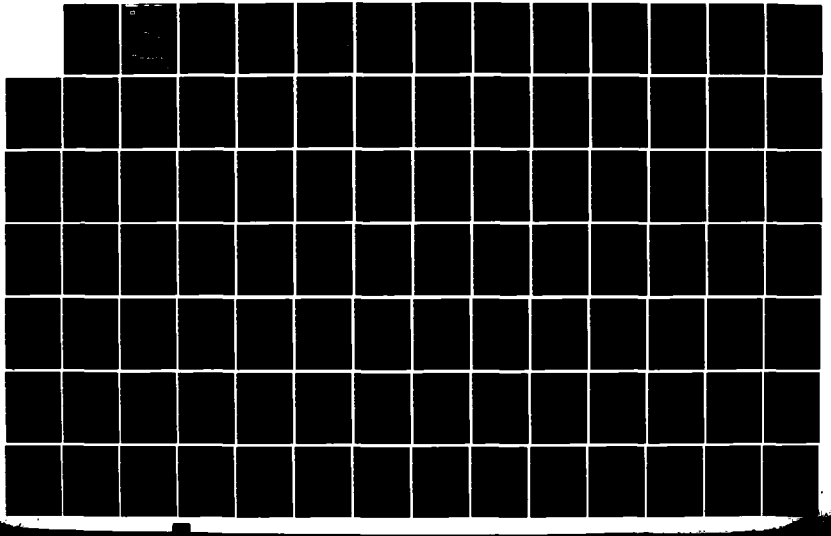
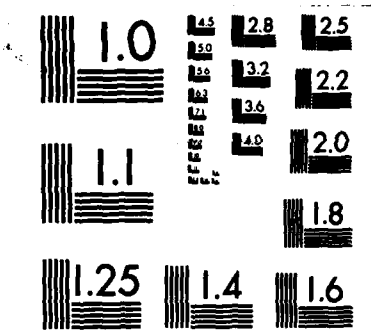
AD-A154 983 LAROSE TO GOLDEN MEADOW LOUISIANA HURRICANE PROTECTION PROJECT FINAL SUPP.. (U) ARMY ENGINEER DISTRICT NEW ORLEANS LA E S CLARK MAY 85 1/2

UNCLASSIFIED F/G 13/2 NL

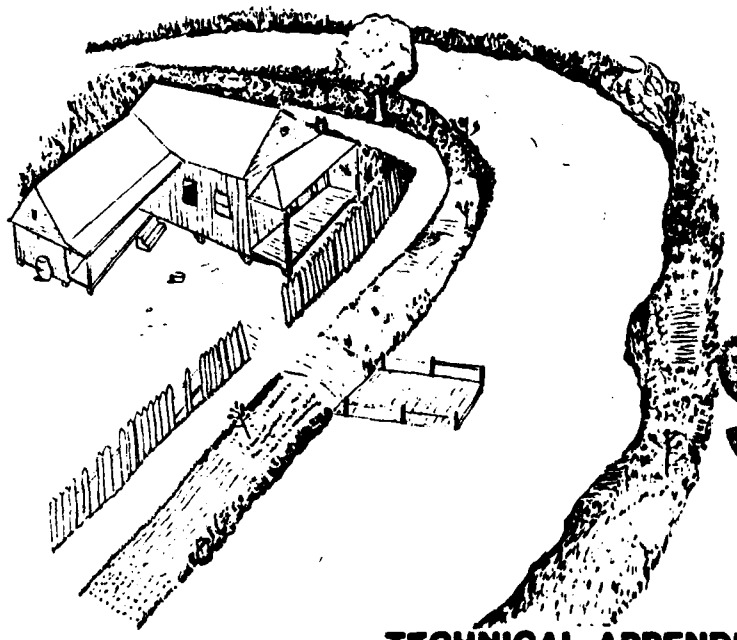




US Army Corps
of Engineers
New Orleans District

NOVEMBER 1984

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



TECHNICAL APPENDIXES

LAROSE TO GOLDEN MEADOW

LOUISIANA

HURRICANE PROTECTION PROJECT

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. ADA154983
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) LAROSE TO GOLDEN MEADOW, LOUISIANA Hurricane Protection Project	5. TYPE OF REPORT & PERIOD COVERED MITIGATION REPORT
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) E. SCOTT CLARK	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Corps of Engineers New Orleans District P.O. Box 60267; New Orleans, La. 70160-0267	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS LMNPD-RE
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U.S. Army Washington, D.C. 20314	12. REPORT DATE May 1985
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

This document has been approved for public release and sale; its distribution is unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental Impacts
Golden Meadow
Lafourche Parish
Larose
Marsh
Mitigation
Wetlands

JUN 13 1985

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report assesses the impacts of the inclusion of two agricultural tracts, the exclusion of a marsh area, and the realignment of a floodwall in conjunction with the Larose to Golden Meadow, Louisiana, hurricane protection project. The project is located in Lafourche Parish, Louisiana. Wetland losses associated with the project were also reevaluated. The project provides for a hurricane protection levee from Larose to Golden Meadow. The levee would extend about 21 miles on the west bank and 22 miles on the east bank of Bayou

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Lafourche. The complete system would have a net elevation of +13.0 feet NGVD at Golden Meadow to +9.5 feet at Larose.

VOLUME 2

APPENDIX A -- NATURAL RESOURCES;

APPENDIX B -- CONSISTENCY DETERMINATION
LOUISIANA COASTAL ZONE MANAGEMENT PROGRAM, Environmental

Supplied keywords:

APPENDIX A

NATURAL RESOURCES

TABLE OF CONTENTS

LAROSE TO GOLDEN MEADOW HURRICANE PROTECTION PROJECT

APPENDIX A

NATURAL RESOURCES

This appendix contains technical information and methodologies concerning the natural resources of the study area. The appendix consists of nine separate sections. Section A.1 contains an alphabetized list of common and scientific names of plants and animals discussed in the report. Section A.2 contains the correspondence with the US Fish and Wildlife Service and National Marine Fisheries Service concerning endangered and threatened species which might occur in the study area. Section A.3 contains the methodology used to determine future-with and future-without project for fishery production. Section A.4 contains the methodology used to determine future-with and future-without project for habitat acreages. Section A.5 contains the State of Louisiana Water Quality Certificate. Section A.6 contains the Archeological Appendix to the report. Section A.7 contains the Recreational Appendix to the report. Section A.8 contains a table listing fur catch and value by marsh type. Section A.9 contains a table listing Primary Ambient Air Quality Standards for Louisiana.

A.1. LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS AND ANIMALS

A.1.1. This section contains an alphabetized list (Table A.1.1.) of the common names of plants discussed in the report with corresponding scientific names. The list is taken from Montz (1975 a, 1975 b, 1981).

TABLE A.1.1.

LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS

Common Name	Scientific Name
Baldcypress	Taxodium distichum
Bulltongue	Sagittaria falcata
Bullwhip	Scirpus californicus
Crabgrass	*Digitaria spp.*
Cyperus	Cyperus spp.
Deer pea	Vigna luteola
Dwarf spikerush	Eleocharis parvula
Duckpotato	Sagittaria latifolia
Eastern baccharis	Baccharis halimifolia
Floating waterprimrose	Ludwigia peploides
Giant cutgrass	Zizaniopsis miliaceae
Goldenrod	Solidago spp.
Green ash	Fraxinus pennsylvanica
Hackberry	Celtis laevigata
Jointgrass	Paspalum vaginatum
Live oak	Quercus virginiana
Marshelder	Iva frutescens
Marsh mallow	Hibiscus lasiocarpus
Oystergrass	Spartina alterniflora
Palmetto	Sabal minor
Red maple	Acer rubrum
Saltgrass	Distichlis spicata

TABLE A.1.1. (CONTINUED)

LIST OF COMMON AND SCIENTIFIC NAMES OF PLANTS

Common Names	Scientific Names
Saltmarsh morning glory	*Ipomoea sagittata*
Saltmarsh pluchea	*Pluchea purpurascens*
Smartweed	*Polygonum spp.*
Southern cattail	*Typha domingensis*
Sweetgum	*Liquidambar styraciflua*
Tupelogum	*Nyssa aquatica*
Virginia willow	*Itea virginica*
Walters millet	*Echinocloa walteri*
Waxmyrtle	*Myrica cerifera*
Wiregrass	*Spartina patens*

LITERATURE CITED

Montz, G.N. 1975a. Master List of Herbs, Fern and Fern Allies, and Vines of the New Orleans District. US Army Corps of Engineers, New Orleans, mimeograph report, 72 pp.

_____. 1975b. Master List of Trees and Shrubs of the New Orleans District. US Army Corps of Engineers, New Orleans, Mimeograph report, 30 pp.

_____. 1981. Annotated Checklist of Plants on the Coastal Beaches, Islands and Barrier Islands of Louisiana. US Army Corps of Engineers, New Orleans, Mimeograph report, 43 pp.

_____. 1981. Annotated Checklist of Plants of the Atchafalaya and Mississippi River Deltas. US Army Corps of Engineers, New Orleans, Mimeograph report, 35 pp.

A.1.2. LIST OF COMMON AND SCIENTIFIC NAMES OF ANIMALS

This section contains an alphabetized list (Table A.1.2.) of the common names of animals discussed in the report with corresponding scientific names. The following taxonomic sources were used: Eddy and Underhill (1978); Robins (1980); Pennak (1978); Lowery (1974a); Lowery (1974b); and Conant (1975).

TABLE A.1.2.

INVERTEBRATES

Common Name	Scientific Name
Amphipods	Amphipoda[1/]
Blue crabs	Callinectes sapidus
Brown shrimp	Penaeus aztecus
Chironomids	Chironomidae[3/]
Clams	Pelecypoda[1/]
Crawfish	Astacidae[3/]
Grass shrimp	Palaemonetes[4/]
Isopods	Isopoda[1/]
Mysids	Mysidacea[1/]
Polychaete worms	Polychaeta[1/]
Tubificid worms	Tubificidae[3/]
White shrimp	Penaeus setiferus

[1/] Order
[2/] Suborder
[3/] Family
[4/] Genus

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

October 19, 1982 F/SER64:AM

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160

Dear Mr. Wagahoff:

This responds to your October 12, 1982, letter regarding the Larose to Golden Meadow Hurricane Protection project, located in Lafourche Parish, Louisiana. You requested a list of endangered or threatened species under our purview that may be found in the project area, as required by Section 7 of the Endangered Species Act of 1973.

We have reviewed the proposed project and have determined that no species of listed sea turtles or whales are likely to occur in the proposed project area. This concludes consultation responsibilities under Section 7 of the Endangered Species Act of 1973. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

The Fish and Wildlife Service should also be contacted for species under their purview if you have not done so already.

Sincerely yours,

Charles A. Oravetz

Charles A. Oravetz
Chief, Marine Mammals and Endangered
Species Branch

cc:
FWS, Jackson, MS

IN REPLY REFER TO
LMNPD-RE

12 October 1982

Mr. Charles A. Oravetz
Chief, Marine Mammals and Endangered Species Branch
National Marine Fisheries Service
Southeast Region
9450 Koger Blvd.
St. Petersburg, FL 33702

Dear Mr. Oravetz:

In accordance with Section 7(c) of The Endangered Species Act Amendments of 1978, we are requesting information concerning threatened and/or endangered species which may occur within the vicinity of the Larose to Golden Meadow Hurricane Protection project, located in Lafourche Parish in Southeast Louisiana (Inclosure 1).

The project consists of the construction of a floodgate on Bayou Lafourche, south of Golden Meadow, Louisiana; construction of the portions of the levee remaining to be built on the west and east side of the bayou; and proposed construction along alinements around Clovelly Farms and Louisiana Lands and Exploration (Inclosure 2, shown in blue).

The project area consists primarily of agricultural lands surrounded by intermediate to brackish marsh, cypress-tupelogum swamp, and some natural ridge forest.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project area.

Sincerely,

ORIGINAL SIGNED BY

2 Inclosures
as stated

CLETIS R. WAGAHOFF
Chief, Planning Division

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
200 EAST PASCAGOULA STREET, SUITE 300
JACKSON, MISSISSIPPI 39201

July 1, 1981

IN REPLY REFER TO:
Log no. 4-3-81-147

Mr. James F. Roy
Chief, Planning Division
Department of the Army
New Orleans District, Corps of Engineers
LMNPD-RE
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Roy:

This refers to your letter of June 9, 1981, in which you requested endangered species information for the area of the Larose to Golden Meadow Hurricane Protection Project located in Lafourche Parish, Louisiana.

Our data indicate that there are no endangered, threatened, or proposed species likely to reside in the project area, and there is no designated Critical Habitat in the vicinity of this project. Therefore, no further endangered species coordination will be required for this project, as described. If you anticipate any changes in project location or activities, however, please contact our office for further coordination.

If you have any questions concerning this project, please contact Fred Bagley of our staff, telephone number 601/960-4912 or FTS 490-4912.

We appreciate your participation in the effort to ensure the survival of endangered species.

Sincerely,

Dennis B. Jordan

Acting for Gary L. Hickman
Area Manager

cc: RD, FWS, Atlanta, GA (ARD-FA/SE)
ES, FWS, Lafayette, LA
Department of Wildlife & Fisheries
New Orleans, LA

LMNPD-RE 9 June 1981

Mr. Gary Hickman
Area Manager
US Department of Interior
Fish and Wildlife Service
200 East Pascagoula St., Suite 300
Jackson, MS 39201

Dear Mr. Hickman:

In compliance with Section 7(c) of the Endangered Species Act Amendments of 1978, we are requesting information concerning the threatened and/or endangered species associated with the project, Larose to Golden Meadow, Louisiana, Hurricane Protection, located in Lafourche Parish in southeast Louisiana (Inclosure 1).

