 1949 and 1968 habitat maps, there has been no change in marsh type throughout these years and into the present. Habitats in this unit currently include approximately 98% water, with the remainder incorporating fragments of fresh marsh and submerged aquatics.

Historic Land Loss - The USACE has quantified land loss for this unit from 1978-1988. Approximately 383 acres of marsh have been lost within this area as a result of wave-induced shoreline erosion and altered hydrology due to water control structures. This equates to a land loss rate of 32 acres per year. The area is considered geologically stable and is experiencing 0-1 ft/century subsidence.

Future Land Loss Projections - The Region 4 Technical Team has not projected future land loss for this open water unit. Any future land loss along the Grand Lake shoreline has been incorporated into adjacent mapping units.

Fish and Wildlife Resources - This unit is a freshwater body that is influenced by locks and control structures. It sustains steady populations of Gulf menhaden, blue crab, largemouth bass, and channel catfish. Red and black drum, spotted seatrout, southern flounder, and white and brown shrimp populations have declined within this unit. All fish and shellfish populations will be stable through 2050. Populations of seabirds, dabbling and diving ducks, and other resident and migrant birds are projected to remain steady until 2050.

Infrastructure - There is a lock structure located at Catfish Point that controls water flux and organism migration from the Mermentau River into Grand Lake. There are 64 oil and/or natural gas wellheads in the area, as well as 12.7 miles of crude oil pipeline (diameter 12 inches), and 11.3 miles of natural gas pipeline (diameter 16 inches). There is one groundwater intake in this area.

Previously Proposed Strategies - A strategy proposed in the past for this unit includes protecting the shoreline surrounding Grand Lake in order to keep the lake from breaching into nearby, smaller open water areas within adjacent marshes.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit for blue crabs and freshwater finfish. The Grand Lake unit also contains navigation and port facilities, oil and gas infrastructure, and functions as a flood water containment basin.

Regional Ecosystem Strategies - There is no wetland habitat in this unit, so no regional strategies apply directly to this unit. However, if lake-bottom sediments are used as a source of spoil for dedicated dredging for marsh creation, portions of the unit will be affected.

Benefits of Regional Strategies - The effects of dredging lake-bottom sediments for marsh creation will have to be addressed on a case-by-case basis.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include maintaining spoil banks along the GIWW where necessary to prevent the GIWW from eroding into the northern portion of Grand Lake; managing the lake as a low salinity, fresh to intermediate ecosystem; and protecting the wetland diversity. Programmatic strategies attributed to this unit include 1) allowing for limited estuarine organism access into the lake at the Catfish Point Control Structure, 2) maintaining the lake as a low salinity fresh to intermediate ecosystem, 3) maintaining the Lakes Subbasin's target water level of 2 ft MLG, and 4) monitoring fisheries access at the locks.

Little Pecan

Location - This mapping unit is bordered by the Grand Chenier Ridge on the south, the Mermentau River on the west, Grand Lake on the north, and the Superior Canal System on the east. This entire unit is located within Cameron Parish and contains 62,231 acres.

Habitat Description and Landscape Change - Habitats in this unit include swamps and cheniers near the middle of the unit, fresh to intermediate marsh to the north of the ridge, and brackish marsh to the south of the ridge. Although there were no significant shifts in habitat type from 1956-1990, there has been a decrease in habitat productivity due primarily to impacts from altered hydrology and flooding.

Historic Land Loss - In 1932, the Little Pecan unit had 55,205 acres of marsh. Between 1932 and 1990, 6,305 acres

were lost. Much of this loss (4,355 acres) occurred between 1956 and 1974, corresponding to an annual land loss rate of 242 acres. The causes for this loss include excessive flooding (induced by altered hydrology), direct removal (largely from the Superior Canal System), and wave/wake erosion. Impoundments have been identified as a lesser cause of land loss. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 3,670 acres of fresh marsh is projected to occur by 2050. This is 7.5% of the remaining 1990 marsh (48,900 acres). Shoreline erosion along the northern boundary of the Little Pecan unit will continue to be a primary cause of future loss.

Fish and Wildlife Resources - This unit contains a diversity of habitats, which makes it ideal for many different types of wildlife. The area supports stable populations of red and black drum, spotted seatrout, Gulf menhaden, southern flounder, white and brown shrimp, blue crab, largemouth bass, and channel catfish. All fish and shellfish populations are projected to remain stable through 2050.

The open water habitat supports stable populations of seabirds, diving ducks, geese, other resident and migrant birds, and furbearers; increasing populations of American alligators; and declining populations of dabbling ducks. These populations are expected to continue their trends through 2050. The fresh marsh supports stable populations of seabirds, shorebirds, geese, rails, gallinules, coots, other resident and migrant birds, furbearers, rabbits and

deer; increasing populations of American alligators; and declining populations of dabbling and diving ducks. These species' populations are expected to continue their trends, and increasing populations of wading birds are expected to steady through 2050. In the hardwood forest habitat, steady populations of dabbling ducks, furbearers, game mammals, and American alligators are expected to remain steady. Steady populations of other resident and migrant birds are expected to decline through 2050.

Infrastructure - The Little Pecan mapping unit contains the following infrastructure: Grand Chenier Drainage Board levee and water control structures; Little Pecan Island's 3,000 ft aircraft runway; Catfish Point control structure; Superior Oil and Gas Canal System (extensive access canals in the eastern portion of the mapping unit); Little Pecan levees and pumps (nine impoundments, 11 flap-gated variable crest weir structures, and three drainage pump stations); and a system of roads, levees, and water control structures extending from Grand Chenier (Louisiana Highway 82) to North Island and the Pan Am oil and gas facility. This unit contains 3.3 miles of secondary and 11.3 miles of tertiary roads, 24.5 miles of crude oil (largest diameter 12 inches) and natural gas (largest diameter 16 inches) pipelines, and 399 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies previously proposed for this unit have included protecting the function of the chenier ridge, managing the fresh to intermediate marsh

hydrology, and stabilizing the southern shoreline of Grand Lake.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh to intermediate marshes and aquatic habitat specifically for American alligators and waterfowl. Other areas of importance include navigation and port facilities, oil and gas infrastructure, roads, levees, and bridges.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock to evacuate excess water after building a new navigation lock on a parallel channel, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water north to south across Louisiana Highway 82 with associated drainage improvements south of the highway have been proposed for this unit to address flooding issues. Stabilizing the Grand Lake shoreline and preventing the coalescence of Grand and White Lakes have also been proposed to minimize wave attack and exposure of interior marshes to high energy environments.

Benefits of Regional Strategies - These strategies are expected to enhance fresh, intermediate, and brackish marshes; forested wetlands; and their associated aquatic habitats. This should benefit alligator and waterfowl populations as well as infrastructure such as that associated with the oil and gas industry and roads and levees. These strategies

are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include freshwater introduction from Grand Lake to Little Pecan Bayou to reduce saltwater intrusion and diversion of water from the Superior Canal to the Little Pecan Bayou area. Other mapping unit strategies involve hydrologic restoration in the North Little Pecan Bayou area (including XME-46) to ensure the egress and ingress of marine organisms and moderation of area salinity by 1) bringing freshwater from Superior Canal, 2) diverting freshwater from Grand Lake, or 3) placing a saltwater reduction structure in Little Pecan Bayou; vegetative plantings on the Little Pecan Lake shoreline; and maintaining and restoring the Little Pecan Lake shoreline. No programmatic strategies have been developed for this unit.

Grand Chenier Ridge

Location - This mapping unit is triangular in shape and is bordered on the west by the Mermentau River, on the south by Grand Chenier Ridge, and on the east by the Miller Canal. This entire unit is located within Cameron Parish and contains 11,865 acres.

Habitat Description and Landscape Change - This unit experienced a shift to more brackish marsh from 1949-1968, with a slight freshening since then. The 1949 map indicated that the unit was composed of 90% fresh and 10% saline marshes. The 1968 map, however, reveals that the unit became 45% brackish, 5% intermediate, with 50% in

the unknown category. This unit currently includes approximately 23% fresh marsh, 25% intermediate marsh, 5% brackish marsh, minimal saline marsh, and 10% open water, with the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - The USACE has not yet collected information about historic land loss in this unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - The Region 4 Technical Team has not yet determined future land loss projections for this unit.

Fish and Wildlife Resources - There is no information available on the status of fishery populations in the Grand Chenier Ridge unit.

Dabbling duck and furbearer populations in the open water; fresh, intermediate and brackish marshes; hardwood forest; and agricultural/upland areas have been, and are expected to remain, steady through 2050. This is also true for diving ducks, geese, rails, gallinules, coots, and other resident and migrant avifauna in all habitats except the hardwood forests, where they are not historically present or there is no data. Raptor, rabbit, and deer populations also follow this trend in all habitats except the open water habitat. Seabird populations will remain steady through 2050 in the open water and marsh habitats. Wading bird populations, which have been increasing in the marsh habitats and upland areas, will remain steady into 2050. Shorebird populations in the marsh areas and upland areas will remain stable. Squirrel and American alligator populations have been stable in

the upland and agricultural areas and are projected to remain so. American alligator populations in the open water and marsh areas are projected to stabilize after their historic increase. American alligator populations in the hardwood forest areas will remain stable.

Infrastructure - The USACE maintains the lower Mermentau River to a cross-section of 3,000 square feet for flood control. This mapping unit contains no primary roads or railroads, but has 16.2 miles of secondary and 18.4 miles of tertiary roads, and 12 miles of natural gas pipelines (largest diameter 20 inches). This unit also contains 64 oil and/or natural gas wells, five drainage pump stations, and two groundwater intakes.

Previously Proposed Strategies - The strategy proposed in the past for this unit was to maintain and protect the function of Grand Chenier Ridge.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh marsh and fastlands, which serve as a storm buffer and contain oil, gas, and utilities infrastructure. This unit is also important for road, bridge, and community development within the unit.

Regional Ecosystem Strategies - Moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of the highway is the only regional ecosystem strategy which is expected to benefit this unit.

Benefits of Regional Strategies - This strategy is expected to reduce saltwater intrusion and minimize tidal flow in the unit. Better drainage will help reduce flooding in the northern portions of the unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategy attributed to this unit is maintaining the Grand Chenier Ridge. A programmatic strategy to restrict sand dredging of the chenier has been recommended.

Rockefeller

Location - This mapping unit incorporates all of Rockefeller State Wildlife Refuge, which is managed by the Louisiana Department of Wildlife and Fisheries. This unit is bordered on the south by the Gulf of Mexico, on the north by Louisiana Highway 82, on the east by Rollover Bayou, and on the west by the Hog Bayou mapping unit. This unit is located in both Cameron and Vermilion parishes and contains 84,483 acres.

Habitat Description and Landscape Change - This unit experienced a shift toward more saline marshes from 1949 to present. In 1949, the unit was classified as 10% beach, 20% fresh marsh, 65% brackish marsh, and 5% saline marsh. The 1968 map revealed a 25% shift of the previous beach and fresh marsh habitats to intermediate marsh. The unit currently contains approximately 15% saline marsh (12,480 acres), 31% brackish marsh (25,780 acres), 14% intermediate marsh (11,770 acres), 15% fresh marsh (12,750 acres), and 23% open water (19,431 acres), with

the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, this unit had 93,280 acres of marsh. Total marsh loss within this unit has been 30,500 acres. Of this loss, 13,420 acres occurred from 1956-1974. Significant land loss (12,490 acres) was also observed from 1932-1956. Marsh degradation in this area has been attributed to severe wave erosion along the Gulf of Mexico. The gulf shoreline erosion rate in 1978 was approximately 36 ft/year. Altered hydrology was another major cause of land loss. Land loss decreased from 1974-1990, when only 4,590 acres were lost within the refuge. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - This unit is projected to lose an additional 13,060 acres of marsh (50% saline, 30% intermediate, and 20% fresh) by 2050. This is 20.8% of the remaining 1990 marsh (62,780 acres). The majority of this loss is projected to occur in interior marshes and along the gulf shoreline.

Fish and Wildlife Resources - This unit completely incorporates Rockefeller Refuge. This unit is composed of open water and fresh to saline marsh, which maintain stable populations of several fish species including red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oyster, blue crab, white and brown shrimp, Spanish mackerel, largemouth bass, and channel catfish. Populations of American oyster, largemouth bass, and channel catfish are projected to increase by 2050. The remaining populations are projected to

decrease, except for Spanish mackerel, which will remain steady.

Throughout the study area, stable populations of seabirds, geese, and furbearers are projected to remain stable. Increasing populations of wading birds are expected to stabilize by 2050, as are increasing American alligator populations in open water and fresh, intermediate, and brackish marshes. Stable American alligator populations in the salt marsh are projected to remain stable, as are stable open water populations of dabbling and diving ducks, raptors, rails, gallinules, and coots. Stable marsh populations of shorebirds, dabbling and diving ducks, raptors, rails, gallinules, coots, other resident and migrant birds, rabbits, and deer are expected to decline by 2050. Currently increasing populations of brown pelicans are expected to maintain this increase into 2050.

Infrastructure - This mapping unit contains no primary roads or railroads, but has 19.6 miles of secondary and 19.3 miles of tertiary roads, and 22.8 miles of crude oil and natural gas pipelines (largest diameter 20 inches). Also located within this unit are 199 oil and/or natural gas wells and six drainage pump stations.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the function of Grand Chenier Ridge, managing the brackish to saline marsh hydrology within the unit, and restoring the chenier shoreline. Previous strategies have also mentioned the possibility of introducing freshwater into the unit via diversions

from the Lakes Subbasin and protecting the gulf shoreline.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh to brackish marshes, chenier shoreline, and developed lands or fastlands. The area includes shrimp, blue crab, saltwater and freshwater finfish, American alligators, furbearers, and waterfowl. This unit is also important for education (scientific study) and as a storm buffer. The committee also indicated the importance of oil and gas infrastructure, roads, levees, and bridges within the unit.

Regional Ecosystem Strategies - Moving water north to south across Louisiana Highway 82 with associated drainage improvements south of the highway is a regional ecosystem strategy for this unit intended to minimize saltwater intrusion. Stabilizing the Gulf of Mexico shoreline in the vicinity of Rockefeller Refuge and maintaining the Atchafalaya River mudstream in the Gulf of Mexico have also been proposed to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to benefit fresh, intermediate, brackish, and saline marshes and their associated aquatic habitats and to stabilize the chenier barrier shoreline. These strategies are also expected to enhance all fishery species found in the mapping unit as well as alligators, furbearers, and waterfowl. Scientific study and tourism through protection of the Rockefeller Refuge will also benefit. Storm

buffering capacity will be enhanced with stabilization of the beach ridge, which will also benefit oil and gas industry infrastructure and roads, levees, and bridges. These strategies are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies in this unit are to preserve and stabilize the gulf shoreline and to maintain and improve current hydrology in the unit. There were no programmatic strategies developed for this unit.

Lacassine

Location - This unit is located entirely within Cameron Parish and includes the Lacassine National Wildlife Refuge (NWR). The unit is bordered by the Lacassine NWR boundary on the north, the Mermentau River and Grand Lake on the east, the Bell City Drainage Canal on the west, and Lake Misere on the south. This unit contains 29,168 acres, of which 15,140 acres are fresh marsh.

Habitat Description and Landscape Change - In 1949, 1968, 1978, and 1988, this unit was classified as fresh marsh.

Historic Land Loss - To calculate accurate land loss rates, this unit was divided into two subunits, Lacassine Pool and Lacassine South and East. Lacassine Pool is a 16,000-acre freshwater impoundment managed for freshwater finfish and migratory waterfowl. The Lacassine Pool, because of its impounded condition and management regime, was treated separately from the remainder of this

unit which is primarily unmanaged and experiences a more natural process of marsh loss. In 1932, the Lacassine Pool had 10,920 acres of marsh. The Lacassine Pool unit lost a total of 5,350 acres of emergent marsh from 1932-1990. However, as noted with many freshwater impoundments, photography taken during periods of high water levels or in the winter when vegetation is not growing often reflect areas of marsh loss where, in fact, no loss has occurred. Also, the USACE's land loss data does not include data on marsh gain. Other sources indicate that many areas within the Lacassine Pool have experienced a conversion from open water to emergent marsh. The rest of the Lacassine unit had 11,580 acres of marsh in 1932. It lost a total of 2,010 acres of emergent marsh from 1932-1990. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, the Lacassine Pool had 5,570 acres of marsh. Based on the current conditions and management regime, the Lacassine Pool subunit will experience insignificant loss or perhaps even marsh gains over the next 50 years. This unit will continue to be managed as a freshwater impoundment for freshwater fisheries and migratory waterfowl.

The Lacassine South and East subunit, which had 9,570 acres of marsh in 1990, will continue to lose marsh at the 1974-1990 rate of 0.35% per year. That figure equates to 1,820 acres of fresh marsh lost from 1990-2050. Most of this loss will occur along the Grand Lake shoreline, Lake Misere shoreline, and the banks of the Mermentau River and the GIWW.

Fish and Wildlife Resources - This unit provides important feeding, nesting, and resting habitat for many species of wildlife and important habitat for many species of freshwater fish. Freshwater finfish found in this unit include largemouth bass, crappie, red ear sunfish, bluegill, gar, freshwater drum, channel catfish, and blue catfish. The Lacassine Pool is popular among recreational fishermen in pursuit of largemouth bass, crappie, and bluegill. Some species, such as gar and catfish, are important commercially as well as recreationally; however, no commercial fishing is allowed on Lacassine NWR. All fisheries populations are projected to remain steady through 2050.

The Lacassine Pool is particularly important in providing feeding and resting habitat for migratory waterfowl and provides refuge for hundreds of thousands of waterfowl during the hunting season. In the open water and aquatic bed habitats, diving and dabbling duck, goose, rail, gallinule, coot, other resident and migrant avifauna, and furbearer populations have been steady and are projected to remain so through 2050. Seabirds also exhibit this trend for open water habitat, while increasing American alligator populations are expected to stabilize. In the fresh marsh habitat, increasing populations of wading birds and American alligators are expected to stabilize, while steady populations of shorebirds and other resident and migrant birds are expected to decline by 2050. Currently steady fresh marsh populations of seabirds, dabbling and diving ducks, geese, furbearers, rabbits and deer are projected to remain steady. In the hardwood forest habitat, steady populations of dabbling

ducks, furbearers, rabbits, deer, and American alligators are projected to remain steady, while steady populations of raptors and other resident and migrant avifauna are expected to decline by 2050.

Infrastructure - The GIWW, Lacassine Bayou, and Mermentau River are within this unit and are Federally maintained for navigation and flood control. This mapping unit contains no primary or secondary roads or railroads, but has 6.7 miles of tertiary roads, 3.2 miles of natural gas pipeline (diameter 16 inches), and 52 oil and/or natural gas wells.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit include 1) protecting/stabilizing banks along navigation canals, bayous, and oil and gas access canals; 2) protecting lake shorelines; 3) continuing hydrologic management of impoundments; and 4) restoring islands of marsh in Lacassine Bayou.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh marshes and associated aquatic habitats. Coastal resource priorities include freshwater finfish, American alligators, and waterfowl. Other coastal uses and resources of importance for this unit are floodwater storage capacity and infrastructure such as navigation facilities, oil and gas infrastructure, roads, levees, and bridges.

Regional Ecosystem Strategies - Operation of locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock specifically to evacuate excess water after building a new navigation lock on a parallel channel and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies that are expected to benefit this unit. Since much of this unit is impounded, however, the effects will vary based on management practices. Stabilizing the Grand Lake shoreline is a regional ecosystem strategy that is expected to benefit this unit regardless of management practices. Prevention of the coalescence of Grand and White lakes and the coalescence of Grand Lake with the GIWW will also benefit this unit. Dedicated dredging of sediment for wetland creation is also proposed.

Benefits of Regional Strategies - These strategies are expected to protect and enhance the fresh marshes of this unit and their associated water bodies. This would benefit the fresh marsh species, such as alligators, finfish, and waterfowl, while protecting the infrastructure associated with roads levees and bridges and navigation ports and facilities. Flood water holding capacity would also be enhanced. These strategies are expected to reduce marsh loss in the non-impounded areas of this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include stabilizing the banks of the GIWW, where necessary, maintaining the Lacassine Bayou shoreline, and beneficial use of dredged material along the GIWW. No

programmatic strategies have been recommended for this unit.

Hog Bayou

Location - This mapping unit is bordered on the south by the Gulf of Mexico and the southwestern portion of Rockefeller Refuge, on the west by the Mermentau River (including Lower Mud Lake), on the north by Louisiana Highway 82, and on the east by Rockefeller Refuge. The entire unit is located within Cameron Parish and contains 23,315 acres.

Habitat Description and Landscape

Change - There was no significant landscape change from 1949-1968, but there has been a slight shift toward more saline marshes since 1968. The 1949 and 1968 maps indicated that approximately 80% of the unit was brackish and 10% was saline; however, there was a 10% increase in the unknown category in 1968. The unit currently contains approximately 5% (1,270 acres) fresh marsh, 33% (7,610 acres) brackish marsh, 25% (5,900 acres) saline marsh, and 34% (7,927 acres) open water, with the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, the Hog Bayou unit had 24,010 acres of marsh. Total marsh loss within this unit has been 9,230 acres (60%). Much of this loss (4,050 acres), occurred from 1956-1974, largely due to impoundment. Other causes of land loss in this area are attributed to altered hydrology and wave/wake erosion along Mud Lake and the Gulf of Mexico. Marsh loss was low between 1974 and 1983, when only 220

acres of land degraded; however, land loss significantly increased to 1,770 acres between 1974 and 1990.

Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 1,200 acres of marsh (40% fresh and brackish, and 20% saline) is projected to occur by 2050. This is 8.1% of the remaining 1990 marsh (14,780 acres). The majority of future land loss within this unit will be along the gulf shoreline and in the interior areas where loss was observed between 1983 and 1990.

Fish and Wildlife Resources - This unit contains brackish to saline marsh, which maintains steady populations of red and black drum, spotted seatrout, and southern flounder. In addition, populations of American oyster, blue crab, and white and brown shrimp have remained steady, whereas marked increases have occurred in Gulf menhaden populations. All populations are expected to decrease by 2050, except for American oysters, which will increase.

Mammals and American alligators are not historically found in the barrier beach habitat, nor are dabbling and diving ducks, geese, rail, gallinules, or coots. Throughout the rest of the mapping unit, in areas where the animals are historically found, declining populations of dabbling and diving ducks and geese will continue to decline into 2050, while steady populations of seabirds, shorebirds, rails, gallinules, coots, other resident and migrant birds, mammals, and American alligators will remain steady. Only the fresh, brackish,

and saline marsh populations of wading birds are presently increasing in this unit, but their levels will stabilize in the future. Steady populations of wading birds on the barrier beach will remain steady through 2050. Open water populations of brown pelicans are projected to continue increasing into 2050.

Infrastructure - The only USACE project within this mapping unit is the maintenance of the lower Mermentau River that borders this unit on the west. This mapping unit contains no primary or secondary roads or railroads, but has 23.4 miles of tertiary roads, and 10.7 miles of natural gas pipelines (largest diameter 30 inches). There are also 157 oil and/or natural gas wells, six drainage pump stations, and one groundwater intake.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the function of Grand Chenier Ridge; managing the intermediate, brackish, and saline marsh hydrology within the unit; and protecting the lake and gulf shorelines located in the Hog Bayou unit. Strategies have also been proposed to introduce freshwater into the unit via diversions from the Lakes Subbasin, which lies to the north.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's intermediate to brackish (with some saline) marshes, and chenier shorelines, which include shrimp, blue crabs, American alligators, furbearers, and waterfowl. The Hog Bayou unit is also

important for agriculture and grazing, navigation and port facilities, and for providing a storm buffer.

Regional Ecosystem Strategies - Moving water from north to south across Louisiana Highway 82 with associated drainage improvements south of the highway and restoring the connection of the original Mermentau River to the Gulf of Mexico and constricting the width and depth of the Mermentau Ship channel to its authorized dimensions have been proposed to benefit this unit. Maintenance of the Atchafalaya River mudstream will also benefit this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its "authorized dimensions" of 15 x 100 feet because the channel must have a minimum cross-section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Benefits of Regional Strategies - These strategies are projected to enhance the fresh, intermediate, brackish, and saline marshes in this unit and their associated aquatic habitats; the chenier barrier

shoreline; and fastlands and other developed lands. These habitats will benefit the shrimp, blue crabs, alligators, furbearers, and waterfowl in the unit. Agricultural/grazing activity, storm buffering capacity, and navigation ports and facilities will also benefit. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategy for this unit includes improving hydrology by moving sediment rich water from the Mermentau River into Hog Bayou. Salinity could be moderated by 1) freshwater and sediment introduction from north of Louisiana Highway 82 to the south, 2) moving freshwater from the Mermentau River into Hog Bayou, and 3) a possible water control structure in Hog Bayou that would allow for the ingress and egress of marine organisms. No programmatic strategies have been developed for this unit.

Cameron Prairie

Location - Located entirely within Cameron Parish, this mapping unit includes the Cameron Prairie NWR. The unit is bordered by the agricultural land-marsh interface on the north, the North Canal on the east, private lands on the west, and the GIWW on the south. This unit contains 14,900 acres, of which 9,680 acres are fresh marsh.

Habitat Description and Landscape Change - This unit was classified as fresh marsh in 1949, 1968, 1978, and 1988.

Historic Land Loss - In 1932, this mapping unit had 11,060 acres of marsh. The Cameron Prairie unit lost a total of 1,380 acres of emergent marsh from 1932-1990. From 1974-1990, 730 acres of marsh were lost, equating to 45.6 acres per year. This unit contains several freshwater impoundments and, as noted with many freshwater impoundments, photography taken during periods of high water levels often reflect areas of marsh loss, where in fact, no loss has occurred. Also, the USACE's land loss data does not include data on marsh gain (areas which have converted from open water to marsh). Many of the freshwater impoundments in this unit have shown signs of recovery as marsh edges have expanded into ponds and other shallow open water areas. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, this unit had 9,680 acres of marsh. The 1974-1990 loss rate for this unit was 0.41% per year. Based on current conditions and marsh recovery in some areas in recent years, the loss rate through 2050 is projected to be 0.34% per year (2,115 acres of marsh). Approximately 120 acres of fresh marsh will be preserved in this area due to restoration projects in the unit. The majority of this unit will continue to be managed as a freshwater impoundment for freshwater fisheries and migratory waterfowl.

Fish and Wildlife Resources - This unit provides important feeding, nesting, and resting habitat for many species of wildlife and important habitat for many species of freshwater fish. Freshwater finfish found in this unit include

largemouth bass, crappie, red ear sunfish, bluegill, gar, freshwater drum, channel catfish, and blue catfish.

Largemouth bass and channel catfish populations are currently steady and are expected to remain so through 2050.

Freshwater impoundments in this unit are especially important in providing feeding and resting habitat for migratory waterfowl, and impoundments on the Cameron Prairie NWR provide refuge habitat for thousands of waterfowl during the hunting season. Throughout the open water, aquatic bed, fresh marsh, and agricultural/upland areas, populations of dabbling and diving ducks, geese, rails, gallinules, coots, and furbearers have been, and are projected through 2050 to remain, stable. The same trends hold for other resident and migrant avifauna, except in the fresh marsh habitats, where now steady populations are expected to decline. Seabird populations have been, and are projected to remain, steady in the open water and fresh marsh habitats. Wading bird populations, which have been increasing in the fresh marsh and agricultural/upland areas, are projected to remain steady through 2050.

Shorebird and raptor populations have been steady in these two habitats. Fresh marsh populations of shorebirds and raptors are expected to decline, and upland populations are expected to remain steady. Other resident and migrant bird populations are, and are expected to remain, steady. Rabbit and deer populations in the fresh marsh and upland areas are currently steady and are projected to remain steady. American alligator populations, which have been increasing in all areas except the upland

areas (where they have been steady), are expected to remain steady by 2050.

Infrastructure - The GIWW, located along the southern boundary of this unit, is Federally maintained for navigation. Louisiana Highway 27, bisecting the unit, is an important transportation and hurricane evacuation route. This mapping unit contains no primary roads or railroads, but has 2.9 miles of secondary and 3.7 miles of tertiary roads, as well as 16 oil and/or natural gas wells. This unit also contains four miles of natural gas pipeline (diameter 20 inches).

Previously Proposed Strategies -

Previously proposed restoration strategies for this unit include protecting/stabilizing banks along navigation canals and oil and gas access canals, and continuing hydrologic management of impoundments and all fresh marshes.

Coastal Use/Resource Objectives -

The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh marshes and associated aquatic habitats. Coastal resource priorities include management for American alligators and waterfowl, and providing recreation and tourism. Other coastal uses and resources of importance for this unit are flood water storage capacity and infrastructure such as navigation facilities, oil and gas, roads, levees, and bridges.

Regional Ecosystem Strategies -

Operation of locks to evacuate excess water from the Lakes Subbasin and managing the watershed to reduce rapid

inflows into the Lakes Subbasin are regional ecosystem strategies that are expected to benefit this unit.

Benefits of Regional Strategies -

Reduced flooding associated with these strategies should enhance the fresh marshes and their associated aquatic habitats. This should benefit freshwater marsh species that utilize the marshes of this unit. Lower water levels would also benefit flood water holding capacity. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategy attributed to this unit includes bank stabilization along the GIWW where necessary. No programmatic strategies have been included for this unit.

Big Burn

Location - This mapping unit is bordered on the west by Louisiana Highway 27, on the north by the GIWW and Bayou Misere, on the south by Little Chenier Ridge, and on the east by the Mermentau River. The entire unit (60,143 acres) is located within Cameron Parish.

Habitat Description and Landscape Change - There has been a slight shift in this unit toward more intermediate marsh from 1949 to present. The 1949 map indicates an area composed of 90% fresh marsh and 10% beach or chenier. The 1968 map reveals a 20% shift from the previous beach and fresh marsh habitats to intermediate marsh. The unit currently contains approximately 67% (40,330 acres) fresh marsh, 4% (2,600 acres) intermediate marsh, minimal

brackish marsh (50 acres), and 18% (10,826 acres) open water. The remaining acreage incorporates upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, the Big Burn unit had 57,880 acres of marsh. A total of 14,900 acres have been lost within this unit since 1932. The majority of this loss (10,040 acres) occurred from 1956-1974, when most of the unit was burned. Other factors such as altered hydrology and wave/wake erosion along the GIWW and Mermentau River resulted in a loss of 4,500 acres from 1974-1990 (281 acres/year). Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 5,550 acres of marsh (60% fresh and 40% intermediate) will be lost by 2050. This is 12.9% of the remaining 1990 marsh (42,980 acres). Although this area is healing from previous burning, some interior loss and continued shoreline erosion are expected to occur. No future loss is expected along Louisiana Highway 27, due to the installation of water management structures at Louisiana Highway 27 and the Little Chenier Ridge.

Fish and Wildlife Resources - The Big Burn unit is composed of fresh to intermediate marsh that contains steady populations of blue crab, largemouth bass, and channel catfish. Blue crab populations are projected to remain steady through 2050, whereas largemouth bass and channel catfish populations are projected to increase. The status on all other fish populations is not known.

In open water habitats, populations of seabirds, dabbling and diving ducks, geese, rails, gallinules and coots, other resident and migrant avifauna, and furbearers have remained stable and are projected to remain stable through 2050. The American alligator population has been increasing and is projected to continue this trend. These patterns are similar in the aquatic bed and fresh marsh habitats, with some exceptions. In the aquatic bed habitat, there is no data for seabirds. In the fresh marsh habitat, wading birds, which had been increasing in numbers, are projected to steady by 2050. Shorebirds, raptors, and other marsh resident and migrant avifauna populations, which have been steady, are expected to decline.

Infrastructure - The only USACE project within the unit is the maintenance of the GIWW. This unit has no primary roads, but has 5.3 miles of secondary roads and 11 miles of tertiary roadways. Also located within Big Burn are 21.4 miles of natural gas pipelines (largest diameter 20 inches). There are two oil and gas platforms, 191 oil and/or natural gas wells, and two groundwater wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit include stabilizing the banks of the GIWW and managing the fresh to intermediate marsh hydrology within the unit.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marshes and fastlands, which

include freshwater finfish, American alligators, and waterfowl. This unit has also been identified by the committee to contain oil and gas infrastructure and several communities.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock to evacuate excess water after building a new navigation lock on a parallel channel, managing the watershed to reduce rapid inflows into the Lakes Subbasin, and moving water north to south across Louisiana Highway 82 with associated drainage improvements south of the highway have been proposed for this unit to address flooding issues. Stabilizing the Grand Lake shoreline and preventing the coalescence of Grand and White Lakes have also been proposed to minimize wave attack and exposure of interior marshes to high energy environments.

Benefits of Regional Strategies - These strategies should benefit the fresh marshes and associated aquatic habitats of the unit. This in turn should enhance freshwater finfish, alligator, and waterfowl habitats, while protecting oil and gas infrastructure and communities. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies adopted for this unit include terracing, vegetative plantings, bank stabilization along the GIWW where necessary, hydrologic restoration at Humble Canal and the GIWW, and freshwater introduction from the GIWW into the

Big Burn. There are no programmatic strategies recommended for this unit.

Middle Marsh

Location - This mapping unit is bordered on the south by Louisiana Highway 1143, on the east by the Mermentau River, on the north by Little Chenier Ridge, and on the west by Louisiana Highway 27. The entire unit is located within Cameron Parish and contains 14,620 acres.

Habitat Description and Landscape Change - In 1949, this unit was principally intermediate marsh and chenier. Between 1949 and 1968, the area changed to more fresh and intermediate marsh and chenier. There was no change between 1968 and 1988. The unit is currently comprised mostly of shallow, intermediate marsh (10,260 acres). A variety of intermediate vegetation is found in the unit from submerged aquatics in deeper marshes, to emergent vegetation and aquatic grasses in shallow marshes and subridges. In addition, a nominal amount of fresh (1,360 acres) and brackish (560 acres) marshes exist within this unit. Excess water in the unit drains via the Creole Canal, Kings Bayou, and the Mermentau River. Drainage is dependent upon tidal movement. The Little Chenier Ridge on the northern boundary of the unit has been identified as the oldest ridge in the Chenier Plain region. Little Chenier and Chenier Perdue are dominated by stands of live oaks.

Historic Land Loss - In 1932, the Middle Marsh unit had 12,675 acres of marsh. Total marsh loss within this unit

has been 495 acres from 1932-1990. Land loss from 1974-1990 totaled 345 acres (21.6 acres/year). Much of the marsh loss within this unit (180 acres) occurred from 1983-1990, largely as a result of altered hydrology. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 1,570 acres of marsh (70% intermediate and 30% fresh) are projected to be lost by 2050. This is 12.9% of the existing 1990 marsh habitat (12,180 acres). The major cause of land loss in the future will continue to be altered hydrology.

Fish and Wildlife Resources - This unit is a very productive wildlife area. Most of the marshes are shallow except for the drainage basins and ditches. Therefore, only a limited amount of fishing occurs, most of which is crabbing. There are steady populations of largemouth bass and channel catfish in this unit, and these populations are projected to increase by 2050. The unit provides excellent waterfowl and deer hunting, as well as fur and American alligator harvesting. Cattle grazing and hay production are also major practices within this unit.

Open water, fresh and intermediate marsh, and agricultural/upland habitat types are all found in this mapping unit. Steady populations of seabirds, dabbling and diving ducks, geese, rails, gallinules, coots, furbearers, rabbits, and deer, and declining populations of raptors are expected to continue their trends in the habitat types in which they are found through 2050. Currently steady populations of wading birds and shorebirds in the marsh habitats are expected to decline; they are projected to

remain steady in the agricultural/upland habitat. Currently steady populations of other resident and migrant marsh and open water birds are expected to remain steady in the open water habitat and decline in the other three habitat types by 2050. Increasing American alligator populations in the open water and marsh habitats, as well as steady populations in the agricultural/upland habitats, are projected to steady by 2050.

Infrastructure - This unit is bordered on the west by Louisiana Highway 27, which is a major transportation and hurricane evacuation route. The eastern border is the Mermentau River, which is a major drainage outlet and is used for navigation to and from the gulf. Many homes and camps are located along Little Chenier Ridge and Little Chenier Road which borders this unit on the north. The southern boundary is Louisiana Highway 1143 (East Creole Highway) and Chenier Perdue Ridge, where many home sites and camps are located. This mapping unit contains no primary roads or railroads, but has 3.8 miles of secondary and 25.2 miles of tertiary roads, and 6.3 miles of natural gas pipelines (largest diameter 20 inches). Also located within this unit are 98 oil and/or natural gas wells and one groundwater intake.

Previously Proposed Strategies - Strategies proposed in the past to help eliminate marsh deterioration within the unit include managing the fresh to intermediate marsh hydrology throughout the area.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its

priorities for coastal use and resource management in the unit include management of intermediate marsh and aquatic habitats which support American alligators, furbearers, and waterfowl. Other important resources within this unit include cattle grazing and hay production, oil and gas infrastructure, roads, levees, bridges, and communities located in the unit. This unit is also critical for storm buffering and flood water holding capacity.

Regional Ecosystem Strategies - Restoration of the connection of the original Mermentau River to the Gulf of Mexico and constriction of the width and depth of the Mermentau Ship Channel to its authorized dimensions is the only regional ecosystem strategy proposed for this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its "authorized dimensions" of 15 x 100 feet because the channel must have a minimum cross-section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Benefits of Regional Strategies - This strategy is expected to enhance the fresh and intermediate marshes and their associated aquatic habitats. This may benefit alligator, furbearer, and waterfowl habitats and agriculture/grazing interests. Storm buffering capacity and flood water holding capacity would also be enhanced, as would infrastructure associated with the oil and gas industry and communities. This strategy is expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategies for this unit include hydrologic restoration by improving drainage within the area to relieve the effects of impoundment and to control herbivory in the area. No programmatic strategies have been developed in this unit.

Oak Grove

Location - This mapping unit is bordered on the north by Louisiana Highway 1143 (East Creole Road) and Chenier Perdue Ridge on the eastern end. The eastern boundary of the unit is the Mermentau River and upper Mud Lake. The unit boundary follows the Mermentau River along its southern boundary, and then follows the old river outlet along the northern edge of Lower Mud Lake to the Creole Canal. The western boundary is the Creole Canal. The entire unit is located within Cameron Parish and contains 28,588 acres.

Habitat Description and Landscape Change - The habitats of the area are very diverse. They range from chenier ridges to 2% fresh (560 acres), 73%

intermediate (20,880 acres), 13% brackish (3,600 acres), and nominal saline (ten acres) marsh.

Historic Land Loss - In 1932, the Oak Grove unit had 26,210 acres of marsh. Total marsh loss in this unit was 1,160 acres from 1932-1990. The majority of this loss (870 acres) occurred from 1956-1974. Land loss bordering Upper and Lower Mud lakes and the Mermentau River is mainly due to wave erosion along the shoreline. The major causes of land loss or decreased productivity in this unit are elevated water levels and extended residence time of flood waters in some areas of the unit (i.e., impoundment). Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 890 acres of intermediate marsh is projected to occur by 2050. This is 3.6% of the remaining 1990 marsh (25,050 acres).

Fish and Wildlife Resources - This mapping unit is home to stable populations of Gulf menhaden, southern flounder, white and brown shrimp, blue crab, largemouth bass, and channel catfish. All populations are projected to remain stable through 2050.