Plans for the project include the construction of a floodgate on Bayou Lafourche south of Golden Meadow, construction of the portions of the levee remaining to be built on the west and east side of the bayou, and proposed construction along alinements around Clovelly Farms and the Louisiana Lands and Exploration area (shown in blue, Inclosure 2).

The project area is primarily drained wetlands surrounded by intermediate and brackish marsh, cypress-tupelogum swamp, and some natural ridge forest.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project area.

Sincerely,

ORIGINAL SIGNED BY

2 Inclosures
As stated

JAMES F. ROY
Chief, Planning Division

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

April 11, 1983

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Wagahoff:

This responds to your April 1, 1983, letter requesting a list of endangered/threatened species under our purview that may occur in the vicinity of the Larose to Golden Meadow hurricane protection project-mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana. Your request was made in accordance with Section 7 of the Endangered Species Act of 1973.

We have reviewed the proposed project and have determined that no species of listed sea turtles or whales are likely to occur in the proposed project area.

This concludes consultation responsibilities under Section 7 of the Endangered Species Act of 1973. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

Sincerely yours,

Charles A. Oravetz, Chief
Protected Species Management Branch

cc:
FWS Jackson, MS

United States Department of the Interior
FISH AND WILDLIFE SERVICE
JACKSON MALL OFFICE CENTER
300 WOODROW WILSON AVENUE, SUITE 3185
JACKSON, MISSISSIPPI 39213

April 28, 1983

IN REPLY REFER TO:
Log no. 4-3-83-190

Mr. Cletis R. Wagahoff
Chief, Planning Division
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160

Dear Mr. Wagahoff:

This responds to your letter of April 13, 1983, requesting endangered species information for the vicinity of the Larose to Golden Meadow hurricane protection project-mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana.

Our records indicate no endangered, threatened or proposed species, or their Critical Habitat occurring in the project area. Therefore, no further endangered species consultation will be required for this project, as currently described.

If you anticipate any changes in the scope or location of this project, please contact our office at 601/960-4900 for further coordination.

We appreciate your participation in the effort to protect endangered species.

Sincerely yours,

Dennis B. Jordan
Field Supervisor
Jackson Endangered Species Office

cc: D, FWS, Washington, D.C. (AFA/OES)
RD, FWS, Atlanta, GA (AFA/SE)
ES, FWS, Lafayette, LA
Department of Wildlife & Fisheries
New Orleans, LA

April 13, 1983

IN REPLY REFER TO:

Planning Division
Environmental Analysis Branch

Mr. Dennis B. Jordan, Field Supervisor
U. S. Department of Interior
Fish and Wildlife Service
Jackson Mall Office Center
300 Woodrow Wilson Avenue, Suite 3185
Jackson, Mississippi 39213

Dear Mr. Jordan:

In accordance with Section 7(c) of The Endangered Species Act Amendments of 1978, we are requesting information concerning threatened and/or endangered species that may occur within the vicinity of the Larose to Golden Meadow hurricane protection project - mitigation area, located in Lafourche and Terrebonne Parishes, Louisiana. (See enclosure 1.)

The proposed mitigation plan was developed after our initial coordination with your agency (letter dated June 1, 1981). The mitigation plan would consist of the construction of a 7-mile-long, earthen levee and three water control structures within the Pointe au Chien Wildlife Management Area. These structural measures are expected to curtail further wetland habitat degradation in the mitigation area due to saltwater intrusion.

There are 4,497 acres of wetland habitat in the proposed mitigation area. Of this total, 2,243 acres are fresh/intermediate marsh. The vegetation in this marsh type includes bull-tongue, cyperus, wiregrass, Pluchea, dwarf spikerush, saltgrass, deerpea, and saltmarsh morning glory. There are 804 acres of brackish marsh which are dominated by wiregrass and saltgrass. The remaining 1,450 acres consist of open water scattered throughout the proposed mitigation area.

Please provide us with a list of endangered and threatened species and species proposed for listing which may occur in the project mitigation area.

Sincerely,

ORIGINAL SIGNED BY

Cletis R. Wagahoff
Chief, Planning Division

Enclosure

Similar letter sent to Charles A. Oravetz/National Marine Fisheries Service
St. Petersburg Florida

A.2. ENDANGERED AND THREATENED SPECIES

This section contains the correspondence between the New Orleans District, Corps of Engineers; the US Fish and Wildlife Service (FWS); and National Marine Fisheries Service (NMFS). As mandated by Section 7(c) of the Endangered Species Act Amendments of 1978, the FWS and NMFS were requested to provide information concerning endangered or threatened species which might occur in the project and mitigation areas. Data provided by each agency indicated that no endangered or threatened species is likely to occur in either area. Thus, this correspondence concludes our responsibilities under Section 7(c).

LITERATURE CITED

Eddy, S. and Underhill, J.C. 1978. Freshwater Fishes. Third Edition. Wm. C. Brown Company Publishers, Dubuque, Iowa. 215 pp.

Conant, R. 1975. A Field Guide to Reptiles and Amphibians. Sec. Ed. National Audubon Society and National Wildlife Federation. Houghton Mifflin Company, Boston. 429 pp.

Lowery, G.H., Jr. 1974a. The Mammals of Louisiana and its Adjacent Waters. Louisiana State University Press and Kingsport Press, Kingsport, Tennessee. 565 pp.

....1974b. Louisiana Birds. Louisiana State University Press and Kingsport Press, Kingsport, Tennessee. 651 pp.

Pennak, R.W. 1978. Fresh-water Invertebrates of the United States. Sec. Ed. John Wiley and Sons Inc., New York. 803 pp.

Robins, R.C. (Chairman) 1980. A list of Common and Scientific Names of Fishes from the United States and Canada. American Fishery Society, Spec. Pub. No. 12. 174 pp.

TABLE A.1.2. (CONT.)

MAMMALS

Common Names	Scientific Names
Eastern cottontail rabbit	Sylvilagus floridanus alacer
Fox squirrel	Sciurus niger subauratus
Gray squirrel	Sciurus carolinensis fuliginosus
Marsh rice rat	Oryzomys palustris texensis
Mink	Mustela vison vulgivaga
Muskrat	Ondatra zibethicus rivalicius
Nine-banded armadillo	Dasypus novemcinctus Mexicanus
Nutria	Myocastor coypus bonariensis
Opossum	Didelphis virginiana
Raccoon	Procyon lotor megalodous
River otter	Lutra canadensis lataxina
Swamp rabbit	Sylvilagus aquaticus aquaticus
White-tail deer	Odocoileus virginianus

TABLE A.1.2. (CONT.)

BIRDS

Common Names	Scientific Names
Northern Shoveler	Spatula clypeata
Red-tailed hawk	Buteo jamaicensis
Ring-necked duck	Aythya collaris
Sora	Porzana carolina
Vulture	Cathartes aura
Wood duck	Aix sponsa
Woodpecker	Picidae 3/

TABLE A.1.2. (CONT.)

BIRDS

Common Name	Scientific Name
American bittern	Botaurus lentiginosus
American coot	Fulica americana
American goldfinch	Spinus tristis tristis
American kestrel	Falco sparverius
American widgeon	Mareca americana
American woodcock	Philohela minor
Barn owl	Alba pratincola
Black-necked stilt	Himantopus mexicanus
Blue jay	Cyanocitta cristata
Blue-winged teal	Anas discors
Cardinal	Richmondena cardinalis
Cattle egret	Bubulicus ibis
Clapper rail	Rallus longirostris
Common moorhen	Gallinula chloropus cachinnans
Common snipe	Capella gallinago delicata
Crow	Corvus brachyrhynchos
Eastern bluebird	Sialia sialis
Eastern meadowlark	Sturnella magna
Gadwall	Anas strepera
Green-winged teal	Anas carolinensis
Heron	Ardeidae 2/
Ibis (white)	Gaura alba
King rail	Rallus elegans
Lesser scaup	Aythya offinis
Mallard	Anas platyrhynchos
Mottled duck	Anas fulvigula
Mourning dove	Zenaldura macroura
Northern pintail	Anas acuta tzitzihoa

TABLE A.1.2. (CONT.)

REPTILES

Common Name	Scientific Name
American alligator	Alligator mississipiensis
Frogs	Anura[1/]
Turtles	Testudines[1/]
Snakes	Serpentes[2/]

TABLE A.1.2. (CONT.)

FISH

Common Name	Scientific Name
Alligator gar	*Lepisosteus spatula*
Atlantic croaker	*Micropogonias undulatus*
Atlantic threadfin	*Polydactylus octonemus*
Bay anchovy	*Anchoa mitchilli*
Bay whiff	*Citharichthys spilopterus*
Bluegill	*Lepomis macrochirus*
Channel catfish	*Ictalurus punctatus*
Freshwater drum	*Aplodinotus grunniens*
Gizzard shad	*Dorosoma cepedianum*
Golden shiner	*Notemigonus crysoleucas*
Gulf menhaden	*Brevoortia patronus*
Hardhead catfish (sea catfish)	*Arius felis*
Largemouth bass	*Micropterus salmoides*
Largemouth buffalo	*Ictiobus cyprinellus*
Longnose gar	*Lepisosteus osseus*
Longnose killifish	*Fundulus similis*
Mosquitofish	*Gambusia affinis*
Red drum	*Sciaenops ocellatus*
Sailfin molly	*Poecilia latipinna*
Sand seatrout	*Cynoscion arenarius*
Sheepshead	*Archosargus probatocephalus*
Sheepshead minnow	*Cyprinodon variegatus*
Smallmouth buffalo	*Ictiobus bubalus*
Southern flounder	*Paralichthys lethostigma*
Spot	*Leiostomus xanthurus*
Spotted seatrout	*Cynoscion nebulosus*
Striped mullet	*Mugil cephalus*
Threadfin shad	*Dorosoma petenense*
Tidewater silverside	*Menidia penninsulae*

A.3. METHODOLOGY FOR FISHERY IMPACT ANALYSIS

A.3.1. This discussion explains the methodology used to determine the estimated fishery harvest contributed by the marsh habitat in the project area. The estimated harvest in the future-without project is compared to the estimated harvest in the future-with the different alternatives.

A.3.2. The area to be impacted lies within Hydrologic Unit IV, as defined by Chabreck (1972). Recent studies (Ader, 1980) have shown that the total acreage of marsh in Hydrologic Unit IV declined from 532,500 acres in 1956 to 406,000 acres in 1978. To estimate the number of acres present in Hydrologic Unit IV in base year 1975, the percent per year loss over the 22-year period was calculated based on acreage of marsh present in 1956 and 1978. It was calculated that total marsh acreage was being lost at 1.22 percent per year. Thus, in base year 1975, there would have been 421,726 acres of marsh in Hydrologic Unit IV.

A.3.3. Table A.3.1 provides a summary of the 1963-1978 average annual commercial harvest and value of the major estuarine-dependent commercial fishes and shellfishes for Hydrologic Unit IV.

A.3.4. To determine fishery harvest per acre, Hydrologic Unit IV average adjusted harvest data (302,950,000 pounds) was divided by the total acres of marsh in Hydrologic Unit IV present in base year 1975. This calculation yields an average commercial harvest of 718 pounds per acre of marsh.

A.3.5. To determine value per acre, the average annual value reported for Hydrologic Unit IV ($75,130,000) was divided by adjusted harvest data (302,950,000 lbs.). This calculation yields an average commercial harvest value of $0.25 per pound. This value multiplied by the pounds per acre (718 pounds/acre) of harvest yields dollars per acre ($179.50).

TABLE A.3.1.

AVERAGE ANNUAL COMMERCIAL HARVEST [1] AND VALUE OF MAJOR ESTUARINE-DEPENDENT FINFISHES AND SHELLFISHES ATTRIBUTABLE TO HYDROLOGIC UNIT IV (BARATARIA BAY), LOUISIANA COASTAL AREA

SPECIES	HYDROLOGIC UNIT IV
Menhaden	
Harvest [2]	225.81
Value [3]	12.60
Shrimp	
Harvest	23.23
Adjusted Harvest [4]	42.26
Value	45.05
Oyster	
Harvest	4.05
Adjusted Harvest [5]	10.13
Value	14.79
Croaker [6]	
Harvest	15.25
Value	0.82
Blue Crab	
Harvest	3.56
Value	1.10
Seatrout	
Harvest	2.70
Value	0.47
Spot	
Harvest	2.88
Value	0.14
Red Drum	
Harvest	0.36
Value	0.16

TABLE A.3.1. (CONT.)

Total	
Harvest	277.84
Adjusted Harvest	302.95
Value	75.13

Source: National Marine Fisheries Service landing records for the years 1963-1978, compiled by New Orleans District, Corps of Engineers.

1/ Harvest refers to total recorded commercial catch of a particular species from an area. The catch from offshore waters was assigned to inshore areas based on the relative abundance of estuarine marsh habitat.

2/ Millions of pounds.

3/ Millions of 1981 dollars. Value for all species except oysters represents running average of 1974-1978 exvessel prices brought to 1981 price levels using the Consumer Price Index for food. Average price for oysters calculated for period 1976-1980.

4/ Reflects 200 percent increase of reported inshore landings, based on surveys conducted by Louisiana Department of Wildlife and Fisheries (C.J. White, personal communication, letter dated April 23, 1979).

5/ Reflects 150 percent increase of reported landings, based on Mackin and Hopkins (1962) and Lindall et al. (1972).