There are three habitat types in this mapping unit – intermediate and brackish marsh and agricultural/upland habitats. Currently stable populations of seabirds, shorebirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots, other resident and migrant open water/marsh and woodland birds, furbearers, rabbits, and deer are expected to remain stable through 2050. Increasing marsh populations of wading

birds and American alligators are projected to remain stable, as will stable agricultural/upland populations of these animals. This unit is also heavily used for cattle grazing and hay production.

Infrastructure - The only USACE project located within the Oak Grove unit is the maintenance dredging of the lower Mermentau River to enhance navigation. Infrastructure within the Oak Grove unit also includes Louisiana Highways 82, 27, and 1143, which are hurricane evacuation routes for the area. Additionally, the communities of Oak Grove and Creole are located within the unit, as well as businesses, homes, and camps scattered along the ridges of the rural communities. This mapping unit contains no primary roads or railroads, but has 12 miles of secondary and 18.2 miles of tertiary roads, and 17.1 miles of natural gas pipelines (largest diameter 30 inches). Also located within this unit are 104 oil and/or natural gas wells, and one commercial groundwater intake.

Previously Proposed Strategies - Strategies proposed in the past to restore marsh habitat throughout this unit include protecting ridge function and managing the fresh to intermediate hydrology of the marshes within the unit. Protecting the shorelines of open water bodies is also a strategy proposed in the past.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's intermediate marshes and developed lands or fastlands, which include waterfowl and cattle grazing/hay

production. Other valuable resources listed were oil and gas infrastructure, roads, bridges, and levees surrounding the communities within the unit.

Regional Ecosystem Strategies - Restoration of the connection of the original Mermentau River to the Gulf of Mexico and constriction of the width and depth of the Mermentau Ship Channel to its authorized dimensions, operating locks to evacuate excess water from the Lakes Subbasin, and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies proposed for this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its "authorized dimensions" of 15 x 100 feet because the channel must have a minimum cross-section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Benefits of Regional Strategies - This strategy is expected to marginally enhance the fresh marshes and their associated aquatic habitats. This would slightly benefit waterfowl habitat and

agriculture/grazing interests. Infrastructure associated with the oil and gas industry; roads, levees, and bridges; and communities would also be protected. This strategy is expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategy for this unit is to maintain the Grand Chenier Ridge. No programmatic strategies have been developed for this unit.

Lower Mud Lake

Location - This mapping unit is triangularly shaped and is bordered on the south by the Gulf of Mexico, on the west by the Mermentau River, and on the east by Lower Mud Lake. The entire unit is located within Cameron Parish and contains 3,784 acres.

Habitat Description and Landscape Change - In this unit, there was a shift to more saline marsh from 1949 to present. In 1949, the unit was composed of 15% beach, 65% brackish marsh, and 20% saline marsh. By 1968, the unit had become 100% saline marsh. This reflects the increase in saltwater intrusion from the Gulf of Mexico, and the increasing shoreline erosion within the unit. The unit currently contains approximately 73% (2,780 acres) saline marsh, minimal fresh (40 acres) and intermediate (20 acres) marsh, and 11% open water. The remaining habitats include upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, the Lower Mud lake unit had 3,810 acres of marsh. Total marsh loss within this unit

has been 970 acres. The majority of this loss (500 acres) occurred from 1956-1974. The leading causes of loss in this area are severe wave erosion along the Gulf of Mexico shoreline and wake erosion along the southern shore of Mud Lake. Land loss has significantly decreased from 1974-1990, when 150 acres were lost (0.31% per year). Subsidence in the area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 525 acres of saline marsh is projected to occur by 2050. This is 18.5% of the remaining 1990 marsh (2,840 acres). As in the past, the majority of future land loss within the Lower Mud Lake unit will be along the gulf shoreline.

Fish and Wildlife Resources - This unit is composed of mostly saline marsh, which maintains steady populations of several species, including red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oyster, and blue crab. These species are projected to decline by 2050, with the exception of the American oyster, which will remain steady. There have been marked decreases in white and brown shrimp populations, and the status of largemouth bass and channel catfish is not known within this unit. White and brown shrimp populations will continue to decline through 2050.

In the open water and saline marsh habitats, populations of rails, gallinules, coots, other resident and migrant birds, furbearers, and American alligators are currently steady and are expected to remain steady through 2050, while declining populations of dabbling and

diving ducks and geese are expected to continue their decline. Currently steady seabird populations in the open water and barrier beach habitats are expected to remain steady, and they are expected to decline in the saline marsh habitat. Wading bird populations have been increasing in the hardwood forest habitat and steady in the barrier beach habitat. Both are expected to continue these trends into 2050. Currently steady populations of shorebirds in the saline marsh are projected to decline, and they are projected to remain steady in the barrier beach habitat. Currently steady populations of other resident woodland birds are expected to decline by 2050, and there is no projection for the stable populations of other migrant woodland birds. Currently steady populations of furbearers, rabbits, deer, and American alligators are projected to remain steady.

Infrastructure - The only USACE project within this unit is the maintenance of the lower Mermentau River Cutoff Channel, which borders this unit on the east. This mapping unit contains 1.8 miles of natural gas pipeline (largest diameter 30 inches) and 17 oil and/or natural gas wells. This unit is bordered on the northwest by the Mermentau River, which undergoes maintenance dredging every two to three years. Approximately 60% of all the material dredged within the Mermentau River was used beneficially to create marsh and stabilize the beach in FY's 1982, 1985, 1987, 1990, 1994, 1995, and 1996. No dredging was planned for FY's 1997 and 1998.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the rapidly

eroding chenier shoreline and stabilizing the southern shoreline of Lower Mud Lake.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's brackish marshes and chenier shoreline, which include waterfowl and non-game fish and wildlife. The unit is also important for agriculture, grazing, and storm buffering.

Regional Ecosystem Strategies - Restoration of the connection of the original Mermentau River to the Gulf of Mexico and constriction of the width and depth of the Mermentau Ship Channel to its authorized dimensions and restoration of longshore sediment flow across the mouth of the Mermentau Ship Channel are regional ecosystem strategies proposed to benefit this unit. In addition, maintenance of the Atchafalaya River mudstream is expected to benefit this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its "authorized dimensions" of 15 x 100 feet because the channel must have a minimum cross-

section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Benefits of Regional Strategies - These strategies are expected to enhance brackish and saline marshes and their associated aquatic habitats in this unit by reducing flooding and saltwater intrusion and by protecting the marshes from increased gulf tidal influence. The chenier barrier shoreline will also be enhanced with restored sediment input. Waterfowl and non-game fish and wildlife species will benefit from these strategies, as would storm buffering capacity. These strategies are not expected to affect land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies recommended for this unit include beneficial use of dredged material from the Mermentau River for gulf shoreline protection, maintaining the Hackberry Ridge, and further stabilizing the gulf shoreline. No programmatic strategies have been developed for this unit.

Calcasieu-Sabine Basin

Sweet/Willow Lakes

Location - This mapping unit is bordered on the west and south by the GIWW, on the east by Louisiana Highway 27, and on the north by the coastal zone boundary. The entire unit is located within Cameron Parish and contains 14,387 acres.

Habitat Description and Landscape Change - This unit contains approximately 43% fresh marsh (6,240 acres), minimal intermediate marsh (20 acres), and 43% open water (6,186 acres). The remaining 13% incorporates upland, swamp, forest, or developed land (1,941 acres). There has been no significant change in marsh type from 1949 to present.

Historic Land Loss - In 1932, this mapping unit had 9,810 acres of marsh. Total marsh loss has been 3,550 acres. The majority of this loss (2,805 acres) occurred between 1956-1974 as a result of storm-related loss, flooding, altered hydrology, and wave/wake erosion along the lakes' shorelines and the GIWW. From 1974-1990, marsh loss was reduced to 680 acres (0.68% per year). Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 2,100 acres of fresh marsh is projected to occur by 2050. This is 33.5% of the remaining 1990 marsh (6,260 acres). This percentage will decrease over time to 29.7% as a result of the protection of 240 acres of fresh marsh from the CWPPRA Sweet/Willow Lakes Hydrologic Restoration (CS-11b) project. This unit contains highly organic soils, and the majority of land lost in the future will continue to be along the lakes' shorelines and the GIWW.

Fish and Wildlife Resources - This unit is composed of fresh marsh which sustains stable populations of largemouth bass and channel catfish. These populations will decrease by 2050.

In the open water habitat, stable populations of seabirds, dabbling and diving ducks, geese, rails, gallinules, coots, other resident and migrant birds, furbearers, and American alligators are expected to remain stable. In the aquatic bed habitat, stable populations of dabbling and diving ducks, geese, rails, gallinules, coots, furbearers, and American alligators are expected to remain stable into 2050, while stable populations of other resident and migrant birds are projected to decline. In the fresh marsh habitat, stable populations of shorebirds, dabbling and diving ducks, geese, rails, gallinules, coots, furbearers, rabbits, deer, and American alligators are projected to remain stable. Stable populations of seabirds, wading birds, and other resident and migrant avifauna are projected to decline by 2050.

Infrastructure - The only USACE project within the mapping unit is maintenance dredging of the GIWW to maintain and enhance navigation. This unit contains no primary roads or railroads, but has 2.7 miles of secondary roads, 4.9 miles of tertiary roads, five miles of natural gas pipelines (largest diameter 36 inches), and 160 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit include stabilizing the banks of the GIWW, managing the fresh marsh hydrology within the unit, and protecting the shorelines of Sweet and Willow lakes.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its

priorities for coastal resource usage emphasize management of this unit's freshwater marshes, which include freshwater finfish, American alligators, and waterfowl. This mapping unit also contains navigation facilities and oil, gas, and utility infrastructure.

Regional Ecosystem Strategies - Operating locks to evacuate excess water from the Lakes Subbasin, operating the existing Calcasieu Lock specifically to evacuate excess water after building a new navigation lock on a parallel channel, dedicated dredging for wetland creation, and managing the watershed to reduce rapid inflows into the Lakes Subbasin are regional ecosystem strategies proposed for this unit.

Benefits of Regional Strategies - These strategies are expected to benefit the fresh marshes and associated aquatic habitats of this unit. This is also expected to enhance habitats for freshwater finfish, alligators, and waterfowl, while protecting infrastructure associated with utilities and the oil and gas industry. These strategies are projected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include terracing and vegetative plantings, shoreline stabilization along the remainder of the GIWW to the Gibbstown Bridge, beneficially utilizing material dredged from the GIWW, improving hydrology by restoring the west bank of the Unocal Canal, and by placing a levee or fence west of the salt burn area. No programmatic strategies have been developed for this unit.

Big Lake

Location - This mapping unit is located on the northeastern edge of Calcasieu Lake. Its eastern boundary is the GIWW. It borders the Cameron-Creole Watershed unit on the south, and Calcasieu Lake on the east. This unit is mostly located within Cameron Parish, with its northern tip located in Calcasieu Parish, and it contains 17,848 acres.

Habitat Description and Landscape Change - The Big Lake unit was largely brackish marsh and unknown in 1949. Between 1949-1968, no change occurred. Between 1978-1988, the acreage of fresh, intermediate, and brackish marsh remained the same. Much of the fresh marsh in this unit has disappeared due to the effects of increased saltwater intrusion that resulted from construction of the Calcasieu Ship Channel and impoundments.

Historic Land Loss - In 1932, the Big Lake unit had 26,910 acres of marsh. Total marsh lost within this unit from 1932-1990 has been 7,815 acres. The majority of this loss (6,180 acres) took place from 1956-1974. Loss was mainly caused by altered hydrology from the ship channel and the GIWW. Other causes of land loss include wake erosion from the GIWW and wave erosion along the east bank of Calcasieu Lake. Impoundments and flooding have caused significant loss as well. Subsidence in this area is estimated at 1.1-2.0 ft/century.

Future Land Loss Projections - In 1990, this unit had 19,095 acres of marsh. No-action projections show that

3,620 acres of marsh (50% brackish, 30% intermediate, and 20% fresh) in the Big Lake mapping unit will be lost by 2050. However, the Cameron-Creole Watershed CWPPRA project will protect 60 acres of brackish marsh along its southern boundary. Therefore, a total of 18.6% of the unit will be lost by 2050.

Fish and Wildlife Resources - This unit has stable fisheries of red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oyster, white and brown shrimp, and blue crab. All these populations will remain steady through 2050. Largemouth bass and channel catfish populations are projected to increase by 2050.

Open water; fresh, intermediate, and brackish marsh; hardwood forest; and agricultural/upland habitat types are all found within this mapping unit. Stable populations of dabbling and diving ducks, raptors, rails, gallinules, coots, furbearers, rabbits, and deer are all projected to remain stable through 2050. Stable populations of seabirds and other resident and migrant open water/marsh birds will remain stable in the open water and upland habitats, but are projected to decline by 2050 in the marsh habitats. Increasing marsh populations of wading birds and stable populations of upland wading birds will be stable by 2050. Stable populations of shorebirds will decline in marsh areas but are projected to remain stable in upland areas. Stable populations of raptors and other resident and migrant woodland birds will remain stable in the upland areas, but stable populations of other resident and migrant woodland birds are projected to decline in the hardwood forest habitat. Increasing

populations of American alligators in the open water and marsh areas are expected to stabilize through 2050, while stable hardwood forest populations of squirrels and American alligators and stable upland populations of American alligators are projected to remain stable.

Infrastructure - Major infrastructure in this unit includes the GIWW, the Calcasieu Lock, and Louisiana Highway 384. This mapping unit contains no primary roads or railroads, but has 7.5 miles of secondary and 29.8 miles of tertiary roads, and 8.5 miles of natural gas pipelines (largest diameter 36 inches). Also located within this unit are 70 oil and/or natural gas wells and two groundwater wells operated by the Cameron Waterworks District No. 11.

Previously Proposed Strategies - Bank stabilization along the GIWW and along the shoreline of Calcasieu Lake and freshwater diversions have been recommended in the past for this unit.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh to intermediate marsh, as well as the developed lands and fastland areas. Coastal use priorities include fresh and saltwater finfish, agriculture and grazing, flood water storage, navigation and port facilities, roads, levees, bridges, and communities.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake and dedicated dredging of sediment for wetland

creation are regional ecosystem strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to aid in preventing saltwater intrusion and should therefore benefit the fresh to brackish marshes and their associated aquatic habitats. This would enhance habitats for freshwater and saltwater finfish and benefit agricultural/grazing interests. Improved flood water holding capacity is projected which should benefit nearby communities. These strategies are also expected to protect infrastructure associated with the oil and gas industry, communities, and roads, levees, and bridges. These strategies will reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - The mapping unit strategy developed for this unit includes beneficially utilizing material dredged from the GIWW and Calcasieu Ship Channel into the shallow, open-water areas in the unit. No programmatic strategies have been developed for this unit.

Cameron-Creole Watershed

Location - The Cameron-Creole Watershed unit is located entirely within Cameron Parish on the east side of Calcasieu Lake. This unit is bordered by the Sweet Lake Canal on the north, Calcasieu Lake on the west, Louisiana Highway 27 on the east, and by a series of cheniers between the communities of Creole and Cameron on the south. This unit contains a total of 51,684 acres.

Much of this unit is included in the Cameron Prairie NWR.

Habitat Description and Landscape Change - Historically, this unit was primarily a brackish, three-corner grass marsh with intermediate, sawgrass marsh located in the eastern and northeastern portions of the unit along Louisiana Highway 27. By 1968 and 1978, there was a natural gradation of brackish marsh along Calcasieu Lake to fresh marsh along Louisiana Highway 27. In 1988, the unit was classified as 35% brackish marsh (17,890 acres) and 25% intermediate marsh (13,170 acres). Today, fresh marsh vegetation appears in the northern to eastern parts of the unit.

Historic Land Loss - In 1932, this mapping unit had 45,460 acres of marsh. This unit lost 14,390 acres of emergent marsh from 1932-1990. Most of this loss (10,095 acres) occurred from 1956-1974, during the period of Hurricane Audrey (1957) and after enlargement of the Calcasieu Ship Channel (1951). Saltwater intrusion from the Calcasieu Ship Channel is cited as the primary cause of marsh loss in this unit. Extensive areas of fresh and intermediate marsh in the northern, central, and eastern portions of this unit began to deteriorate and break up from 1956-1974. Those areas contained extensive stands of sawgrass marsh and other fresh and intermediate vegetation which were unable to tolerate the increased salinity from the Calcasieu Ship Channel. The northeastern portion of the project area continued to show signs of deterioration from 1974-1990.

The Cameron-Creole Watershed Management project, authorized by

Public Law 566, encompasses approximately 64,000 acres and includes a 16.5 mile levee along Calcasieu Lake and five water control structures, which allow hydrologic management of this unit. Currently salinity, tidal exchange, water levels, and estuarine organism movement into and out of the area are controlled by those structures. Natural marsh loss rates in the area were approximately 0.45% per year from 1974-1990, a considerable reduction from the 1.3% per year from 1956-1974. Records indicate that since installation of the water control structures in 1989, marsh loss rates have decreased even further. Land loss information from the USACE does not include post-management data for this unit.

Marsh loss continues in this unit primarily as marsh edges adjacent to large open water areas continue to erode from wind-generated waves. Also, in some areas, marshhay cordgrass appears to be stressed and dying from high water levels. Periodic salinity spikes during drought years continue to impact fresh and intermediate vegetation, causing interior marsh break-up. Several areas, particularly in the eastern and northeastern portions of the unit, have shown recovery as cattail, California bulrush, and other intermediate plants have colonized shallow water areas, and marsh edges have expanded into small ponds. Subsidence in this area is estimated at 1.1-2.0 ft/century, the highest of any mapping unit in Region 4.

Future Land Loss Projections - In 1990, this unit had 31,070 acres of marsh. The future land loss rate in this unit is projected to be approximately 0.45% per year (7,370 acres). This rate

does not include loss information after the unit was placed under management in April 1989. Post-management loss rates should be somewhat lower than the 1974-1990 rate. Marsh loss will continue due to wave erosion of marsh edges and periodic salinity spikes which stress fresh and intermediate species. Approximately 2,220 acres of emergent marsh (50% intermediate and 50% brackish) will be lost from 1990-2050, after accounting for CWPPRA restoration projects. However, during high rainfall or low-salinity years, intermediate species will continue to colonize shallow open water areas, reducing marsh loss for that period.

Considered in the future land loss projections are two CWPPRA restoration projects located in this unit. The Cameron-Creole Watershed Plugs project was completed in January 1997 and consisted of installing two plugs with boat bays in the Calcasieu Lake Levee Borrow Canal. One plug is located south of the Mangrove Bayou water control structure and the other is south of Grand Bayou. The purpose of this project is to prevent the movement of saline waters to the north and south and to reduce the unnatural circulation pattern caused by the borrow canal, thus restoring historic flow to the natural bayous. The Cameron-Creole Watershed Maintenance project establishes a maintenance fund for the Cameron-Creole Watershed project over the next 20 years. Authorization for the Cameron-Creole Watershed project did not include adequate funds for maintenance of the management levee and water control structures. These projects are predicted to protect 5,150

acres of intermediate and brackish marsh from 1990-2050.

Also, the North American Wetlands Conservation Act and the Louisiana Department of Natural Resources (DNR) funded a project which will install automation equipment on the five water control structures along Calcasieu Lake. Automation equipment will allow for more effective water management of this unit.

Fish and Wildlife Resources - This unit provides important habitat for many species of wildlife and freshwater finfish, and important nursery habitat for many estuarine-dependent species of fish and shellfish. Red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oyster, white and brown shrimp, and blue crab populations have all been decreasing in recent years. Largemouth bass and catfish have been increasing. Several of those species, including white shrimp and blue crab, are important recreationally as well as commercially. All species are projected to remain steady through 2050.

Migratory waterfowl utilize this area as overwintering and feeding habitat. A portion of the unit, located on Cameron Prairie NWR, is a refuge area during the waterfowl hunting season. Wading birds also utilize shallow water areas to prey on small fish and invertebrates. Shorebirds, during low-water periods, utilize exposed mud flats for foraging on invertebrates. Muskrat and mink are common furbearers in the area, and the American alligator is a commercially important species found in the fresher portions of the unit. Open water and

fresh and brackish marsh habitats are found in this unit. Stable populations of seabirds, shorebirds, geese, raptors, rails, gallinules, coots, other resident and migrant birds, rabbits, and deer are all expected to remain stable in their current habitats by 2050. Increasing populations of wading birds and diving and dabbling ducks are projected to stabilize by 2050, and increasing populations of furbearers and American alligators are projected to continue to increase throughout the area by 2050.

Infrastructure - There is only one USACE infrastructure project within this unit, which is the maintenance of the GIWW. Louisiana Highway 27, along the unit's eastern boundary, is an important transportation and hurricane evacuation route. Also, several oil and gas access roads and pipelines cross the unit at various locations. Collectively, this unit contains 8.1 and 6.1 miles of secondary and tertiary roads, respectively, 5.6 miles of natural gas pipelines (largest diameter 36 inches), and 74 oil and/or natural gas wells.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit focus on hydrologic management of the fresh to brackish marshes with the current system of water control structures and levees. Other previously proposed strategies to protect wetlands in this unit include 1) bank stabilization along navigation canals, 2) shoreline protection adjacent to large open water areas, and 3) vegetative plantings to encourage colonization of shallow water areas and protection of marsh edges.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the unit's brackish, fresh, and intermediate marshes and associated aquatic habitats. Coastal resource priorities include estuarine-dependent species such as shrimp, blue crabs, and saltwater finfish. Freshwater finfish, American alligators, furbearers, waterfowl, and non-game fish and wildlife are also important coastal resources in this unit. Other coastal uses and resources of importance for this unit are scientific study/education, storm buffering, oil and gas infrastructure, utilities infrastructure, roads, levees, and bridges.

Regional Ecosystem Strategies - Dedicated dredging of sediment for marsh creation and salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake are regional ecosystem strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to benefit fresh, intermediate, and brackish marshes and their associated aquatic habitats. This in turn will enhance habitat value for all fishery species utilizing this unit, waterfowl, and non-game fish and wildlife species. Improved storm buffering capacity is projected, which should help protect infrastructure associated with utilities; the oil and gas industry; and roads, levees, and bridges. These strategies are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies recommended for this unit include vegetative plantings, terracing, submerged aquatic vegetation plantings within the watershed, and beneficial use of material dredged from the GIWW. No programmatic strategies have been developed for this unit.

Cameron

Location - This unit is located in Cameron Parish on the gulf coast east of the Calcasieu Ship Channel. The unit extends from the ship channel eastward to Louisiana Highway 27. It is bounded on the north by the Cameron-Creole Watershed unit. This unit contains a total of 31,236 acres.

Habitat Description and Landscape Change - The habitat has changed very little between 1949-1988. In 1949, this unit was classified as 19% fresh marsh (5,900 acres), 22% intermediate marsh (6,820 acres), 14% brackish marsh (4,220 acres), and 6% saline marsh (1,940 acres). There was also beach habitat prevalent near the coast. In 1968, the unit was classified as a mixture of fresh, intermediate, brackish, and saline marshes. Developed areas also exist in the unit; the town of Cameron is located in the western part of the unit.

Historic Land Loss - In 1932, the Cameron unit had 20,440 acres of marsh. This unit lost 1,565 acres of emergent marsh from 1932-1990. Much of this loss (740 acres) occurred from 1956-1974. Historic land loss causes include wave and wake erosion, altered hydrology, and impoundments. Saltwater intrusion resulting from the

Calcasieu Ship Channel has been a significant cause of land loss in marshes adjacent to Calcasieu Lake. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 890 acres of marsh (50% intermediate, 40% fresh, and 10% brackish) is projected to occur by 2050 within this unit. This is 4.7% of the remaining 1990 marsh (18,880 acres). Future land loss within this unit will most likely continue to be attributed to impoundment, wave erosion along the Gulf of Mexico shoreline, and wake erosion along the ship channel.

Fish and Wildlife Resources - Stable fisheries for red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oyster, white and brown shrimp, blue crab, largemouth bass, and channel catfish currently exist in this unit. All populations but largemouth bass and channel catfish will remain steady through 2050. Largemouth bass and channel catfish populations will increase by 2050.

Open water; fresh, intermediate, brackish, and saline marsh; hardwood forest; and barrier beach habitats are found in this unit. Stable populations of dabbling and diving ducks, geese, raptors, rails, gallinules, coots, furbearers, and game mammals are expected to remain stable through 2050 in those habitats in which they are currently found. Stable populations of seabirds are projected to remain stable in all areas except the fresh marsh habitat, where they are expected to decline by 2050. Increasing marsh populations of wading birds and stable barrier beach populations of wading birds are

projected to remain stable. Stable populations of open water/marsh resident species will remain stable in all areas except for the hardwood forest habitat, where they are expected to decline by 2050. Currently increasing populations of American alligators in the open water and marsh areas and presently stable American alligator populations in the hardwood forest and barrier beach habitats are projected to be stable by 2050.

Infrastructure - Key infrastructure components for this region include the Calcasieu Ship Channel and Louisiana Highways 27 and 82. Additionally, there is infrastructure associated with the town of Cameron, such as drainage structures, roads, buildings, etc. A ferry is used to transport traffic on the two highways across the ship channel. This mapping unit contains 15.7 miles of primary, 16.7 miles of secondary, and 55.5 miles of tertiary roadways. Two natural gas pipelines totaling 1.4 miles are located within the unit. Also contained within the unit are 193 oil and/or natural gas wells, five drainage pump stations, and 11 groundwater intakes operated by the Cameron Waterworks Districts 1 and 7.

Previously Proposed Strategies - One proposed strategy is to protect the function of the chenier ridges which run through the unit. Another strategy is to stabilize the banks of the Calcasieu Ship Channel.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue preserving the intermediate to

brackish marsh habitat, developed lands, fastlands, and the chenier ridge.

Additionally, it would like to maintain the developed area associated with the community of Cameron. Coastal resource priorities include waterfowl, agriculture, grazing, recreation, tourism, storm buffering capacity, navigation, port facilities, oil/gas infrastructure, roads, levees, bridges, and communities.

Regional Ecosystem Strategies -

Restoring the connection of the original Mermentau River to the Gulf of Mexico and restricting the width and depth of the Mermentau Ship Channel to its authorized dimensions and restoration of longshore sediment flow across the Mermentau Ship Channel are regional ecosystem strategies expected to benefit this unit.

Note: The CWPPRA Engineering Working Group reviewed a project to constrict the ship channel 60% and concluded that may not be sufficient to produce significant tidal and salinity reduction benefits. Further study during the summer of 1999 indicated that restoring the connection of the original Mermentau River to the Gulf of Mexico would have adverse environmental impacts since a viable estuarine/marsh system has developed between Creole Canal and the gulf. The ship channel cannot be restricted to its "authorized dimensions" of 15 x 100 feet because the channel must have a minimum cross-section of 3,000 square feet for flood control. Restricting the existing 7,800-square foot channel to 3,000 square feet is not likely to change tidal amplitude or salinity to the north.

Benefits of Regional Strategies - These strategies are expected to enhance intermediate and saline marshes and their associated aquatic habitats through reduction of flooding in the eastern portion of this unit and excessive salinity in the western portions of this unit. This is expected to enhance waterfowl habitat and agriculture/grazing interests while improving storm buffering capacity and protecting oil and gas infrastructure and roads, levees, and bridges. These strategies are expected to slightly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include terracing and vegetative plantings, where feasible, in the eastern portion of the unit, maintaining the chenier ridge function, maintaining drainage infrastructure in the Cameron fastland, and maintaining the existing Rutherford Beach wetland management plan. There were no programmatic strategies proposed for this mapping unit.

Choupique Island

Location - The Choupique Island unit is located just north of Calcasieu Lake. It is an area of 1,721 acres that is surrounded by historic meanders of the Calcasieu River, the GIWW, and the Calcasieu Ship Channel. This mapping unit contains 750 acres of fresh and brackish marsh.

Habitat Description and Landscape Change - The 1949 and 1968 habitat maps show this unit as “unknown” and quantitative GIS analysis is not complete.

Historic Land Loss - Wake erosion from the ship channel and the GIWW has been the major cause of erosion for this unit. Additionally, altered hydrology, resulting primarily from the construction of the ship channel, has resulted in saltwater intrusion and land loss. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, this unit had 750 acres of marsh. No future land loss is expected within this region by the year 2050.

Fish and Wildlife Resources - The Choupique Island unit has stable fisheries for red and black drum, spotted seatrout, Gulf menhaden, southern flounder, white and brown shrimp, blue crab, and channel catfish. All populations are projected to remain stable through 2050.

Open water, fresh and brackish marsh, and upland habitats are found within this unit. Currently stable populations of seabirds, wading birds, shorebirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots, other resident and migrant birds, furbearers, game mammals, and American alligators are all projected to remain stable through 2050.

Infrastructure - Key infrastructure elements for this unit include the GIWW, the Calcasieu Ship Channel, and a 40'-deep channel called Industrial Canal which runs eastward from the island to a docking facility. Also contained within this unit are 1.2 miles of natural gas pipeline (diameter 6 inches), and one oil and/or natural gas well.

Previously Proposed Strategies - No previous strategies have been proposed for the Choupique Island unit, although the area has been used in the past as a dredge spoil disposal area.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh and brackish marsh and upland habitats. Specific coastal use and resource objectives include shrimp, blue crabs, saltwater finfish, agriculture and grazing, navigation, and port facilities.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake is a regional ecosystem strategy that is expected to benefit this unit.

Benefits of Regional Strategies - This strategy is expected to enhance the brackish marshes of the unit, which should enhance the habitat value for shrimp, blue crabs, and saltwater finfish.

Mapping Unit and Programmatic Strategies - The mapping unit strategies recommended for this unit include beneficially utilizing material dredged from the GIWW and Calcasieu River to restore and create marsh in this unit and maintaining the perched marshes on Choupique Island. No programmatic strategies have been developed for this unit.

Calcasieu Lake

Location - This mapping unit is entirely encompassed by Calcasieu Lake. The lake is located in the middle portion of Cameron Parish and totals 60,359 acres.

Habitat Description and Landscape Change - This unit contains approximately 98% water, with the remainder incorporating fragments of marsh and submerged aquatics. In 1949 and 1968, this unit was shown as 100% brackish. However, salinity and saline marsh acreage have increased within this unit as a result of constructing and maintaining the Calcasieu Ship Channel.

Historic Land Loss - The USACE has not collected information about historic land loss within the Calcasieu Lake unit. Land loss along the shoreline of Calcasieu Lake has been incorporated into adjacent mapping units.

Future Land Loss Projections - The Region 4 Technical Team has not projected future land loss for this unit. Any future land loss along the Calcasieu Lake shoreline has been incorporated into adjacent mapping units.

Fish and Wildlife Resources - This unit is a brackish water body that sustains stable populations of Gulf menhaden, southern flounder, American oyster, and Spanish mackerel. All of these species are projected to remain stable through 2050. Several species have declined in population within this unit, including white and brown shrimp and blue crab, but these species are projected to stabilize by 2050. Species such as red and black drum and spotted seatrout are currently increasing in population

throughout this unit, but will stabilize by 2050.

Stable populations of seabirds, dabbling and diving ducks, and other resident and migrant birds are expected to remain stable through 2050, while increasing populations of brown pelicans are expected to continue increasing.

Infrastructure - The USACE conducts maintenance dredging of the Calcasieu Ship Channel for navigation. The area also includes 40.8 miles of natural gas pipelines (largest diameter 36 inches), 49 oil and/or natural gas wells, one industrial groundwater intake, and one industrial surface water intake.

Previously Proposed Strategies - A previously proposed strategy included the possible placement of a lock or saltwater barrier in the southern end of the Calcasieu Ship Channel to manage the navigation channel.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that this area should be managed as a brackish water estuary with resource (fish, wildlife, and infrastructure) priorities similar to those units surrounding the lake.

Regional Ecosystem Strategies - There is no wetland habitat in this unit, so no regional strategies apply directly to this unit. However, if lake-bottom sediments are used as a source of spoil for dedicated dredging for marsh creation, portions of the unit will be affected.

Benefits of Regional Strategies - The effects of dredging lake-bottom

sediments for marsh creation will have to be addressed on a case-by-case basis.

Mapping Unit and Programmatic Strategies - Mapping unit strategies in this unit include maintaining and enhancing islands in the unit with material dredged from the Calcasieu Ship Channel, placing continuous armor along the ship channel bank, and to allow for estuarine organism access into surrounding marshes.

Black Lake

Location - This mapping unit is bordered on the north by the GIWW, on the east by the Calcasieu Ship Channel, on the west by the West Black Lake Management Levee, and on the south by the Shell Western Road and Hackberry Ridge. The majority of this unit is located in Cameron Parish, but a small portion of the northern boundary is located in Calcasieu Parish. This unit contains a total of 16,826 acres.

Habitat Description and Landscape Change - In this mapping unit there has been a slight shift to more saline marsh from 1949 to present. In 1949, the marshes in this unit were 50% brackish, 25% intermediate, and 15% fresh, with the remainder in the unknown category. By 1968, there was a shift to 80% brackish marsh throughout this unit, with the remainder unknown. This 30% increase to brackish marsh within a 19-year period reflects saltwater intrusion possibly from the Calcasieu Ship Channel and the GIWW through Kelso Bayou and the Alkali Ditch. This unit currently contains 11% brackish marsh (1,920 acres), 5% intermediate marsh (910 acres), minimal fresh marsh (230

acres), and 68% open water (11,442 acres). The remainder incorporates upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, this unit had 15,420 acres of marsh. Total marsh loss within this unit has been 12,360 acres. The majority of this loss (11,390 acres) occurred from 1956-1974, when the construction of the Calcasieu Ship Channel increased saltwater intrusion and storm related losses took their toll on this unit's marshes. Marsh degradation in this area has declined to an annual loss rate of 0.7% from 1974-1990. From 1983-1990, marsh loss was reduced to 320 acres as a result of implemented restoration projects and continued management. Subsidence in this area is estimated at 1.1-2.0 ft/century.

Future Land Loss Projections - An additional loss of 1,050 acres of marsh (70% brackish and 30% intermediate) is projected to occur by 2050 within this unit. This is 34.3% of the remaining 1990 marsh (3,060 acres). This loss is not as high as would have occurred naturally, because the CWPPRA Brown Lake Hydrologic Restoration (C/S-9) project benefits 540 acres of brackish marsh within the unit. Also included in this figure is the marsh created or enhanced by the USACE beneficial use of dredged material project in Brown Lake. With this restoration work, 17% of the 1990 marsh is projected to be lost.

Fish and Wildlife Resources - This unit is composed of primarily brackish marsh that contains stable populations of black drum, spotted seatrout, southern

flounder, blue crab, and American oysters. All of these populations will decrease by 2050, except for American oysters, which will remain steady. Within this unit there has been a trend of increased populations of red drum, Gulf menhaden, largemouth bass, and channel catfish and marked decreases in white and brown shrimp populations. Largemouth bass and channel catfish populations will increase by 2050, while the other populations are projected to decrease.

Stable furbearer and American alligator populations in the open water, intermediate and brackish marsh, and agricultural/upland habitats are expected to remain stable through 2050. Currently stable open water populations of seabirds and other resident and migrant birds, and currently stable agricultural/upland populations of seabirds, wading birds, shorebirds, and other resident and migrant open water/marsh and woodland birds are projected to remain stable. Stable marsh populations of seabirds, shorebirds, rails, gallinules, coots, other resident and migrant birds, rabbits and deer are projected to decline by 2050, as are the presently increasing marsh populations of dabbling and diving ducks, geese, and raptors. Currently increasing marsh populations of wading birds are expected to stabilize by 2050.

Infrastructure - The GIWW is partially located within this unit and is Federally maintained for navigation and flood control. This mapping unit contains no primary roads or railroads, but has 4.4 miles of secondary and 17.3 miles of tertiary roads, 7.2 miles of natural gas pipelines (largest diameter 6 inches), and 889 oil and/or natural gas wells. The

Black Lake unit is also bordered on the east by the Calcasieu Ship Channel, which undergoes annual maintenance dredging. In FY 1992, Calcasieu Pass (from mile marker 5 to 22.7) was maintenance dredged, and the 1,200,000 cubic yards of material were beneficially disposed of in Brown's Lake. This dredged material restored 156 acres of marsh.

Previously Proposed Strategies - Strategies proposed in the past include stabilizing the banks of the GIWW and the Calcasieu Ship Channel, diverting freshwater from the GIWW, managing the intermediate and brackish hydrology within the marsh, stabilizing the shoreline of Black Lake, and possibly utilizing dredged material from the Calcasieu Ship Channel.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource utilization should emphasize management of the area as intermediate marsh and aquatic habitats for shrimp, blue crab, saltwater and freshwater finfish, and waterfowl. In addition, the committee emphasized continued management of its navigation and port facilities, oil and gas infrastructure, roads, levees and bridges.

Regional Ecosystem Strategies - Dedicated dredging of sediment for marsh creation and salinity control on the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to enhance the fresh, intermediate, and brackish

marshes and their associated aquatic habitats. This should in turn enhance the habitats for shrimp, blue crabs, salt- and freshwater finfish, and waterfowl while protecting oil and gas infrastructure and roads, levees, and bridges. These strategies are expected to achieve no net loss.

Mapping Unit and Programmatic Strategies - Mapping unit strategies developed for this unit include terracing; vegetative plantings; reestablishing the historic Black Lake shoreline boundaries; beneficially utilizing dredged material from the GIWW and Calcasieu Ship Channel; and improving hydrology throughout the area by 1) installing a saltwater intrusion moderating structure at the Alkali Ditch, 2) maintaining the CWPPRA Brown's Lake (CS-09) project, 3) maintaining existing hydrologic restoration projects in the area, 4) closing the structure under Shell Western Road near the West Black Lake Management Area, and 5) restoring the hydrology at Kelso Bayou. No programmatic strategies have been developed for this unit.

Hackberry Ridge

Location - Hackberry Ridge is situated along the west bank of Calcasieu Lake, south of Black Lake. The unit is bordered on the north by Black Lake and Brown's Lake, on the east by Calcasieu Lake and the Calcasieu Ship Channel, and on the south and west by the Sabine NWR. The town of Hackberry is located in this unit. This unit is 11,840 acres in size and contains 2,920 acres of fresh and brackish marsh.

Habitat Description and Landscape Change - The majority of the Hackberry Ridge unit can be classified as upland developed and agricultural area.

However, the region south of the ridge is classified as brackish marsh. There has been little change with regard to habitat distribution over the last 50 years, except that many of the upland areas have been developed.

Historic Land Loss - No significant loss has occurred in this area due to the upland nature of most of the unit. Subsidence in this area is estimated at 1.1-2.0 ft/century.

Future Land Loss Projection - There will be minimal to no future land loss for this unit.

Fish and Wildlife Resources - Stable fisheries exist for red and black drum, spotted seatrout, southern flounder, American oyster, white and brown shrimp, and blue crab. The Gulf menhaden fishery is increasing.

In open water habitats, stable populations of seabirds, other resident and migrant birds, furbearers, and American alligators are projected to remain stable through 2050. Currently stable populations of rails, gallinules, and coots are projected to decline by 2050. Currently increasing populations of dabbling and diving ducks and geese are projected to decline in the future. In the brackish marsh habitat, currently stable populations of seabirds, shorebirds, furbearers, and American alligators are expected to remain stable, and currently stable populations of rails, gallinules, coots, other resident and migrant birds, rabbits, and deer are

expected to decline by 2050. Currently increasing populations of wading birds are expected to stabilize, while increasing populations of dabbling and diving ducks and geese are expected to decline. In the hardwood forest habitat, currently stable populations of dabbling ducks, mink, otter, raccoon, and game mammals are projected to remain stable, and presently stable populations of raptors and other resident and migrant open water/marsh birds are expected to decline by 2050. Currently stable agricultural/upland populations of wading birds, shorebirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots, other marsh/open water resident and migrant birds, mink, otter, raccoon, rabbits, and deer are expected to remain stable through 2050.