6/ Includes food fish and industrial bottomfish. Quantities of croaker, spot, and seatrout calculated after Lindall et al. (1972).

A.3.6. Table A.3.2. shows the estimated pounds and dollar value of the potential fishery harvest contributed by the marsh acreage in the project area for each plan and future-without project conditions.

A.3.7. Table A.3.3. shows the estimated pounds and dollar value of the potential annual fishery harvest contributed by the marsh acreage associated with Louisiana Land and Exploration Company and Clovelly Farms under future-without project conditions. Under future-with project for each farm, potential annual fishery harvest would be zero by the year 1991.

A.3.8. This methodology is crude, and it is assumed that pounds per acre and dollar value per acre remain constant, with only marsh acreage being variable.

TABLE A.3.2.

COMPARISON OF FUTURE-WITHOUT PROJECT TO FUTURE-WITH PROJECT POTENTIAL ANNUAL FISHERY HARVEST

Target Year	Alternative	Marsh[1/] (acres)	Harvest (pound)	Value (dollars)
1975	Base	1,938	1,391,484	347,871
	Plan 1 (TSP)	1,938	1,391,484	347,871
	Plan 2	1,938	1,391,484	347,871
	Plan 3	1,938	1,391,484	347,871
	Plan 4	1,938	1,391,484	347,871
	Plan 5	1,938	1,391,484	347,871
1986	FWO[2/]	1,669	1,198,342	299,585
	Plan 1 (TSP)	1,100	789,800	197,450
	Plan 2	1,146	822,828	205,707
	Plan 3	1,144	821,392	205,348
	Plan 4	1,197	859,446	214,861
	Plan 5	1,141	819,238	204,809
1991	FWO	1,559	1,119,362	279,840
	Plan 1 (TSP)	0	0	0
	Plan 2	43	30,874	7,718
	Plan 3	80	57,440	14,360
	Plan 4	132	94,776	23,694
	Plan 5	496	356,126	89,032
1996	FWO	1,457	1,046,126	261,531
	Plan 1 (TSP)	0	0	0
	Plan 2	40	28,720	7,180
	Plan 3	73	52,414	13,103
	Plan 4	123	88,314	22,078
	Plan 5	451	323,818	80,954
2026	FWO	969	695,742	173,935
	Plan 1 (TSP)	0	0	0
	Plan 2	27	19,386	4,846
	Plan 3	42	30,156	7,539
	Plan 4	82	58,876	14,719
	Plan 5	258	185,244	46,311
2096	FWO	374	268,532	67,133
	Plan 1 (TSP)	0	0	0
	Plan 2	10	7,180	1,795
	Plan 3	13	9,347	2,333
	Plan 4	32	22,976	5,744
	Plan 5	81	58,158	14,539

1/ Refer to Section A.4 for methodology used to determine marsh loss rate in project area.
2/ Future-Without Project.

TABLE A.3.3.

FUTURE-WITHOUT PROJECT POTENTIAL ANNUAL FISHERY HARVEST FOR CLOVELLY FARMS AND LOUISIANA LANDS AND EXPLORATION (LL&E)

Target Year	Farm Segment	Marsh (acres)	Harvest (pounds)	Value (dollars)
1975	Clovelly Farms	110	79,090	19,745
1986		88	63,272	15,796
1991		80	57,520	14,360
1996		73	52,487	13,103
2026		42	30,198	7,539
2096		13	9,347	2,333
1975	LL&E	54	38,826	9,693
1986		46	33,074	8,257
1991		43	30,917	7,718
1996		40	28,760	7,180
2026		27	19,413	4,846
2096		10	7,180	1,795

LITERATURE CITED

Ader, Robert R. 1980. Mississippi Deltaic Plain Region Habitat Acreage Data. National Coastal Ecosystems Team, US Fish and Wildlife Service, Office of Biological Services.

Chabreck, R.H. 1972. Vegetation, water, and soil characteristics of the Louisiana Coastal Region. Louisiana State University, Agricultural Experiment Station Bulletin 664. 72 pp.

A.4. METHODOLOGIES FOR TABLE A.4.1., "COMPARISON OF FUTURE-WITHOUT PROJECT HABITAT ACREAGES TO FUTURE-WITH PROJECT ACREAGES"

A.4.1. Five natural habitat types [fresh/intermediate marsh, brackish marsh, open water, wooded swamp, and bottomland hardwoods (BLHW)] could be impacted by the project alternatives. Three new habitat types (levee, pasture, and residential/commercial) would be created as a result of project activities. All habitat types were determined by using the Mississippi Deltaic Plain Region habitat mapping study (Wicker et al., 1980). After the pertinent habitat types were determined, the area of impact was planimetered from US Geological Survey (USGS) 1:24000 quandrangle maps and project design maps for the base year 1975. Corresponding habitat maps illustrating habitat acreages for 1956 and 1978 were used to determine the without-project habitat change for the 22-year period. The change of the habitat types under consideration was converted to a percent change per year. This percent change was used to predict the number of acres of each natural habitat type which was present in the project area in 1975 and would be present until the year 2096 (100-year project life). In calculating the projected habitat loss, a worst-case analysis was assumed. Based on calculated rates of habitat change between the 1956 and 1978 habitat maps, fresh/intermediate marsh is being lost at a rate of 3.22 percent per year. Total marsh is lost at an annual rate of 1.35 percent, which is also equal to brackish marsh loss per year. For comparative purposes, marsh loss rates were obtained for the Barataria and Breton Sound Basins.[1/] Annual total marsh loss rates for these two basins were 1.12 and 0.66 percent per year, with fresh/intermediate marsh being lost at 2.56 and 2.89 percent per year, respectively.

1/ Louisiana Coastal Area, Louisiana, "Freshwater Diversion to Barataria and Breton Sound Basins." US Army Corps of Engineers, New Orleans District, Draft, March 1982, p. D-27-37.

A.4.2. Based on the habitat maps for the study area, 60 percent of fresh/intermediate marsh lost became open water, and 40 percent became brackish marsh. This trend would apply only to fresh/intermediate marsh not inclosed by the project (Plans III, IV, & V) which would undergo natural succession. Also, it was assumed (worst case) that as fresh/intermediate marsh became brackish marsh, the same erosive forces that were affecting the fresh marsh also would affect the newly converted or existing brackish marsh. A 1.35 percent loss was calculated, with the loss becoming open water. Those marsh acres which would be inclosed by the project levee were calculated to be lost as follows. Fresh/intermediate was lost at 3.22 percent per year and total marsh was lost at 1.35 percent per year. To determine brackish marsh for a given year, fresh marsh was subtracted from total marsh for that given year and the difference was remaining brackish marsh. Total marsh loss between target years was converted to open water. This rationale applies for all plans through target year 1986. All inclosed marsh and open water (with the exception of borrow pits) were assumed to be drained by 1991. About 84 percent was converted to pasture and 16 percent to residential/commercial uses.

A.4.3. Total forest habitat was calculated to have a future-without project lost rate of 1.49 percent per year and wooded swamp was lost at 3.93 percent per year. Bottomland hardwood forest change was computed by subtracting the number of acres of wooded swamp from the number of total forest acres for that same target year. According to the trends of forest loss, 84 percent was converted to pasture and 16 percent was converted to residential/commercial use. Forest habitats not inclosed by the project were calculated at the same rate of loss as described above, throughout project life. In the case where total forest (not inclosed) consisted only of bottomland hardwood forest (Plans II and IV), the rate of loss was the same as total forest loss (1.49%). Forest habitat inclosed by the project was assumed to undergo an accelerated rate of loss due to its desirability to local

interest for residential and agricultural uses. The accelerated rate loss was predicted to be double the rate loss for total forest and wooded swamp. The accelerated rate loss was applied (2.98% total forest and 7.86% wooded swamp) for target years 1991 through 2096.

A.4.4. In Table A.4.1., the 1975 base condition represents 4,598 acres by habitat type located in the study area [the proposed project alinement (Tentatively Selected Plan) and those areas expected to be impacted due to inclosure & pumping]. For each alternative, the number of acres which eventually would be affected over the life of the project is shown. For example, Plan 2 includes the modified General Design Memorandum (GDM) and Clovelly Farms alinement. With this plan, there are 1,093, 791, 1,533, 141, and 721 acres of fresh/intermediate marsh, brackish marsh, open water, wooded swamp, and bottomland hardwoods, respectively. However, over the life of the project, these acres would be lost, due to direct and secondary project impacts (PI). Also represented are 319 acres which would be affected by Plan 1 but not be affected by Plan 2, and which would undergo natural change (NC). The 319-acre difference is due to the deletion of LL&E farms from Plan 2. These acres are shown in the NC category so that the study area is the same for each plan. Each alternative is represented in this manner for each target year over the life of the project through target year 2096.

A.4.5. Target years are significant dates in the project life based upon estimates of construction time, assumptions of indirect project impacts, and assumptions of the impact of drainage on wetland succession.

- o 1975: beginning of project
- o 1986: completion of first lift
- o 1991: completion of drainage of wetlands inside the levee system (assume that pumping would begin after completion of first lift and continue for five years)

- o 1996: completion of all three project lifts
- o 2026: near complete loss of wooded swamp due to draining and clearing
- o 2096: end of project life

A.4.6. By 1991, drainage of wet areas inside the levee system should be complete. At this time, all inclosed marsh and waterbodies would become pasture and residential/commercial. The inclosed forests would decrease at the rates previously described.

A.4.7. Tables A.4.2. and A.4.3. show base condition, future-with project and future-without project conditions for the Louisiana Land and Exploration Company and Clovelly Farms.

LITERATURE CITED

Wicker, Karen M., et al. 1980. Mississippi Deltaic Plain Region Ecological Characterization: a habitat mapping study. A users guide to the habitat maps. US Fish and Wildlife Service, Office of Biological Services. FWS/OBS-79/07. 84 pp.

TABLE A.4.1.

COMPARISON OF FUTURE-WITHOUT PROJECT HABITAT ACREAGES TO FUTURE WITH PROJECT HABITAT ACREAGES

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
1975	Base Condition[1/]	1,093	845	1,638	141	881				4,598
	Plan 1 (GDM, CF, LL&E)	1,093	845	1,638	141	881	0	0	0	4,598
	Project Impact (PI)	1,093	845	1,638	141	881	0	0	0	
	Natural Change (NC)	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	1,093	791	1,533	141	721	0	0	0	
	NC	0	54	105	0	160	0	0	0	
	Plan 3 (GDM & LL&E)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	983	845	1,531	141	881	0	0	0	
	NC	110	0	107	0	0	0	0	0	
	Plan 4 (GDM)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	983	791	1,426	141	721				
	NC	110	54	212	0	160	0	0	0	
	Plan 5 (LED)	1,093	845	1,638	141	881	0	0	0	4,598
	PI	412	845	1,294	97	592	0	0	0	
	NC	681	0	344	44	289	0	0	0	

1/ See Section A.4.1
2/ See Section A.4.5

Abbreviations

GDM - General Design Memorandum Alinement
CF - Clovelly Farms
LL&E - Louisiana Lands and Exploration
PI - Project Impact
NC - Natural Change
LED - Least Environmental Damaging

TABLE A.4.1. (CONT.)

Target[2/] Year	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
1986	Without Project	763	906	1,907	91	755	0	131	25	4,598
	Plan 1 (GDM, CF, LL&E)	504	596	1,961	78	552	794	95	18	4,598
	Project Impact (PI)	504	596	1,961	78	552	794	95	18	
	Natural Change (NC)	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	504	642	1,869	78	662	712	111	21	4,599
	PI	504	596	1,755	78	526	712	91	17	
	NC	0	46	114	0	136	0	20	4	
	Plan 3 (GDM & LL&E)	546	598	1,956	78	552	755	95	18	4,598
	PI	469	587	1,827	78	552	755	95	18	
	NC	77	11	129	0	0	0	0	0	
	Plan 4 (GDM	483	714	1,856	78	662	673	111	21	4,598
	PI	406	650	1,621	78	526	673	91	17	
	NC	77	64	235	0	136	0	20	4	
	Plan 5 (LED)	571	570	1,969	56	528	799	88	17	4,598
	PI	96	499	1,490	58	274	799	45	9	
	NC	475	71	479	28	254	0	43	8	

6. ARCHEOLOGY RESOURCES

A.6.1. Archeological investigations in the vicinity of the proposed Larose to Golden Meadow Hurricane Protection project have been conducted by Fred B. Kniffen (1941), W. G. McIntire (1958), an unpublished report (1974), Gagliano et al. (1975), Jon L. Gibson (1978), Bert F. Rader (1978), McIntire et al. (1981), Michael E. Stout and John W. Muller (1983) and David McCullough (1984). Cultural resources investigations are on-going and scheduled to be completed in FY 84 (see Table A.6.1.). The human settlement and cultural history has been outlined by Gagliano et al. (1975) and McIntire et al. (1981). Rather than summarizing their work, the reader is directed to these sources.

A.6.2. The proposed project is situated on alluvial deposits associated with the Lafourche Delta Complex (Frazier 1967). This complex was active from appproximately 3,500 years B.P. (Before Present) to the closing of Bayou Lafourche in 1904. Of particular importance to the human settlement of this area is the Bayou Blue lobe (ca. 1800-1700 B.P.) and the Bayou Lafourche lobe (ca. 500-78 B.P.).