Infrastructure - Significant infrastructure in this unit includes the Calcasieu Ship Channel, which is Federally maintained for navigation, and Louisiana Highway 27. The infrastructure associated with the town of Hackberry also exists in this unit. This mapping unit contains 5.2 miles of primary (Louisiana Highway 27), 0.3 miles of secondary, and 39.9 miles of tertiary roadways. Also located within this unit are 1.4 miles of natural gas pipeline (diameter 4 inches), 485 oil and/or natural gas wells, two drainage pump stations, and six commercial and Cameron Waterworks District 2 groundwater intakes. In addition, the U.S. Department of Energy Strategic Petroleum Reserve, with a capacity of 34.8 million cubic meters of crude oil, is located in the West Hackberry salt dome.

Previously Proposed Strategies - It has been proposed in the past to stabilize the

banks and manage the hydrology of the Calcasieu Ship Channel in order to prevent saltwater intrusion into the wetlands of this unit. Protecting the function of Hackberry Ridge, freshwater diversions, and managing the brackish hydrology of the marshes have also been proposed.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to convert the brackish marsh to intermediate marsh and to preserve developed land and fastland areas associated with the community of Hackberry. Specific coastal use priorities include agriculture and grazing, navigation and port facilities, oil and gas infrastructure, roads, levees, bridges, and communities.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake is a regional ecosystem strategy that should benefit this unit.

Benefits of Regional Strategies - This strategy should enhance brackish marshes and their associated aquatic habitats in this unit. This should benefit freshwater species utilizing this unit. In addition, agriculture/grazing objectives are protected, as are oil and gas infrastructure and roads, levees, and bridges.

Mapping Unit and Programmatic Strategies - The mapping unit strategies for this unit are to reduce erosion along the west bank of the Calcasieu Ship Channel and to improve hydrology by

maintaining the Rycade Canal structure and structures in the Sabine NWR. No programmatic strategies have been developed for this unit.

Hog Island Gully

Location - This mapping unit is located entirely within Cameron Parish and is primarily within the Sabine NWR. The unit is bordered by Hackberry Ridge on the north, Louisiana Highway 27 on the west, the Calcasieu Ship Channel on the east, and the West Cove of Calcasieu Lake on the south. This unit contains a total of 6,048 acres, of which 3,460 acres are brackish and saline marsh.

Habitat Description and Landscape Change - In 1949, this unit was classified as a brackish, three-corner grass marsh. A gradual increase in saline marsh at the expense of brackish marsh was seen from 1968-1988. The 1988 classification shows the northern and southern portions of this unit as brackish. The central portion of the unit, adjacent to the Hog Island Gully Canal, was classified as saline marsh. According to 1990 GIS information, the habitat within this unit is 22% brackish marsh (1,330 acres) and 35% saline marsh (2,130 acres), for a total of 3,460 acres of marsh within this area. The remaining 2,588 acres consists of open water and upland habitats.

Historic Land Loss - In 1932, the Hog Island Gully unit had 5,550 acres of marsh. This unit lost 2,090 acres of emergent marsh from 1932-1990. Most of this loss (1,890 acres) occurred from 1956-1974. As with other mapping units in this area, most of the historical loss occurred from the mid-1950's to the

1960's, after Hurricane Audrey (1957) and Hurricane Carla (1961). Also, the proximity of this unit to the Calcasieu Ship Channel has allowed saltwater intrusion and increased tidal exchange, which have contributed to the conversion to more saline conditions and the loss of emergent wetlands. Subsidence in this area is estimated at 1.1-2.0 ft/century.

Future Land Loss Projections - In 1990, this unit had 3,460 acres of marsh. Marsh loss in this unit has apparently stabilized and loss rates were relatively low (0.29% per year) from 1974-1990. Future loss will continue at 0.29% per year (550 acres from 1990-2050) provided no restoration projects are implemented. Shoreline erosion along West Cove in Calcasieu Lake continues to be the major cause of marsh loss. Uncontrolled saltwater intrusion and free tidal exchange through the Calcasieu Ship Channel also contribute to wetland loss.

In recent years, this unit has experienced a gain in emergent marsh as a result of USACE Section 204 marsh creation projects during 1993 and 1996. These projects restored marsh in several hundred acres of open water north and south of the Hog Island Gully Canal. Another USACE Section 204 marsh creation project is planned for 1999. Also, a series of earthen terraces, constructed in open water east of the Headquarters Canal, has proven successful in increasing emergent marsh, protecting marsh edges from wave erosion, and increasing submerged aquatics.

Future loss of existing marsh may continue at the present rate of 0.29% per

year. However, marsh creation projects and earthen terraces will result in a gain of 1,040 acres of brackish to saline emergent marsh, offsetting the projected loss (550 acres through 2050) with a net gain of 450 acres of marsh by 2050.

Fish and Wildlife Resources - This unit is particularly important to numerous estuarine-dependent fisheries species which utilize it as nursery habitat during a portion of their life cycle. Estuarine-dependent species access this unit through several small bayous and openings in the spoil banks along the Hog Island Gully Canal, Headquarters Canal, and West Cove Canal. Important species include white shrimp, brown shrimp, blue crab, Gulf menhaden, red drum, spotted seatrout, Atlantic croaker, and southern flounder. Several species (including brown shrimp and blue crab) are important recreationally as well as commercially. Red drum, black drum, spotted seatrout, southern flounder, American oyster, white and brown shrimp, and blue crab populations are currently stable. Gulf menhaden are presently increasing. By 2050, the populations of red and black drum, spotted seatrout, southern flounder, brown shrimp, and blue crab will increase, while Gulf menhaden will stabilize, and American oysters and white shrimp will decrease.

This unit also provides feeding and resting habitat for migratory waterfowl. Wading birds utilize the shallow water areas to prey on small fish, and shorebirds forage for invertebrates on exposed mud flats. The muskrat is the most common furbearer in the area, particularly after marsh fires encourage growth of three-corner grass and tender

shoots of marshhay cordgrass. In the open water habitat, currently stable populations of seabirds, other resident and migrant birds, furbearers, and American alligators are projected to remain stable through 2050, whereas currently increasing populations of dabbling and diving ducks and geese are projected to decline. Stable populations of furbearers and American alligators are expected to remain stable in brackish and saline marsh habitats through 2050. Currently stable brackish and saline marsh populations of seabirds, shorebirds, rails, gallinules, coots, other resident and migrant open water/marsh birds, rabbits, and deer are expected to decline. Currently increasing marsh populations of wading birds are expected to stabilize by 2050, and currently increasing brackish marsh populations of dabbling and diving ducks and geese are expected to decline. Currently stable saline marsh populations of diving and dabbling ducks and geese are also projected to decline by 2050.

Infrastructure - The USACE is authorized to maintain the Calcasieu Ship Channel, located along this unit's eastern boundary, to a depth of 42 ft and to a width of 400 ft for navigation in this mapping unit. Louisiana Highway 27, along the unit's western boundary, is an important transportation and hurricane evacuation route. This mapping unit contains no primary roads, railroads, or pipelines, but has 7.9 miles of secondary and 1.2 miles of tertiary roads.

Previously Proposed Strategies - Previously proposed strategies focused on protecting the Calcasieu Lake West Cove shoreline and the banks of the Calcasieu Ship Channel from wave

erosion. Another proposed strategy was utilizing dredged material from the Calcasieu Ship Channel to create and restore marsh in open water areas, particularly around the Hog Island Gully Canal.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the brackish marshes and associated aquatic habitats. Coastal resource priorities include estuarine-dependent species such as shrimp, blue crab, and saltwater finfish. Other coastal uses and resource priorities of importance for this unit are agriculture and grazing, recreation/tourism, storm surge protection, and flood water retention.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake is a regional ecosystem strategy that should benefit this unit.

Benefits of Regional Strategies - This strategy should enhance brackish and saline marshes and their associated aquatic habitats in this unit. This should benefit shrimp, blue crab, and saltwater finfish populations. This strategy is not expected to have an effect on land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies developed for this unit include beneficially using dredged material to create marsh in shallow open water areas, as well as to stabilize the marsh east of Louisiana Highway 27 to protect

the highway, and to maintain and expand terracing in shallow open water areas of the unit. There are no programmatic strategies proposed for this mapping unit.

West Cove

Location - This mapping unit is located entirely within Cameron Parish and is within the Sabine NWR. The unit is bordered by the Back Ridge Canal on the north and west, and by Louisiana Highway 27 on the east and south. It contains 4,268 acres, of which 2,810 acres are fresh marsh.

Habitat Description and Landscape Change - Historically, this unit was primarily a brackish marsh with a small area of intermediate marsh in the northwestern corner of the unit. During the late 1950's, levees were constructed around the perimeter of this unit and it was divided into two subunits - Subunit 1A to the north and Subunit 1B to the south. Presently, both units are under hydrologic management with water control structures and a pump station. Since the impoundments were created, the West Cove unit has shown a freshening trend. This unit was classified as fresh and intermediate marsh in 1988.

Historic Land Loss - In 1932, this unit had 4,230 acres of marsh. Historically, Subunit 1B experienced some marsh break-up as higher water levels were maintained to open up the marsh for fish and wildlife habitat. Recently, however, many of the shallow, open water areas have revegetated with California bulrush and other fresh and intermediate marsh species. Because of the stable nature of

the marshes in Subunit 1B and recent gains in emergent marsh, marsh loss rates for this unit were calculated using only Subunit 1A. The West Cove unit lost a total of 1,420 acres of emergent marsh from 1932-1990. Most of this loss, 930 acres, occurred from 1956-1974. Historical records from Sabine NWR indicate that Hurricane Audrey (1957) and Hurricane Carla (1961) inundated this unit with high-salinity water, causing extensive stands of sawgrass in the northern portion of the unit to die. That area has converted to open water and has remained so since that time.

Salinity and water levels in the West Cove unit are controlled by variable-crest weirs and a pump station. In Subunit 1A, marshes adjacent to large open water areas continue to erode from wind-generated waves. Subunit 1B continues to show signs of recovery as marsh edges expand and California bulrush and cattail colonize open water areas. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, the West Cove unit had 2,810 acres of marsh. Land loss in this unit will continue at the current rate of 0.40% per year (1974-1990 rate). That equates to 600 acres of fresh marsh lost from 1990-2050 without restoration. Furthermore, because of the stable nature and marsh gain in Subunit 1B, all future loss will occur in Subunit 1A. To offset the land loss, CWPPRA and USACE projects within the unit are predicted to preserve 320 acres of fresh marsh, which leaves a moderate loss of 280 acres through 2050.

Fish and Wildlife Resources - This unit provides important feeding, nesting, and resting habitat for many wildlife species and important habitat for several freshwater fish species. Migratory waterfowl utilize this area as feeding habitat and as a refuge area during the waterfowl hunting season. Wading birds utilize the open water areas to prey on small fish and invertebrates. This unit is particularly important for nesting black-crowned night herons. American alligators are especially common in this unit because of the fresh conditions.

Freshwater finfish found in this unit include largemouth bass, crappie, bluegill, channel catfish, blue catfish, freshwater drum, and several species of gar. Largemouth bass and crappie are particularly important from a recreational standpoint. Red and black drum, spotted seatrout, Gulf menhaden, southern flounder, blue crab, largemouth bass, and channel catfish populations are all holding stable, whereas white and brown shrimp populations are currently decreasing. All species, except largemouth bass and channel catfish, are projected to decline by 2050, and these latter two species will increase.

Stable open water populations of seabirds, other resident and migrant avifauna, and furbearers are projected to remain stable through 2050, whereas currently stable populations of rails, gallinules, and coots are expected to decline. Currently increasing open water populations of brown pelicans are expected to continue to increase through 2050. Increasing populations of American alligators are expected to stabilize, and increasing populations of dabbling and diving ducks and geese are

expected to decline by 2050. In the aquatic bed habitat, increasing populations of dabbling and diving ducks and geese are projected to decline, as are currently stable populations of rails, gallinules, coots, and other resident and migrant avifauna. Stable populations of furbearers will remain stable, and increasing American alligator populations will also stabilize by 2050. In the fresh marsh habitats, currently stable populations of seabirds, wading birds, dabbling and diving ducks, geese, rails, gallinules, coots, other resident and migrant avifauna, rabbits, and deer are all expected to decline. Stable populations of shorebirds and furbearers will remain stable, and presently increasing American alligator populations will stabilize by 2050.

Infrastructure - Louisiana Highway 27 along the unit's eastern and southern boundary is an important transportation and hurricane evacuation route. Collectively, this unit contains 7.8 miles of primary (Louisiana Highway 27) and 1.3 miles of tertiary roads, one oil and/or natural gas well, and one drainage pump station, but no secondary roads, railroads, or pipelines.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit focused on managing water levels and maintaining freshwater conditions with water control structures, levees, and pumps. Other proposed strategies in this unit include: 1) vegetative plantings to protect the perimeter levees from erosion, 2) interior vegetative plantings to reduce erosion of marsh edges adjacent to open water areas, 3) installation of additional water control structures for water level

management, 4) freshwater diversions, and 5) beneficial use of dredged material in shallow open water areas.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue preserving fresh marshes and associated aquatic habitats. Coastal resource priorities include freshwater finfish, American alligators, and waterfowl. Other coastal uses and resources of importance for this unit are recreation/tourism, scientific study/education, and infrastructure such as roads, levees, and bridges.

Regional Ecosystem Strategies - There are no regional ecosystem strategies that are expected to benefit this unit.

Benefits of Regional Strategies - Not applicable.

Mapping Unit and Programmatic Strategies - The mapping unit strategy recommended for this unit is vegetative plantings in the northeastern portion of the unit. No programmatic strategies have been developed for this unit.

Mud Lake

Location - The Mud Lake unit is bordered on the north by the West Cove of Calcasieu Lake, on the west by Louisiana Highway 27, on the east by the Calcasieu Ship Channel, and on the south by Louisiana Highway 82 and Holly Beach. The entire unit is located within Cameron Parish and contains 22,711 acres, of which 14,040 acres are brackish marsh.

Habitat Description and Landscape Change - Comparing the 1949 and 1968 habitat maps, very little change in marsh type occurred from these years to the present. In 1949, approximately 90% of the unit was brackish marsh, and 10% was saline marsh. By 1968, approximately 70% of the marsh remained brackish, 15% was saline marsh, 10% was intermediate marsh, and the remainder was in the unknown category. Currently, this unit is approximately 62% brackish marsh (14,040 acres) and 34% open water (7,722 acres), with the remaining 2% incorporating upland, ridge, swamp, forest, or developed land (949 acres).

Historic Land Loss - In 1932, the Mud Lake unit had 18,670 acres of marsh. A total of 4,630 acres of marsh has been lost from 1932-1990. The majority of this loss (3,570 acres) occurred from 1956-1974. Marsh loss from 1974-1990 drastically decreased to 940 acres (0.35% per year). The area has somewhat stabilized as a result of restoration projects throughout the unit; however, the Mud Lake unit continues to undergo flooding, altered hydrology, and wave/wake erosion along Calcasieu and East Mud lakes, and the Calcasieu Ship Channel. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 2,660 acres of brackish marsh are projected to be lost by 2050. This is 18.9% of the remaining 1990 marsh (14,040 acres). This percentage is expected to decrease to 13.2% throughout this time period, however, as a result of the CWPPRA East Mud Lake (C/S-20, PCS-24) project protecting and

enhancing 810 acres of brackish marsh currently within the unit.

Fish and Wildlife Resources - This unit contains a variety of indigenous saltwater finfish that include red and black drum, spotted seatrout, Gulf menhaden, and flounder. These species, as well as shrimp and blue crab, have been decreasing over the past few years in the unit and will continue to decrease through 2050. This could possibly be attributed to increasing saltwater intrusion from the Calcasieu Ship Channel resulting in decreased primary productivity within the marsh.

In open water habitats of this unit, increasing populations of brown pelicans are expected to maintain their increase through 2050, while increasing populations of dabbling and diving ducks, geese, and American alligators are projected to stabilize. Stable populations of seabirds, rails, gallinules, coots, other resident and migrant avifauna, and furbearers are projected to remain stable through 2050. In the brackish marsh habitats, currently stable populations of seabirds, wading birds, shorebirds, and other resident and migrant open water/marsh birds are expected to decline. Presently stable populations of rails, gallinules, coots, furbearers, rabbits, and deer are expected to remain stable. Populations of dabbling and diving ducks, geese, and American alligators are currently increasing and are expected to stabilize by 2050.

Infrastructure - The USACE maintains the Calcasieu River and Pass within the unit. The channel is 40 ft deep and 400 ft wide, extending from approximately

one mile north of the Gulf of Mexico to Calcasieu Lake, for a distance of nearly four miles. This mapping unit contains 6.5 miles of primary (Louisiana Highways 27 and 82) and 9.5 miles of tertiary roadways. There are no secondary roads or railroads in the unit. Also located within this unit are 5.3 miles of natural gas pipelines (largest diameter 36 inches), 123 oil and/or natural gas wells, one industrial surface water intake, and two industrial groundwater intakes.

Previously Proposed Strategies - Strategies proposed in the past to enhance marsh in this unit include protecting ridge function, stabilizing the bank along the Calcasieu Ship Channel, and protecting the shoreline along the West Cove of Calcasieu Lake. Beneficial use of dredged material in shallow water areas and hydrologic management of the units brackish to saline marshes have also been proposed.

Coastal Use/Resource Objectives - The Cameron Wetlands Advisory Committee has indicated that the coastal resources of most value to this unit are shrimp, blue crab, saltwater finfish, and waterfowl. These are found within this area's intermediate to brackish water habitats. The highest priorities of coastal usage include navigation and port facilities, oil and gas infrastructure, and road/levee support.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake is a regional ecosystem strategy proposed for this unit.

Benefits of Regional Strategies - This strategy is expected to enhance intermediate and brackish marshes and their associated aquatic habitats. This would enhance habitat for shrimp, crabs, waterfowl, and saltwater finfish. Oil and gas infrastructure and roads, levees, and bridges will also benefit. These strategies are expected to reduce wetland loss by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include shoreline protection along the Sabine NWR boundary, beneficial use of material dredged from the Calcasieu Ship Channel to restore marshes, and managing the hydrology outside of the East Mud Lake area (i.e., the Oyster Bayou project). No programmatic strategies have been developed for this unit.

Martin Beach Ship Canal Shore

Location - This mapping unit is bordered on the east by the Calcasieu Ship Channel, on the north by Blue Buck Ridge and Louisiana Highway 82, on the south by the Gulf of Mexico, and on the west by an area two miles east of the town of Johnson's Bayou. This unit is located within Cameron Parish and contains 5,525 acres of marsh in its total of 8,491 acres.

Habitat Description and Landscape Change - There has been a shift from beach habitat to brackish marsh from 1949 to the present. In 1949, the unit was 90% beach and 5% brackish and saline marshes. By 1968, there was an 80% shift from the previous beach habitat to brackish marsh and a 5% reduction from saline to intermediate

marsh. Current habitats include approximately 7% saline marsh (570 acres), 26% brackish marsh (2,170 acres), 33% intermediate marsh (2,760 acres), minimal fresh marsh (20 acres), and 5% open water (425 acres). The remaining 30% incorporates upland, swamp, forest, or developed land (2,546 acres).

Historic Land Loss - In 1932, this unit had 6,720 acres of marsh. Total marsh loss from 1932-1990 has been 1,200 acres. The majority of this loss (740 acres) occurred from 1956-1974, shortly after construction of the Calcasieu Ship Channel. The primary causes of marsh loss in this unit are wave erosion along the Gulf of Mexico. Loss in this area declined to 180 acres from 1974-1983; however, it has increased to 250 acres between 1983 and 1990. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 630 acres of marsh (60% brackish and 40% intermediate) will be lost by 2050. This is 11.4% of the remaining 1990 marsh (5,520 acres). The State has constructed a breakwater system, extending 8.5 miles from Peveto Beach to Holly Beach, that will reduce shoreline erosion.

Fish and Wildlife Resources - This unit contains open water; intermediate, brackish, and saline marsh; barrier beach; and agricultural/upland habitats. This unit sustains stable populations of red and black drum, spotted seatrout, Gulf menhaden, southern flounder, American oysters, and blue crabs. All of these species will remain stable through 2050. The white and brown shrimp populations have declined within this

unit, but will stabilize by 2050. Populations of largemouth bass and channel catfish have not been assessed.

In open water habitats, currently increasing populations of brown pelicans will continue to increase through 2050, increasing populations of dabbling and diving ducks and geese will begin to decline, and stable populations of seabirds, rails, gallinules, coots, other resident and migrant avifauna, furbearers, and American alligators will remain stable through 2050. In the three marsh habitats, currently stable populations of furbearers and American alligators will remain stable in the future, stable populations of seabirds, wading birds, shorebirds, raptors, rails, gallinules, coots, and other migrant and resident birds will begin to decline by 2050. Presently increasing populations of diving and dabbling ducks and geese are projected to decline as well. Stable barrier beach populations of seabirds, shorebirds, and wading birds are expected to remain stable through 2050. In the agricultural/upland habitat, stable populations of wading birds, shorebirds, furbearers, and American alligators will remain stable. Currently stable populations of raptors, rails, gallinules, coots, other resident and migrant open water/marsh birds, rabbits, and deer are projected to decline by 2050, as will currently increasing populations of dabbling and diving ducks and geese.

Infrastructure - The only USACE project in this unit is the Calcasieu River and Pass project, which is necessary for maintaining and enhancing navigation through the Calcasieu Ship Canal to the GIWW and the Port of Lake Charles. This project includes maintenance

dredging of the 40 ft deep and 400 ft wide channel for approximately one mile north of the Gulf of Mexico.

Collectively, this mapping unit contains 7.4 miles of primary (Louisiana Highway 82), 10.2 miles of secondary, and 8.3 miles of tertiary roadways. Also located within this unit are 1.1 miles of natural gas pipeline (diameter 36 inches), 59 oil and/or natural gas wells, and one industrial groundwater intake.

Previously Proposed Strategies - Strategies proposed in the past for this unit include restoring the barrier shoreline, protecting the function of Blue Buck Ridge, stabilizing the banks of the Calcasieu Ship Channel, and utilizing dredged material from the Calcasieu Ship Channel for shoreline stabilization along the beach and to fill open water areas within the unit's marshes.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's intermediate marsh and chenier shoreline habitats, which encompass agriculture, tourism, and recreational interests. This unit is also important for community development, utility infrastructure, and storm buffering.

Regional Ecosystem Strategies - Stabilization of the Gulf of Mexico shoreline from Calcasieu Pass to Johnson's Bayou and restoration of longshore sediment flow across the mouth of Calcasieu Pass are regional ecosystem strategies proposed for this unit.

Benefits of Regional Strategies - These strategies are expected to benefit the intermediate marshes and associated aquatic habitats of this unit, as well as protecting the chenier barrier shoreline. These strategies are expected to benefit agriculture/grazing interests and recreation and tourism. Improved storm buffering capacity is also expected, which should benefit roads, levees, and bridges and infrastructure associated with communities and utilities. These strategies are expected to achieve no net loss in this unit.

Mapping Unit and Programmatic Strategies - No mapping unit or programmatic strategies have been developed for this unit.

Clear Marais

Location - This mapping unit is bordered on the south by the GIWW, and on the east, west, and north by the Coastal Zone boundary. This entire unit is located within Calcasieu Parish and contains 9,718 acres.

Habitat Description and Landscape Change - The 1968 classification indicates that the unit was composed of 15% brackish marsh, 10% intermediate marsh, and the rest unknown. Current habitats include 48% fresh marsh (4,650 acres), 1% intermediate marsh (ten acres), 1% brackish marsh (120 acres), and 20% open water (1,944 acres). The remaining acres incorporate upland, swamp, forest, or developed land.

Historic Land Loss - In 1932, the Clear Marais unit had 6,805 acres of marsh. A total of 2,065 acres has been lost from 1932-1990. The majority of this loss

(1,245 acres) occurred from 1956-1974. Before 1956, negligible land loss had been observed. The leading causes of land loss in this area have been altered hydrology and wake erosion along the GIWW. Since 1974, land loss rates have decreased. From 1974-1990, 820 acres were lost (0.42% per year). Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 1,060 acres is projected to be lost by 2050. This is 22.4% of the remaining 1990 marsh (4,740 acres). Three impoundments within this unit are controlled and will be stable through 2050. However, wake erosion from the GIWW will continue to erode the southern boundary of the unit. To offset this erosion, CWPPRA and USACE projects within this unit are expected to preserve approximately 760 acres of fresh marsh. About 6% of the 1990 marsh is projected to be lost.

Fish and Wildlife Resources - The fresh to brackish water fish populations have stabilized within the unit and include species such as red and black drum, spotted seatrout, Gulf menhaden, and southern flounder. Other species that exhibit stable populations include blue crab, largemouth bass, and channel catfish. There has been a marked decline in the brown and white shrimp population within this unit. All populations will stabilize by 2050, with the exception of largemouth bass and channel catfish, which will increase.

Open water, aquatic bed, fresh marsh, and agricultural/upland habitats are all found in this unit. Currently stable populations of seabirds, shorebirds, raptors, rails, gallinules, coots, other

resident and migrant open water/marsh and woodland birds, furbearers, rabbits, and deer are projected to remain stable through 2050 throughout the unit in those habitats in which they are currently found, as are stable agricultural/upland populations of wading birds and American alligators. Dabbling and diving duck and goose populations are currently increasing throughout the area and are projected to continue to increase through 2050. American alligators are currently increasing in open water, aquatic bed, and fresh marsh habitats, and are projected to continue to increase. Fresh marsh populations of wading birds are currently increasing but are projected to stabilize by 2050.

Infrastructure - The only USACE project in the unit is the maintenance of the GIWW for navigation. This unit contains no primary roads or railroads, 1.4 miles of secondary and 33 miles of tertiary roads, 9.6 miles of crude oil and natural gas pipelines (largest diameter 18 inches), and five oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit have involved stabilization of the northern bank of the GIWW.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of the unit's freshwater marshes, which include freshwater finfish, American alligators, and waterfowl. Other activities important to this unit involve agriculture and grazing, and navigation and port facilities.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake is a regional ecosystem strategy which is expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to benefit the fresh marshes and associated aquatic habitats of this unit. This should enhance the habitats for alligators, freshwater finfish, and waterfowl. Agriculture and grazing should also be enhanced. These strategies are expected to achieve no net loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategies developed for this unit include continued maintenance of the Clear Marais shoreline stabilization project and to address hydrologic problems between Choupique Bayou and Brannan's Ditch. No programmatic strategies have been developed for this unit.

West Black Lake

Location - This unit is bordered on the north by the GIWW, on the west by Gum Cove Ridge, on the south by an oilfield production road connecting the Hackberry Ridge and Gum Cove Ridge, and on the east by the West Black Lake Management Levee. This entire unit is located within Cameron Parish and contains 12,795 acres.

Habitat Description and Landscape Change - There has been a significant shift to more saline marsh. In 1949, the area was composed of 85% fresh marsh, 5% intermediate marsh, and the rest in the unknown category. The 1968 map

reveals a 60% increase in intermediate marsh, and a 30% shift to brackish marsh. This reflects the occurrence of saltwater intrusion during these years, possibly from the Calcasieu Ship Channel via the Kelso Bayou, GIWW, and the Alkali Ditch to Black Lake. Current habitats include 18% fresh marsh (2,240 acres), 1% brackish marsh (140 acres), 9% intermediate marsh (1,190 acres), and 60% open water (7,677 acres). The remaining 12% incorporates upland, swamp, forest, or developed land (1,548 acres).

Historic Land Loss - In 1932, this unit had 10,080 acres of marsh. Total marsh loss within this unit has been 6,510 acres. The majority of this loss (6,340 acres) occurred from 1956-1974, when altered hydrology and storm related losses peaked. From 1974-1990 land loss significantly decreased to 170 acres, with a loss rate of 0.52% per year throughout the unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 960 acres of marsh (67% fresh and 33% intermediate) is projected to occur by 2050 within this unit. This is 26.9% of the remaining 1990 marsh (3,570 acres). This area is currently managed by a pump and culverts, and the levees are in fair shape. However, with little money available for repairs, the levees, structures, and pump system will deteriorate over time.

Fish and Wildlife Resources - Several fishery populations have decreased throughout the unit (red and black drum, spotted seatrout, Gulf menhaden, southern flounder, white and brown shrimp, and blue crab) due to the

impounded nature of the unit. These species are projected to continue to decrease through 2050. Other fresh to intermediate water species have increased in abundance (largemouth bass and channel catfish) and are projected to stabilize by 2050.

In the open water habitats, stable populations of seabirds, other resident and migrant birds, furbearers, and American alligators are all projected to remain stable, and stable populations of rails, gallinules, and coots are expected to decline by 2050. Currently increasing populations of dabbling and diving ducks are also expected to decline. In the fresh and intermediate marshes, stable populations of furbearers are expected to remain stable, and stable populations of seabirds, wading birds, shorebirds, rails, gallinules, coots, other resident and migrant avifauna, rabbits, and deer are expected to decline by 2050. American alligator populations, currently stable, are expected to rise in the future. Presently increasing populations of dabbling and diving ducks and geese are expected to decline. In the agricultural and upland habitats, stable populations of wading birds, shorebirds, rails, coots, gallinules, furbearers, rabbits, deer, and American alligators are expected to remain stable, whereas currently stable populations of other resident and migrant birds are expected to decline by 2050. Currently increasing populations of dabbling and diving ducks and geese are projected to stabilize in the future.

Infrastructure - The only USACE project in the unit is the Lake Charles Deep Water Channel (a.k.a. GIWW) that is used for navigation purposes along the

northern boundary of the unit. This project provides for the maintenance of the channel (30 ft deep by 125 ft wide) from the Sabine River to the Calcasieu River, a length of 24.9 miles. This unit contains no primary or secondary roads, pipelines, or railroads, but has 16.4 miles of tertiary roads, eight oil and/or natural gas wells, and two drainage pump stations.

Previously Proposed Strategies - Strategies previously proposed for this unit include stabilizing the banks of the GIWW, managing the fresh to intermediate marsh hydrology, and protecting the existing management levee along the western shoreline of Black Lake.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh to intermediate marsh habitat and the freshwater finfish, American alligators, and waterfowl that reside there. Also important to the unit is continued management of navigation and port facilities, roads, levees, and bridges.

Regional Ecosystem Strategies - There are no regional strategies that are expected to benefit this unit.

Benefits of Regional Strategies - Not applicable.

Mapping Unit and Programmatic Strategies - Mapping unit strategies developed for this unit include terracing, vegetation plantings, beneficial use of dredged material, and shoreline

protection along the GIWW (where needed) and the West Black Lake shoreline. No programmatic strategies have been developed for this unit.

Brown Lake

Location - The Brown Lake unit is located entirely within Cameron Parish and is primarily within the Sabine NWR. The unit is bordered by the Hackberry Ridge and an oilfield production road connecting the Hackberry Ridge and Gum Cove Ridge on the north, the Beach Canal on the west, Louisiana Highway 27 on the east, and the Back Ridge Canal and Central Canal on the south. This unit contains a total of 35,202 acres.

Habitat Description and Landscape Change - Historically, this unit was a mixture of fresh and intermediate marsh, with sawgrass marsh noted in the central and northern portions of the unit. The maps of 1968, 1978, and 1988 show a gradual trend toward a brackish marsh type. In 1988, the majority of this unit was classified as 33% brackish marsh (11,660 acres). There was also 5% intermediate marsh (1,870 acres), 7% fresh marsh (2,570 acres), and 54% open water (19,102 acres).

Historic Land Loss - In 1932, the Brown Lake unit had 36,190 acres of marsh. This unit lost a total of 20,090 acres (55%) of emergent marsh from 1932-1990. Most of this loss (18,110 acres) occurred from 1956-1974. Historical records from Sabine NWR indicate that sawgrass marshes and other low-salinity marshes in this unit began to deteriorate in the mid-1950's and 1960's, particularly after Hurricane Audrey

(1957) and Hurricane Carla (1961). Those storms inundated this entire unit with high-salinity water for several days, causing fresh and intermediate marsh vegetation to die and large areas of open water to develop.

Currently, salinity and tidal exchange in this unit are controlled by water control structures at the Hog Island Gully Canal, West Cove Canal, and Headquarters Canal, which limit exchange with the Calcasieu Ship Channel. Marsh loss in the area has stabilized, and loss rates were approximately 0.52% per year from 1974-1990. Marsh edges adjacent to large open water areas continue to erode from wind-generated waves. Also, waterlogging of marshhay cordgrass and short-term high salinity events (spikes) continue to cause interior marsh break-up. However, during high-rainfall years, cattail, California bulrush, and other intermediate marsh plants colonize shallow water areas, and marsh edges expand into small ponds, especially in the western portion of this unit. Subsidence in this area is estimated at 1.1-2.0 ft/century.

Future Land Loss Projections - In 1990, the Brown Lake unit had 16,100 acres of marsh. Future land loss in this unit should continue at the current rate of 0.52% per year (1974-1990 rate). That corresponds to 4,325 acres of marsh (80% brackish and 20% intermediate) lost from 1990-2050. Marsh loss appears to have mostly stabilized in this unit, and future loss will be moderated by continued hydrologic management. However, loss due to wave erosion of marsh edges and periodic salinity spikes will continue. During high rainfall or low-salinity years, intermediate species

will continue to colonize shallow, open water areas, negating some of the marsh loss.

Also considered in future land loss projections for this unit are two restoration projects which are predicted to reduce brackish marsh loss by 720 acres. The West Hackberry Vegetative Planting Demonstration project, funded by the CWPPRA, was completed in June 1994, and consisted of plantings of California bulrush in open water areas north of the Starks North Canal. Those plantings were installed with other wave-dampening devices to reduce shoreline erosion in the northwest corner of this unit.

Another CWPPRA-funded project (CS-23), scheduled to be completed in 2000, will replace the water control structures at Hog Island Gully, West Cove Canal, and Headquarters Canal. Replacement of those structures will allow more efficient drainage of excess water, more effective salinity control, and more management flexibility with installation of programmable timers and partial automation. With these restoration projects, about 22% of the 1990 acres are projected to be lost.

Fish and Wildlife Resources - This unit provides important feeding, nesting, and resting habitat for many species of wildlife and important nursery habitat for many estuarine-dependent species of fish and shellfish. Estuarine-dependent species enter the Calcasieu/Sabine Basin via the Calcasieu Ship Channel and migrate to interior marshes through bayous and canals. Estuarine access to this unit from Calcasieu Lake is through the Hog Island Gully Canal,

Headquarters Canal, and West Cove Canal water control structures or from Sabine Lake on the west. Important species include white shrimp, brown shrimp, blue crab, Gulf menhaden, red drum, spotted seatrout, Atlantic croaker, and southern flounder. Several of those species, including brown shrimp and blue crab, are both recreationally and commercially important. All species are projected to decline by 2050.

Open water, fresh, intermediate, and brackish marsh habitats are found within this mapping unit. Stable populations of furbearers throughout the area are projected to remain stable through 2050, as are steady open water populations of seabirds, other resident and migrant birds, and American alligators. Presently stable marsh populations of seabirds, shorebirds, rails, gallinules, rabbits, and deer are expected to decline by 2050, as are currently increasing populations of dabbling and diving ducks and geese throughout the area. Currently increasing marsh populations of wading birds and American alligators are expected to stabilize by 2050.

Infrastructure - There are no USACE infrastructure projects within this unit. Louisiana Highway 27, along the unit's eastern boundary, is an important transportation and hurricane evacuation route. Also, the unit's northern boundary is along an important oil and gas access road connecting Hackberry Ridge and Gum Cove Ridge. Collectively, this unit contains five miles of primary roadway (Louisiana Highway 27), 12.35 miles of tertiary roads, two oil and/or natural gas platforms, and 51 oil and/or natural gas wells, but no secondary roads, railroads, or pipelines.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit primarily include managing hydrology and stabilizing banks of navigation channels, managing hydrology of the marshes, and marsh creation through the beneficial use of dredged material from the Calcasieu Ship Channel.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to preserve the habitats in this area as fresh to intermediate marshes and associated aquatic habitats. Coastal resource priorities include American alligators, waterfowl, non-game fish and wildlife species, and estuarine-dependent species such as shrimp and blue crab. Other coastal uses and resources of importance for this unit are scientific study/education, and infrastructure such as roads, levees, and bridges.

Regional Ecosystem Strategies - Dedicated dredging of sediment for marsh creation and salinity control on the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake are regional strategies proposed for this unit.

Benefits of Regional Strategies - These strategies are expected to benefit intermediate marshes and associated aquatic habitats in this unit. This would enhance habitats for shrimp, blue crabs, alligators, waterfowl, and non-game fish and wildlife. Roads, levees, and bridges would also be protected. These strategies are expected to reduce wetland loss by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies developed for this unit include terracing and vegetative plantings; beneficially utilizing material dredged from the Calcasieu Ship Channel to create marsh in shallow, open-water areas; and improving hydrology in the area by installing the Northline Canal structure and maintaining and improving the proposed Sabine NWR water control structures (CS-23). There are no programmatic strategies proposed for this mapping unit.

Southeast Sabine

Location - This mapping unit is located entirely within Cameron Parish and is within the Sabine NWR. The unit is bordered by the Starks Central Canal on the north, the Burton-Sutton Canal on the west, Louisiana Highway 27 on the east, and the Starks South Canal on the south. This unit contains 21,279 acres.

Habitat Description and Landscape Change - In 1949, this unit was primarily intermediate marsh with a small area of brackish, three-cornered grass marsh along its eastern boundary. In 1968, 1978, and 1988 the majority of this unit was classified as intermediate marsh, with approximately 10-20% classified as brackish marsh. The 1988 vegetative type map classifies the majority of this unit as intermediate marsh, with brackish marsh noted in the northwestern, north-central, and eastern portions of the unit. Currently, this unit contains 58% intermediate marsh (12,430 acres), 31% brackish marsh (6,590 acres), nominal fresh marsh (ten acres) and 11% open water and other habitats (2,249 acres).

Historic Land Loss - In 1932, the Southeast Sabine unit had 21,110 acres of marsh. This unit lost a total of 2,070 acres of emergent marsh from 1932-1990. Most of this loss (1,650 acres) occurred from 1956-1974. This unit historically contained little open water and was dominated by fresh and intermediate marsh vegetation. Following construction of the Calcasieu Ship Channel, saltwater intrusion impacted fresh and intermediate vegetation in the northern portion of the unit, resulting in the conversion of some areas to open water. Marshes across most of this unit have remained very stable, despite hydrologic changes. Comparisons of recent aerial photography and field investigations indicate that intermediate marsh species, such as bullwhip and cattail, have colonized some of the shallow open water in areas of broken marsh. However, marshhay cordgrass appears to be stressed in some areas from periodic high water levels. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - Currently, salinity and tidal exchange are controlled by perimeter spoil banks and water control structures at Hog Island Gully, West Cove, and Headquarters canals. These limit water exchange with the Calcasieu Ship Channel. In 1990, this unit had 19,030 acres of marsh. Marsh loss in the area has stabilized. The primary threat of marsh loss in this unit is from canal-induced saltwater intrusion from the Calcasieu Ship Channel. This intrusion would come via the West Cove or Headquarters canals, or to a lesser extent through the Starks and Burton-Sutton canals and Sabine Lake on the west. Breaches in the spoil

banks surrounding this unit would also allow high-salinity water to enter the unit, which would kill intermediate marsh vegetation. Marsh edges adjacent to large open water areas will continue to erode from wind-generated waves. Also, excessively high water levels could cause some species, such as marshhay cordgrass, to become stressed, thereby causing increased mortality and interior marsh break-up.

The CWPPRA-funded Sabine Structures Replacement project (CS-23), although incomplete, will replace the water control structures at Hog Island Gully, West Cove, and Headquarters canals and is expected to protect 400 acres of brackish and intermediate marsh in this unit. Replacing these structures and installing programmable timers and automation will allow more efficient drainage of excess water, salinity control, and flexibility. These structures will help prevent high-salinity and higher elevation water from impacting this unit.

Marsh loss in this unit has stabilized and is projected to continue at the current rate of 0.08% per year (1974-1990 rate). That corresponds to 890 acres of marsh (80% brackish and 20% intermediate) lost from 1990-2050 that would be lost without the CWPPRA project. With the CWPPRA project, only 490 acres would be lost by 2050. Continued hydrologic management of this unit will provide relatively stable conditions for protection of intermediate and brackish marsh plant communities. Also, during high-rainfall years resulting in fresh conditions, cattail, bullwhip, and other intermediate species will colonize shallow water areas

and cause marsh edges to expand into open water areas and small ponds.

Fish and Wildlife Resources - This unit provides habitat for several species of freshwater finfish as well as several estuarine-dependent fish species. Largemouth bass, crappie, bluegill, gar, and blue catfish are some of the more common freshwater species. Those species utilize the fresher portions of this unit, particularly the western half. Common estuarine-dependent species include white shrimp, brown shrimp, blue crab, Gulf menhaden, and red drum. Several of those species, including brown shrimp and blue crab, are important recreationally as well as commercially. All of these species are currently declining but are expected to stabilize by 2050. Those species typically utilize the saltier portions of the unit, found on the eastern side near the West Cove Canal and Headquarters Canal structures, which allow access from Calcasieu Lake. Largemouth bass and channel catfish populations are increasing but are projected to stabilize by 2050.

Migratory waterfowl utilize this area as wintering habitat, and this unit is extremely popular for waterfowl hunting. Wading birds also utilize shallow water areas to prey on small fish and invertebrates. The north-central portion of the unit contains a black vulture and turkey vulture winter roost site. Muskrat and mink are common furbearers in the area and the American alligator is a commercially important species found in the fresher portions of the unit. In open water areas, currently stable populations of seabirds, rails, gallinules, coots, other resident and

migrant avifauna, and furbearers are expected to remain stable through 2050, whereas currently increasing populations of dabbling and diving ducks and geese are expected to decline. Increasing American alligator populations are projected to stabilize by 2050. In the intermediate and brackish marsh areas, currently stable populations of seabirds, wading birds, shorebirds, and furbearers are projected to remain stable, whereas currently stable populations of raptors, rails, gallinules, coots, other resident and migrant birds, rabbits, and deer are projected to decline by 2050. Currently increasing populations of diving and dabbling ducks and geese are expected to decline, whereas increasing American alligator populations are expected to stabilize by 2050.

Infrastructure - There are no USACE infrastructure projects within this unit. Several pipelines are located along the unit's western boundary and one gas pipeline crosses the southeastern corner of the unit. Louisiana Highway 27, along the unit's eastern boundary, is an important transportation and hurricane evacuation route. Collectively, this unit contains 2.4 miles of primary (Louisiana Highway 27) and 2.8 miles of tertiary roadways, eight miles of natural gas pipelines (largest diameter 36 inches), and 67 oil and/or natural gas wells, but no secondary roads or railroads.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit primarily center around maintenance of navigation channel banks to prevent breaching and creation of additional routes for saltwater intrusion, and development of reef zones.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve fresh to intermediate marshes and associated aquatic habitats. Coastal resource priorities include freshwater finfish, American alligators, and waterfowl. Other coastal uses and resources of importance for this unit are agriculture and grazing, oil and gas infrastructure, roads, levees, and bridges.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake, maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are projected to enhance fresh and intermediate marshes and their associated aquatic habitats. This should enhance habitats for freshwater finfish, alligators, and waterfowl. In addition, agricultural/grazing interests; oil and gas infrastructure; and roads, levees, and bridges will be protected. These strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategy recommended for this unit is to construct and plant terraces in the area and to improve hydrology by placing control structures in Starks Central and Burton-Sutton canals. The programmatic strategy developed for this unit is to

address the potential impacts of the Trans-Texas Water Plan.

Second Bayou

Location - This unit is bordered on the east by Louisiana Highway 27, on the north by the South Starks Canal, and on the west and south by Starks Canal. The unit is completely located within Cameron Parish and contains 17,295 acres.

Habitat Description and Landscape

Change - There appears to be a shift toward fresher marsh habitats from 1949 to the present. In 1949, the unit was 85% brackish marsh and 15% intermediate marsh. In 1968, however, the unit contained less brackish (45%) than intermediate (55%) marsh. This unit now contains approximately 64% intermediate marsh (11,150 acres), 13% brackish marsh (2,300 acres), and 12% open water (2,075 acres). The remaining 10% incorporates upland, swamp, forest, or developed land (1,770 acres).

Historic Land Loss - In 1932, the Second Bayou unit had 17,380 acres of marsh. Total marsh lost from 1932-1990 was 3,930 acres. The majority of this loss (3,640 acres) occurred from 1956-1974. Impoundment and altered hydrology, due to construction of roads and canals, significantly contributed to marsh loss in this area. Land loss decreased to 220 acres from 1974-1983 and again to 50 acres from 1983-1990. This equates to a land loss rate of 0.2% per year within the unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 1,520 acres of marsh

(80% intermediate and 20% brackish) is projected to occur by 2050. This is 11.3% of the remaining 1990 marsh (13,450 acres). Altered hydrology and impoundment will continue to be the leading causes of land loss within this unit.

Fish and Wildlife Resources - This unit has a stable red drum population. It will remain stable through 2050. Little else is known about the population status of other fisheries within this unit.

Stable populations of seabirds and furbearers are projected to increase throughout the study area by 2050, as are stable intermediate and brackish marsh populations of wading birds and shorebirds and open water populations of rails, gallinules, coots, and other resident and migrant birds. Currently stable marsh populations of raptors, rails, gallinules, coots, other resident and migrant avifauna, rabbits, and deer are expected to decline by 2050. Increasing populations of dabbling and diving ducks and geese are expected to decline, whereas currently increasing American alligator populations are expected to continue increasing throughout the study area by 2050.

Infrastructure - This mapping unit contains 3.9 miles of primary (Louisiana Highways 27 and 82) and 2.1 miles of tertiary roads, but no secondary roads or railroads. Also located within this unit are 5.7 miles of natural gas pipelines (largest diameter 36 inches) and 87 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the ridge that

Louisiana Highway 27 is on, stabilizing the banks of the North Starks and Starks canals, and reestablishing/managing the fresh to intermediate hydrology within the unit.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its coastal use preference for this unit is to manage fresh to intermediate marshes and related aquatic habitats located in the unit. Priorities for management of coastal resources include American alligators, furbearers, waterfowl, agriculture, and grazing. Particular interests specified by the committee included oil, gas, and utilities infrastructure.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake, maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit. In addition, stabilization of the Gulf shoreline between Calcasieu Pass and Johnson's Bayou is expected to benefit this unit indirectly through protection of the Martin Beach Ship Canal Shore unit.

Benefits of Regional Strategies - These strategies are projected to enhance fresh and intermediate marshes and their associated aquatic habitats. This should enhance habitats for alligators, furbearers and waterfowl while protecting agricultural/grazing interests and infrastructure associated with the oil and gas industry and utilities. These

strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategies for this unit include herbivory control throughout the area and to improve hydrology by improving water flow. The programmatic strategy developed for this unit includes conducting studies to address bullwhip mortality throughout the area.

Gum Cove

Location - This mapping unit is bordered on the north by the GIWW, and the other boundaries follow the higher elevations of the Gum Cove Ridge. This unit is mostly located within Cameron Parish, with the northernmost tip of the unit located in Calcasieu Parish. This unit contains a total of 5,768 acres, of which 1,230 acres are fresh marsh.

Habitat Description and Landscape Change - No habitat data for this unit were available for 1949, but the 1968 map indicates an area composed of 15% intermediate marsh, with the rest being unknown (probably upland ridge habitat). Current habitats include approximately 21% fresh marsh (1,230 acres), with the remainder incorporating upland, swamp, forest, or developed land.

Historic Land Loss - The USACE has not yet collected information about historic land loss in this unit. This area is considered geologically stable with little to no subsidence occurring. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, the Gum Cove unit had 1,230 acres of marsh. The Region 4 Technical Team does not project any significant future land loss in this unit. The ridge and surrounding marsh appear to be stable.

Fish and Wildlife Resources - There is no information available about fish populations in the Gum Cove unit. Currently stable fresh marsh and agricultural/upland populations of shorebirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots, other resident and migrant open water/marsh birds, furbearers, rabbits, deer, and American alligators are projected to remain stable through 2050, as are stable fresh marsh populations of seabirds and stable agricultural/upland populations of wading birds and other resident and migrant woodland birds. Fresh marsh populations of wading birds are currently increasing but are projected to stabilize by 2050.

Infrastructure - This unit contains a USACE project called the Lake Charles Deep Water Channel (a.k.a. GIWW) that crosses the unit's northern boundary. This project involves maintaining the channel for transportation from the Sabine River to the Calcasieu River. The dimensions of the GIWW maintenance project within the unit are 30 ft deep by 125 ft wide for a length of 24.9 miles. Collectively, this mapping unit contains no primary or secondary roads or railroads, but has 25.2 miles of tertiary roads, two miles of crude oil pipeline (diameter 4 inches), 22 oil and/or natural gas wells, and one drainage pump station.

Previously Proposed Strategies - The only strategy that has been proposed for this unit is to protect bay/lake shorelines.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marsh and developed/fastlands, which include agriculture, grazing, recreation, and tourism. Also important to the unit is the continued maintenance of oil and gas infrastructure, as well as the roads, levees, and bridges connecting the unit with nearby communities.

Regional Ecosystem Strategies - Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake and salinity control in the GIWW east of Sabine Lake are regional ecosystem strategies which are projected to benefit this unit.

Benefits of Regional Strategies - These strategies should benefit the small areas of fresh marsh in this unit but are not expected to significantly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - No mapping unit or programmatic strategies have been developed for this unit.

Southwest Gum Cove

Location - This mapping unit is bordered on the north by the Bancroft Canal, on the south by Starks Canal, on the west by Right Prong and Black bayous, and on the east by the Gum

Cove Ridge. This unit contains a total of 15,251 acres.

Habitat Description and Landscape

Change - There appears to have been a habitat shift to more brackish marshes in this unit. From 1949-1968, 15% of what was once fresh to intermediate marsh habitat had converted to brackish marsh. Current habitats include approximately 38% fresh marsh (5,840 acres), 23% intermediate marsh (3,510 acres), 7% brackish marsh (1,120 acres), and 17% open water (2,593 acres). The remaining 14% incorporates upland, swamp, forest, or developed land (2,188 acres).

Historic Land Loss - In 1932, the Southeast Gum Cove unit had 12,740 acres of marsh. Total marsh loss from 1932-1990 was 2,270 acres (17% of the marshes in this unit). The majority of this loss (1,750 acres) occurred between 1956 and 1974 as a result of altered hydrology and wake erosion along the unit's main waterways. From 1974-1990, however, marsh loss was reduced to 330 acres (0.18% per year). Subsidence in this area is estimated at 0-1 ft./century.

Future Land Loss Projections - An additional loss of 1,070 acres of marsh (50% fresh, 30% intermediate, and 20% brackish) is projected to occur by 2050. This is 10.2% of the remaining 1990 marsh (10,470 acres). This percentage will decrease through 2050 as a result of the protection and enhancement of 20 acres of fresh marsh by CWPPRA projects in the area.

Fish and Wildlife Resources - Most fishery populations are not found in this unit. Populations of blue crab,

largemouth bass, and channel catfish are found within the unit; however, their population trends are currently unknown.

In the open water habitat, stable populations of seabirds, other resident and migrant avifauna, furbearers, and American alligators are projected to remain stable through 2050, whereas stable populations of rails, gallinules, and coots are expected to decline. Currently increasing populations of dabbling and diving ducks and geese are expected to decline by 2050. In the fresh, intermediate, and brackish marsh habitats, stable populations of seabirds, wading birds, shorebirds, furbearers, and American alligators are projected to remain stable, whereas currently stable populations of rails, gallinules, coots, other resident and migrant birds, rabbits, and deer are expected to decline. Currently increasing populations of dabbling and diving ducks and geese are projected to decline as well. In hardwood forests, presently stable populations of dabbling ducks, furbearers, and American alligators are projected to remain stable, while stable populations of other resident and migrant woodland birds, rabbits, and deer are expected to decline. In the agricultural and upland habitats, currently stable populations of wading birds, shorebirds, dabbling and diving ducks, geese, raptors, rails, gallinules, coots, other resident and migrant open water/marsh and woodland birds, furbearers, rabbits, deer, and American alligators are all expected to remain stable through 2050.

Infrastructure - This mapping unit contains no primary or secondary roads, pipelines, or railroads, but has 21.9 miles

of tertiary roads and 125 oil and/or natural gas wells.

Previously Proposed Strategies -

Strategies proposed in the past for this unit include stabilizing the banks of navigation channels, protecting the shorelines of open water bodies, and managing the fresh to intermediate marsh hydrology within the unit.

Coastal Use/Resource Objectives -

The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's freshwater marshes and aquatic habitats, which include freshwater finfish, American alligators, and waterfowl. Other important resources within this unit include freshwater supplies, and oil and gas infrastructure.

Regional Ecosystem Strategies -

Salinity control on the GIWW east of Sabine Lake, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies -

These strategies are projected to benefit the fresh to brackish marshes and associated aquatic habitats of this unit. This should in turn enhance the habitats for freshwater finfish, alligators, and waterfowl, while enhancing the freshwater supply and protecting oil and gas infrastructure. These strategies are expected to reduce land loss in this unit by about 50%.

Mapping Unit and Programmatic

Strategies - The mapping unit strategies developed for this unit are hydrologic restoration within the Northline and Bancroft canals, implementing and maintaining the NRCS and CWPPRA Black Bayou (XCS-48) projects, and maintaining the north levee of the Northline Canal. The programmatic strategies recommended for this unit include restoring hydrology by maintaining the freshwater inflows from Sabine Lake and addressing the impacts of the Trans-Texas Water Plan.

Sabine Pool #3 (Sabine Pool)

Location - The Sabine Pool unit is located entirely within Cameron Parish and is within the Sabine NWR. The unit is bordered by the Starks North Canal on the north, the Beach Canal on the east, the Burton-Sutton Canal on the west, and the Starks Central Canal on the south. This unit contains a total of 26,254 acres, of which 15,980 acres are fresh marsh.

Habitat Description and Landscape

Change - In 1949, this unit was classified as a mixture of fresh and intermediate marsh, with sawgrass marsh noted across most of the northern half of the unit. Levees were constructed around this unit in 1951, and since that time this unit has been managed as a fresh marsh impoundment. The area was classified as fresh marsh in 1968, 1978, and 1988.

Historic Land Loss - In 1932, this mapping unit had 20,460 acres of marsh. This unit lost 4,450 acres of emergent marsh from 1932-1990. However, as noted with many freshwater impoundments in southwestern

Louisiana, photography taken during periods of high water levels often reflect areas of marsh loss where no loss has occurred. Historical records from Sabine NWR indicate that marshes damaged by Hurricane Audrey in 1957 and Hurricane Carla in 1961 continued to deteriorate into the 1970's. By the late 1970's, most of the marshes in the southeast quadrant of this unit had deteriorated to a shallow, turbid, open-water area. However, drawdowns in the early 1980's restored several areas along the perimeter of the southeast quadrant. Furthermore, a comparison of 1981/83 and 1989 color infrared photography indicated significant closure of marsh during that period. It should be noted that it is not in the best interest of the Sabine NWR goals that this unit convert to 100% marsh. The refuge goals include providing overwintering habitat for waterfowl. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, this unit had 16,010 acres of marsh. Marsh loss in this unit has apparently stabilized, and no future marsh loss is predicted. This unit will continue to be managed as a freshwater impoundment with variable-crest weirs. Following drawdowns, emergent vegetation colonizes shallow water areas and exposed pond bottoms, allowing marsh edges to expand. The primary mechanism for future loss will continue to be erosion of marsh edges adjacent to open water areas. This unit may experience little net loss of emergent marsh, as closure of ponds and shallow open water offset the losses in other areas.

In addition to continued hydrologic management, a bank stabilization project, funded by CWPPRA, has been constructed along the eastern bank of the Burton-Sutton Canal. The project protects this unit's western boundary from breaching.

Fish and Wildlife Resources - This unit provides important feeding, nesting, and resting habitat for many species of wildlife and important habitat for many species of freshwater fish in open water, aquatic bed, and fresh marsh habitats. Freshwater finfish found in this unit include largemouth bass, crappie, bluegill, gar, channel catfish, and blue catfish. This unit is popular among recreational fishermen in pursuit of largemouth bass, crappie, and bluegill. Largemouth bass and channel catfish populations have been increasing in the area but are expected to stabilize by 2050.

Stable populations of seabirds, wading birds, shorebirds, rails, gallinules, coots, other resident and migrant birds, furbearers, rabbits, deer, and American alligators are projected to remain stable through 2050. Populations of dabbling and diving ducks and geese have been increasing throughout the area and are projected to stabilize in the future.

Infrastructure - There are no USACE infrastructure projects within this unit. Several pipelines border this unit along the Burton-Sutton and Starks North canals. This unit also contains one oil and/or natural gas well. There are no roads, railroads, or pipelines within the unit.

Previously Proposed Strategies -

Previously proposed restoration strategies for this unit focus on maintaining the unit as a freshwater impoundment by regulating water levels, conducting periodic drawdowns, and preventing saltwater intrusion. Other proposed strategies include 1) stabilizing the banks along canals to prevent breaching and loss of hydrologic management, 2) protecting marsh edges adjacent to large open water areas, and 3) installing additional water control structures to improve water level management.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh marshes and associated aquatic habitats. Coastal resource priorities include freshwater finfish, American alligators, and waterfowl. Other coastal uses and resources of importance for this unit are scientific study/education, and infrastructure such as roads, levees, and bridges.

Regional Ecosystem Strategies - Since this unit is impounded and the sole freshwater supply is rainwater, no regional ecosystem strategies are expected to impact this unit.

Benefits of Regional Strategies - There are no regional ecosystem strategies for this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies within this unit include improving water quality by reducing turbidity through the use of wave breaks, improving

hydrology by managing the marsh to lower water levels and placing control structures in North and South (Central) canals, and constructing terraces with vegetative plantings in the southeastern open water areas of the unit to serve as wave break levees. No programmatic strategies have been developed for this unit.

Perry Ridge

Location - This unit is bordered on the south by the GIWW, on the west by the Sabine River, and on the north and east by the Coastal Zone boundary. The entire mapping unit is located in Calcasieu Parish and contains 27,301 acres.

Habitat Description and Landscape Change - There was a marked shift toward more brackish marsh habitat from 1949 to 1968. In 1949, the area was composed of 35% fresh marsh, with the remaining 65% in the unknown category. The 1968 map reveals a 10% decrease in fresh marsh and the occurrence of 55% intermediate and 20% brackish marsh. This may reflect saltwater intrusion from Sabine Lake via the Sabine River and the GIWW. The unit currently includes approximately 27% intermediate marsh (7,370 acres), 29% fresh marsh (7,820 acres), 1% of swamp (170 acres), and 30% open water (8,190 acres). The remaining 14% incorporates upland, ridge, swamp, forest, or developed land (3,751 acres).

Historic Land Loss - In 1978, the Perry Ridge unit had 12,000 acres of marsh. From 1978-1990, there has been a gain of 3,190 acres within this area. The area

is considered geologically stable with no subsidence occurring.

Future Land Loss Projections - In 1990, this unit had 15,190 acres of marsh. No significant land loss is expected to occur through 2050 in this unit, based on the projected preservation of 880 acres in this area as a result of the CWPPRA Perry Ridge Shore Protection project (C/S-24, PCS-26I) approved in 1994. This project will stabilize the GIWW's north shoreline to prevent wake erosion and breaching, the leading potential cause of future land loss in this unit.

Fish and Wildlife Resources - The current trends in fishery populations are not known for this unit.

In the open water habitat, currently stable populations of seabirds are expected to decline by 2050, and stable populations of rails, gallinules, coots, other resident and migrant birds, and furbearers are projected to remain stable. Currently increasing populations of dabbling and diving ducks, geese, and American alligators are expected to stabilize in the future. In the fresh and intermediate marsh habitats, stable populations of seabirds, wading birds, shorebirds, rails, gallinules, coots, furbearers, rabbits, and deer are projected to remain stable through 2050. Stable populations of other resident and migrant open water/marsh birds are expected to decline. Presently increasing populations of dabbling and diving ducks and geese are projected to stabilize. In the hardwood forest habitats, bald eagles have potentially been eliminated, and there is no projected recovery. Stable populations

of dabbling ducks, furbearers, game mammals, and American alligators are expected to remain stable, and stable populations of other resident and migrant birds are expected to decline by 2050.

Infrastructure - The USACE maintains the Vinton Waterway and the GIWW. The Vinton Waterway, however, was deauthorized November 2, 1979, and is no longer functional. This mapping unit contains 2.2 miles of primary and 10.7 miles of tertiary roadways, but no secondary roads or railroads. Also located within this unit are ten miles of natural gas pipelines (largest diameter 18 inches) and 83 oil and/or natural gas wells.

Previously Proposed Strategies - The only previously proposed strategy is stabilizing the northern bank of the GIWW.

Coastal Use/Resource Objectives - The Calcasieu Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of the unit's freshwater marshes, which include freshwater finfish, American alligators, and waterfowl. Other coastal uses of importance to the unit include agriculture, grazing, recreation, and tourism.

Regional Ecosystem Strategies - Maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the GIWW east of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to benefit fresh marshes and associated aquatic habitats, which should enhance habitats for freshwater finfish, alligators, and waterfowl. Agriculture, grazing, and recreation and tourism will also benefit from these strategies. These strategies are expected to continue the wetland gain in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include beneficially utilizing material dredged from the GIWW and Sabine River to restore marsh and stabilizing the remainder of the GIWW north bank from Perry Ridge to the Sabine River. Programmatic strategies for this unit include addressing potential hydrologic impacts of the Trans-Texas Water Plan, and promoting freshwater releases from Toledo Bend.

Black Bayou

Location - This mapping unit is bordered on the west by the Sabine River and Sabine Lake, on the south by Pines Ridge, on the north by the GIWW, and on the east by Gum Cove Ridge, Bancroft Canal, Black Bayou, and Right Prong Canal. The majority of this unit is located within Cameron Parish, but a small portion of the northern boundary is located in Calcasieu Parish. This unit contains a total of 40,635 acres.

Habitat Description and Landscape Change - There has been a significant shift to more brackish marsh from 1949 to present. The 1949 map indicated the distribution of marsh types as 50% fresh, 20% intermediate, 25% brackish, and

5% unknown. By 1968, there was an increase of 15% in brackish marsh and 10% in intermediate marsh, corresponding to a 30% decrease in fresh marsh habitat. This may reflect saltwater intrusion via the Sabine-Neches and Calcasieu Ship channels. The unit currently consists of approximately 23% intermediate marsh (9,480 acres), 34% brackish marsh (13,750 acres), nominal fresh marsh (600 acres), and 33% open water (13,410 acres). The remainder incorporates upland, swamp, forest, or developed land.

Historic Land Loss - In 1978, the Black Bayou unit had 28,730 acres of marsh. Marsh loss from 1978-1990 was 4,900 acres. Land loss in this area has been attributed to altered hydrology, and wave/wake erosion along the eastern shoreline of Sabine Lake and the southern shore of the GIWW. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional loss of 6,400 acres of marsh (90% brackish and 10% intermediate) is projected to occur by 2050 in this unit. This is 27% of the remaining 1990 marsh (23,830 acres). This percentage is expected to decrease to 17%, however, as a result of the CWPPRA Black Bayou Hydrologic Restoration project (C/S-27, XCS-48), which was approved in 1996 and is projected to benefit 2,380 acres of brackish and 640 acres of intermediate marsh. Future land loss within this unit will most likely be caused by altered hydrology and wave/wake erosion.

Fish and Wildlife Resources - This unit provides habitat for a stable population

of several fresh to brackish water fisheries that include red and black drum, spotted seatrout, Gulf menhaden, and southern flounder. In addition, there are stable populations of blue crab, white and brown shrimp, and largemouth bass. All populations are expected to decrease by 2050, with the exception of largemouth bass, which will remain steady.

Stable furbearer populations in the open water, intermediate and brackish marsh, and hardwood forest habitats are projected to remain stable through 2050, as are stable open water populations of seabirds, other resident and migrant birds, and American alligators, and hardwood forest populations of American alligators. Stable marsh populations of seabirds, shorebirds, rails, gallinules, coots, other resident and migrant birds, rabbits and deer are expected to decline by 2050. Stable open water populations of rails, gallinules, and coots and stable hardwood forest populations of other resident and migrant birds, rabbits, and deer are expected to decline by 2050. Increasing open water populations of brown pelicans are projected to continue this trend, and increasing marsh populations of wading birds and American alligators are expected to stabilize by 2050. Increasing populations of dabbling and diving ducks and geese are expected to decline in marsh and hardwood forest habitats through 2050.

Infrastructure - The USACE has indicated that it is maintaining the Lake Charles Deep Water Channel (a.k.a. GIWW) for the 24.9 miles between the Calcasieu and Sabine rivers in order to

improve navigation. This mapping unit contains no primary or secondary roads or railroads, but has 16.4 miles of tertiary roads and 32.8 miles of crude oil and natural gas pipelines (largest diameter 8 inches). Other structures located within this unit are 306 oil and/or natural gas wells and two industrial groundwater intakes.

Previously Proposed Strategies - Strategies proposed for this unit in the past included bank stabilization and hydrologic management along the GIWW, Sabine River, Black Bayou, and Bancroft and Right Prong canals; freshwater diversion from these waterways; hydrologic management in fresh to brackish marshes; and marsh creation with dredged material from waterways.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of the unit's fresh to brackish water marshes and forested wetland habitats that include freshwater finfish, American alligators, and waterfowl. The committee also indicated the importance of continued management of the unit's navigation and port facilities, and oil and gas infrastructure.

Regional Ecosystem Strategies - Maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, salinity control in the GIWW east of the Sabine River, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Dedicated dredging of sediment for wetland creation may also benefit this unit.

Benefits of Regional Strategies - These strategies should benefit fresh, intermediate, and brackish marshes in this unit. This in turn should enhance habitats for freshwater finfish, alligators, and waterfowl while protecting oil and gas infrastructure. These strategies are expected to reduce land loss in this unit by slightly more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include freshwater introduction from the Sabine River (including a siphon from the Sabine Canal and the Vinton Drainage Ditch into Black Bayou) and hydrologic restoration through the National Marine Fisheries Service maintenance of the CWPPRA Black Bayou project through the year 2050. Another mapping unit strategy developed for this unit is beneficial use of dredged material from the Sabine River and the GIWW. The programmatic strategy for this unit is to develop a contingency plan for the Trans-Texas Water Plan.

Willow Bayou

Location - This unit is located entirely within Cameron Parish and is primarily within the Sabine NWR. The unit is bordered by Pines Ridge on the north, Sabine Lake on the west, the Burton-Sutton Canal on the east, and the Starks South Canal on the south. This unit contains a total of 36,470 acres.

Habitat Description and Landscape Change - Historically, the eastern two-

thirds of this unit was a mixture of fresh and intermediate marsh; the western one-third was classified as brackish marsh. The maps of 1968 and 1978 show a trend toward more brackish conditions; intermediate marsh occurred only in the southeastern corner and east-central portion of the unit. The 1988 vegetative type map classifies the majority of the unit as brackish marsh, with a small area of intermediate marsh located in the southeastern corner along Starks South Canal. Currently, the unit is approximately 7% intermediate marsh (2,500 acres) and 52% brackish marsh (18,960 acres), with the remaining 41% consisting of open water and upland habitats (15,010 acres).

Historic Land Loss - In 1932, the unit had 36,410 acres of marsh. Aerial photography, used for land loss calculations, did not provide coverage for the entire unit. Therefore, the land loss data for this unit is incomplete. However, most of the loss in this unit (13,810 acres) occurred from 1956-1974. From 1974-1990, 1,140 acres were lost (0.46% per year). Historical records from Sabine NWR indicate that sawgrass marshes and other low-salinity marshes in this unit began to deteriorate in the mid-1950's and 1960's. This period of loss coincides with enlargement of the Calcasieu Ship Channel (1951), Port Arthur Canal, and Sabine-Neches Ship Channel. A basin-wide increase in salinity caused areas of fresh and intermediate vegetation to die and large open water areas to form. Large, open water areas developed in the northeastern portion of the unit, around Greens Lake, and in the southern portion of the unit, south of the Willow Bayou Canal. Those areas contained deep,

organic, fresh marshes which quickly deteriorated from increased salinity and tidal exchange through canals connected to Sabine Lake.

Interior loss appears to have stabilized throughout much of this unit. Erosion along the edges of open water areas appears to be the primary mechanism for interior marsh loss. Historical records from Sabine NWR and field inspections indicate that in some areas marshhay cordgrass appeared to be stressed and dying. Also, shoreline erosion along Sabine Lake continues to be a problem. Periodic salinity spikes through Willow Bayou in the southern portion of the unit, and Greens Bayou in the northern portion of the unit, can cause the die-back of established fresh and intermediate marsh species. During high-rainfall years, recovery of broken marsh areas has been noted. Cattail, bullwhip, and other intermediate marsh plants colonize shallow water areas, and marsh edges expand into small ponds and other open water areas. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 5,190 acres of brackish marsh will be lost by 2050 without restoration. This is 24.2% of the remaining 1990 marsh (21,460 acres). Shoreline erosion along water bodies and altered hydrology will continue to be the leading causes of future land loss throughout this unit.

Fish and Wildlife Resources - This unit provides habitats for several species of freshwater finfish as well as several estuarine-dependent species. Largemouth bass, crappie, bluegill, gar, and blue catfish are some of the more

common freshwater species. Common estuarine-dependent species include white shrimp, brown shrimp, blue crab, Gulf menhaden, and red drum. Several species, including brown shrimp and blue crab, are important recreationally as well as commercially. Red and black drum, spotted seatrout, and American oyster populations are all increasing in the area. These populations are projected to decline by 2050. Gulf menhaden, southern flounder, and blue crab populations are stable, and white and brown shrimp populations are declining. All of these species are also projected to decline by 2050.

Migratory waterfowl utilize this area as wintering habitat. Wading birds also utilize shallow water areas to forage for small fish and invertebrates. A heron roost site has been identified in the northwestern portion of the unit, and two Neotropical cormorant nesting sites and spring heron rookeries have been identified in the southern portion of the unit. Muskrat and mink are common furbearers in the area, and the American alligator is a commercially important species found in the fresher portions of the unit. In the open water habitat, stable populations of seabirds, other resident and migrant birds, and furbearers are expected to remain stable through 2050, whereas currently stable populations of rails, gallinules, and coots are expected to decline. Currently declining populations of dabbling and diving ducks and stable goose populations are expected to decline in the future. Increasing American alligator populations should stabilize in the future, while increasing brown pelican populations should continue to increase through 2050. In the intermediate and

brackish marsh habitats, stable populations of seabirds, wading birds, geese, rails, gallinules, coots, other resident and migrant avifauna, rabbits, and deer are projected to decline, whereas stable populations of shorebirds and furbearers are expected to remain stable through 2050. Currently declining populations of dabbling and diving ducks are projected to continue declining. Currently increasing populations of American alligators are expected to stabilize in the future.

Infrastructure - There are no USACE infrastructure projects in this unit. Several pipelines follow the eastern boundary of the unit along the Burton-Sutton Canal. This unit contains eight oil and/or natural gas wells. There are no roads, railroads, or pipelines within the unit.

Previously Proposed Strategies - Previously proposed restoration strategies for this unit include 1) bank stabilization along canals to prevent breaching and exposure of marsh to increased exchange and saltwater intrusion, 2) shoreline protection adjacent to large open water areas with vegetative plantings and wave-stilling devices, 3) shoreline protection along Sabine Lake, and 4) utilization of water control structures and plugs to restore historic water flow patterns through bayous to reduce saltwater intrusion.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve the fresh to brackish water marshes and associated aquatic habitats. Coastal resource priorities

include American alligators, waterfowl, and non-game fish and wildlife species. Other coastal uses and resources of importance for this unit are agriculture and grazing, oil and gas infrastructure, roads, levees, and bridges.

Regional Ecosystem Strategies - Maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies will benefit fresh, intermediate, and brackish marshes and their associated aquatic habitats in this unit. This will enhance habitat value for alligators, waterfowl, and non-game fish and wildlife. Agricultural/grazing interests; oil and gas infrastructure; and roads, levees, and bridges will also be protected. These strategies are expected to reduce land loss in this unit by more than 50%.

Mapping Unit and Programmatic Strategies - Mapping unit strategies for this unit include terracing and vegetative plantings; stabilizing the shoreline along Sabine Lake; beneficially using material dredged from the Sabine-Neches Ship Channel; and improving hydrology by 1) maintaining freshwater inflows from the Sabine River, 2) managing Gray's Canal in a manner similar to the Cameron-Creole Watershed Management Plan, 3) developing a contingency plan for the Trans-Texas Water Plan, 4) plugging Willow Bayou Canal and Gray's Ditch, and 5) placing control structures in the Burton-Sutton Canal. The programmatic

strategies developed for this unit include maintaining freshwater inflows from the Sabine River and developing a contingency plan for the Trans-Texas Water Plan.

East Johnson's Bayou

Location - This mapping unit is located east of Sabine Lake and is bordered by Deep Bayou on the west, Louisiana Highway 82 on the south, South Line Canal and Sabine NWR on the north, and the Second Bayou unit on the east. This unit is located in Cameron Parish and contains 27,064 acres.

Habitat Description and Landscape Change - In 1949, this unit was divided evenly between intermediate and brackish marsh. By 1968, the unit had transformed into an area that was comprised of 70% intermediate marsh and 30% brackish marsh habitats. This indicated that overall salinity declined in the unit. As of 1990, the habitat within this unit was classified as 7% fresh marsh (1,840 acres), 79% intermediate marsh (21,380 acres), and nominal brackish marsh (280 acres). The remainder consists of open water, chenier ridge, spoil bank shrub/scrub, and agricultural habitats.

Historic Land Loss - In 1932, this mapping unit had 26,270 acres of marsh. Total marsh loss within this unit has been 2,770 acres. Much of this loss (1,520 acres) occurred from 1956-1974. The land loss rate from 1974-1990 was 0.47% per year. Altered hydrology has caused the majority of the land loss in this region. Many natural bayous have been channelized; this provides an efficient conduit for saltwater intrusion.

Other causes of land loss are wave erosion and herbivory. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - In 1990, this unit had 23,500 acres of marsh. By 2050, 5,790 acres of intermediate marsh within this unit are expected to be lost. This translates to 25% of the total remaining marsh in this mapping unit.

Fish and Wildlife Resources - Stable fisheries exist in this unit for red and black drum, Gulf menhaden, southern flounder, and blue crab. All of these populations are projected to increase by 2050. Spotted seatrout and white and brown shrimp populations, currently unknown, are also projected to increase by 2050. Stable open water populations of seabirds, rails, gallinules, coots, other resident and migrant birds, and furbearers are projected to remain stable through 2050. Presently increasing American alligator populations are projected to stabilize, while presently increasing populations of dabbling and diving ducks and geese are projected to decline throughout the area by 2050. Stable marsh populations of furbearers are projected to remain stable, whereas stable marsh populations of seabirds, shorebirds, raptors, gallinules, coots, and other resident and migrant birds are expected to decline by 2050. Currently increasing populations of wading birds are projected to stabilize. Although present marsh deer populations are stable, no projections are available.

Infrastructure - This mapping unit contains no primary or secondary roads or railroads, but has 15.4 miles of tertiary roads and 31 miles of natural gas

pipelines (largest diameter 36 inches). Also located within this unit are 303 oil and/or natural gas wells and two drainage pump stations.

Previously Proposed Strategies -

Protecting and maintaining the function of the chenier ridges has been stressed as an effective way to prevent the northward progression of salt water from the gulf. Stabilizing canal banks and restoring their hydrologic integrity have also been suggested means of marsh protection and restoration. Hydrologic management of the fresh to brackish marshes of the unit has also been proposed.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its management objective for this unit is to continue to preserve fresh to brackish marsh habitats. Specific coastal use priorities include American alligator and furbearer harvest, waterfowl habitat, agriculture and grazing, and communities.

Regional Ecosystem Strategies - Maintenance of Sabine River inflow, salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit. In addition, stabilization of the gulf shoreline between Calcasieu Pass and Johnson's Bayou is expected to benefit this unit.

Benefits of Regional Strategies - These strategies should benefit fresh to brackish marshes and associated aquatic habitats in this unit. This should

enhance habitats for alligators, furbearers, and waterfowl while protecting agricultural/grazing interests. These strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - The mapping unit strategies within this unit are to restore hydrologic barriers in Deep Bayou, to restore hydrology in the Burton-Sutton Canal, and herbivory control throughout the area. A programmatic strategy that has been developed for this unit is to address the bullwhip mortality issue.

Johnson's Bayou Ridge

Location - This mapping unit is bordered on the south by the Gulf of Mexico for an expanse of approximately ten miles. The unit is bordered on the north by Hackberry Ridge, meets with Louisiana Highway 82 at the town of Johnson's Bayou, and extends westward for approximately ten miles. This unit is entirely located within Cameron Parish and contains 4,299 acres.

Habitat Description and Landscape Change - The 1949 map depicts 100% of the habitat as beach and associated marshes. The 1968 map shows that 40% of this unit was saline marsh, with 5% brackish and intermediate marshes, and the rest being chenier ridge habitat. Since 1968, approximately 25% of the ridge has shifted to brackish marsh. Current habitats include approximately 43% saline marsh (1,830 acres), 30% brackish marsh (1,290 acres), and 5% open water (215 acres); the remaining 22% incorporates upland, chenier ridge, swamp, forest, or developed land habitats (964 acres).

Historic Land Loss - Marsh loss in this unit was 1,195 acres from 1978-1990. There were approximately 4,315 acres of brackish and saline marsh present as of 1978 in this unit. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 1,070 acres of marsh (60% brackish and 40% saline) are projected to be lost by 2050. This is 34% of the remaining 1990 marsh (3,120 acres). Shoreline erosion and saltwater intrusion will most likely continue to be the leading causes of land loss within this unit.

Fish and Wildlife Resources - The Johnson's Bayou Ridge unit is home to stable populations of red and black drum, spotted seatrout, Gulf menhaden, American oyster, southern flounder, and blue crab, which generate a large portion of the fishery revenue in southern Cameron Parish. All of these populations are projected to remain steady through 2050. The current trend, however, shows decreases in spotted seatrout and white and brown shrimp populations within the unit. All of these species are also projected to stabilize by 2050.