A.6.3. Due to the recent age of the surface deposits, the earliest human occupation of this area probably does not predate the terminal Troyville or initial Coles Creek Periods (McIntire 1958, Gagliano, et al. 1975). The earlist deposits which can be identified within the vicinity of the project area consist of a series of relict natural levees. These levees, which once supported woody vegetation, have subsided to marsh level or, in some cases, to the near subsurface. The abandoned stream courses, which can be traced on the color infrared aerial photographs, support a plant community that is different from the surrounding marsh. In a few cases, underfit streams now occupy earlier abandoned channels. This early system flows east-northeast and extends from Clovelly Farms to the vicinity of Chicot Point. These courses predate the late Bayou Lafourche lobe and are probably associated with the Bayou Blue lobe. If the Bayou Blue association is accurate, these channels were active approxi-

quality standards of Louisiana provided for under Section 303 of P.L. 95-217 will not be violated.

Very truly yours,

J. Dale Givens

J. Dale Givens
Administrator

JDG/LW/mp

RANK P. SIMONEAUX
SECRETARY
B. JIM PORTER
ASSISTANT SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS
COASTAL MANAGEMENT DIVISION

J. DALE GIVENS
ADMINISTRATOR

June 12, 1983

DNR 830414-06

Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, La. 70160

Attention: Mr. Jeffrey Heaton

Gentlemen:

RE: Proposal for seven levee segments approx. 26 miles in length which would encompass approx. 1248 acres. The levee will extend along the east side of Bayou Lafourche from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be part of the Golden Meadow Hurricane Protection Project.

This is to acknowledge receipt of "Proof of Publication" of public notice, above reference, forwarded to you with our letter dated May 16, 1983 and to advise that no complaints relative to this project have been received by this agency within the ten day period stipulated in the notice.

It is our opinion that your proposed project will not violate water quality standards of the State of Louisiana; therefore, we offer no objection to this project provided turbidity during dredging in state waters is kept to a practicable minimum, provided also the proposed project does not change historical water flows.

In accordance with statutory authority contained in the Louisiana Revised Statutes of 1950, Title 30, Chapter 11, Part IV, Section 1094 A(3) and provisions of Section 401 of the Clean Water Act (P.L. 95-217), the Office of Environmental Affairs certifies that it is reasonable to expect that water

[illegible] TO BE RUN IN THE OFFICIAL
[illegible] STATE OF LOUISIANA

Notice is hereby given that the Department of the Army, New Orleans Corps of Engineers New Orleans, La.

has applied to the Louisiana Department of Natural Resources, Office of Environmental Affairs, Water Pollution Control Division for

a Water Quality Certification for a ring levee totaling approx. 43 miles in circumference which would encompass approx. 32,400 acres. The authorized project includes floodgates on Bayou Lafourche at the upper and lower limits of the protection levee and eight multi-barreled culverts to be located at strategic locations along the levee proper. The levee would extend southward from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be the Golden Meadow Hurricane Protection Project.

This work will require a Letter of No Objection and a Water Quality Certification in accordance with statutory authority contained in the Louisiana Revised Statutes of 1950, Title 30, Chapter 11, Part IV, Section 1094 A(3) and provisions of Section 401 of the Clean Water Act (P.L. 95-217).

Comments concerning this application can be filed with the Office of Environmental Affairs within ten days from the date of this notice using reference No. DNR 830414-06 at the following address:

Louisiana Department of Natural Resources
Office of Environmental Affairs
Division of Water Pollution Control
Post Office Box 44066, Capitol Station
Baton Rouge, La. 70804
Telephone: (504) 342-6363

J. Dale Givens

J. Dale Givens, Administrator
Water Pollution Control Division

1004 A(3) and provisions of Section 401 of the Clean Water Act (Public Law 95-217.)

Very truly yours,

J. Dale Givens
Administrator

JDG/LW/mp
enclosure

cc: Corps of Engineers
New Orleans District
Attention: Permit Section

Coastal Zone Management
P.O. Box 44396
Baton Rouge, La. 70804

FRANK P. SIMONEAUX
SECRETARY
B. JIM PORTER
ASSISTANT SECRETARY

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF ENVIRONMENTAL AFFAIRS
WATER POLLUTION CONTROL DIVISION

J. DALE GIVENS
ADMINISTRATOR

April 29, 1983

DNR 830414-06

Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, La. 70160

Attention: Mr. Jeffrey Heaton

Gentlemen:

RE: Proposal for a ring levee totaling approx. 43 miles in circumference which would emcompass approx. 32,400 acres. The authorized project includes floodgates on Bayou Lafourche at the upper and lower limits of the protection levee and eight multi-barreled culverts to be located at strategic locations along the levee proper. The levee will extend southward from the latitude of the Intracoastal Waterway at Larose, La. to approx. 2.0 miles south of Golden Meadow, La. a distance of approx. 26 miles. This will be the Golden Meadow Hurricane Protection Project.

We have reviewed the information of the above referenced proposal as contained in your submittal dated April 8, 1983.

Enclosed is a copy of a public notice to be published by you one time in the official state journal, the Baton Rouge STATE TIMES. (As provided for by LRS 30:1094 A(3), the cost of this publication is to be at your expense). PLEASE REQUEST THAT THE BATON ROUGE STATE TIMES FURNISH US WITH PROOF OF PUBLICATION OF THIS NOTICE.

Provided there have been no objections to your project within ten days of the date of publication, we will forward a letter of no objection and water quality certification in accordance with statutory authority contained in Louisiana Revised Statutes of 1950, Chapter 11, Part IV, Section

April 8, 1983

IN REPLY REFER TO:

Planning Division
Environmental Analysis Branch

Mr. J. Dale Givens, Administrator
Division of Water Pollution Control
Office of Environmental Affairs
P.O. Box 44066
Baton Rouge, Louisiana 70804

Dear Mr. Givens:

The U. S. Army Corps of Engineers, New Orleans District, intends to perform dredge and fill activities associated with the Larose to Golden Meadow hurricane protection project. The proposed activities and the areas affected are documented in the enclosed Public Notice and Section 404 (b)(1) Evaluation.

Copies of the four letters received in response to the Public Notice are also enclosed for your review. Issues raised by the three letters from pipeline companies have been satisfactorily resolved by our Engineering Division. The idea of water control structures raised in the letter from Mr. Joseph Vincent of the Orleans Audubon Society was originally proposed by the New Orleans District, but rejected by the project local interests. No letters were received from Federal agencies from which we infer their approval of the proposed activities.

As concluded in the Section 404 (b)(1) Evaluation, no significant adverse impacts on the environment or aquatic ecosystem would be expected as a result of dredge and fill activities. We, therefore, request that a state water quality certificate be issued for this work as required by the 1977 amendments to the Clean Water Act.

If you have any questions, please contact Mr. Jeffrey Heaton at 838-1975

Sincerely,

ORIGINAL SIGNED BY

Cletis R. Wagahoff
Chief, Planning Division

Enclosures

A.5. State Water Quality Certificate

This section contains the correspondence between the New Orleans District, Corps of Engineers, and the Louisiana Department of Natural Resources, Office of Environmental Affairs, Water Pollution Control Division.

TABLE A.4.3.