Open water, brackish and saline marsh, hardwood forest, barrier beach, and agricultural/upland habitats are all found within this unit. Throughout the study area, furbearer and American alligator populations have been stable and are projected to remain so through 2050. Stable rabbit and deer populations in the marsh and upland areas are expected to decline, while they are projected to remain stable in the hardwood forest habitat through 2050. Currently stable seabird populations are expected to

remain so in the open water and barrier beach habitats, but to decline in the marsh habitats. Wading bird populations in the marsh habitats (currently increasing) and in the barrier beach and upland habitats (currently stable) are projected to remain stable by 2050. Diving and dabbling ducks and geese are currently increasing in the open water, marsh, and upland habitats, but are expected to decline in the future. Stable populations of hardwood forest dabbling ducks are expected to remain stable. Shorebird populations in the marsh, barrier beach, and upland areas are currently stable, but only the barrier beach and upland populations will remain stable in the future. Populations in the other two areas will decline. Raptors, rails, gallinules, coots, and other marsh/open water resident and migrant birds are currently stable in the marsh and upland areas but are expected to decline by 2050. The same trends hold for hardwood forest populations of other resident and migrant woodland birds. Currently stable populations of rails, gallinules, coots, and other resident and migrant birds in the open water areas will remain stable. Currently increasing open water populations of brown pelicans are expected to continue increasing through 2050.

Infrastructure - The USACE has indicated that it has no infrastructure projects within this unit. In addition to Louisiana Highway 82, which borders this unit on the northeast, there are 1.4 miles of secondary and 0.5 miles of tertiary roads within this unit. Also located in this area are 14 oil and/or natural gas wells and 2.5 miles of natural gas pipelines (largest diameter 24 inches).

Previously Proposed Strategies -

According to the 1993 CWPPRA Restoration Plan, the major strategies for this unit are to restore the gulf shoreline and preserve the ridge function.

Although strategies for this area have not been addressed within other restoration plans, Cameron Parish has indicated the need to restore and protect the rapidly eroding gulf shoreline. This could most likely be done through the use of segmented offshore breakwaters, such as those used along the Peveto to Holly Beach shoreline.

Coastal Use/Resource Objectives -

The Cameron Parish Wetlands Advisory Committee completed a survey that indicated the public's priorities for coastal resource usage within the Johnson's Bayou Ridge unit. They specified a need for continued management of the area's intermediate marshes, as well as the chenier shoreline. This area includes saltwater finfish, non-game fish and wildlife, and recreation and tourism. The committee had also indicated that this unit was critical for storm abatement and protection of the communities' roads and infrastructure.

Regional Ecosystem Strategies -

Restoration of longshore sediment flow across the mouth of Calcasieu Pass is a regional ecosystem strategy that is expected to benefit this unit.

Benefits of Regional Strategies -

This strategy is expected to benefit the brackish and saline marshes and their associated aquatic habitats and the chenier barrier shoreline. This is expected to enhance habitats for saltwater finfish and non-game fish and wildlife. Recreation and tourism should

also be enhanced, and increased storm buffering capacity will benefit communities, roads, levees, and bridges. This strategy is not expected to significantly reduce land loss in this unit.

Mapping Unit and Programmatic Strategies -

Mapping unit strategies recommended for this unit include maintaining the natural chenier ridge for Neotropical bird habitat and constructing sacrificial feeder berms just west of the Constance Beach breakwater system. In addition, the programmatic strategy devised for this unit includes maintaining the chenier ridge habitat for Neotropical bird migration through policy and study formulation. No local strategies have been developed for this unit.

West Johnson's Bayou

Location - This unit is bordered on the west by Sabine Lake, on the south by Buck Ridge, on the east by Deep Bayou, and on the north by a portion of Gray's Ditch. The entire mapping unit is located within Cameron Parish and contains 13,257 acres.

Habitat Description and Landscape

Change - Little change in marsh type has taken place from 1949 to the present. The 1949 map indicates an area composed of 85% brackish marsh, and 5% each of saline marsh, intermediate marsh, and beach. The 1968 map shows an area with 75% brackish marsh, and 25% intermediate marsh. The unit currently contains approximately 83% brackish marsh (11,060 acres), 3% intermediate marsh (430 acres), and 13% open water (1,723 acres). The remaining

1% incorporates upland, swamp, forest, or developed land (44 acres).

Historic Land Loss - In 1978, this mapping unit had 12,160 acres of marsh. Land loss from 1978-1990 was 670 acres. Land loss in this area has mainly been caused by altered hydrology and wave erosion along the facing shoreline of Sabine Lake. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 2,510 acres of brackish marsh will be lost by 2050 within this unit. This is 22% of the remaining 1990 marsh (11,490 acres). Shoreline erosion and altered hydrology will continue to be the leading causes of future land loss throughout this unit.

Fish and Wildlife Resources - Currently, there are stable populations of several fresh to brackish water fish species within the unit (including red and black drum, Gulf menhaden, southern flounder, and blue crab). All of these populations are projected to increase by 2050. Population trends for spotted seatrout, white shrimp, and brown shrimp are currently unknown, but are also projected to increase by 2050.

In the open water habitat, increasing brown pelican populations are expected to continue to increase through 2050, whereas increasing American alligator populations are projected to stabilize. Increasing populations of dabbling and diving ducks and geese are projected to decline by 2050. Stable populations of seabirds, rails, gallinules, coots, other resident and migrant avifauna, and furbearers are projected to remain stable.

In brackish marsh habitat, stable populations of seabirds, shorebirds, raptors, rails, gallinules, coots, other resident and migrant avifauna, rabbits, and deer are expected to decline by 2050. Stable populations of furbearers are expected to remain stable. Increasing populations of wading birds, shorebirds, dabbling and diving ducks, and geese are projected to decline in the future. Increasing American alligator populations are expected to stabilize by 2050. The accuracy of these trends will, in large part, be determined by future inflows of the Sabine River. If the Trans-Texas Water Plan is implemented, most of these renewable resources would be expected to decline.

Infrastructure - This area contains no primary or secondary roads or railroads, but has 1.8 miles of tertiary roads, 3.7 miles of natural gas pipelines (largest diameter 36 inches), and 13 oil and/or natural gas wells.

Previously Proposed Strategies - Strategies proposed in the past for this unit include protecting the function of Buck Ridge, managing the intermediate to brackish marsh hydrology located within the unit, and stabilizing the banks of navigation canals.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's intermediate to brackish marsh habitat, which includes American alligators and waterfowl. This unit is also important for agriculture and grazing, navigation, and port facilities.

Regional Ecosystem Strategies - Salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies will benefit fresh, intermediate, and brackish marshes and their associated aquatic habitats in this unit. This should in turn enhance habitats for alligators and waterfowl while protecting agricultural/grazing interests. These strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies developed for this unit include shoreline protection along Sabine Lake, the beneficial use of material dredged from the Sabine Ship Channel, and hydrologic restoration by plugging canals in the area. Programmatic strategies developed for this unit include maintaining the Toledo Bend-Sabine Lake freshwater inflows and developing a contingency plan for the Trans-Texas Water Plan.

Sabine Lake Ridges

Location - This triangular mapping unit is bordered on the south by the Gulf of Mexico and Hackberry Ridge, on the west by the Sabine River and Sabine Pass, and on the north by Buck Ridge. The entire unit is located within Cameron Parish and contains 34,268 acres.

Habitat Description and Landscape Change - The marsh types in this unit have recently shifted toward more fresh

marshes. In 1949, the area was 70% brackish marsh, 10% saline marsh, and 20% beach or chenier. By 1968, the area was 60% brackish marsh, 15% saline marsh, and 20% of the previous beach habitat had converted to intermediate marsh. The habitats in the unit currently consist of approximately 11% saline marsh (3,800 acres), 35% brackish marsh (12,100 acres), 24% intermediate marsh (8,300 acres), 5% fresh marsh (1,810 acres), and 5% open water (1,713 acres), with the remaining 19% consisting of upland, swamp, forest, or developed land (6,545 acres).

Historic Land Loss - In 1978, this mapping unit had 33,420 acres of marsh. Land loss from 1978-1990 was 7,410 acres. The leading causes of land loss in this area have been altered hydrology and wave erosion along the shorelines of Sabine Lake and the Gulf of Mexico. Subsidence in this area is estimated at 0-1 ft/century.

Future Land Loss Projections - An additional 3,360 acres of marsh (90% brackish and 10% intermediate) will be lost by 2050. This is 13% of the remaining 1990 marsh (26,010 acres). Altered hydrology and wave erosion along the gulf and Sabine Lake will probably remain the leading causes of marsh loss for this unit.

Fish and Wildlife Resources - There has been a marked increase in several brackish to saline fish and invertebrate species in this unit (red and black drum, spotted seatrout, and American oysters). These populations are projected to stabilize by 2050. Populations of other species such as Gulf menhaden, southern flounder, blue crab, largemouth bass,

and channel catfish have stabilized. Gulf menhaden, largemouth bass, and channel catfish are projected to increase by 2050, while blue crab and southern flounder populations will remain stable through 2050. White and brown shrimp populations have decreased throughout the mapping unit, but are projected to stabilize by 2050.

In the open water habitat, increasing populations of brown pelicans are projected to increase, while increasing populations of geese will stabilize by 2050. Stable populations of seabirds, diving and dabbling ducks, rails, gallinules, coots, other resident and migrant avifauna, furbearers, and American alligators are projected to remain stable through 2050. In the fresh marsh habitats, stable populations of seabirds, wading birds, shorebirds, and other resident and migrant open water/marsh birds are projected to decline in the future. Stable populations of diving and dabbling ducks, raptors, rails, gallinules, coots, furbearers, rabbits, deer, and American alligators are projected to remain stable, and increasing populations of geese will stabilize in the future. In the intermediate, brackish, and saline marsh habitats, stable populations of seabirds, wading birds, shorebirds, dabbling and diving ducks, rails, gallinules, coots, other migrant and resident avifauna, rabbits, and deer are all projected to decline by 2050. Stable populations of raptors and furbearers are expected to remain stable, and increasing populations of geese are projected to decline in the future. In the hardwood forest habitat, stable populations of other woodland resident and migrant birds are expected to decline. Stable populations

of furbearers, rabbits, deer, and American alligators are projected to remain stable through 2050. In the barrier beach habitat, stable populations of seabirds, wading birds, and shorebirds are expected to remain stable.

Infrastructure - The USACE maintains Sabine Pass for navigational purposes. This mapping unit contains no primary roads, but has 14.5 miles of secondary roads, 14.1 miles of tertiary roads, and 39.4 miles of natural gas pipelines (largest diameter 36 inches). Also located within this unit are 171 oil and/or natural gas wells, and three drainage pump stations.

Previously Proposed Strategies - Previously proposed strategies for this unit include protecting the ridge function, stabilizing the banks of navigation channels, managing the brackish to saline marsh hydrology, managing the chenier zone, and using dredged material to restore marsh. The development of reef zones has also been proposed to protect the lake shoreline.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priorities for coastal resource usage emphasize management of this unit's fresh to brackish marshes and chenier ridges. The committee has also indicated the importance of this unit to waterfowl, agriculture and grazing, and storm buffering capacity. Management priority was also given by the committee to navigation and port facilities, oil and gas infrastructure, and the roads, bridges, and levees within the nearby communities.

Regional Ecosystem Strategies - Salinity control at Sabine Pass, salinity reduction of Sabine Lake at the causeway, and salinity control on the eastern shoreline of Sabine Lake are regional strategies which are expected to benefit this unit.

Benefits of Regional Strategies - These strategies are expected to benefit fresh, intermediate, brackish, and saline marshes and their associated aquatic habitats. This should enhance habitat for waterfowl and protect agriculture/grazing interests. Increased storm buffering capacity should help protect navigation ports and facilities; oil and gas infrastructure; roads, levees, and bridges; and communities. These strategies are expected to reduce land loss in this unit.

Mapping Unit and Programmatic Strategies - Mapping unit strategies attributed to this unit include shoreline protection along Sabine Lake and along the gulf shoreline east of the Sabine Pass Jetty, beneficially utilizing material dredged from the Sabine Ship Channel for marsh restoration, restoring hydrology within the unit by plugging canals, and restoring hydrology at Lighthouse Bayou. Programmatic strategies developed for this unit include addressing the impacts of the Trans-Texas Water Plan and maintaining the Toledo Bend-Sabine Lake freshwater inflows.

Sabine Lake

Location - The Sabine Lake mapping unit is entirely encompassed by the Louisiana portion of Sabine Lake, which is located in the western portion of

Cameron Parish, along the Louisiana/Texas border.

Habitat Description and Landscape Change - Comparing the 1949 and 1968 habitat maps, there was no change in marsh type throughout these years and into the present. Both maps indicate that the unit was 100% brackish. Current habitats include approximately 98% open water, with the remainder incorporating fragments of brackish marsh and submerged aquatics.

Historic Land Loss - The USACE has not collected information about historic land loss within the Sabine Lake unit.

Future Land Loss Projections - The Region 4 Technical Team has not collected information about future land loss within the Sabine Lake unit.

Fish and Wildlife Resources - This unit is a brackish water body that sustains stable populations of Gulf menhaden, southern flounder, blue crab, and channel catfish. All of these species are projected to remain stable through 2050. Several species have declined in abundance within this unit (e.g., white and brown shrimp), but are projected to stabilize by 2050. However, species such as red and black drum, spotted seatrout, and the American oyster are currently increasing in population. These populations will stabilize by 2050. The population of largemouth bass has not been assessed throughout this unit.

Infrastructure - Infrastructure within this unit has not been determined.

Previously Proposed Strategies - Previously proposed strategies for this

unit include stabilizing the banks of navigation channels and managing the brackish and intermediate hydrology within the unit.

Coastal Use/Resource Objectives - The Cameron Parish Wetlands Advisory Committee has indicated that its priority for coastal resource usage in this unit is to maintain Sabine Lake as a lower-salinity, brackish water estuary to benefit associated brackish water fishery, wildlife, and plant species.

Regional Ecosystem Strategies - There is no wetland habitat in this unit, so no regional strategies apply directly to this unit. However, if lake-bottom sediments are used as a source of spoil for dedicated dredging for marsh creation, portions of the unit will be affected.

Benefits of Regional Strategies - The effects of dredging lake-bottom sediments for marsh creation will have to be addressed on a case-by-case basis.

Mapping Unit and Programmatic Strategies - The mapping unit strategies attributed to this unit include the beneficial use of dredged material and to improve hydrology by managing the area as a low-salinity, brackish water lake with control structures to be constructed in the future (either in the Sabine Ship Channel or along its eastern shoreline). Programmatic strategies developed for this unit include increasing water quality by reducing pollution with the best management techniques practical and addressing potential hydrologic impacts of the Trans-Texas Water Plan.

SECTION 4

PRIOR AND PREDICTED LAND LOSS, PREVIOUS STRATEGIES AND COAST 2050 STRATEGIES

Wetland Table

Calculation of Rate of Loss in the Absence of Restoration

There are two databases showing land loss in coastal Louisiana.

- ! The database developed by the National Wetlands Research Center of the U.S. Geological Survey (USGS) covers the entire coast, indicates habitat types, and shows loss and gain from 1956 to 1990.

- ! The database developed by the New Orleans District of the U.S. Army Corps of Engineers (USACE) covers the coastal marshes over a sixty-year period of record, divided into four time intervals. The product of this data base is a set of seven maps depicting the location of land loss per time period. The database is highly consistent, because the same two geologists determined the land/water interface for all periods. However, it does not cover all of the cypress swamps, does not include the drainage of the Sabine River, and does not show habitat types.

In 1991, as part of the CWPPRA planning process, an interagency group of marsh experts gathered to discuss which database to use to project marsh loss for the Louisiana Coastal Wetlands Restoration Plan (published in 1993). The group determined that the USACE database was the most appropriate to use to project future loss, because it had the most extensive loss record and the land/water interface had been consistently delineated. Since land gain was infrequent and localized, the group determined that this parameter was not necessary to project future losses.

The 1991 interagency group chose 1974 through 1990 as the most appropriate base period to determine future loss. The average loss statewide was slightly more than 30 square miles per year from 1974 to 1983. The loss dropped to just over 25 square miles per year in the most recently analyzed time period, 1983 to 1990. There are significant uncertainties in any 60-year projection into the future—rate of sea level rise, frequency of hurricanes and floods, rate of development, etc. The group determined that including the higher 1974-1983 loss with the 1983-1990 loss would compensate for a possible increase in sea level rise. They also felt that the 1974-1990 loss rate most accurately reflected the post-1990 loss rate. Thus, this rate was used in the 1993 CWPPRA

"Louisiana Coastal Wetlands Restoration Plan" and in subsequent feasibility studies conducted under CWPPRA.

Subsequently, as part of feasibility studies done under CWPPRA, another group of marsh experts (including some members of the 1991 group) analyzed the loss patterns on the USACE land loss maps. The group drew polygons around areas where loss patterns seemed to have the same cause. The acres lost in each polygon of similar loss were determined for each of the four time periods. The annual percent of marsh loss between 1974 and 1990 was determined for each polygon. For projection purposes, these rates were assumed to continue into the future.

During the Coast 2050 planning process, local experts on Coast 2050 Regional Planning Teams adjusted a few of the 1974-1990 loss rates to account for one-time losses and false loss associated with extremely high water levels.

Another adjustment during the Coast 2050 process was done because the USACE database included only land to water changes, and therefore did not show embankments of dredged material along channels as land loss. To partially correct this, the most extensive spoil banks, those along the Mississippi River Gulf Outlet, were measured and counted as loss. Since the Louisiana Coastal Wetlands Restoration Plan is now in place, all future loss due to development will be mitigated. Thus, the 1974-1990 loss due to canals, borrow pits, etc. was not included in the rate to be used for projections. Since the Sabine River watershed was not covered by the USACE database, the 1978-1990 loss

rate from the USGS database was used in that area.

The USACE database covered all habitats in the coastal area, including the extensive agricultural and residential areas adjacent to the Mississippi River and Bayou Lafourche. The polygons of similar loss included these non-wetland areas. The Coast 2050 experts realized that including these developed areas in the base from which loss was determined produced an inaccurately low loss rate, since the loss rate should apply only to wetlands acreage. Accordingly, the USGS database was used to determine the acres of marsh in 1990 in each polygon. All loss on the USACE loss maps was determined to be in marsh. The adjusted 1974-1990 loss rate was applied to the acres of marsh in 1990 and then to the remaining acres of marsh each year from 1991 through 2050. This determined the acres remaining in 2050 for each polygon, if no restoration occurred.

Adjustment for Restoration Projects

There is one large freshwater diversion from the Mississippi River at Caernarvon and a second under construction at Davis Pond. There are nearly 60 coastal restoration projects authorized on the first six CWPPRA Priority Lists. All these projects either reduce future marsh loss or create marsh. For CWPPRA projects, the additional acres present in the project area at the end of 20 years (as determined by the Wetland Value Assessment) were used to determine the benefits between 1990 and 2010. Then, the longevity of each project (as determined by the CWPPRA

Environmental Working Group) was used to determine the marsh loss reduction/marsh gain for each project for years 2011 through 2050. If the project had longevity of greater than 50 years, the WVA benefits were continued until 2050. If the longevity was less than 30 years, after year 30, the loss rate was returned to the 1974-1990 rate.

The benefitted acreage in each polygon was calculated as described above. This acreage was then subtracted from the acres projected to be lost. This determined the net amount of marsh to be lost in each polygon.

Location of Lost Land

In order to determine where within each polygon the above loss might be located, the 1993 LANDSAT image was used. The polygons, diversion, and CWPPRA project boundaries were obtained from the Louisiana Department of Natural Resources (DNR). The Natural Systems Engineering Laboratory at LSU developed the prediction maps. They selectively modified parts of the LANDSAT image to reflect the net acreage of marsh lost in each polygon by 2050.

Each 25 m pixel on the image contained brightness based on combining bands from the original LANDSAT data. Each cell was assigned a pseudo color – dark blue for the lowest end of the brightness range and bright white for the highest end. Generally, solid marsh areas had a high brightness while open water had a low brightness. Areas with an intermediate brightness were assumed to be broken marsh with brightness corresponding to the percentage of land.

Brightness was then used as land/water boundary criteria. Areas with brightness higher than the criterion were considered land and those with lower brightness were classified as water.

In order to make the image "lose" land, the criterion for land was then adjusted to a higher value that resulted in less land in the image. This was done iteratively until the amount of land in each polygon matched the acreage predicted to remain in that polygon in 2050 (Table 4-1). Reducing the brightness criterion removed land from the image. The amount of land preserved by CWPPRA projects and the river diversions was then added back to the image in each polygon. In order to clearly indicate the land lost and gained through 2050, maps were printed to show the base marsh in green, the areas to be lost in red, and areas of gain in black. The result is a map of coastal Louisiana that indicates what marsh areas may be lost or gained by 2050. Refer to Figures 1-1 and 1-2 in the Coast 2050 main report. The overall results of the projection also are presented in Chapter 5 of the report.

Prediction of Loss Through 2050 by Mapping Unit

The USGS database was used to determine the acres of swamp and various types of marsh in each mapping unit in 1990 (Table 4-1). The USACE database was used to determine historic losses and the rate of loss from 1974-1990 for each mapping unit. The benefits of the CWPPRA projects and freshwater diversions were also determined by mapping unit and habitat type. The habitat types to be lost were

estimated by superimposing the 2050 loss projection maps onto the 1990 habitat maps. This methodology assumes that the location of future habitat zones will not shift. Since these zones have shifted both north and south in the past, the assumption that they will remain as they were in 1990 is simplistic. Since the USACE database did not include swamps, academics with experience in analyzing swamp loss were contacted and their help was used to determine the amount of swamp predicted to be lost in each mapping unit.

Previously Proposed Strategies Table

Data in this table (Table 4-2) came from an extensive review of past coastal restoration plans, studies, and current projects. Following are the sources and citations for each of the abbreviated footnotes in the table:

Blueprint

Gagliano, S.M. 1994. An environmental-economic blueprint for restoring the Louisiana coastal zone: The state plan. Report of the Governor's Office of Coastal Activities, Science Advisory Panel Workshop. Coastal Environments, Inc., Baton Rouge, La.

CCEER

van Heerden, I.L. 1994. A long-term comprehensive management plan for coastal Louisiana to ensure

sustainable biological productivity, economic growth, and the continued existence of its unique culture and heritage. Center for Coastal, Energy, and Environmental Resources, Louisiana State University. Baton Rouge, La.

Coalition to Restore Coastal Louisiana

Coalition to Restore Coastal Louisiana. 1989. Coastal Louisiana: Here today and gone tomorrow? A citizen's program for saving the Mississippi River Delta region to protect its heritage, economy, and environment. Baton Rouge, La. 70 pp.

CWPPRA Basin Report

Louisiana Coastal Wetlands Conservation and Restoration Task Force. 1993. Coastal Wetlands Planning, Protection, and Restoration Act: Louisiana Coastal Wetlands Restoration Plan. Main report and environmental impact statement. Louisiana Coastal Wetlands Conservation and Restoration Task Force, Baton Rouge, La.

Gagliano and van Beek, 1993

Gagliano, S.M., and J.L. van Beek. 1993. A long-term plan for Louisiana's coastal wetlands. Louisiana Department of Natural Resources, Office of Coastal Restoration, Baton Rouge, La.

***NRCS Mermentau
River Basin Plan***

Natural Resources Conservation Service.
1997. Mermentau: Cooperative
river basin study report. U.S.
Department of Agriculture,
Natural Resources Conservation
Service. Alexandria, La.

***NRCS Calcasieu-Sabine
River Basin Plan***

Natural Resources Conservation Service.
1993. Calcasieu-Sabine:
Cooperative river basin study
report. U.S. Department of
Agriculture, Soil Conservation
Service, Alexandria, La. 152 pp.

***NRCS Cameron-Creole
Watershed Plan***

USDA - Soil Conservation Service.
1967. Work plan for watershed
protection, flood prevention and
agricultural water management,
Cameron-Creole watershed,
Cameron Parish, Louisiana. U.S.
Department of Agriculture, Soil
Conservation Service,
Alexandria, LA. 44 pp.

**Region 4 Coast 2050
Strategies Tables**

These (Tables 4-3, 4-4, and 4-5) are the
final Regional, Mapping Unit, and
Programmatic strategies that were
formulated and finalized during the year
and a half long Coast 2050 process.
These strategies were formulated
through a joint Federal, State, and local
effort that involved agency officials and
members of the public.

Table 4-1. Region 4 wetland loss.

MERMENTAU BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Cameron Prairie	Fresh marsh	No change	Low 0-1 ft per century
Lacassine (Pool only)	Fresh marsh	No change	Low 0-1 ft per century
Lacassine (South and East)	Fresh marsh	No change	Low 0-1 ft per century
Big Burn	Fresh marsh (F) Beach/Chenier (Be)	49-68 - to F, Be, and I 68-88 - to F, I, and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Cameron Prairie	Acres marsh in 1932	11,060	no significant loss	Acres marsh in 1990	9,680
	Acres lost 1932-1956	0		Acres lost by 2050	2,115
	Acres lost 1956-1974	650		Acres preserved CWPPRA	120
	Acres lost 1974-1983	230		% 1990 wetland acres lost CWPPRA	21
	Acres lost 1983-1990	500			
Lacassine (Pool only)	Acres marsh in 1932	10,920	Wave Erosion - 1, H	Acres marsh in 1990	5,570
	Acres lost 1932-1956	0	Wake Erosion - 1, H	Acres lost by 2050	0
	Acres lost 1956-1974	920	Herbivory - 2, H	% 1990 wetland acres lost	0
	Acres lost 1974-1983	4,140			
	Acres lost 1983-1990	290			
Lacassine (South and East)	Acres marsh in 1932	11,580	Wave Erosion - 1, H, C	Acres marsh in 1990	9,570
	Acres lost 1932-1956	170	Wake Erosion - 1, H, C	Acres lost by 2050	1,820
	Acres lost 1956-1974	1,250	Herbivory - 2, H	% 1990 wetland acres lost	19
	Acres lost 1974-1983	320			
	Acres lost 1983-1990	270			
Big Burn	Acres marsh in 1932	57880	Direct Removal - 1, H	Acres marsh in 1990	42,980
	Acres lost 1932-1956	360	Altered Hydrology - 2, H	Acres lost by 2050	5,550
	Acres lost 1956-1974	10,040	Wave Erosion - 3, H, C	% 1990 wetland acres lost	13
	Acres lost 1974-1983	3,200	Wake Erosion - 3, H, C		
	Acres lost 1983-1990	1,300			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Middle Marsh	Intermediate marsh (I) Chenier (C)	49-68 - to F, I, and C 68-88 - No change	Low 0-1 ft per century
Grand Chenier	Fresh marsh (F) Saline marsh (S)	49-68 - to B, I, and Unknown 68-88 - to F, I, B, and Water	Low 0-1 ft per century
Oak Grove	Fresh marsh (F) Chenier (C) Brackish marsh (B) Intermediate marsh (I)	No change	Low 0-1 ft per century
Lower Mud Lake	Brackish marsh (B) Saline marsh (S) Beach (Be)	49-68 - to S 68-88 - to S and Water	Low 0-1 ft per century
Hog Bayou	Brackish marsh (B) Saline marsh (S)	49-68 - No change 68-88 - to B, S, F, and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Middle Marsh	Acres marsh in 1932	12,675	Altered Hydrology- 1, H, C	Acres marsh in 1990	12,180
	Acres lost 1932-1956	25		Acres lost by 2050	1,570
	Acres lost 1956-1974	125		% 1990 wetland acres lost	13
	Acres lost 1974-1983	165			
	Acres lost 1983-1990	180			
Grand Chenier	Acres marsh in 1932	12,210	Impoundment- 1, H Wave Erosion- 2, H	Acres marsh in 1990	6,170
	Acres lost 1932-1956	220		Acres lost by 2050	0
	Acres lost 1956-1974	2,500		% 1990 wetland acres lost	0
	Acres lost 1974-1983	2,000			
	Acres lost 1983-1990	1,320			
Oak Grove	Acres marsh in 1932	26,210	Wave Erosion- 1, H, C Impoundment- 2, C	Acres marsh in 1990	25,050
	Acres lost 1932-1956	10		Acres lost by 2050	890
	Acres lost 1956-1974	870		% 1990 wetland acres lost	4
	Acres lost 1974-1983	65			
	Acres lost 1983-1990	215			
Lower Mud Lake	Acres marsh in 1932	3,810	Wave Erosion- 1, H, C Wake Erosion- 2, H, C	Acres marsh in 1990	2,840
	Acres lost 1932-1956	320		Acres lost by 2050	525
	Acres lost 1956-1974	500		% 1990 wetland acres lost	19
	Acres lost 1974-1983	60			
	Acres lost 1983-1990	90			
Hog Bayou	Acres marsh in 1932	24,010	Altered Hydrology- 1, H Impoundment- 1, H Wave Erosion- 2, H, C Wake Erosion- 3, H, C	Acres marsh in 1990	14,780
	Acres lost 1932-1956	3,190		Acres lost by 2050	1,200
	Acres lost 1956-1974	4,050		% 1990 wetland acres lost	8
	Acres lost 1974-1983	220			
	Acres lost 1983-1990	1,770			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

MERMENAU BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
North Grand Lake	Fresh marsh Open water	No change	Low 0-1 ft per century
Little Pecan	Fresh marsh Intermediate marsh Brackish marsh Swamp Chenier	No change	Low 0-1 ft per century
Rockefeller	Brackish marsh (B) Fresh marsh (F) Beach (Be) Saline marsh (S)	49-68 - Be and F to I 68-88 - to B, S, F, I, and Water	Low 0-1 ft per century
Grand Lake East	Fresh marsh	No change	Low 0-1 ft per century
Grand/White Lake Land Bridge	Fresh marsh	No change	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
North Grand Lake	Acres marsh in 1932	17,000	Altered Hydrology- 1, H Wave Erosion- 1, H, C Wake Erosion- 1, H, C	Acres marsh in 1990	10,640
	Acres lost 1932-1956	1,300		Acres lost by 2050	1,700
	Acres lost 1956-1974	2,560		% 1990 wetland acres lost	16
	Acres lost 1974-1983	1,900			
	Acres lost 1983-1990	600			
Little Pecan	Acres marsh in 1932	55,205	Altered Hydrology- 1, H Flooding- 1, H Wave Erosion- 2, H, C Wake Erosion- 2, H, C Direct Removal- 2, H Impoundment- 3, H	Acres marsh in 1990	48,900
	Acres lost 1932-1956	650		Acres lost by 2050	3,670
	Acres lost 1956-1974	4,355		% 1990 wetland acres lost	8
	Acres lost 1974-1983	700			
	Acres lost 1983-1990	600			
Rockefeller	Acres marsh in 1932	93,280	Wave Erosion- 1, H, C Altered Hydrology- 1, H Subsidence- 2, H	Acres marsh in 1990	62,780
	Acres lost 1932-1956	12,490		Acres lost by 2050	13,060
	Acres lost 1956-1974	13,420		% 1990 wetland acres lost	21
	Acres lost 1974-1983	2,270			
	Acres lost 1983-1990	2,320			
Grand Lake East	Acres marsh in 1932	9,770	Wave Erosion- 1, H, C Altered Hydrology- 1, H, C Flooding- 1, H Herbivory- 2, H	Acres marsh in 1990	6,970
	Acres lost 1932-1956	190		Acres lost by 2050	2,200
	Acres lost 1956-1974	1,670		% 1990 wetland acres lost	32
	Acres lost 1974-1983	730			
	Acres lost 1983-1990	210			
Grand/White Lake Land Bridge	Acres marsh in 1932	8,935	Wave Erosion- 1, H, C Flooding- 1, H, C Altered Hydrology- 2, H	Acres marsh in 1990	7,090
	Acres lost 1932-1956	560		Acres lost by 2050	1,030
	Acres lost 1956-1974	990		% 1990 wetland acres lost	15
	Acres lost 1974-1983	175			
	Acres lost 1983-1990	120			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Amoco	Fresh marsh	No change	Low 0-1 ft per century
South White Lake	Fresh marsh (F) Upland (U)	No change	Low 0-1 ft per century
South Pecan Island	Fresh marsh (F) Brackish marsh (B) Saline marsh (S) Beach or Chenier (C)	49-68 - F to I 68-88 - to B and Water	Low 0-1 ft per century
North White Lake	Fresh marsh (F) Brackish marsh (B) Beach or Chenier (C)	49-68 - to F 68-88 - to F and Water	Low 0-1 ft per century
Little Prairie	Fresh marsh (F) Agricultural (A)	49-68 - F to A 68-88 - F to A	Stable

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Amoco	Acres marsh in 1932	23,560	Flooding- 1, H, C	Acres marsh in 1990	16,500
	Acres lost 1932-1956	1,030	Altered Hydrology- 1, H, C	Acres lost by 2050	6,000
	Acres lost 1956-1974	440	Wake Erosion- 2, H, C	% 1990 wetland acres lost	36
	Acres lost 1974-1983	3,940	Wave Erosion- 3, H, C		
	Acres lost 1983-1990	1,650			
South White Lake	Acres marsh in 1932	36,795	Flooding- 1, H	Acres marsh in 1990	30,270
	Acres lost 1932-1956	1,025	Impoundment- 1, H, C	Acres lost by 2050	4,220
	Acres lost 1956-1974	2,740	Wave Erosion- 1, H	Acres preserved CWPPRA	3
	Acres lost 1974-1983	1,110	Altered Hydrology- 2, H	% 1990 wetland acres lost CWPPRA	14
	Acres lost 1983-1990	1,650			
South Pecan Island	Acres marsh in 1932	46,370	Altered Hydrology- 1, H,C	Acres marsh in 1990	34,850
	Acres lost 1932-1956	290	Storm-Related Loss- 1, H	Acres lost by 2050	6,980
	Acres lost 1956-1974	6,320	Impoundment- 2, H	% 1990 wetland acres lost	20
	Acres lost 1974-1983	3,260	Wave Erosion- 3, C		
	Acres lost 1983-1990	1,650			
North White Lake	Acres marsh in 1932	41,610	Direct Removal- 1, H	Acres marsh in 1990	38,830
	Acres lost 1932-1956	370	Wave Erosion- 1, H	Acres lost by 2050	3,560
	Acres lost 1956-1974	1,190	Altered Hydrology- 2, H	% 1990 wetland acres lost	9
	Acres lost 1974-1983	910			
	Acres lost 1983-1990	310			
Little Prairie	Acres marsh in 1932	11,970	Wake Erosion- 1, H, C	Acres marsh in 1990	10,670
	Acres lost 1932-1956	0	Impoundment- 1, H	Acres lost by 2050	740
	Acres lost 1956-1974	380		% 1990 wetland acres lost	7
	Acres lost 1974-1983	60			
	Acres lost 1983-1990	860			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Big Marsh	Fresh marsh (F) Brackish marsh (B) Saline marsh (S)	49-68 - B, S to I 68-88 - to F, I, B, and Water	Low 0-1 ft per century
Locust Island	Brackish marsh (B) Fresh marsh (F) Agricultural (A)	49-68 - B to I	Stable/low
CALCASIEU-SABINE BASIN			
Hackberry Ridge	Developed Brackish marsh	No change	Intermediate 1.1-2 ft per century
Choupique Island	Unknown	Unknown	Low 0-1 ft per century
Big Lake	Brackish marsh (B) Unknown	49-68 - No change 68-88 - to B, F, and Agricultural	Intermediate 1.1-2 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

MERMENTAU BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Big Marsh	Acres marsh in 1932	35,680	Altered Hydrology- 1, C	Acres marsh in 1990	31,870
	Acres lost 1932-1956	0	Wave Erosion- 1, C	Acres lost by 2050	3,000
	Acres lost 1956-1974	2,610	Storm-Related Loss- 1, H	Acres preserved CWPPRA	2,470
	Acres lost 1974-1983	980	Wake Erosion- 2, H, C	% 1990 wetland acres lost CWPPRA	2
	Acres lost 1983-1990	220			
Locust Island	Acres marsh in 1932	14,365	Wake Erosion- 1, H, C	Acres marsh in 1990	12,710
	Acres lost 1932-1956	10	Impoundment- 1, H, C	Acres lost by 2050	1,870
	Acres lost 1956-1974	350		% 1990 wetland acres lost	15
	Acres lost 1974-1983	100			
	Acres lost 1983-1990	1,195			
CALCASIEU-SABINE BASIN					
Hackberry Ridge	Acres marsh in 1932	not	Wake Erosion- 1, H, C	Acres marsh in 1990	not in
	Acres lost 1932-1956	in			database
	Acres lost 1956-1974	data		Acres lost by 2050	0
	Acres lost 1974-1983	base		% 1990 wetland acres lost CWPPRA	0
	Acres lost 1983-1990				
Choupique Island	Acres marsh in 1932	not	Wave Erosion- 1, C	Acres marsh in 1990	750
	Acres lost 1932-1956	in	Altered Hydrology- 1, C, H	Acres lost by 2050	0
	Acres lost 1956-1974	data	Wake Erosion- 2, C	% 1990 wetland acres lost	0
	Acres lost 1974-1983	base			
	Acres lost 1983-1990				
Big Lake	Acres marsh in 1932	26,910	Altered Hydrology- 1, H, C	Acres marsh in 1990	19,095
	Acres lost 1932-1956	65	Flooding- 2, C	Acres lost by 2050	3,620
	Acres lost 1956-1974	6,180	Wave Erosion- 2, C	Acres preserved CWPPRA	60
	Acres lost 1974-1983	1,410	Impoundment- 2, H	% 1990 wetland acres lost CWPPRA	19
	Acres lost 1983-1990	160	Wake Erosion- 3, C		

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Sweet/Willow Lakes	Fresh marsh (F) Unknown	49-68 - No change 68-88 - to F and Water	Low 0-1 ft per century
Cameron-Creole Watershed	Brackish marsh (B) Intermediate marsh (I)	49-68 - to B, I, and F 68-78 - No change 78-88 - to B, I, and Water	Intermediate 1.1-2 ft per century
Cameron	Fresh marsh (F) Intermediate marsh (I) Brackish marsh (B) Saline marsh (S)	No change	Low 0-1 ft per century
Clear Marais	Unknown	68 - B, I, and Unknown 68-88 - to F and Water	Low 0-1 ft per century
West Black Lake	Fresh marsh (F) Intermediate marsh (I) Unknown	49-68 - to I and B 68-88 - to mainly F and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Sweet/Willow Lakes	Acres marsh in 1932	9,810	Storm-related Loss- 1, H	Acres marsh in 1990	6,260
	Acres lost 1932-1956	65	Altered Hydrology- 2, H	Acres lost by 2050	2,100
	Acres lost 1956-1974	2,805	Flooding- 2, H	Acres preserved CWPPRA	240
	Acres lost 1974-1983	410	Wave Erosion- 2, H, C	% 1990 wetland acres lost CWPPRA	30
	Acres lost 1983-1990	270	Wake Erosion- 2, H, C		
Cameron-Creole Watershed	Acres marsh in 1932	45,460	Altered Hydrology- 1, H	Acres marsh in 1990	31,070
	Acres lost 1932-1956	1,210	Wave Erosion- 2, C	Acres lost by 2050	7,370
	Acres lost 1956-1974	10,095	Wake Erosion- 2, C	Acres preserved CWPPRA	5,150
	Acres lost 1974-1983	1,670		% 1990 wetland acres lost CWPPRA	7
	Acres lost 1983-1990	1,415			
Cameron	Acres marsh in 1932	20,440	Wave Erosion- 1, H, C	Acres marsh in 1990	18,880
	Acres lost 1932-1956	500	Impoundment- 2, H, C	Acres lost by 2050	890
	Acres lost 1956-1974	740	Wake Erosion- 2, C	% 1990 wetland acres lost	5
	Acres lost 1974-1983	215	Altered Hydrology- 2, H, C		
	Acres lost 1983-1990	110			
Clear Marais	Acres marsh in 1932	6,805	Altered Hydrology- 1, H, C	Acres marsh in 1990	4,740
	Acres lost 1932-1956	0	Wake Erosion- 2, H, C	Acres lost by 2050	1,060
	Acres lost 1956-1974	1,245		Acres preserved CWPPRA	760
	Acres lost 1974-1983	420		% 1990 wetland acres lost CWPPRA	6
	Acres lost 1983-1990	400			
West Black Lake	Acres marsh in 1932	10,080	Altered Hydrology- 1, H	Acres marsh in 1990	3,570
	Acres lost 1932-1956	0	Wave Erosion- 2, C	Acres lost by 2050	960
	Acres lost 1956-1974	6,340	Wake Erosion- 2, C	% 1990 wetland acres lost	27
	Acres lost 1974-1983	70	Storm-related Loss- 3, H		
	Acres lost 1983-1990	100			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Black Lake	Brackish marsh (B) Intermediate marsh (I) Fresh marsh (F)	49-68 - to B and Unknown 68-88 - to B and Water	Intermediate 1.1-2 ft per century
Brown Lake	Fresh marsh (F) Intermediate marsh (I)	49-68 - to B	Intermediate 1.1-2 ft per century
Hog Island Gully	Brackish (B)	49-88 - to B and S	Intermediate 1.1-2 ft per century
West Cove	Brackish marsh (B) Intermediate marsh (I)	49-88 - to F and I	Low 0-1 ft per century
Mud Lake	Brackish marsh (B) Saline marsh (S)	49-68 - to B, S, and I 68-88 - to B and Water	Intermediate 1.1-2 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Black Lake	Acres marsh in 1932	15,420	Altered Hydrology- 1, C	Acres marsh in 1990	3,060
	Acres lost 1932-1956	260	Flooding- 2, C	Acres lost by 2050	1,050
	Acres lost 1956-1974	11,390	Wave Erosion- 2, C	Acres preserved CWPPRA	540
	Acres lost 1974-1983	390	Impoundment- 2, H	% 1990 wetland acres lost CWPPRA	17
	Acres lost 1983-1990	320	Wake Erosion- 3, C		
Brown Lake	Acres marsh in 1932	36,190	Altered Hydrology- 1, H, C	Acres marsh in 1990	16,100
	Acres lost 1932-1956	760	Wave Erosion- 2, C	Acres lost by 2050	4,325
	Acres lost 1956-1974	18,110	Wave Erosion- 2, C	Acres preserved CWPPRA	720
	Acres lost 1974-1983	830	Storm-related Loss- 2, H	% 1990 wetland acres lost CWPPRA	22
	Acres lost 1983-1990	390			
Hog Island Gully	Acres marsh in 1932	5,550	Storm-related Loss- 1, H	Acres marsh in 1990	3,460
	Acres lost 1932-1956	40	Altered Hydrology- 2, H	Acres lost by 2050	550
	Acres lost 1956-1974	1,890	Wave Erosion- 2, C	Acres preserved CWPPRA	1,040
	Acres lost 1974-1983	70		% 1990 wetland acres lost CWPPRA	-14
	Acres lost 1983-1990	90			
West Cove	Acres marsh in 1932	4,230	Altered Hydrology- 1, H, C	Acres marsh in 1990	2,810
	Acres lost 1932-1956	0	Wave Erosion- 2, C	Acres lost by 2050	600
	Acres lost 1956-1974	930		Acres preserved CWPPRA	320
	Acres lost 1974-1983	440		% 1990 wetland acres lost CWPPRA	10
	Acres lost 1983-1990	50			
Mud Lake	Acres marsh in 1932	18,670	Altered Hydrology- 1, C	Acres marsh in 1990	14,040
	Acres lost 1932-1956	120	Flooding- 2, C	Acres lost by 2050	2,660
	Acres lost 1956-1974	3,570	Wave Erosion- 2, C	Acres preserved CWPPRA	810
	Acres lost 1974-1983	770	Wake Erosion- 3, C	% 1990 wetland acres lost	13
	Acres lost 1983-1990	170			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Martin Beach Ship Canal Shore	Beach (Be) Brackish marsh (B) Saline marsh (S)	49-68 - Be to B, S to I 68-88 - to B, I, S, and Water	Low 0-1 ft per century
Southeast Sabine	Intermediate marsh (I) Brackish marsh (B)	No change	Low 0-1 ft per century
Second Bayou	Brackish marsh (B) Intermediate marsh (I)	49-68 - Some B to I	Low 0-1 ft per century
Gum Cove	Unknown	68 - to I and Unknown 68-88 - to F and Upland/Developed	Low 0-1 ft per century
Southwest Gum Cove	Fresh marsh (F) Intermediate marsh (I)	49-68 - to F, I, and B 68-88 - to F, I, B, and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Martin Beach Ship Canal Shore	Acres marsh in 1932	6,720	Wave Erosion- 1, H, C	Acres marsh in 1990	5,520
	Acres lost 1932-1956	30		Acres lost by 2050	630
	Acres lost 1956-1974	740		% 1990 wetland acres lost	11
	Acres lost 1974-1983	180			
	Acres lost 1983-1990	250			
Southeast Sabine	Acres marsh in 1932	21,110	Altered Hydrology- 1, H, C	Acres marsh in 1990	19,030
	Acres lost 1932-1956	150		Acres lost by 2050	890
	Acres lost 1956-1974	1,650		Acres preserved CWPPRA	400
	Acres lost 1974-1983	230		% 1990 wetland acres lost	3
	Acres lost 1983-1990	40			
Second Bayou	Acres marsh in 1932	17,380	Altered Hydrology- 1, H, C Impoundment- 2, H, C	Acres marsh in 1990	13,450
	Acres lost 1932-1956	20		Acres lost by 2050	1,520
	Acres lost 1956-1974	3,640		% 1990 wetland acres lost	11
	Acres lost 1974-1983	220			
	Acres lost 1983-1990	50			
Gum Cove	Acres marsh in 1932	not	Wake Erosion- 1, C Wave Erosion- 2, C	Acres marsh in 1990	1,230
	Acres lost 1932-1956	in		Acres lost by 2050	0
	Acres lost 1956-1974	data		% 1990 wetland acres lost	0
	Acres lost 1974-1983	base			
	Acres lost 1983-1990				
Southwest Gum Cove	Acres marsh in 1932	12,740	Altered Hydrology- 1, H Wave Erosion- 2, H	Acres marsh in 1990	10,470
	Acres lost 1932-1956	190		Acres lost by 2050	1,070
	Acres lost 1956-1974	1,750		Acres preserved CWPPRA	20
	Acres lost 1974-1983	280		% 1990 wetland acres lost	10
	Acres lost 1983-1990	50			

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Sabine Pool #3	Fresh marsh (F) Intermediate marsh (I)	49-68 - I to F	Low 0-1 ft per century
Willow Bayou	Fresh marsh (F) Intermediate marsh (I) Brackish marsh (B)	49-88 - to Mostly B	Low 0-1 ft per century
East Johnson's Bayou	Intermediate marsh (I) Brackish marsh (B)	49-68 - Some B to I 68-88 - to I and F	Low 0-1 ft per century
Perry Ridge	Fresh marsh (F) Unknown	49-68 - to F, I, and B 68-88 - to F, I, and Water	Stable
Sabine Lake Ridges	Brackish marsh (B) Beach/Chenier (Be) Saline marsh (S)	49-68 - to B, S, and I 68-88 - to B, S, I, F, and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Sabine Pool #3	Acres marsh in 1932	20,460	Altered Hydrology- 1, H, C	Acres marsh in 1990	16,010
	Acres lost 1932-1956	0		Acres lost by 2050	0
	Acres lost 1956-1974	1,060		% 1990 wetland acres lost	0
	Acres lost 1974-1983	2,840			
	Acres lost 1983-1990	550			
Willow Bayou	Acres marsh in 1932	36,410	Altered Hydrology- 1, H, C Wave Erosion- 2, C	Acres marsh in 1990	21,460
	Acres lost 1932-1956	0		Acres lost by 2050	5,190
	Acres lost 1956-1974	13,810		% 1990 wetland acres lost	24
	Acres lost 1974-1983	900			
	Acres lost 1983-1990	240			
East Johnson's Bayou	Acres marsh in 1932	26,270	Altered Hydrology- 1, H Herbivory- 2, H Wave Erosion- 2, H, C	Acres marsh in 1990	23,500
	Acres lost 1932-1956	60		Acres lost by 2050	5,790
	Acres lost 1956-1974	1,520		% 1990 wetland acres lost	25
	Acres lost 1974-1983	1,090			
	Acres lost 1983-1990	100			
Perry Ridge	Acres marsh in 1978	12,000	Altered Hydrology- 1, H, C Wave Erosion- 2, C Wave Erosion- 3, C	Acres marsh in 1990	15,190
	Acres gained 1978-1990	3,190		Acres gained by 2050	1,160
				Acres preserved CWPPRA	880
			% 1990 wetland acres lost	-13	
Sabine Lake Ridges	Acres marsh in 1978	33,420	Altered Hydrology- 1, H, C Wave Erosion- 2, H, C Wave Erosion- 2, H, C	Acres marsh in 1990	26,010
	Acres lost 1978-1990	7,410		Acres lost by 2050	3,360
				% 1990 wetland acres lost	13

* H=historic cause, C=current cause

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Major Habitat Types in 1949	Habitat Changes 1949-1988/1990	Subsidence Rate
Johnson's Bayou Ridge	Beach (Be)	49-68 - to S, B/I, and Be 68-88 - to S, B, Be, and Water	Low 0-1 ft per century
Black Bayou	Fresh marsh (F) Brackish marsh (B) Intermediate marsh (I)	49-68 - Some F to I and B 68-88 - to I, B, and Water	Low 0-1 ft per century
West Johnson's Bayou	Brackish marsh (B) Saline marsh (S) Intermediate marsh (I) Fresh marsh (F)	49-68 - to B and I 68-88 - to B, I, and Water	Low 0-1 ft per century

Table 4-1. Region 4 wetland loss (Cont.).

CALCASIEU-SABINE BASIN	Approximate Acres Lost		Causes of Loss*	Projected acres lost by 2050	
Johnson's Bayou Ridge	Acres marsh in 1978	4,315	Wave Erosion- 1, C	Acres marsh in 1990	3,120
	Acres lost 1978-1990	1,195	Altered Hydrology- 2, C	Acres lost by 2050	1,070
				% 1990 wetland acres lost	34
Black Bayou	Acres marsh in 1978	28,730	Altered Hydrology- 1, H, C	Acres marsh in 1990	23,830
	Acres lost 1978-1990	4,900	Wave Erosion- 1, H, C	Acres lost by 2050	6,400
			Wake Erosion- 2, H, C	Acres preserved CWPPRA	3,020
				% 1990 wetland acres lost CWPPRA	17
West Johnson's Bayou	Acres marsh in 1978	12160	Altered Hydrology- 1, H, C	Acres marsh in 1990	11,490
	Acres lost 1978-1990	670	Wave Erosion- 2, H, C	Acres lost by 2050	2,510
				% 1990 wetland acres lost CWPPRA	22

* H=historic cause, C=current cause

Table 4-2. Region 4 previously proposed strategies.

REGION 4	DEFENSIVE					FRESHWATER DIVERSIONS
	CRITICAL DEFENSE LINE			MANAGE NAVIGATION CHANNELS		
MAPPING UNITS	Create/restore barrier islands	Preserve land bridges	Preserve/protect ridge function	Manage hydrology	Stabilize banks	
MERMENTAU BASIN						
Amoco					1,6	
Big Marsh			1,5		4,6	
Big Burn					6	
Cameron Prairie					1	
Grand Chenier Ridge			4			
Grand Lake						
Grand/White Lake Land Bridge		4			4,6	
Grand Lake East					1,6	
Hog Bayou			4			4
Lacassine					1,5,6	
Little Prairie					1	
Little Pecan			1,5			
Locust Island					1,4,6	
Lower Mud Lake						
Middle Marsh						
North White Lake					1,6	
North Grand Lake					1,5	
Oak Grove			1,5			
Rockefeller			2			2,4
South Pecan Island					4	2,4
South White Lake			1,5			
White Lake						

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4	DEFENSIVE				
	MANAGE HYDROLOGY			DEVELOP REEF ZONES	PROTECT BAY/ LAKE SHORELINES
MAPPING UNITS	Swamps	Fresh/intermediate marsh	Brackish/saline marsh		
MERMENTAU BASIN					
Amoco		1,4,5,6			
Big Marsh		1,4,5,6			
Big Burn		4,6			
Cameron Prairie		1,5			
Grand Chenier Ridge					
Grand Lake					4,6
Grand/White Lake Land Bridge		1,5			4,6
Grand Lake East		1,5			4,6
Hog Bayou		4	4,6		4,6
Lacassine		1,4,5			4,6
Little Prairie		1,4,5,6			
Little Pecan		1,4,5,6			4,6
Locust Island		1,4,5,6			
Lower Mud Lake					4,7
Middle Marsh		1,4,5,6			
North White Lake		1,4,5			4,6
North Grand Lake					1,5
Oak Grove		1,4,5,6			6
Rockefeller			4,6		4,6
South Pecan Island		2,4	6		
South White Lake		1,5			4,6
White Lake					4

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4 MAPPING UNITS	OFFENSIVE			
	INCREASE ATCHAFALAYA FLOW	RELOCATE NAVIGATION CHANNELS	SEDIMENT DIVERSIONS (or pumping)	USE OF DREDGED MATERIAL
MERMENTAU BASIN				
Amoco				
Big Marsh				
Big Burn				
Cameron Prairie				
Grand Chenier Ridge				
Grand Lake				
Grand/White Lake Land Bridge				
Grand Lake East				
Hog Bayou				
Lacassine				
Little Prairie				
Little Pecan				
Locust Island				
Lower Mud Lake				
Middle Marsh				
North White Lake				
North Grand Lake				
Oak Grove				
Rockefeller				
South Pecan Island				4,6
South White Lake				
White Lake				

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4	DEFENSIVE					
	CRITICAL DEFENSE LINE			MANAGE NAVIGATION CHANNELS		FRESHWATER DIVERSIONS
MAPPING UNITS	Create/restore barrier islands	Preserve land bridges	Preserve/protect ridge function	Manage hydrology	Stabilize banks	
CALCASIEU-SABINE BASIN						
Big Lake					1,5	4,7
Black Lake					1,4,7	4,7
Black Bayou				4	1,4,7	7
Brown Lake				4,7	4,7	
Calcasieu Lake				4		
Cameron			1,4,5		1	
Cameron-Creole Watershed					1,5	
Choupique Island						
Clear Marais					1,4	
Gum Cove						
Hackberry Ridge			4	7	4,7	7
Hog Island Gully					4	
Johnson's Bayou (East and West)			1,5	4,7	7	
Johnson's Bayou Ridge			4			
Martin Beach Ship Canal Shore	1,2,5		4		7	
Mud Lake			1,5		7	
Perry Ridge					1	
Sabine Lake					4,5	

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4	DEFENSIVE				
	MANAGE HYDROLOGY			DEVELOP REEF ZONES	PROTECT BAY/ LAKE SHORELINES
MAPPING UNITS	Swamps	Fresh/intermediate marsh	Brackish/saline marsh		
CALCASIEU-SABINE BASIN					
Big Lake					
Black Lake		4,7	4,7		5
Black Bayou		4,7	4		
Brown Lake		1,5,7	4		4,5
Calcasieu Lake					
Cameron					
Cameron-Creole Watershed		1,4,5,8	4,8		1,5
Choupique Island					
Clear Marais					
Gum Cove					5
Hackberry Ridge		1,4,5,7			
Hog Island Gully					
Johnson's Bayou (East and West)		4	4		
Johnson's Bayou Ridge					
Martin Beach Ship Canal Shore					
Mud Lake			4,7		4,5,7
Perry Ridge					
Sabine Lake		1,4,5,7			

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4 MAPPING UNITS	OFFENSIVE			
	INCREASE ATCHAFALAYA FLOW	RELOCATE NAVIGATION CHANNELS	SEDIMENT DIVERSIONS (or pumping)	USE OF DREDGED MATERIAL
CALCASIEU-SABINE BASIN				
Big Lake				
Black Lake				7
Black Bayou				4
Brown Lake				4
Calcasieu Lake				
Cameron				
Cameron-Creole Watershed				
Choupique Island				
Clear Marais				
Gum Cove				
Hackberry Ridge				
Hog Island Gully				4
Johnson's Bayou (East and West)				
Johnson's Bayou Ridge				
Martin Beach Ship Canal Shore				7
Mud Lake				7
Perry Ridge				
Sabine Lake				

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4	DEFENSIVE					
	CRITICAL DEFENSE LINE			MANAGE NAVIGATION CHANNELS		FRESHWATER DIVERSIONS
MAPPING UNITS	Create/restore barrier islands	Preserve land bridges	Preserve/protect ridge function	Manage hydrology	Stabilize banks	
Sabine Lake Ridges			1,5		4,7	
Sabine Pool #3					4,7	
Second Bayou			1,5		7	
Southeast Sabine					7	
Southwest Gum Cove					7	
Sweet/Willow Lakes					1,5	
West Black Lake					1	
West Cove				4,7	7	7
Willow Bayou				4,7	4,7	

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4	DEFENSIVE				
	MANAGE HYDROLOGY			DEVELOP REEF ZONES	PROTECT BAY/LAKE SHORELINES
MAPPING UNITS	Swamps	Fresh/intermediate marsh	Brackish/saline marsh		
Sabine Lake Ridges			4	1	
Sabine Pool #3		7			7
Second Bayou		7			
Southeast Sabine				1	
Southwest Gum Cove		1,5,7			4,7
Sweet/Willow Lakes		1,5			4
West Black Lake		4			4
West Cove			4		5
Willow Bayou		1,5	4		5

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Table 4-2. Region 4 previously proposed strategies (Cont.).

REGION 4 MAPPING UNITS	OFFENSIVE			
	INCREASE ATCHAFALAYA FLOW	RELOCATE NAVIGATION CHANNELS	SEDIMENT DIVERSIONS (or pumping)	USE OF DREDGED MATERIAL
Sabine Lake Ridges				7
Sabine Pool #3				
Second Bayou				
Southeast Sabine				
Southwest Gum Cove				
Sweet/Willow Lakes				
West Black Lake				
West Cove				7
Willow Bayou				

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Table 4-3. Region 4 regional ecosystem strategies.

Restore and Sustain Wetlands	
1	Operate locks to evacuate excess water from the Mermentau Lakes Subbasin
2	Operate existing Calcasieu Lock specifically to evacuate excess water, after building a new lock on a parallel channel specifically for navigation
3	Manage watershed to reduce rapid inflows into the Mermentau Lakes Subbasin
4	Move water from north to south across Highway 82 with associated drainage improvements south of Highway 82
5	Restore the connection of the original Mermentau River to the Gulf of Mexico and constrict the width and depth of the Mermentau Ship Channel to its authorized dimensions
6	Dedicated dredging of sediment for wetland creation
7	Maintain Atchafalaya River water and sediment inflow through the Gulf Intracoastal Waterway
Salinity Control in the Calcasieu-Sabine Basin	
8	Salinity control of the Calcasieu Ship Channel between the Gulf of Mexico and Calcasieu Lake
9	Maintain Sabine River inflow (to mitigate Trans-Texas Water Plan)
10	Salinity control at Sabine Pass
11	Salinity reduction of Sabine Lake at the Causeway
12	Salinity control on the east shoreline of Sabine Lake
13	Salinity control in the Gulf Intracoastal Waterway east of Sabine River
Protect Bay and Lake Shorelines	
14	Stabilize Grand Lake and White Lake shorelines
Restore and Maintain Barrier Islands and Shorelines	
15	Stabilize Gulf of Mexico shoreline in the vicinity of Rockefeller Refuge
16	Stabilize Gulf of Mexico shoreline from Calcasieu Pass to Johnson's Bayou
17	Maintain Atchafalaya River mudstream in the Gulf of Mexico
18	Restore long-shore sediment flow across the mouth of Calcasieu Pass
19	Restore long-shore sediment flow across the mouth of the Mermentau Ship Channel
Maintain Critical Landforms	
20	Prevent the coalescence of Grand and White lakes
21	Prevent the coalescence of Grand Lake and the Gulf Intracoastal Waterway

Table 4-4. Region 4 mapping unit strategies.

MERMENTAU BASIN	
AMOCO	
1	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
	e.g., Maintain integrity along White Lake shoreline (possibly using fly ash)
BIG BURN	
2	Improve Hydrology
	e.g., Hydrologic restoration at Humble Canal and the GIWW
	e.g., Freshwater introduction from the GIWW into Big Burn
3	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
4	Terracing/Vegetative Plantings
BIG MARSH	
5	Improve Hydrology
	e.g., Maintain the CWPPRA Freshwater Bayou (ME-04) hydrologic restoration and bank protection project
CAMERON PRAIRIE	
6	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
GRAND CHENIER RIDGE	
7	Maintain Ridge Function
	e.g., Maintain Grand Chenier Ridge
GRAND LAKE	
8	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
9	Manage as a Low Salinity, Fresh to Intermediate Ecosystem
	e.g., Protect the freshwater supply to rice/crawfish farms and fresh marshes from saltwater intrusion
10	Protect Wetland Diversity
GRAND LAKE EAST	
11	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
	e.g., Shore stabilization in Umbrella Bay
12	Terracing/Vegetative Plantings
	e.g., Vegetative plantings in Mallard Bay
	e.g., Build terraces at Bird Island between Mallard Bay and Grand Lake
GRAND/WHITE LAKE LAND BRIDGE	
13	Dedicated Dredging
	e.g., Dedicated dredging from Grand and/or White lakes to the land bridge
14	Improve Hydrology
	e.g., Structures/hydrologic management at the Old GIWW
15	Terracing/Vegetative Plantings
	e.g., Terracing and associated plantings
16	Protect Shorelines

Table 4-4. Region 4 mapping unit strategies (Cont.).

HOG BAYOU	
17	Improve Hydrology
	e.g., Move sediment-rich water from Mermentau River into Hog Bayou
	e.g., Moderate salinities (3 alternatives): (a) Freshwater & sediment introduction from north to south of Hwy. 82 from the Lakes Subbasin; (b) Move fresh water and sediment from the Mermentau River into Hog Bayou; (c) Possible salinity control structure in Hog Bayou
	e.g., Insure ingress/egress of marine organisms
LACASSINE	
17	Beneficial Use of Dredged Material
	e.g., Beneficial use of dredged material along the GIWW
18	Protect Shorelines
	e.g., Bank stabilization along the GIWW where necessary
	e.g., Maintain Lacassine Bayou shoreline
LITTLE PECAN	
19	Freshwater Introduction
	e.g., Divert fresh water from Grand Lake to Little Pecan Bayou to reduce saltwater intrusion
	e.g., Move water from the Superior Canal to the Little Pecan Bayou area to the west
	e.g., Insure ingress/egress of marine organisms
20	Improve Hydrology
	e.g., Moderate salinities (3 alternatives): (a) bring fresh water from the Superior Canal; (b) divert freshwater from Grand Lake; or (c) saltwater barrier in Little Pecan Bayou
	e.g., Hydrologic restoration in the North Little Pecan Bayou area (e.g., XME-46)
	e.g., Insure ingress/egress of marine organisms
21	Protect Shorelines
	e.g., Vegetative plantings on Little Pecan Lake shore
	e.g., Maintain and restore Little Pecan Lake shorelines
LITTLE PRAIRIE	
22	Beneficial Use of Dredged Material
	e.g., For protection from saltwater intrusion during storms
	e.g., Prevent locks from being bypassed during storms
23	Freshwater Introduction
	e.g., Maintain freshwater inflows from the GIWW and Vermilion River to the west
	e.g., Maintain freshwater inflow through the marshes
LOCUST ISLAND	
24	Beneficial Use of Dredged Material
	e.g., Protection from saltwater intrusion during storms
	e.g., Prevent locks from being bypassed during storms
	e.g., Prevent erosion from tidal fluctuations
25	Freshwater Introduction
	e.g., Maintain freshwater and sediment inflow from the Vermilion River through the GIWW and Freshwater Bayou Canal to protect fresh marshes south of the GIWW
	e.g., Maintain freshwater inflow through the marshes
26	Protect Shorelines
	e.g., Rebuild west bank along Freshwater Bayou Canal and the south bank of GIWW

Table 4-4. Region 4 mapping unit strategies (Cont.).

LOWER MUD LAKE	
27	Beneficial Use of Dredged Material e.g., Beneficial use of Mermentau River spoil for Gulf of Mexico shore protection
28	Maintain Ridge Function e.g., Maintain the Hackberry Ridge function
29	Shoreline Stabilization e.g., Stabilize Gulf of Mexico shoreline
MIDDLE MARSH	
30	Herbivory Control
31	Improve Hydrology e.g., Improve drainage to relieve impoundment
NORTH GRAND LAKE	
32	Protect Shorelines e.g., Bank stabilization of the GIWW e.g., Vegetative plantings for shoreline stabilization
33	Improve Hydrology e.g., Restrict the Mermentau River at its confluence with Grand Lake and the GIWW
NORTH WHITE LAKE	
34	Protect Shorelines e.g., Bank stabilization on the GIWW e.g., Vegetative plantings where feasible e.g., Pump historic beach sand to restore the current White Lake north shore
OAK GROVE	
35	Maintain Ridge Function e.g., Maintain Grand Chenier function
ROCKEFELLER	
36	Protect Shorelines e.g., Preserve and stabilize the gulf shoreline
37	Improve Hydrology e.g., Maintain and improve current hydrology
SOUTH PECAN ISLAND	
38	Dedicated Dredging e.g., Dredge fill in open water areas with either White Lake or gulf spoil
39	Shoreline Protection to Prevent Coalescence of White Lake and the Gulf e.g., Maintain integrity of Gulf of Mexico shoreline where needed
40	Terracing/ Vegetative Plantings e.g., Terracing and plantings along northern boundary of unit
SOUTH WHITE LAKE	
41	Protect Shorelines e.g., Pump historic sand beach to restore the current White Lake south shore
CALCASIEU/ SABINE BASIN	
BIG LAKE	
42	Beneficial Use of Dredged Material e.g., Pump dredged material from the GIWW and Calcasieu Ship Channel to shallow open water areas

Table 4-4. Region 4 mapping unit strategies (Cont.).

43	Improve Hydrology
	e.g., Hydrologic restoration south of Big Lake (CS-10) to complete perimeter control along the eastern shoreline of Calcasieu Lake
BLACK BAYOU	
44	Beneficial Use of Dredged Material
	e.g., Pump dredged material from the Sabine River
45	Freshwater Introduction
	e.g., Freshwater inflows from Sabine River to include a siphon from the Sabine Canal and the Vinton Drainage Ditch into Black Bayou
46	Improve Hydrology
	e.g., Hydrologic restoration through the NRCS watershed project and maintenance of the CWPPRA Black Bayou project through 2050
BLACK LAKE	
47	Beneficial Use of Dredged Material
	e.g., Pump dredged material from the GIWW and the Calcasieu Ship Channel
48	Improve Hydrology
	e.g., Install a saltwater barrier at the Alkali Ditch
	e.g., Maintain Brown's Lake project (CS-09)
	e.g., Maintain existing hydrologic restoration projects
	e.g., Close structure under Shell Western Road near Black Lake Mgt. Area
	e.g., Hydrologic restoration at Kelso Bayou near the Calcasieu Ship Channel
49	Shoreline Stabilization
	e.g., Re-establishment of Black Lake shoreline boundaries
50	Terracing/Vegetative Plantings
BROWN LAKE	
51	Beneficial Use of Dredged Material
52	Improve Hydrology
	e.g., Implement the North Line Canal structure
	e.g., Maintain Sabine NWR hydrologic restoration control structures through 2050
53	Terracing/Vegetative Plantings
CALCASIEU LAKE	
54	Beneficial Use of Dredged Material
	e.g., Maintain and enhance islands (i.e., Rabbit Island)
55	Protect Shorelines
	e.g., Continuous armored bank along ship channel; Decrease height of ship channel spoil to near marsh level lakeward of channel and fortify channel shoreline
CAMERON	
56	Improve Hydrology
	e.g., Maintain existing wetland management plan at Rutherford Beach
57	Maintain Drainage Infrastructure
	e.g., Maintain drainage infrastructure within the Cameron fastland
58	Maintain Ridge Function
59	Terracing/Vegetative Plantings
	e.g., Terracing may be feasible in eastern portion of unit

Table 4-4. Region 4 mapping unit strategies (Cont.).

CAMERON-CREOLE WATERSHED	
60	Beneficial Use of Dredged Material
	e.g., Beneficial use of dredged material from the GIWW
61	Terracing/Vegetative Plantings
	e.g., Vegetative plantings, terraces, submerged aquatic vegetation plantings
CHOUPIQUE ISLAND	
62	Beneficial Use of Dredged Material
	e.g., Pump dredged material from the GIWW and the Calcasieu River
63	Maintain Perched Marshes
CLEAR MARAIS	
64	Improve Hydrology
	e.g., Address hydrologic problems between Choupique Bayou & Brannon's Ditch
65	Shoreline Stabilization
	e.g., Maintain and extend Clear Marais shoreline stabilization project
EAST JOHNSON'S BAYOU	
66	Herbivory Control
67	Improve Hydrology
	e.g., Restore hydrologic barriers in Deep Bayou
	e.g., Hydrologic restoration in Burton-Sutton Canal
HACKBERRY RIDGE	
68	Improve Hydrology
	e.g., Maintain the Rycade Canal structure
69	Shoreline Stabilization
	e.g., Reduce erosion along the west bank of ship channel
HOG ISLAND GULLY	
70	Beneficial Use of Dredged Material
	e.g., Stabilize the marsh east of Hwy. 27 to protect the highway
	e.g., Pump dredged material to rebuild marsh
71	Terracing/Vegetative Plantings
	e.g., Maintain and expand terracing in shallow water areas of the unit east of Hwy. 27
JOHNSON'S BAYOU RIDGE	
72	Maintain Ridge Function
	e.g., Maintain chenier ridge natural habitat (for Neotropical migrant birds)
73	Shoreline Stabilization
	e.g., Sacrificial (feeder) berm just west of Constance Beach breakwaters
MUD LAKE	
74	Beneficial Use of Dredged Material
	e.g., Pump dredged material from Calcasieu Ship Channel to restore marsh
75	Improve Hydrology
	e.g., Manage hydrology outside of East Mud Lake project area (Oyster Bayou project)
76	Protect Shorelines
	e.g., Shoreline protection along Sabine Refuge boundary

Table 4-4. Region 4 mapping unit strategies (Cont.).

PERRY RIDGE	
77	Beneficial Use of Dredged Material
	e.g., Pump material from the GIWW and Sabine River to restore marsh
78	Shoreline Stabilization
	e.g., Stabilize the northern GIWW bank from Perry Ridge to the Sabine River
SABINE LAKE	
79	Beneficial Use of Dredged Material
	e.g., Maintain Sabine Island
SABINE LAKE RIDGES	
80	Beneficial Use of Dredged Material
	e.g., Pump material from Sabine Ship Channel to restore marsh
81	Improve Hydrology
	e.g., Restore hydrologic barriers by plugging canals
	e.g., Hydrologic restoration at Lighthouse Bayou (maintain fisheries access)
82	Protect Shorelines
	e.g., Protect Sabine Lake shoreline and gulf coast east of Sabine jetty
SABINE POOL #3	
83	Improve Hydrology
	e.g., Marsh management to lower water levels
	e.g., Structures in North and South (Central) Canals to restore hydrology
84	Improve Water Quality
	e.g., Reduce turbidity in unit with wave breaks
85	Terracing/Vegetative Plantings
	e.g., Wave break levees (terracing in open water in southeast)
SECOND BAYOU	
86	Herbivory Control
87	Improve Hydrology
	e.g., Restore natural hydrology by improving water flow in the unit
SOUTHEAST SABINE	
88	Improve Hydrology
	e.g., Hydrologic restoration structures in Central Canal
	e.g., Hydrologic restoration in the Burton-Sutton Canal
89	Terracing/Vegetative Plantings
SOUTHWEST GUM COVE	
90	Improve Hydrology
	e.g., Hydrologic restoration at the Northline Canal & Bancroft Canal
	e.g., Implement and maintain the NRCS and CWPPRA Black Bayou (XCS-48) projects
	e.g., Maintain north levee of Northline Canal to maintain the hydrology of Starks Canal
SWEET/WILLOW LAKES	
91	Beneficial use of Dredged Material
92	Improve Hydrology
	e.g., Restore the west bank of the Unical Canal
	e.g., Place levee (or breakwater fence or Christmas tree fence) west of salt burn
93	Protect Shorelines
	e.g., Stabilize remainder of GIWW to Gibbstown Bridge
94	Terracing/Vegetative Plantings

Table 4-4. Region 4 mapping unit strategies (Cont.).

WEST BLACK LAKE	
95	Beneficial Use of Dredged Material
96	Protect Shorelines
	e.g., Erosion control along GIWW where needed
	e.g., Erosion control along West Black Lake shoreline
97	Terracing/Vegetative Plantings
WEST COVE	
98	Vegetative Plantings
	e.g., Plantings in the NE region of unit
WEST JOHNSON'S BAYOU	
99	Beneficial Use of Dredged Material
	e.g., Pump material from the Sabine-Neches Ship Channel to restore marsh
100	Improve Hydrology
	e.g., Hydrologic restoration by plugging canals
101	Protect Shorelines
	e.g., Sabine Lake shoreline protection
WILLOW BAYOU	
102	Beneficial Use of Dredged Material
	e.g., Dredge-filling/beneficial use of Sabine-Neches Ship Channel material
103	Improve Hydrology
	e.g., Maintain freshwater inflows from the Sabine River
	e.g., Manage Gray's Canal similar to the Cameron-Creole Watershed
	e.g., Contingency plan for the Trans-Texas Water Plan (research and develop)
	e.g., Hydrologic restoration in the Burton-Sutton Canal
	e.g., Restore hydrology by plugging Willow Bayou Canal & Gray's Ditch
104	Protect Shorelines
	e.g., Sabine Lake shoreline protection
105	Terracing/Vegetative Plantings

Table 4-5. Region 4 programmatic recommendations.

GRAND CHENIER RIDGE	
1	Restrict sand dredging
WHITE LAKE	
2	Allow for limited estuarine organism access
	e.g., Allow for limited estuarine access into the lake at the Schooner Bayou, Leland-Bowman, and Catfish locks
3	Maintain lake as a low salinity fresh to intermediate ecosystem
	e.g., Protect the rice/crawfish farms and fresh marshes from saltwater intrusion, as well as protect wetland diversity
	e.g., Maintain the surrounding marshes as fresh to intermediate
4	Maintain lake's subbasin target water level
	e.g., Achieve the 2 ft MLG water level targets in the Lakes Subbasin. At 3 ft MLG go to an emergency drainage program at structures and locks
5	Monitor fisheries access at the locks
LITTLE PRAIRIE	
6	Navigation safety
	e.g., Straighten the "wiggles" in the GIWW for navigation safety, wildlife, and fisheries
GRAND LAKE	
7	Maintain lake as a low salinity, fresh to intermediate ecosystem
	e.g., Protect the rice/crawfish farms and fresh marshes from saltwater intrusion, as well as protect wetland diversity
	e.g., Maintain the surrounding marshes as fresh to intermediate
8	Maintain lake's subbasin target water level
	e.g., Achieve the 2 ft MLG water level targets in the Lakes subbasin. At 3 ft MLG go to an emergency drainage program at structures and locks
9	Allow for limited estuarine organism access
	e.g., Allow for limited estuarine access into Grand Lake at Catfish Lock
10	Monitor fisheries access at the locks
BLACK BAYOU	
11	Contingency plan for the Trans-Texas Water Plan (research and develop)
CALCASIEU LAKE	
12	Allow for estuarine organism access to surrounding marshes
	e.g., Allow for estuarine fisheries access to adjacent lake marshes with existing and future control structures

Table 4-5. Region 4 programmatic recommendations (Cont.).

PERRY RIDGE	
13	Restore hydrology
	e.g., Contingency plan for the Trans-Texas Water Plan (research and develop)
	e.g., Maintain Toledo Bend/Sabine Lake freshwater inflows
SABINE LAKE	
14	Increase water quality
	e.g., Reduce pollution by best management practices
15	Contingency plan for the Trans-Texas Water Plan (research and develop)
SABINE LAKE RIDGE	
16	Restore/maintain hydrology
	e.g., Contingency plan for the Trans-Texas Water Plan (research and develop)
	e.g., Maintain Toledo Bend/Sabine Lake freshwater inflows
SOUTHEAST SABINE	
17	Contingency plan for the Trans-Texas Water Plan (research and develop)
SOUTHWEST GUM COVE	
18	Restore hydrology
	e.g., Contingency plan for the Trans-Texas Water Plan (research and develop)
	e.g., Maintain Toledo Bend/Sabine Lake freshwater inflows
WILLOW BAYOU	
19	Restore hydrology
	e.g., Maintain Toledo Bend/Sabine Lake freshwater inflows
20	Contingency plan for the Trans-Texas Water Plan (research and develop)
JOHNSON'S BAYOU RIDGE	
21	Maintain ridge function
	e.g., Maintain chenier ridge natural habitat (for Neotropical migrant birds) through policy and study formulation.
WEST JOHNSON'S BAYOU	
22	Maintain Toledo Bend/Sabine Lake freshwater inflows
23	Contingency plan for the Trans-Texas Water Plan (research and develop)
WHITE LAKE	
24	Allow for limited estuarine organism access
	e.g., Allow for limited estuarine organism access into the lake at the Schooner Bayou, Leland Bowman, and Catfish locks
	e.g., Monitor fisheries access at the locks
25	Manage lake as a low salinity fresh to intermediate ecosystem
	e.g., Protect the rice/crawfish farms and fresh marshes from saltwater intrusion, as well as protect wetland diversity
	e.g., Maintain the surrounding marshes as fresh to intermediate
EAST JOHNSON'S BAYOU	
26	Address bullwhip mortality
27	Contingency plan for the Trans-Texas Water Plan (research and develop)
SECOND BAYOU	
28	Address bullwhip mortality

SECTION 5

INFRASTRUCTURE

Roads

Road data was gathered from the U.S. Geological Survey (USGS) digital line graph information. The scale was 1:100,000, and the data was derived from 1983 1:100,000 quadrangle maps. The lengths of the State primary, secondary, and tertiary roads were clipped out of the master database for each mapping unit with a Geographic Information System (GIS) computer program. In the case that a primary, secondary, or tertiary road formed the boundary of two mapping units, that common road length was applied to both mapping units. The technical work was performed by Jay Edwards, USGS, National Wetlands Research Center - Coastal Restoration Field Station, Baton Rouge, Louisiana.

Railroads

Road data was gathered from the U.S. Geological Survey (USGS) digital line graph information. The scale was 1:100,000, and the data was derived from 1983 1:100,000 quadrangle maps. The lengths of the railroads were clipped out of the master database for each mapping unit with a GIS computer program. The technical work was performed by Jay Edwards, USGS, National Wetlands Research Center - Coastal Restoration Field Station, Baton Rouge, Louisiana.

Pipelines

Data for pipelines was gathered from the 1987 Louisiana Geological Survey (LGS) pipelines database. The data source is an LGS industry survey conducted in 1987. The survey was sent to all pipeline operators in the coastal zone, querying the operators for information about pipelines they had laid in the coastal zone, and this dataset represents the responses to that survey. Approximately 60% of the companies that were laying pipelines at that time responded to the survey. However, this does not necessarily translate into 60% of the pipelines, because each company does not operate an equal amount of pipelines. For example, a company that did not respond could lay and operate 75% of the pipelines in the coastal zone or in a particular area of the coastal zone. Because we do not know for sure how incomplete the set is, these data are only meant to be an index to the activity that was going on by the responding operators at the time the survey was taken and should be used with caution. Technical work was done by Jay Edwards, USGS, National Wetlands Research Center - Coastal Restoration Field Station, Baton Rouge, Louisiana.

Oil and/or Natural Gas Wells

Oil and natural gas well data came from the Louisiana Department of Natural

Resources (DNR) Coastal Use Permit database. This electronic database is maintained by the Coastal Management Division (CMD) of the Office of Coastal Restoration and Management, DNR, Baton Rouge, Louisiana. It shows all permits issued for oil and gas well construction in the coastal zone since 1981. This database is complete, and the data presented can be used as an index to oil and gas activity since that year.

Drainage Pump Stations

This data was gathered from the following source:

Himel, W., J. Reed, and D. Clark. 1991. Atlas and database of pump locations for the study of the use of runoff discharges in coastal Louisiana for wetland quality and water quality enhancement. Louisiana Department of Natural Resources. 220 pp.

The information in this report was compiled from local parish governments, CMD field investigators, drainage districts, 1:24,000 scale quadrangle maps, and the 1978 U.S. Fish and Wildlife Service habitat maps. Pump locations were pencilled in on quadrangle maps and later digitized into INFOCAD GIS software.

Water Intakes

Water intake data was compiled from a 1996 USGS database of water intakes in the coastal zone. The source for this data was the 1996 USGS Surface Water Quality Meeting Proceedings. The dataset was built by Christina Saltus,

USGS, National Wetlands Research Center - Coastal Restoration Field Station, Baton Rouge, Louisiana.

Navigation Channels

This information was compiled and presented by Mike Liffman and Robin Roberts of the Louisiana Sea Grant College Program, Wetland Resources Building, Louisiana State University, Baton Rouge, Louisiana. The following sources were used to gather the information:

U.S. Army Corps of Engineers, New Orleans District. 1993. Navigation maps of the Atchafalaya River system. Third edition.

U.S. Army Corps of Engineers, Lower Mississippi Valley Division. 1994. Flood control and navigation maps of the Mississippi River. Mississippi River Commission, 60th edition reprint.

U.S. Army Corps of Engineers and Water Resources Support Center. 1995. Waterborne commerce of the United States: Part 2 - waterways and harbors gulf coast, Mississippi River system and Antilles.

U.S. Army Corps of Engineers and Water Resources Support Center. 1997. Navigation Data Center Publications and U.S. Waterway CD: Volume 3. CD-ROM [machine-readable data file].

Battle Creek, MI: Defense
Logistics Services Center.

Port Installations

This information was compiled and presented by Mike Liffman and Robin Roberts of the Louisiana Sea Grant College Program, Wetland Resources Building, Louisiana State University, Baton Rouge, Louisiana. Information was gathered in March and April 1998 through personal communication with the following individuals: Davie Breaux, Greater Lafourche Port Commission; Charles Coppels, Vinton Harbor and Terminal Port; John Dixon, West Calcasieu Port, Harbor, and Terminal District; Jerry Hoffpauir, Morgan City Harbor and Terminal District; Ed Kelly, West Cameron Port Commission; Todd Pellegrin, Terrebonne Port Commission; Roy Pontiff, Port of Iberia District; Phil Prejean, West St. Mary Parish Port, Harbor, and Terminal District; Joseph Schexnaider, Twin Parish Port Commission. The following

publications provided additional ports information:

U.S. Army Corps of Engineers. 1990. The ports of Baton Rouge and Lake Charles, Louisiana. Port Series No. 21, Revised 1990. Prepared by the Water Resources Support Center. Washington, D.C.: U.S. Government Printing Office.

U.S. Army Corps of Engineers. 1990. The ports of New Orleans, Louisiana. Port Series No. 21, Revised 1990. Prepared by the Water Resources Support Center. Washington, D.C.: U.S. Government Printing Office.

U.S. Army Corps of Engineers. 1991. Mississippi River ports above and below New Orleans. Port Series No. 20A, Revised 1991. Prepared by the Water Resources Support Center. Washington, D.C.: U.S. Government Printing Office.

Region 4 Mapping Unit Infrastructure Summaries (In Alphabetical Order)

Amoco

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0
2. Railroads (miles): 0.0
3. Pipelines: None
4. Oil and/or Natural Gas Wells: 64
5. Drainage Pump Stations: 3
6. Water Intakes: None
7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations within this unit.

Big Burn

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 5.3
 - Tertiary: 11.0
2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S. Inc.	9.5	16
Natural Gas	Active	Koch Industries, Inc.	8.1	20
Natural Gas	Active	Koch Industries, Inc.	3.8	6

Total pipeline length: 21.4 miles

4. Oil and/or Natural Gas Wells: 191

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Cameron WW Dist. 9	Groundwater
Cameron WW Dist. 9	Groundwater

Groundwater intakes: 2 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine Rive. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Catfish Point Control Structure	Mermentau River			

Big Lake

1. Roads (miles):
 Primary: 0.0
 Secondary: 7.5
 Tertiary: 29.8

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.4	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.1	30
Natural Gas	Active	Bridgeline	1.6	6
Natural Gas	Active	Tejas Gas Corporation	1.4	6

Total pipeline length: 8.5 miles

4. Oil and/or Natural Gas Wells: 70

5. Drainage Pump Stations: 0

6. Water Intakes:

Operator	Type
Cameron WW Dist. 11	Groundwater
Cameron WW Dist. 11	Groundwater

Groundwater intakes: 2 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide along the western bank of Calcasieu Lake.	Navigation	Navigation
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Crab Lady Landing	Calcasieu Lake	40		1
Hebert's Marina	Calcasieu Lake	48		2
Calcasieu Lock	GIWW			
Totals		88	0	3

Big Marsh

1. Roads (miles):

Primary: 0.0

Secondary: 5.9

Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines: None

4. Oil and/or Natural Gas Wells: 91

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Cameron WW Dist. 11	Groundwater
Cameron WW Dist. 11	Groundwater

Groundwater intakes: 2 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Freshwater Bayou	Channel 12 ft deep x 125 ft wide; Project shared with Region 3; 6 miles canal.	Navigation	Navigation
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Navigation	Navigation

Navigation Channels (Cont.):

Project Name	Project Features	Purpose	Primary User
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 100 ft wide.	Navigation	Navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Schooner Bayou Control Structure	Old GIWW			

Black Bayou

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 16.4

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Enterprise Products Company	17.5	4
Natural Gas	Active	Sabine Pipeline Company	7.9	18
Natural Gas	Active	Sabine Pipeline Company	7.4	16

Total pipeline length: 32.8 miles

4. Oil and/or Natural Gas Wells: 306

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Industry	Groundwater
Industry	Groundwater

Groundwater intakes: 2 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of channel from Sabine River to Calcasieu River, 30 ft x 125 ft; length of improvement is 24.9 miles	Navigation	Navigation

8. Port Installations: No major port or terminal installations in this unit.

Black Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 4.4
 Tertiary: 17.3

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Tejas Gas Corporation	4.0	6
Natural Gas	Active	Tejas Gas Corporation	3.2	4

Total pipeline length: 7.2 miles

4. Oil and/or Natural Gas Wells: 889

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of channel from Sabine River to Calcasieu River, 30 ft x 125 ft; length of improvement is 24.9 miles	Navigation	Navigation
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation

8. Port Installations: No major port or terminal installations within this unit.

Brown Lake

1. Roads (miles):

Primary: 5.00
 Secondary: 0.00
 Tertiary: 12.35

2. Railroads (miles): 0.00

3. Pipelines: None

4. Oil and/or Natural Gas Wells: 51

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide along the western bank of Calcasieu Lake.	Navigation	Navigation

8. Port Installations: No major ports or terminal installations within this unit.

Calcasieu Lake

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	19.8	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	13.0	30
Natural Gas	Active	Bridgeline	5.2	6
Natural Gas	Active	Tejas Gas Corporation	2.8	6

Total pipeline length: 40.8 miles

4. Oil and/or Natural Gas Wells: 49

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Industry	Surface Water
Industry	Groundwater

Groundwater intakes: 1

Surface water intakes: 1

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation

8. Port Installations: No major port or terminal installations in this unit.

Cameron

- 1. Roads (miles):
 - Primary: 15.7
 - Secondary: 16.7
 - Tertiary: 55.5

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	0.8	4
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.6	NA

Total pipeline length: 1.4 miles

4. Oil and/or Natural Gas Wells: 193

5. Drainage Pump Stations: 5

6. Water Intakes:

Operator	Type
Cameron WW Dist. 7	Groundwater
Cameron WW Dist. 7	Groundwater
Cameron WW Dist. 7	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater
Cameron WW Dist. 1	Groundwater

Groundwater intakes: 11 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide from the Gulf of Mexico to Calcasieu Lake (approximately 5 miles).	Navigation	Navigation
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
West Cameron Port Commission	Calcasieu Ship Channel, Calcasieu Pass		5,200	
Charlida, Inc.	Calcasieu River	8		1
Tesoro Petroleum Corp., Cameron Lower Wharf	Calcasieu Pass	1	230	
Berwick Bay Oil Co., Cameron Wharf	Calcasieu Pass	1	257	
Zapata Haynie, Cameron East Bank Wharf	Calcasieu Pass	3	965	
Tesoro Petroleum Corp., Cameron Upper Wharf	Calcasieu Pass	1	165	
Steed's Shrimp Co. Mooring	Calcasieu Pass	2	270	
Gulf Crews, Cameron Wharf	Calcasieu Pass	1	110	
Steed's Shrimp Co., Shrimp Wharf	Calcasieu Pass	2	175	
Lake Charles Diesel, Cameron Wharf	Calcasieu Pass	3	300	
Francis Drilling Fluids, Cameron Wharf	Calcasieu Pass	1	250	
Seafood 2000 Dock	Calcasieu Pass	1	375	
Bailey's Seafood, Cameron Wharf	Calcasieu Pass	2	200	
James S. Henry Wharf	Calcasieu Pass	1	150	
Bolo Ice Wharf	Calcasieu Pass	1	170	
Mobil Oil Exploration Southeast, Cameron Highway 27 Wharf	Calcasieu Pass	3	370	
Monkey Island Ferry, East Bank Slip	Calcasieu Pass	2	90	
Big Diamond Industries, Cameron Wharf	Calcasieu Pass	2	262	
Cameron Crew Boats Wharf	Calcasieu Pass	1	160	
Cameron Offshore Boats, Dispatch Dock	Calcasieu Pass	2	245	
Koch Exploration Co., Cameron Wharves and Slip	Calcasieu Pass	3	498	
Dowell Schlumberger Cameron Dock	Calcasieu Pass	1	200	
Global Chemicals, Cameron Dock	Calcasieu Pass	3	690	

Port Installations (Cont.):

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Manning Menard Oil Co., Cameron Exxon Fuel Dock	Calcasieu Pass	3	235	
Steed's Shrimp Co., Ice Wharf	Calcasieu Pass	2	245	
M-I Drilling Fluids, Cameron Bulk Barite Dock	Calcasieu Pass	1	130	
Trosclair Canning Co. Wharf	Calcasieu Pass	1	280	
Campbell-Taylor Oil Co. of Louisiana, Cameron Mobil Fuel Wharf	Calcasieu Pass	1	195	
M-I Drilling Fluids, Cameron Crew Boat Dock	Calcasieu Pass	1	115	
M-I Drilling Fluids, Cameron Loading Ramp Doek	Calcasieu Pass	1	115	
Doxey Marine Pier	Calcasieu Pass	3	380	
M-I Drilling Fluids, Cameron Crane Dock	Calcasieu Pass	1	190	
Cameron Offshore Boats, Leesburg Street Dock	Calcasieu Pass	1	145	
Mobil Oil Exploration Southeast, Cameron Offshore Base Wharf	Calcasieu Pass	1	600	
Baroid Corp., Cameron Wharf	Calcasieu Pass	1	460	
Cameron Construction Co. Wharf	Calcasieu Pass	1	400	
Milpark Drilling Fluids, Cameron Lower Wharf	Calcasieu Pass	1	500	
OSCA Cameron Wharf	Calcasieu Pass	1	300	
Cameron Parish Shell Dock	Calcasieu Pass	1	200	
Chevron Cameron Shore Base Wharf	Calcasieu Pass	1	420	
Conoco Cameron Wharf	Calcasieu Pass	1	500	
Cameron Pilots Dock	Calcasieu Pass	1	100	
Monkey Island Ferry, Monkey Island Slip	Calcasieu Pass	2	90	
Bailey's Seafood, Monkey Island Wharf	Calcasieu Pass	1	160	
State Highways 27 and 82 Ferry, East Bank Slip	Calcasieu Ship Channel	3	460	
Cameron Offshore KAD Industries, Berths Nos. 4 and 5	Calcasieu Ship Channel	1	370	
Louisiana Resources Co., Calcasieu River Loading Terminal Dock	Calcasieu Ship Channel	2	332	
BJ Titan Services Co., Cameron Wharf	Calcasieu Ship Channel	1	200	
Halliburton Services, Cameron Wharf	Calcasieu Ship Channel	1	320	
Cameron Offshore KAD Industries, Berths Nos. 1, 2, and 3	Calcasieu Ship Channel	2	590	
Louisiana Menhaden Co., Cameron North Fish Unloading Dock	Calcasieu Ship Channel	1	200	
Louisiana Menhaden Co., Cameron South Fish Unloading Dock	Calcasieu Ship Channel	1	200	
Louisiana Menhaden Co., Cameron Fish Oil Loading Dock	Calcasieu Ship Channel	1	150	
Cameron Offshore KAD Industries, Berth No. 6	Calcasieu Ship Channel	1	165	

Port Installations (Cont.):

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Arnvin Seafood, Cameron Wharf	Calcasieu Ship Channel	1	600	
Cameron Offshore KAD Industries, Industrial Marine Services Dock	Calcasieu Ship Channel	1	225	
Fountain Seafood Co., Cameron Wharf	Calcasieu Ship Channel	1	20	
Cameron Offshore KAD Industries, Berths Nos. 7 and 8	Calcasieu Ship Channel	1	330	
Cameron Offshore KAD Industries, Crew Boat Dock, Berths A, B, C, and D	Calcasieu Ship Channel	1	250	
Western Co. of North America, Cameron Wharf	Calcasieu Ship Channel	1	220	
Louisiana Menhaden Co., Cameron North Lay Dock	Calcasieu Ship Channel	1	150	
Louisiana Menhaden Co., Cameron Machine Shop Dock	Calcasieu Ship Channel	1	320	
Louisiana Menhaden Co., Cameron South Lay Dock	Calcasieu Ship Channel	1	170	
Amerada Hess Corp., Cameron Base Wharf	East Fork, Calcasieu Pass	1	374	
International Drilling Fluids, Cameron Wharf	East Fork, Calcasieu Pass	1	355	
McDaniel Wharf	East Fork, Calcasieu Pass	1	405	
DL-Mud, Cameron Facility Mooring	East Fork, Calcasieu Pass	1	200	
DL-Mud, Cameron Facility Ramp Dock	East Fork, Calcasieu Pass	1	200	
DL-Mud, Cameron Facility Crane Dock	East Fork, Calcasieu Pass	1	200	
Milpark Drilling Fluids, Cameron Upper Wharf	East Fork, Calcasieu Pass	1	400	
Totals		102	19298	1

Cameron-Creole Watershed

1. Roads (miles):

Primary: 0.0
 Secondary: 8.1
 Tertiary: 6.1

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.6	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.0	30

Total pipeline length: 5.6 miles

4. Oil and/or Natural Gas Wells: 74

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations within this unit.

Cameron Prairie

1. Roads (miles):

Primary: 0.0

Secondary: 2.9

Tertiary: 3.7

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	4.0	20

Total pipeline length: 4.0 miles

4. Oil and/or Natural Gas Wells: 16

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations in this unit.

Choupique Island

1. Roads (miles):

Primary: 0.0

Secondary: 0.0

Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Bridgeline	1.2	6

Total pipeline length: 1.2 miles

4. Oil and/or Natural Gas Wells: 1

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide for approximately 10 miles north of Calcasieu Lake, changing to 35 ft deep x 250 ft wide at 10 miles north of Calcasieu Lake to Lake Charles Harbor. Prevents saltwater intrusion.	Navigation	Navigation
Calcasieu River at Devil's Elbow	Channel 40 ft deep x 400 ft wide from the Calcasieu River and Pass to the Industrial Canal.	Navigation	Navigation
Calcasieu River at Coon Island	Channel 40 ft deep x 200 ft wide.	Navigation	Navigation

8. Port Installations: No major port or terminal installations in this unit.

Clear Marais

1. Roads (miles):

Primary: 0.0
 Secondary: 1.4
 Tertiary: 33.0

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Enterprise Products Company	4.3	4
Natural Gas	Active	Sabine Pipeline Company	2.8	18
Natural Gas	Active	Sabine Pipeline Company	2.5	16

Total pipeline length: 9.6 miles

4. Oil and/or Natural Gas Wells: 5

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of channel from Sabine River to Calcasieu River; 30 ft x 125 ft. Length of improvement, 24.9 miles	Navigation	Navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
West Calcasieu Port, Harbor & Terminal District	Lake Charles Deep Water Channel		2,200	
Devall Fleeting Service, Calcasieu River Intersection Fleet	GIWW	3	4,500	
Totals		3	6700	0

East Johnson's Bayou

1. Roads (miles):

Primary: 0.0

Secondary: 0.0

Tertiary: 15.4

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	14.2	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	10.7	30
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.2	24
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.9	16

Total pipeline length: 31.0 miles

4. Oil and/or Natural Gas Wells: 303

5. Drainage Pump Stations: 2

- 6. Water Intakes: None
- 7. Navigation Channels: No USACE-maintained channels.
- 8. Port Installations: No major port or terminal installations within this unit.

Grand Chenier Ridge

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 16.2
 - Tertiary: 18.4

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	11.0	20
Natural Gas	Active	Koch Industries, Inc.	0.7	12
Natural Gas	Active	Koch Industries, Inc.	0.2	6
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.2	12

Total pipeline length: 12.1 miles

4. Oil and/or Natural Gas Wells: 64

5. Drainage Pump Stations: 5

6. Water Intakes:

Operator	Type
Industry	Groundwater
Industry	Groundwater

Groundwater intakes: 2 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood Control	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Grand Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	12.7	12
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	11.3	16

Total pipeline length: 24.0 miles

4. Oil and/or Natural Gas Wells: 64

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Commercial	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Grand Lake East

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0
- 2. Railroads (miles): 0.0
- 3. Pipelines: None
- 4. Oil and/or Natural Gas Wells: 65
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None
- 7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations within this unit.

Grand/White Lake Land Bridge

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0
- 2. Railroads (miles): 0.0
- 3. Pipelines: None
- 4. Oil and/or Natural Gas Wells: 5

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Gum Cove

1. Roads (miles):

Primary: 0.0

Secondary: 0.0

Tertiary: 25.2

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Enterprise Products Company	2.0	4

Total pipeline length: 2.0 miles

4. Oil and/or Natural Gas Wells: 22

5. Drainage Pump Stations: 1

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of the channel from Sabine River to Calcasieu River; 30 ft deep x 125 ft wide. Length of improvement, 24.9 miles	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Hackberry Ridge

1. Roads (miles):

Primary: 5.2
 Secondary: 0.3
 Tertiary: 39.9

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Tejas Gas Corporation	1.4	4

Total pipeline length: 1.4 miles

4. Oil and/or Natural Gas Wells: 485

5. Drainage Pump Stations: 2

6. Water Intakes:

Operator	Type
Commercial	Groundwater
Commercial	Groundwater
Cameron WW Dist. 2	Groundwater
Cameron WW Dist. 2	Groundwater
Cameron WW Dist. 2	Groundwater
Cameron WW Dist. 2	Groundwater

Groundwater intakes: 6 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide along the western bank of Calcasieu Lake.	Navigation	Navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Andy's Seafood Wharf	Black Lake Bayou	1	620	
Texaco East Hackberry Field Service Wharf	Black Lake Bayou	1	380	
Amoco Production Co., Hackberry Wharf	Black Lake Bayou	3	203	
Amoco Production Co., Hackberry East Slip	Black Lake Bayou	3	305	
Red Top Seafood, Hackberry Shrimp Dock	Black Lake Bayou	3	445	
Devall Towing and Boat Service, Hackberry Landing	Black Lake Bayou	1	248	
Ocean Seafood Co., Hackberry Wharves	Black Lake Bayou	3	350	
Amoco Production Co., Hackberry West Slip	Black Lake Bayou	3	1,050	
Hackberry Seafood Dock	Black Lake Bayou	1	100	

Port Installations (Cont.):

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Devall Towing and Boat Service, Hackberry Slip	Black Lake Bayou	3	1,010	
West Cove Seafood, Hackberry No. 3 Dock	Calcasieu River	3	415	
Oxy-Cities Service NGL, Hackberry LPG Terminal	Calcasieu River	1	850	
Red Top Seafood, Hackberry Fueling Docks	Calcasieu River	3	67	
Fisherman Fresh Seafood, Hackberry Wharf	Calcasieu River	1	150	
West Cove Seafood, Hackberry No. 1 Dock	Calcasieu River	3	190	
Dugas Landing Docks	Calcasieu River	2	230	
Totals		35	6613	0

In addition to the infrastructure listed above, a U.S. Department of Energy Strategic Petroleum Reserve is located in the West Hackberry salt dome. The facility can store 34.8 million m³ of crude oil, although a 1996 inventory reported the facility to be 3.6 million m³ below capacity.

Hog Bayou

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 23.4

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.7	12
Natural Gas	Active	Koch Industries, Inc.	1.9	12
Natural Gas	Active	Koch Industries, Inc.	1.9	10
Natural Gas	Active	Mobil Exploration & Producing U.S. Inc.	1.3	16
Natural Gas	Active	Koch Industries, Inc.	1.0	20
Natural Gas	Active	Panhandle Eastern Corporation	0.8	30

Total pipeline length: 10.6 miles

4. Oil and/or Natural Gas Wells: 157

5. Drainage Pump Stations: 6

6. Water Intakes:

Operator	Type
Industry	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	

8. Port Installations: No major port or terminal installations within this unit.

Hog Island Gully

1. Roads (miles):

 Primary: 0.0
 Secondary: 7.9
 Tertiary: 1.2

2. Railroads (miles): 0.0

3. Pipelines: None

4. Oil and/or Natural Gas Wells: None

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation

8. Port Installations: No major port or terminal installations in this unit.

Johnson's Bayou Ridge

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 1.4
 - Tertiary: 0.5

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	1.1	16
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.9	24
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.5	16

Total pipeline length: 2.5 miles

4. Oil and/or Natural Gas Wells: 14

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels: No USACE-maintained channels.

8. Port Installations: No major port or terminal installations within this unit.

Lacassine

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 6.7

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	3.2	16

Total pipeline length: 3.2 miles

4. Oil and/or Natural Gas Wells: 52
5. Drainage Pump Stations: None
6. Water Intakes: None
7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations in this unit.

Little Pecan

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 3.3
 - Tertiary: 11.3
2. Railroads (miles): 0.0
3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	8.9	16
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	8.5	6
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	5.3	6
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	1.8	3
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	0.1	12

Total pipeline length: 24.6 miles

4. Oil and/or Natural Gas Wells: 399
5. Drainage Pump Stations: 3
6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the Mermentau River; Project shared with Region 3.	Flood control	

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Catfish Point Control Structure	Mermentau River			

Little Prairie

1. Roads (miles):

Primary: 0.0
 Secondary: 14.1
 Tertiary: 54.2

2. Railroads (miles): 0.0

3. Pipelines: None

4. Oil and/or Natural Gas Wells: 55

5. Drainage Pump Stations: 9

6. Water Intakes:

Operator	Type
Commercial	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Navigation	Navigation
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Schooner Bayou Control Structure	Old GIWW			

Locust Island

1. Roads (miles):

Primary: 0.0
 Secondary: 2.2
 Tertiary: 60.2

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	3.6	4
Natural Gas	Active	Koch Industries, Inc.	1.8	3

Total pipeline length: 5.4 miles

4. Oil and/or Natural Gas Wells: 98

5. Drainage Pump Stations: 14

6. Water Intakes:

Operator	Type
Industry	Groundwater
Industry	Groundwater
Commercial	Groundwater
Industry	Groundwater

Groundwater intakes: 4 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Freshwater Bayou	Channel 12 ft deep x 125 ft wide; Project shared with Region 3; 6 mile canal.	Navigation	Navigation
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight	Commercial navigation
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Leland Bowman Lock	GIWW			

Lower Mud Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Panhandle Eastern Corporation	1.1	30
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	0.7	16

Total pipeline length: 1.8 miles

4. Oil and/or Natural Gas Wells: 17

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	

8. Port Installations: No major port or terminal installations within this unit.

Martin Beach Ship Canal Shore

1. Roads (miles):

Primary: 7.4
 Secondary: 10.2
 Tertiary: 8.3

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.1	36

Total pipeline length: 1.1 miles

4. Oil and/or Natural Gas Wells: 59

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Industry	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide stretching approximately 1 miles north of the Gulf of Mexico	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Middle Marsh

1. Roads (miles):

Primary: 0.0
 Secondary: 3.8
 Tertiary: 25.2

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	3.4	6
Natural Gas	Active	Koch Industries, Inc.	1.6	20
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	1.3	16

Total pipeline length: 6.3 miles

4. Oil and/or Natural Gas Wells: 98

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Cameron WW Dist. 9	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	

8. Port Installations: No major port or terminal installations within this unit.

Mud Lake

1. Roads (miles):

Primary: 6.5
 Secondary: 0.0
 Tertiary: 9.5

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.8	30
Natural Gas	Active	Koch Industries, Inc.	1.8	4
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.7	36

Total pipeline length: 5.3 miles

4. Oil and/or Natural Gas Wells: 123

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Industry	Surface Water
Industry	Groundwater
Industry	Groundwater

Groundwater intakes: 2 Surface water intakes: 1

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Calcasieu River and Pass	Channel 40 ft deep x 400 ft wide from approximately 1 miles north of the Gulf of Mexico to Calcasieu Lake (approximately 4 miles).	Navigation	Navigation
Calcasieu Ship Channel	Calcasieu River and Ship Channel extends 109.5 miles from Phillips Bluff, LA to the 42 ft contour in the Gulf of Mexico. Controlling depths are 39 ft MLG in the Bar Channel and 42 ft MLG to Lake Charles.	Navigation	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
West Cameron Port Commission	Calcasieu Ship Channel, Calcasieu Pass		5,200	
Zapata Haynie, Cameron West Bank Fish Dock	Calcasieu Ship Channel	1	780	
Zapata Haynie, Cameron West Bank Repair Basin	Calcasieu Ship Channel	3	350	
Zapata Haynie, Cameron West Bank Fish Meal Dock	Calcasieu Ship Channel	1	420	
State Highways 27 and 82 Ferry, West Bank Slip	Calcasieu Ship Channel	3	460	
Leevac Petroleum, Cameron Terminal Wharf	Calcasieu Ship Channel	1	1,000	
Totals		9	8210	0

North Grand Lake

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 8.6

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	3.9	12
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	3.4	16
Natural Gas	Active	Enterprise Products Company	2.9	4
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.3	30
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	1.4	12
Product	Active	Enron LA Energy Company	0.8	6
Natural Gas	Active	Tejas Gas Corporation	0.4	4
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	0.4	12

Total pipeline length: 15.5 miles

- 4. Oil and/or Natural Gas Wells: 52
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None
- 7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River, Bayou Nezpique, and Des Cannes	Provides removal of obstructions in entire Mermentau River.	Navigation	Navigation
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	Navigation
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Gary's Landing	Mermentau River			1

North White Lake

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 1.1
2. Railroads (miles): 0.0
3. Pipelines: None
4. Oil and/or Natural Gas Wells: 52
5. Drainage Pump Stations: None
6. Water Intakes: None
7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Navigation	Navigation
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Oak Grove

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 12.0
 - Tertiary: 18.2

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	5.1	16
Natural Gas	Active	Koch Industries, Inc.	4.9	4
Natural Gas	Active	Koch Industries, Inc.	3.7	20
Natural Gas	Active	Panhandle Eastern Corporation	3.2	30
Natural Gas	Active	Koch Industries, Inc.	0.2	6

Total pipeline length: 17.1 miles

4. Oil and/or Natural Gas Wells: 104

5. Drainage Pump Stations: None

6. Water Intakes:

Operator	Type
Commercial	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Mermentau River	Enlargement of the lower Mermentau River; Project shared with Region 3.	Flood control	

8. Port Installations: No major port or terminal installations in this unit.

Perry Ridge

1. Roads (miles):

 Primary: 2.2

 Secondary: 0.0

 Tertiary: 10.7

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Sabine Pipeline Company	5.0	16
Natural Gas	Active	Sabine Pipeline Company	5.0	18

Total pipeline length: 10.0 miles

4. Oil and/or Natural Gas Wells: 83

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of channel from Sabine River to Calcasieu River, 30 ft x 125 ft; Length of improvement, 24.9 miles	Navigation	Navigation
Vinton Waterway	Channel 9 ft x 60 ft from GIWW via Vinton Drainage Canal to a turning basin at Vinton.	Navigation	Commercial navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Vinton Harbor and Terminal Port	Vinton Waterway		1,200	

Rockefeller

1. Roads (miles):

Primary: 0.0
 Secondary: 19.6
 Tertiary: 19.3

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	10.1	16
Natural Gas	Active	Koch Industries, Inc.	6.1	20
Natural Gas	Active	Natural Gas Pipeline Co. of America	4.1	12
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	2.0	6
Natural Gas	Active	Koch Industries, Inc.	0.3	10
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	0.2	6

Total pipeline length: 22.8 miles

4. Oil and/or Natural Gas Wells: 199

5. Drainage Pump Stations: 6

6. Water Intakes: None

7. Navigation Channels: No USACE-maintained channels.

8. Port Installations: No major port or terminal installations within this unit.

Sabine Lake Ridges

1. Roads (miles):

Primary: 0.0

Secondary: 14.5

Tertiary: 14.1

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Koch Industries, Inc.	14.7	16
Natural Gas	Active	Natural Gas Pipeline Co. of America	7.3	30
Natural Gas	Active	Natural Gas Pipeline Co. of America	7.3	36

Pipelines (Cont.):

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Mobil Exploration & Producing U.S., Inc.	4.2	16
Natural Gas	Active	Koch Industries, Inc.	2.7	8
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.3	6
Natural Gas	Active	Koch Industries, Inc.	0.7	4
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.6	24
Natural Gas	Active	Natural Gas Pipeline Co. of America	0.5	16

Total pipeline length: 39.3 miles

4. Oil and/or Natural Gas Wells: 171
5. Drainage Pump Stations: 3
6. Water Intakes: None
7. Navigation Channels: No USACE-maintained channels.
8. Port Installations: No major port or terminal installations within this unit.

Sabine Pool #3

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0
2. Railroads (miles): 0.0
3. Pipelines: None
4. Oil and/or Natural Gas Wells: 1
5. Drainage Pump Stations: None
6. Water Intakes: None
7. Navigation Channels: No USACE-maintained channels.
8. Port Installations: No major port or terminal installations within this unit.

Second Bayou

- 1. Roads (miles):
 - Primary: 3.9
 - Secondary: 0.0
 - Tertiary: 2.1
- 2. Railroads (miles): 0.0
- 3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.1	30
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.6	36

Total pipeline length: 5.7 miles

- 4. Oil and/or Natural Gas Wells: 87
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None
- 7. Navigation Channels: No USACE-maintained channels.
- 8. Port Installations: No major port or terminal installations within this unit.

South Pecan Island

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 4.3
 - Tertiary: 8.8
- 2. Railroads (miles): 0.0
- 3. Pipelines: None
- 4. Oil and/or Natural Gas Wells: 124
- 5. Drainage Pump Stations: 3
- 6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Freshwater Bayou	Channel 12 ft deep x 125 ft wide; Project shared with Region 3; 6 mile canal.	Navigation	Navigation

8. Port Installations:

Installation	Waterway	Berths	Berthing Space (ft.)	Launching Ramps
Freshwater Bayou Lock	Freshwater Bayou			

South White Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 19.4
 Tertiary: 15.9

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Crude Oil	Active	Mobil Exploration & Producing U.S., Inc.	0.4	6

Total pipeline length: 0.4 miles

4. Oil and/or Natural Gas Wells: 197

5. Drainage Pump Stations: 3

6. Water Intakes:

Operator	Type
Waterworks Dist. 1	Groundwater

Groundwater intakes: 1 Surface water intakes: 0

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Southeast Sabine

1. Roads (miles):

Primary: 2.4
 Secondary: 0.0
 Tertiary: 2.8

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	4.2	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	3.8	30

Total pipeline length: 8.0 miles

4. Oil and/or Natural Gas Wells: 67

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels: No USACE-maintained channels.

8. Port Installations: No major port or terminal installations within this unit.

Southwest Gum Cove

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 21.9
- 2. Railroads (miles): 0.0
- 3. Pipelines: None
- 4. Oil and/or Natural Gas Wells: 125
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None
- 7. Navigation Channels: No USACE-maintained channels.
- 8. Port Installations: No major port or terminal installations within this unit.

Sweet/Willow Lakes

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 2.7
 - Tertiary: 4.9

2. Railroads (miles): 0.0

3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.5	30
Natural Gas	Active	Natural Gas Pipeline Co. of America	2.5	36

Total pipeline length: 5.0 miles

- 4. Oil and/or Natural Gas Wells: 160
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Gulf Intracoastal Waterway (GIWW)	266 miles from Harvey and Algiers Locks at New Orleans to the Sabine River. Controlling depth is 12 ft MLG.	Navigation - In 1995, handled 68.3 million tons of freight.	Commercial navigation

8. Port Installations: No major port or terminal installations within this unit.

West Black Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 16.4

2. Railroads (miles): 0.0

3. Pipelines: None

4. Oil and/or Natural Gas Wells: 8

5. Drainage Pump Stations: 2

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Lake Charles Deep Water Channel	Provide for the maintenance of channel from Sabine River to Calcasieu River, 30 ft x 125 ft; Length of improvement, 24.9 miles	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

West Cove

- 1. Roads (miles):
 - Primary: 7.8
 - Secondary: 0.0
 - Tertiary: 1.3
- 2. Railroads (miles): 0.0
- 3. Pipelines: None
- 4. Oil and/or Natural Gas Wells: 1
- 5. Drainage Pump Stations: 1
- 6. Water Intakes: None
- 7. Navigation Channels: No USACE-maintained channels.
- 8. Port Installations: No major port or terminal installations within this unit.

West Johnson's Bayou

- 1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 1.8
- 2. Railroads (miles): 0.0
- 3. Pipelines:

Type	Status	Operator	Length (miles)	Size (inches)
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.9	36
Natural Gas	Active	Natural Gas Pipeline Co. of America	1.8	30

Total pipeline length: 3.7 miles

- 4. Oil and/or Natural Gas Wells: 13
- 5. Drainage Pump Stations: None
- 6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Johnson's Bayou	Extends 5.5 miles from the Sabine River to Blue Buck Ridge; Controlling depth is 8 ft.	Navigation - In 1995, carried 585,000 tons of freight traffic.	Commercial and recreational navigation

8. Port Installations: No major port or terminal installations within this unit.

White Lake

1. Roads (miles):

Primary: 0.0
 Secondary: 0.0
 Tertiary: 0.0

2. Railroads (miles): 0.0

3. Pipelines: None

4. Oil and/or Natural Gas Wells: 279

5. Drainage Pump Stations: None

6. Water Intakes: None

7. Navigation Channels:

Project Name	Project Features	Purpose	Primary User
Inland Waterway	Removal of obstructions from mouth to Southern Pacific RR bridge; Dredging 10 cutoffs; Length 14 miles; Stream varies from 50 ft to 110 ft wide.	Navigation	Navigation

8. Port Installations: No major port or terminal installations within this unit.

Willow Bayou

1. Roads (miles):
 - Primary: 0.0
 - Secondary: 0.0
 - Tertiary: 0.0
2. Railroads (miles): 0.0
3. Pipelines: None
4. Oil and/or Natural Gas Wells: 8
5. Drainage Pump Stations: None
6. Water Intakes: None
7. Navigation Channels: No USACE-maintained channels.
8. Port Installations: No major port or terminal installations within this unit.

SECTION 6

WETLAND DEVELOPMENT/PERMITTED ACTIVITIES

The following account of impacts from development activity comes from Louisiana's Coastal Use permit data and reflects impacts to wetlands as well as non-wetland habitat. No data are available to correlate permit type with extent of impact in wetlands.

In November 1997, the Louisiana Department of Natural Resources (DNR), in cooperation with the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the Environmental Protection Agency, developed the *Louisiana Coastal Wetlands Conservation Plan*. Included in this document is an account of development-related activities in wetlands over the previous 15 years. The coast of Louisiana had its highest level of wetland development in the period between 1980 and 1985, whereas the period between 1990 and 1995 showed the lowest development losses.

Importantly, acreage losses per issued permit dropped as well. Data from DNR show that annual losses peaked in 1983 at 2,735 acres, with a low of 196 acres in 1990. Average annual wetland losses for the period 1982-1995 are estimated at 843 acres. This corresponded with an annual average of 860 permits issued between 1980 and 1995: 941 permits per year between 1980 and 1985; 793 permits per year between 1985 and 1990; and 846 permits per year between 1990 and 1995. Regions 2 and 3 have sustained and continue to sustain the

greatest impact from permit/development activity. Total acres disturbed in Region 4 declined from 1980 through 1995 (1,284, 1,193, and 947 acres, respectively, for 1980-1985, 1985-1990, and 1990-1995).

Oil and gas development has greatly dominated the activities associated with permitted losses in coastal Louisiana. For instance, of the 4,706 permits issued between 1980 and 1985, 3,911 (83.1%) were for oil and gas activity. Between 1985 and 1990, 2,844 (71.7%) of the total 3,964 permits issued were for oil and gas. Finally, for the period between 1990 and 1995, a total of 4,229 permits were issued, of which 2953 (69.8%) were for oil and gas. No attempt has been made to correlate rates of loss per permit with specific activity types (i.e., oil/gas, development of fastland, bulkheads, etc.).

Region 4 has sustained moderate permit activity, with a steady decline from the early 1980's through the 1995 reporting period (791, 628, and 538 permits per year, respectively, for 1980-1985, 1985-1990, and 1990-1995). The oil and gas industry dominated permitted activity in this region. Fastland development and the construction of bulkheads and piers were greatest in the Cameron area.. The annual number of oil and gas permits declined from 686 to 397 in the same 15-year reporting period.

SECTION 7

FISH AND WILDLIFE

Methodology for Historic Trends in Fisheries Production

In order to assess the recent trends and future projections of fishery populations within the Coast 2050 study area, four broad species assemblages were established based on salinity preferences. These assemblages were marine, estuarine dependent, estuarine resident, and freshwater. Within each of the four assemblages, guilds of fishery organisms were established. As used in this document, guilds are groupings of ecologically similar species identified by a single, representative species and, hereafter, the terms guild and species are used interchangeably. Fishery guilds common to coastal Louisiana, within each salinity-preference assemblage are:

- Spanish mackerel guild – marine;
- red drum, black drum, spotted seatrout, Gulf menhaden, southern flounder, white shrimp, brown shrimp, and blue crab guilds – estuarine dependent;
- American oyster guild – estuarine resident; and
- largemouth bass and channel catfish guilds – freshwater.

In a broad sense, each of the 12 guilds is uniquely identified by the combination of the representative species' habitat preference, salinity preference, primary

habitat function, seasonal occurrence in the estuary, and spawning or migratory seasons. Habitat and life history information is based on available scientific literature specific to the northwestern Gulf of Mexico, but is somewhat generalized to accommodate the establishment of guilds.

Once the species representing each fishery guild was identified, population changes of each species were assessed and displayed by using a matrix for each of the four coastal regions. The matrices display mapping units and guilds and, within the mapping units, provide information on the population stability (recent change trends) and population projections for each species group (Table 7-1). The discussion of fishery population projections follows this section. Most of the recent trend information was provided by fishery biologists of the Louisiana Department of Wildlife and Fisheries (LDWF). The assessments were based on LDWF fishery independent sampling data and personal observation of area fisheries biologists, and generally span a period of 10 to 20 years. Staff of LDWF believe that, due to selectivity of sample gear, the trend information is most reflective of recent changes in the subadult portion of each guild.

The projections of possible future changes in fishery production for coastal Louisiana are based solely on landscape

change model predictions discussed in the main report. The key parameters in making those projections were percent and pattern of wetland loss in each mapping unit. Numerous other factors which could not be forecast, such as changes in water quality, fishery harvest levels, wetland development activities (e.g., dredging and filling), and blockages of migratory pathways, also could negatively impact fishery production. These factors and the potentially great inaccuracy in predicting land loss 50 years into the future, especially when considering landscape changes at a mapping unit scale, limit the precision of the predicted changes in fishery production.

Information provided in the matrix was developed through the collaborative effort of the Louisiana Department of Wildlife and Fisheries (LDWF) and the National Marine Fisheries Service (NMFS). Contributors to this effort for Region 4 were Dudley C. Carver, Jerry Ferguson, Michael Harbison and Glenn Thomas of the LDWF and Rickey Ruebsamen and Richard Hartman of the NMFS.

Methodology for Wildlife Functions, Status, Trends, and Projections

Louisiana's coastal wetlands, extending from the forested wetlands at the upper end to the barrier shorelines bordering the gulf, provide a diverse array of habitats for numerous wildlife communities. In addition to fulfilling all life-cycle needs for many resident species, coastal wetlands provide wintering or stopover habitat for

migratory waterfowl and many other birds. The bald eagle and brown pelican, protected by the Endangered Species Act, are recovering from very low populations over the last three decades. These two species are projected to continue to increase in the future, independent of near-term wetland changes. The fate of other species groups in coastal Louisiana will be influenced by habitat conditions within their areas. The prediction of extensive land loss and habitat change by the year 2050 prompted an examination of the effect of such losses and changes on the abundance of wildlife.

To assess habitat functions and the status, recent trends, and future projections of wildlife abundance within the Coast 2050 study area, 21 prominent wildlife species and/or species groups were identified:

- Brown pelican
- Bald eagle
- Seabirds, such as black skimmer, royal tern, common tern, and laughing gull
- Wading birds, such as great blue heron, snowy egret, and roseate spoonbill
- Shorebirds, such as piping plover, black-necked stilt, American avocet, and willet
- Dabbling ducks, such as mallard, gadwall, mottled duck, and wood duck
- Diving ducks, such as greater scaup, ring-necked duck, redhead, and canvasback
- Geese, such as snow goose, white-fronted goose, and Canada goose

- Raptors, such as northern harrier, peregrine falcon, and American kestrel
- Rails, gallinules, and coots, such as king rail, sora rail, and purple gallinule
- Other marsh and open water residents, such as anhinga, least bittern, and seaside sparrow
- Other woodland residents, such as pileated woodpecker, Carolina chickadee, and belted kingfisher
- Other marsh and open water migrants, such as tree swallow, barn swallow, and Savannah sparrow
- Other woodland migrants, such as hermit thrush, American robin, and cedar waxwing
- Nutria
- Muskrat
- Mink, otter, and raccoon
- Rabbits
- Squirrels
- White-tailed deer
- American alligator

A matrix was developed for each region to present the habitat function and the status, trend, and projection for the above listed species and/or species groups for each habitat type within each mapping unit (Table 7-2).

“Habitat functions” considered were nesting (Ne), wintering area (W), stopover habitat (St), and multiple functions (Mu). “Status” categories included the following: not historically present (NH), no longer present (NL), present in low numbers (Lo), present in moderate numbers (Mo), and present in high numbers (Hi). “Not historically present” means that the species or species group has not been present in the given area for over about 50 years. “No

longer present” means that the species or species group was present in the given area sometime during the last 50 years, but is not currently present.

“Trend” refers to changes in abundance over the last 10 to 20 years, and “projection” refers to a prediction of changes in wildlife abundance through the year 2050; “trend” and “projection” categories include steady (Sy), decrease (D), increase (I), and unknown (U).

“Habitat Types” reflect 1988 conditions and include the following: open water (OW), aquatic bed (AB), fresh marsh (FM), intermediate marsh (IM), brackish marsh (BM), saline marsh (SM), fresh swamp (FS), hardwood forest (HF), barrier beach (BB), and agriculture/upland (AU). Habitat types comprising less than 5% of a unit are shown only if that habitat type is particularly rare or important to wildlife in the given mapping unit.

“Habitat function,” “status,” and “trend” information displayed in each regional matrix represents common understandings of the selected species and/or species groups, field observations, some data, and recent habitat changes. “Projection” information is based almost exclusively on the predicted conversion of marsh to open water and the gradual relative sinking and resultant deterioration of forested habitat throughout the study area. Such predictions may or may not prove to be accurate. Additionally, numerous other factors including water quality, harvesting level, and habitat changes elsewhere in the species’ range cannot be predicted and were not considered in these projections.

Therefore, the projections are to be viewed and used with caution.

and Quin Kinler (Natural Resources Conservation Service).

The matrices were compiled by Gerry Bodin (U.S. Fish and Wildlife Service)

The individuals responsible for synthesizing the information displayed in each regional matrix are identified below:

Species or Species Group	Individuals	Agency Affiliation
Brown pelican, bald eagle	Tom Hess	LDWF
	Larry McNease	LDWF
	Terry Rabot	U.S. Fish and Wildlife Service
Seabirds, wading birds, shorebirds, raptors, rails, gallinules, coots, other marsh and open water residents, other woodland residents, other marsh and open water migrants, other woodland migrants	Bill Vermilion	LDWF
Dabbling ducks, diving ducks, geese	Robert Helm	LDWF
Nutria, muskrat, mink, otter, raccoon, American alligator	Noel Kinler	LDWF
	Larry McNease	LDWF
Rabbits, squirrels, white-tailed deer	Mike Olinde	LDWF
	Dave Moreland	LDWF
	Quin Kinler	Natural Resources Conservation Service

Table 7-1. Region 4 fish and invertebrate population status and 2050 change.

Mapping Unit	Fish and Invertebrate Guilds (Species)												Comments
	Red drum	Black drum	Spotted seatrout	Gulf menhaden	Southern flounder	American oyster	White shrimp	Brown shrimp	Blue crab	Spanish mackerel	Largemouth bass	Channel catfish	
	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	
MERMENTAU													
Amoco	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/D	Sy/D	Impounded and influenced by locks
Big Marsh	Sy/Sy	Sy/Sy	U/Sy	NA/Sy	NA/NA	NA/NA	Sy/Sy	Sy/D	Sy/Sy	NA/NA	Sy/I	Sy/I	Impounded and influenced by locks
Big Burn	U/NA	U/NA	U/NA	U/NA	U/NA	NA/NA	NA/NA	NA/NA	Sy/Sy	NA/NA	Sy/I	Sy/I	Impounded and influenced by locks
Cameron Prairie	U/NA	U/NA	U/NA	U/NA	U/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/Sy	Sy/Sy	
Grand Lake	D/Sy	D/Sy	D/Sy	Sy/Sy	D/Sy	NA/NA	D/Sy	D/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Impounded and influenced by locks
Grand/White Lake Land Bridge	D/D	D/D	D/D	Sy/D	D/D	NA/NA	D/D	D/D	Sy/D	NA/NA	Sy/Sy	Sy/Sy	Impounded and influenced by locks
Grand Lake East	D/D	D/D	D/D	Sy/D	D/D	NA/NA	D/D	D/D	Sy/D	NA/NA	Sy/Sy	Sy/Sy	Impounded and influenced by locks
Hog Bayou	Sy/D	Sy/D	Sy/D	I/D	Sy/D	Sy/I	Sy/D	Sy/D	Sy/D	NA/NA	NA/NA	NA/NA	
Lacassine	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/Sy	Sy/Sy	
Little Prairie	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/Sy	Sy/Sy	Impounded and influenced by locks
Little Pecan	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Restricted by weirs and water control structures
Locust Island	U/U	U/U	U/U	U/U	U/U	NA/NA	U/U	U/U	U/U	NA/NA	Sy/I	Sy/I	Impounded and influenced by locks
Lower Mud Lake	Sy/D	Sy/D	Sy/D	Sy/D	Sy/D	Sy/Sy	D/D	D/D	Sy/D	NA/NA	U/NA	U/NA	

NOTES: Steady=Sy, Decrease=D, Increase=I, Unknown=U, Not Applicable=NA

Table 7-1. Region 4 fish and invertebrate population status and 2050 change (Cont.).

Mapping Unit	Fish and Invertebrate Guilds (Species)												Comments
	Red drum	Black drum	Spotted seatrout	Gulf menhaden	Southern flounder	American oyster	White shrimp	Brown shrimp	Blue crab	Spanish mackerel	Largemouth bass	Channel catfish	
	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	
Middle Marsh	U/U	U/U	U/U	U/U	U/U	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/I	Sy/I	
N. White Lake	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	D/Sy	U/U	Sy/Sy	NA/NA	Sy/I	Sy/I	Inside Catfish & Schooner structures
N. Grand Lake	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	D/D	U/U	Sy/D	NA/NA	Sy/I	Sy/I	
Oak Grove	NA/	NA/NA	NA/NA	Sy/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	
Rockefeller	Sy/D	Sy/D	Sy/D	Sy/D	Sy/D	Sy/I	Sy/D	Sy/D	Sy/D	Sy/Sy	Sy/I	Sy/I	Restricted by weirs and water control structures
S. Pecan Island	Sy/D	Sy/D	Sy/D	Sy/D	Sy/D	NA/NA	Sy/D	Sy/D	Sy/D	NA/NA	Sy/I	Sy/I	Restricted by weirs and water control structures
S. White Lake	Sy/D	Sy/D	NA/NA	Sy/D	Sy/D	NA/NA	Sy/D	Sy/D	Sy/D	NA/NA	Sy/I	Sy/I	Influenced by locks & weir
White Lake	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	D/Sy	D/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Influenced by locks & weir
CALC./SABINE													
Big Lake	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	U/I	U/I	
Black Lake	I/D	Sy/D	Sy/D	I/D	Sy/D	Sy/Sy	D/D	D/D	Sy/D	NA/NA	I/Sy	I/Sy	
Black Bayou	Sy/D	Sy/D	Sy/D	Sy/D	Sy/D	NA/NA	Sy/D	Sy/D	Sy/D	NA/NA	Sy/Sy	U/Sy	
Brown Lake	D/D	D/D	D/D	D/D	D/D	NA/NA	D/D	D/D	D/D	NA/NA	U/U	U/U	Restricted by weirs and water control structures
Calcasieu Lake	I/Sy	I/Sy	I/Sy	Sy/Sy	Sy/Sy	Sy/Sy	D/Sy	D/Sy	D/Sy	Sy/Sy	NA/NA	NA/NA	
Cameron	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	Sy/I	Sy/I	
Cameron-Creole Watershed	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	NA/NA	I/Sy	I/Sy	Influenced by weirs and gates
Choupique Island	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	U/U	Sy/Sy	

NOTES: Steady=Sy, Decrease=D, Increase=I, Unknown=U, Not Applicable=NA

Table 7-1. Region 4 fish and invertebrate population status and 2050 change (Cont.).

Fish and Invertebrate Guilds (Species)													
	Red drum	Black drum	Spotted seatrout	Gulf menhaden	Southern flounder	American oyster	White shrimp	Brown shrimp	Blue crab	Spanish mackerel	Largemouth bass	Channel catfish	
Mapping Unit	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Comments
Clear Marais	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	NA/NA	D/Sy	D/Sy	Sy/Sy	NA/NA	Sy/I	Sy/I	
Hackberry Ridge	Sy/U	Sy/U	Sy/U	I/U	Sy/U	Sy/U	Sy/U	Sy/U	Sy/U	NA/NA	NA/NA	NA/NA	
Hog Island Gully	Sy/I	Sy/I	Sy/I	I/Sy	Sy/I	Sy/D	Sy/D	Sy/I	Sy/I	NA/NA	NA/NA	NA/NA	
E Johnson's Bayou	Sy/I	Sy/I	U/I	Sy/I	Sy/I	NA/NA	U/I	U/I	Sy/I	NA/NA	NA/NA	NA/NA	
W. Johnson's Bayou	Sy/I	Sy/I	U/I	Sy/I	Sy/I	NA/NA	U/I	U/I	Sy/I	NA/NA	NA/NA	NA/NA	
Johnson's Bayou Ridge	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	D/Sy	D/Sy	Sy/Sy	NA/NA	U/U	U/U	
Martin Beach Ship Canal Shore	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	Sy/Sy	D/Sy	D/Sy	Sy/Sy	NA/NA	U/NA	U/NA	
Mud Lake	D/D	D/D	D/D	D/D	D/D	NA/NA	D/D	D/D	D/D	NA/NA	NA/NA	NA/NA	Partly restricted by weirs and water control structures
Perry Ridge	U/U	U/U	U/U	U/U	U/U	NA/NA	U/U	U/U	U/U	U/U	U/U	U/U	
Sabine Lake	I/Sy	I/Sy	I/Sy	Sy/Sy	Sy/Sy	I/Sy	D/Sy	D/Sy	Sy/Sy	NA/NA	U/U	Sy/Sy	Lower/brackish portion of lake
Sabine Lake Ridge	I/Sy	I/Sy	I/Sy	Sy/I	Sy/Sy	I/Sy	D/Sy	D/Sy	Sy/Sy	NA/NA	Sy/I	Sy/I	
Sabine Pool #3	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	I/Sy	I/Sy	Fresh impoundment
Second Bayou	Sy/Sy	U/U	U/U	U/U	U/U	NA/NA	U/U	U/U	U/U	U/U	U/I	U/I	Restricted by weirs and water control structures

NOTES: Steady=Sy, Decrease=D, Increase=I, Unknown=U, Not Applicable=NA

Table 7-1. Region 4 fish and invertebrate population status and 2050 change (Cont.).

Fish and Invertebrate Guilds (Species)													
	Red drum	Black drum	Spotted seatrout	Gulf menhaden	Southern flounder	American oyster	White shrimp	Brown shrimp	Blue crab	Spanish mackerel	Largemouth bass	Channel catfish	
Mapping Unit	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Trend/ Projection	Comments
SE Sabine	D/Sy	D/Sy	D/Sy	D/Sy	D/Sy	NA/NA	D/Sy	D/Sy	D/Sy	NA/NA	I/Sy	I/Sy	Restricted by weirs and water control structures
SW Gum Cove	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	U/U	NA/NA	U/U	U/U	Restricted by weirs and water control structures
Sweet/Willow Lakes	NA/	NA/	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	Sy/D	Sy/D	
W. Black Lake	D/D	D/D	D/D	D/D	D/D	NA/NA	D/D	D/D	D/D	NA/NA	I/Sy	I/Sy	Restricted by weirs and water control structures
West Cove	Sy/D	Sy/D	Sy/D	Sy/D	Sy/D	U/U	D/D	D/D	Sy/D	NA/NA	Sy/I	Sy/I	
Willow Bayou	I/D	I/D	I/D	Sy/D	Sy/D	I/D	D/D	D/D	Sy/D	NA/NA	U/U	U/U	

NOTES: Steady=Sy, Decrease=D, Increase=I, Unknown=U, Not Applicable=NA

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.

Status: NH = Not Historically Present; NL = No Longer Present; Lo = Low Numbers; Mo = Moderate Numbers; Hi = High Numbers

Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Mu = Multiple Functions

Trends (since 1985) / Projections (through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																								
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules				
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.					
Mermentau Basin																																											
Amoco	OW	14		NH				NH			Mu	Lo	Sy	Sy		NH				NH				W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I		NH		W	Mo	Sy	Sy	
	FM	80		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy	
Big Marsh	OW	11		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH		W	Mo	Sy	Sy		
	FM	57		NH				St	Lo	U	U	Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	25		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	
Big Burn	OW	18		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH		W	Mo	Sy	Sy		
	AB	6		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH		Mu	Mo	Sy	Sy		
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy	
Cameron Prairie	OW	6		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH		W	Mo	Sy	Sy		
	AB	14		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH		Mu	Mo	Sy	Sy		
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy	
	AU	11		NH				NH				NH			St	Lo	I	Sy	Mu	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	
Grand Chenier Ridge	OW	11		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH		W	Mo	Sy	Sy		
	FM	23		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	
	IM	24		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	
	BM	5		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
	HF	8		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH			
	AU	30		NH				NH				NH			St	Lo	I	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	
Grand Lake	OW	99		NH				NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH			NH				

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

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Mapping Unit	1988 Habitat		Avifauna																																												
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules								
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.									
Grand/White Lake Land Bridge	OW	35		NH				NH			Mu	Mo	Sy	Sy		NH				NH				W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				W	Lo	Sy	Sy	
	FM	54		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy	W	Mo	D	D		W	Mo	D	D		W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		
	HF	9		NH				NH				NH				NH					NH				NH					NH									Mu	Hi	Sy	D		NH			
Grand Lake East	OW	14		NH				NH			Mu	Lo	Sy	Sy		NH				NH				W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				W	Lo	Sy	Sy	
	AB	6		NH				NH				NH				NH					NH			W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				Mu	Lo	Sy	Sy	
	FM	64		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy		Mu	Hi	Sy	D	W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				Mu	Lo	Sy	Sy	
Hog Bayou	HF	14		NH				NH				NH				NH					NH				NH					NH										Mu	Hi	Sy	D		NH		
	OW	34	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH					NH			W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				W	Lo	Sy	Sy	
	FM	5		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy	W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				Mu	Lo	Sy	Sy	
Lacassine	BM	32		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy	W	Mo	D	D		W	Mo	D	D		W	Lo	D	D		NH				Mu	Lo	Sy	Sy	
	SM	25		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy	W	Lo	D	D		W	Lo	D	D		W	Lo	D	D		NH				Mu	Lo	Sy	Sy	
	BB	1		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy		Mu	Hi	Sy	Sy	W	Hi	Sy	Sy		W	Hi	Sy	Sy		W	Lo	Sy	Sy		NH				W	Mo	Sy	Sy	
Little Prairie	OW	20		NH				NH			Mu	Mo	Sy	Sy		NH					NH			W	Hi	Sy	Sy		W	Hi	Sy	Sy		W	Lo	Sy	Sy		NH				W	Mo	Sy	Sy	
	AB	20		NH				NH				NH				NH					NH			W	Hi	Sy	Sy		W	Hi	Sy	Sy		W	Lo	Sy	Sy		NH				W	Mo	Sy	Sy	
	FM	55		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D	W	Hi	Sy	Sy		W	Hi	Sy	Sy		W	Lo	Sy	Sy		NH				W	Mo	Sy	Sy	
Little Prairie	HF	5		NH				NH				NH				NH					NH			Ne	Lo	Sy	Sy		NH					NH					Mu	Hi	Sy	D		NH			
	OW	6		NH				NH			Mu	Lo	Sy	Sy		NH					NH			W	Mo	Sy	Sy		W	Mo	Sy	Sy		W	Lo	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	
	FM	30		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy		Mu	Hi	Sy	Sy	W	Mo	Sy	Sy		W	Mo	Sy	Sy		W	Lo	Sy	Sy		W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	
Little Prairie	HF	14		NH				NH				NH				NH					NH			Ne	Lo	Sy	Sy		NH					NH					W	Mo	Sy	Sy		NH			
	AU	50		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy		Mu	Hi	Sy	Sy	W	Mo	Sy	Sy		W	Lo	Sy	Sy		W	Lo	Sy	Sy		W	Mo	Sy	Sy	Mu	Lo	Sy	Sy	

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

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Mapping Unit	1988		Avifauna (cont.)												Furbearers									Game Mammals									Reptiles											
	Habitat	% of Unit	Other Marsh/OW Residents			Other Wood-land Resid.			Other Marsh/OW Migrants			Other Wood-land Mig.			Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator											
	Type		Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.										
Grand/White Lake Land Bridge	OW	35	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy								
	FM	54	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	D	D				
	HF	9		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	Sy	Sy				
Grand Lake East	OW	14	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	Sy	Sy				
	AB	6	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	FM	64	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	D	D				
Hog Bayou	HF	14		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy
	OW	34	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	FM	5	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
Lacassine	BM	32	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	SM	25	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	BB	1		NH				NH				NH				NH				NH							NH				NH					NH				NH				
Little Prairie	OW	20	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	AB	20	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	FM	55	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
Little Prairie	HF	5		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	OW	6	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy				
	FM	30	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy
Little Prairie	HF	14		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	Sy	Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy				
	AU	50	Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy				

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.

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Mapping Unit	1988 Habitat		Avifauna																																								
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules				
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.					
Little Pecan	OW	15		NH			NH			Mu	Mo	Sy	Sy		NH				NH				W	Mo	D	D	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy	
	FM	75		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy		W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy	
	HF	3		NH			NH				NH				NH				NH				Ne	Lo	Sy	Sy		NH				NH				NH				NH			
Locust Island	OW	9		NH			NH			Mu	Mo	Sy	Sy		NH				NH				W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	
	FM	9		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	
	IM	31		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	
	BM	13		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	
	AU	36		NH			NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy		W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Lo	Sy	Sy	
Lower Mud Lake	OW	11	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Lo	Sy	Sy	
	SM	77		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D		W	Lo	D	D	W	Lo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	HF	4		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			
	BB	2		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH			
Middle Marsh	OW	7		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy	
	FM	10		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D		W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	IM	69		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D		W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	AU	10		NH				NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
North White Lake	FM	92		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy		W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy
	HF	6		NH				NH				NH				NH				NH				Mu	Lo	Sy	Sy		NH				NH				Mu	Hi	Sy	D		NH	

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Mapping Unit	1988 Habitat		Avifauna (cont.)												Furbearers												Game Mammals												Reptiles					
	Type	% of Unit	Other Marsh/OW Residents				Other Wood-land Resid.				Other Marsh/OW Migrants				Other Wood-land Mig.				Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator							
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.						
Little Pecan	OW	15	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Hi	I	I			
	FM	75	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Hi	I	I			
	HF	3		NH							Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy			
Locust Island	OW	9	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				NH				Mu	Mo	I	Sy			
	FM	9	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Mo	Sy	Sy		Mu	Mo	I	Sy		
	IM	31	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy		Mu	Mo	I	Sy		
	BM	13	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy		Mu	Mo	I	Sy		
	AU	36	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		
Lower Mud Lake	OW	11	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				NH				Mu	Lo	Sy	Sy			
	SM	77	Mu	Hi	Sy	Sy		NH				Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		
	HF	4		NH					Mu	Hi	Sy	D		NH					Mu	Hi	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy			
	BB	2		NH						NH				NH							NH					NH									NH				NH					
Middle Marsh	OW	7	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				NH				Mu	Mo	I	Sy			
	FM	10	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Mo	Sy	Sy		Mu	Mo	I	Sy		
	IM	69	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy		Mu	Mo	I	Sy		
	AU	10	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Mo	Sy	Sy		Mu	Lo	Sy	Sy		
North White Lake	FM	92	W	Lo	Sy	Sy		W	Lo	Sy	Sy		W	Lo	Sy	Sy		W	Lo	Sy	Sy		W	Lo	Sy	Sy		W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Mo	I	Sy
	HF	6		NH					Mu	Hi	Sy	D		NH						Mu	Hi	Sy	D		Mu	Lo	Sy	Sy		NH				W	Lo	Sy	Sy		W	Lo	Sy	Sy		

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Mapping Unit	1988 Habitat		Avifauna																																										
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules						
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.							
North Grand Lake	OW	20		NH				NH			Mu	Lo	Sy	Sy		NH				NH					W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy	
	FM	68		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Lo	Sy	Sy	
	HF	7		NH				NH				NH				NH					NH				Mu	Lo	Sy	Sy		NH				NH				Mu	Hi	Sy	D		NH		
Oak Grove	IM	73		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
	BM	13		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
	AU	8		NH				NH				NH			St	Lo	Sy	Sy		Mu	Mo	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	
Rockefeller	OW	23	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH					NH				W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	
	FM	15		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D	
	IM	14		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D	
	BM	30		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D	
	SM	15		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy		Mu	Hi	Sy	D		W	Lo	D	D	W	Lo	D	D	W	Mo	Sy	Sy		NH			Mu	Lo	D	D	
South Pecan Island	OW	26	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH					NH				W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	
	IM	5		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D	
	BM	61		NH				NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D	
South White Lake	OW	7		NH				NH			Mu	Lo	Sy	Sy		NH					NH				W	Mo	D	D	W	Mo	D	D	W	Lo	D	D					W	Mo	Sy	Sy	
	FM	70		NH				Ne	Lo	I	I	Mu	Lo	Sy	D	Mu	Hi	Sy	D		Mu	Hi	Sy	D		W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	HF	11		NH				NH				NH				NH					NH					NH				NH				NH				NH				NH			
White Lake	AU	10		NH				NH				NH			St	Lo	Sy	Sy		Mu	Mo	Sy	Sy		W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	
	OW	99		NH				NH			Mu	Hi	Sy	Sy		NH					NH				W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH			

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Calcasieu/Sabine Basin																																										
Big Lake	OW	24	NH				NH			Mu	Mo	Sy	Sy	NH				NH				W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	NH			W	Mo	Sy	Sy		
	FM	14	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	NH			Mu	Mo	Sy	Sy		
	IM	9	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	NH			Mu	Mo	Sy	Sy		
	BM	18	NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	NH			Mu	Mo	Sy	Sy		
	HF	10	NH				NH			NH				NH				NH				Ne	Lo	Sy	Sy	NH				NH			NH			NH						
	AU	25	NH				NH			St	Lo	Sy	Sy	St	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH				
Black Bayou	OW	34	W	Lo	I	I	NH			Mu	Mo	Sy	Sy	NH				NH				W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			W	Lo	Sy	D		
	IM	23	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		
	BM	34	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		
	HF	5	NH				NH			NH				NH				NH				NH				NH				NH			NH			NH						
Black Lake	OW	68	NH				NH			Mu	Mo	Sy	Sy	NH				NH				W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	Sy	D	
	IM	5	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	Mu	Lo	Sy	D	
	BM	11	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	Mu	Lo	Sy	D	
	AU	10	NH				NH			St	Lo	Sy	Sy	St	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH				NH				NH			NH			NH						
Brown Lake	OW	52	NH				NH			Mu	Mo	Sy	Sy	NH				NH				W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		
	FM	7	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		
	IM	5	NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		
	BM	34	NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D		

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			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.						
Calcasieu/Sabine Basin																																												
Big Lake	OW	24	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	I	Sy				
	FM	14	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Mo	I	Sy			
	IM	9	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Mo	I	Sy			
	BM	18	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Mo	I	Sy			
	HF	10		NH				Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D	Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		
Black Bayou	AU	25	Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	OW	34	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	IM	23	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Mo	I	Sy			
	BM	34	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Mo	I	Sy			
Black Lake	HF	5		NH				Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D	Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Lo	Sy	Sy		
	OW	68	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	IM	5	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Lo	Sy	Sy			
	BM	11	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Lo	Sy	Sy			
Brown Lake	AU	10	Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Mo	Sy	D	Mu	Lo	Sy	Sy
	OW	52	Mu	Mo	Sy	Sy		NH				Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	FM	7	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Mo	I	Sy			
	IM	5	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Mo	I	Sy			
BM	34	Mu	Hi	Sy	D		NH				Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy		Mu	Lo	Sy	Sy		NH				Mu	Lo	Sy	D	Mu	Mo	I	Sy				

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh;

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Trends (since 1985) / Projections (through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																									
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules					
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.						
Cameron	OW	6		NH			NH			Mu	Mo	Sy	Sy		NH				NH																									
	FM	19		NH			NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy		NH											Mu	Lo	Sy	Sy		NH					
	IM	22		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy			
	BM	14		NH			NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	SM	6		NH			NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	HF	1		NH			NH				NH				NH				NH																									
	BB	1		NH			NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH																					
Calcasieu Lake	OW	94	W	Lo	I	I		NH							NH										W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH										
Cameron-Creole Watershed	OW	38		NH			NH			Mu	Mo	Sy	Sy		NH										W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	IM	26		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	BM	35		NH			NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
Choupique Island	OW	33		NH			NH			Mu	Lo	Sy	Sy		NH										W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	FM	29		NH			NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	BM	31		NH			NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy			
	AU	5		NH			NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH																					
Clear Marais	OW	21		NH			NH			Mu	Mo	Sy	Sy		NH									W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I		NH			W	Mo	Sy	Sy	
	AB	10		NH			NH				NH				NH									W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I		NH			Mu	Mo	Sy	Sy	
	FM	58		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy			
	AU	6		NH			NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	I	Sy	W	Mo	I	Sy	W	Mo	I	I	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy			
Gum Cove	FM	21		NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy			
	AU	77		NH			NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy			

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Mapping Unit	1988 Habitat		Avifauna (cont.)												Furbearers									Game Mammals									Reptiles							
	Type	% of Unit	Other Marsh/OW Residents				Other Wood-land Resid.				Other Marsh/OW Migrants				Other Wood-land Mig.				Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.		
Cameron	OW	6	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH				NH			NH			Mu	Mo	I	Sy		
	FM	19	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH				NH			NH			Mu	Mo	I	Sy		
	IM	22	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy	
	BM	14	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy	
	SM	6	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
	HF	1	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	1		NH			NH				NH			NH				NH				NH				NH				NH			NH			NH				
Calcasieu Lake	OW	94	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH				NH				NH			NH				NH			NH			NH					
Cameron-Creole Watershed	OW	38	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I	NH			NH			Mu	Lo	Sy	Sy		
	IM	26	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	
Choupique Island	BM	35	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	
	OW	33	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy		
	FM	29	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy	NH			W	Lo	Sy	Sy	
	BM	31	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy	NH			W	Lo	Sy	Sy	
Clear Marais	AU	5		NH			Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy	NH			W	Lo	Sy	Sy			
	OW	21	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Mo	I	I		
	AB	10	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Mo	I	I		
	FM	58	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	
Gum Cove	AU	6	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy			
	FM	21	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	
	AU	77	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy			

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Mapping Unit	1988 Habitat		Avifauna																																							
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.				
Hackberry Ridge	OW	12	NH				NH				Mu	Mo	Sy	Sy	NH				NH				W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D	
	BM	21	NH				NH				Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D	
	HF	9	NH				NH				NH				NH				NH				Ne	Lo	Sy	Sy	NH			NH					Mu	Mo	Sy	D	NH			
	AU	53	NH				NH				NH				St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy
Hog Island Gully	OW	37	NH				NH				Mu	Mo	Sy	Sy	NH				Mu	Hi	I	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D	
	BM	22	NH				NH				Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	NH			Mu	Lo	Sy	D	
	SM	36	NH				NH				Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D	NH			Mu	Lo	Sy	D	
East Johnson's Bayou	OW	7	NH				NH				Mu	Mo	Sy	Sy	NH				NH				W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	NH			W	Lo	Sy	Sy	
	FM	7	NH				NH				Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	IM	80	NH				NH				Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
West Johnson's Bayou	OW	13	W	Lo	I	I	NH				Mu	Hi	Sy	Sy	NH				NH				W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	NH			W	Lo	Sy	Sy	
	BM	83	NH				NH				Mu	Mo	Sy	D	Mu	Hi	I	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
Johnson's Bayou Ridge	OW	5	W	Lo	I	I	NH				Mu	Mo	Sy	Sy	NH				NH				W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	NH			W	Lo	Sy	Sy	
	BM	31	NH				NH				Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	SM	44	NH				NH				Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	HF	3	NH				NH				NH				NH				NH				Ne	Lo	Sy	Sy	NH			NH					NH			NH				
	BB	1	NH				NH				Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy	NH				NH			NH						NH			NH			
	AU	16	NH				NH				NH				St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
Martin Beach-Ship Can. Shore	OW	9	W	Mo	I	I	NH				Mu	Mo	Sy	Sy	NH				NH				W	Mo	I	D	W	Mo	I	D	W	Lo	I	D	NH			W	Lo	Sy	Sy	
	IM	33	NH				NH				Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BM	26	NH				NH				Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	SM	7	NH				NH				Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BB	1	NH				NH				Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy	NH				NH			NH						NH			NH			
	AU	24	NH				NH				NH				St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	I	D	W	Lo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D

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Mapping Unit	1988 Habitat		Avifauna (cont.)												Furbearers												Game Mammals												Reptiles			
	Type	% of Unit	Other Marsh/OW Residents			Other Wood-land Resid.			Other Marsh/OW Migrants			Other Wood-land Mig.			Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator									
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.								
Hackberry Ridge	OW	12	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy								
	BM	21	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	HF	9	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			NH			NH		Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH								
Hog Island Gully	AU	53	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	NH			NH			NH		Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy						
	OW	37	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	D							
	BM	22	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
East Johnson's Bayou	SM	36	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	OW	7	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH			NH			Mu	Hi	I	Sy								
	FM	7	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	Sy							
West Johnson's Bayou	IM	80	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	Sy							
	OW	13	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Hi	I	Sy							
	BM	83	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Hi	I	Sy							
Johnson's Bayou Ridge	OW	5	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy							
	BM	31	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	SM	44	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	HF	3		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy								
	BB	1		NH				NH				NH				NH			NH				NH			NH					NH											
Martin Beach-Ship Can. Shore	AU	16	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	OW	9	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy								
	IM	33	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	BM	26	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	SM	7	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D							
	BB	1		NH				NH				NH				NH			NH				NH			NH					NH											
AU	24	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	D	NH			Mu	Mo	Sy	D								

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.

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Trends (since 1985) / Projections (through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																								
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules				
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.					
Mud Lake	OW	34	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	I	Sy	W	Mo	I	Sy	W	Lo	I	Sy		NH			W	Lo	Sy	Sy	
	BM	62		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	Sy	W	Mo	I	Sy	W	Lo	I	Sy	Mu	Lo	Sy	D	W	Lo	Sy	Sy	
Perry Ridge	OW	30		NH				NH			Mu	Mo	Sy	D		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			W	Lo	Sy	Sy	
	FM	30		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy	
Sabine Pool No. 3	IM	28		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy	
	HF	10		NH				Mu	Lo	Sy	Sy		NH			NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH			
	OW	32		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			W	Lo	Sy	Sy	
Sabine Lake Ridges	AB	7		NH				NH				NH				NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			Mu	Mo	Sy	Sy	
	FM	61		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			Mu	Mo	Sy	Sy	
	OW	5	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy		NH			W	Mo	Sy	Sy	
Second Bayou	FM	5		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	
	IM	24		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	D	W	Mo	Sy	D	W	Hi	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	
	BM	35		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	D	W	Mo	Sy	D	W	Hi	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	
	SM	11		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D	W	Mo	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	
	HF	1		NH				NH				NH				NH				NH				NH					NH				NH				NH				NH		
	BB	2		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH					NH				NH				NH				NH		
	AU	17		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
Second Bayou	OW	13		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy	
	IM	72		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D	
	BM	14		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D	

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh;

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Trends (since 1985) / Projections (through 2050): Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988		Avifauna (cont.)												Furbearers									Game Mammals									Reptiles										
	Habitat	% of Unit	Other Marsh/OW Residents				Other Wood-land Resid.				Other Marsh/OW Migrants				Other Wood-land Mig.				Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator						
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.					
Mud Lake	OW	34	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy	
	BM	62	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
Perry Ridge	OW	30	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	
	FM	30	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
Sabine Pool No. 3	IM	28	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
	HF	10		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	
	OW	32		NH				NH				NH				NH				NH					NH				NH				NH				NH			Mu	Hi	Sy	Sy
Sabine Lake Ridges	AB	7	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Hi	Sy	Sy	
	FM	61	Mu	Hi	Sy	Sy	NH			Mu	Hi	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy
	OW	5	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	
Second Bayou	FM	5	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	24	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	BM	35	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	SM	11	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	HF	1		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy		
	BB	2		NH				NH				NH				NH				NH					NH				NH				NH				NH				NH		
Second Bayou	AU	17	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	OW	13	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	NH			NH			Mu	Hi	I	I	
	IM	72	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Hi	I	I
	BM	14	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Hi	I	I

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Mapping Unit	1988		Avifauna																																														
	Habitat	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules										
	Type		Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.											
Southeast Sabine	OW	9		NH				NH			Mu	Mo	Sy	Sy		NH				NH							W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy			
	IM	59		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D			
	BM	31		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D			
SW Gum Cove	OW	17		NH				NH			Mu	Mo	Sy	Sy		NH				NH						W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	D				
	FM	41		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D			
	IM	24		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D			
	BM	8		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D			
	HF	6		NH				NH				NH				NH					NH						Ne	Lo	Sy	Sy		NH				NH					NH								
	AU	5		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy			
Sweet/Willow Lakes	OW	43		NH				NH			Mu	Lo	Sy	Sy		NH				NH						W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	6		NH				NH				NH				NH				NH						W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	46		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy
West Black Lake	OW	61		NH				NH			Mu	Mo	Sy	Sy		NH				NH						W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D				
	FM	20		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D			
	IM	9		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D			
	AU	6		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy			
West Cove	OW	24	W	Mo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH						W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D				
	AB	7		NH				NH				NH				NH				NH						W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D				
	FM	65		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	Sy	D	W	Hi	Sy	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D			
Willow Bayou	OW	40	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH						W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			W	Lo	Sy	D				
	IM	8		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D			
	BM	52		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D			

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Mapping Unit	1988 Habitat		Avifauna (cont.)												Furbearers												Game Mammals												Reptiles		
	Type	% of Unit	Other Marsh/OW Residents			Other Wood-land Resid.			Other Marsh/OW Migrants			Other Wood-land Mig.			Nutria			Muskrat			Mink, Otter, and Raccoon			Rabbits			Squirrels			Deer			American Alligator								
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.							
Southeast Sabine	OW	9	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy			
	IM	59	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy		
	BM	31	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy		
SW Gum Cove	OW	17	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		
	FM	41	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy		
	IM	24	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy		
	BM	8	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy		
	HF	6		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	Sy				
Sweet/Willow Lakes	AU	5	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy				
	OW	43	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		
	AB	6	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		
West Black Lake	FM	46	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		
	OW	61	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		
	FM	20	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Lo	Sy	I		
	IM	9	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Lo	Sy	I		
West Cove	AU	6	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		
	OW	24	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy		
	AB	7	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy		
Willow Bayou	FM	65	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy		
	OW	40	Mu	Mo	Sy	Sy	NH			Mu	Mo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy		
	IM	8	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy		
	BM	52	Mu	Hi	Sy	D	NH			Mu	Hi	Sy	D	NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D	NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy		

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