COMPARISON OF BASE AND FUTURE-WITHOUT PROJECT FOR BOTH FARMS, AND LL&E[1/] ONLY AND CLOVELLY FARMS ONLY (DATA BASED ON 1975 ACREAGE)

Target Year	Farm Segment	Fresh/ Intermediate Marsh	Brackish marsh	Open water	Wooded swamp	Bottomland hardwoods	Pasture/ cropland	Residential/ commercial	Levee	Total [2/] acreages
1975	Clovelly and LL&E (Base)	110	54	212	0	160	0	0	0	536
1986	FWO[3/]	77	64	235	0	136	20	4	0	536
1991	FWO	65	67	244	0	126	28	6	0	536
1996	FWO	55	68	253	0	117	36	7	0	536
2026	FWO	21	61	294	0	75	71	14	0	536
2096	FWO	2	30	344	0	26	112	22	0	536
1975	Clovelly (Base)	110	0	107	0	0	0	0	0	217
1986	FWO	77	11	129	0	0	0	0	0	217
1991	FWO	65	15	137	0	0	0	0	0	217
1996	FWO	55	18	144	0	0	0	0	0	217
2026	FWO	21	21	175	0	0	0	0	0	217
2096	FWO	2	11	204	0	0	0	0	0	217
1975	LL&E (Base)	0	54	105	0	160	0	0	0	319
1986	FWO	0	46	114	0	136	20	4	0	320
1991	FWO	0	43	117	0	126	28	6	0	320
1996	FWO	0	40	120	0	117	36	7	0	320
2026	FWO	0	27	133	0	75	71	14	0	320
2096	FWO	0	10	150	0	26	112	22	0	320

1/ Louisiana Land and Exploration
2/ Total acreage may vary slightly due to rounding error.
3/ Future-without project conditions

TABLE A.4.2.

COMPARISON OF BASE AND FUTURE-WITH PROJECT FOR BOTH FARMS, FOR CLOVELLY FARMS ONLY, AND LL&E[1/] ONLY. (DATA BASED ON 1975 ACREAGE)

Target Year	Farm Segment	Fresh/ Intermediate Marsh	Brackish marsh	Open water	Wooded swamp	Bottomland hardwoods	Pasture/ cropland	Residential/ commercial	Levee	Total acreages[2/]
1975	Clovelly and LL&E (Base)	110	54	212	0	160	0	0	0	536
1986	FW[3/]	35	0	349	0	22	7	2	121	536
1991	FW	0	0	331	0	19	54	10	121	535
1996	FW	0	0	331	0	16	57	10	121	535
2026	FW	0	0	331	0	6	65	12	121	535
2096	FW	0	0	331	0	1	69	13	121	535
1975	Clovelly (Base)	110	0	107	0	0	0	0	0	217
1986	FW	35	0	143	0	0	0	0	39	217
1991	FW	0	0	125	0	0	44	9	39	217
1996	FW	0	0	125	0	0	44	9	39	217
2026	FW	0	0	125	0	0	44	9	39	217
2096	FW	0	0	125	0	0	44	9	39	217
1975	LL&E (Base)	0	54	105	0	160	0	0	0	319
1986	FW	0	0	206	0	22	7	2	82	319
1991	FW	0	0	206	0	19	10	2	82	319
1996	FW	0	0	206	0	16	13	2	82	319
2026	FW	0	0	206	0	6	21	4	82	319
2096	FW	0	0	206	0	1	25	5	82	319

1/ Louisiana Land and Exploration Company

2/ Totals may vary slightly due to rounding error.

3/ Future-with Project.

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
2096	Without Project	21	353	3,202	1	165	0	720	137	4,599
	Plan 1 (GDM, CF, LL&E)	0	0	660	0	23	794	2,623	498	4,598
	PI	0	0	660	0	23	794	2,623	498	
	NC	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	0	10	604	0	48	712	2,708	517	4,599
	PI	0	0	454	0	22	712	2,596	495	
	NC	0	10	150	0	26	0	112	22	
	Plan 3 (GDM &LL&E)	2	11	739	0	23	755	2,578	490	4,598
	PI	0	0	535	0	23	755	2,578	490	
	NC	2	11	204	0	0	0	0	0	
	Plan 4 (GDM)	2	30	673	0	48	673	2,663	509	4,598
	PI	0	0	329	0	22	673	2,551	487	
	NC	2	30	344	0	26	0	112	22	
	Plan 5 (LED)	13	68	1,565	0	65	799	1,754	344	4,598
	PI	0	0	621	0	11	799	1,519	290	
	NC	13	68	944	0	54	0	235	44	

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
2026	Without Project	206	763	2,607	18	457	0	460	4,599	88
	Plan 1 (GDM, CF, LL&E)	0	0	660	3	185	794	2,484	4,598	472
	PI	0	0	660	3	185	794	2,484		472
	NC	0	0	0	0	0	0	0		0
	Plan 2 (GDM & CF)	0	27	587	3	252	712	2,534	4,599	484
	PI	0	0	454	3	177	712	2,463	470	
	NC	0	27	133	0	75	0	71	14	
	Plan 3 (GDM &LL&E)	21	21	710	3	185	755	2,439	4,598	464
	PI	0	0	535	3	185	755	2,439	464	
	NC	21	21	175	0	0	0	0		0
	Plan 4 (GDM)	21	61	623	3	252	673	2,489	4,598	476
	PI	0	0	329	3	177	673	2,418		462
	NC	21	61	294	0	75	0	71	14	
	Plan 5 (LED)	128	130	1,388	7	238	799	1,603	4,598	305
	PI	0	0	621	1	89	799	1,453	277	
	NC	128	130	767	6	149	0	150	28	

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
1996	Without Project	550	907	2,119	61	684	0	233	45	4,599
	Plan 1 (GDM, CF, LL&E)	0	0	660	35	431	794	2,250	428	4,598
	PI	0	0	660	35	431	794	2,250	428	
	NC	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	0	40	574	35	528	712	2,276	434	4,599
	PI	0	0	454	35	411	712	2,240	427	
	NC	0	40	120	0	117	0	36	7	
	Plan 3 (GDM &LL&E)	55	18	679	35	431	755	2,205	420	4,598
	PI	0	0	535	35	431	755	2,205	420	
	NC	55	18	144	0	0	0	0	0	
	Plan 4 (GDM)	55	68	582	35	528	673	2,231	426	4,598
	PI	0	0	329	35	411	673	2,195	419	
	NC	55	68	253	0	117	0	36	7	
	Plan 5 (LED)	342	109	1,195	32	434	799	1,417	270	4,598
	PI	0	0	621	13	210	799	1,341	256	
	NC	342	109	574	19	224	0	76	14	

TABLE A.4.1. (CONT.)

Target Year[2/]	Alternatives	Fresh/ Intermediate Marsh	Brackish Marsh	Open Water	Wooded Swamp	Bottomland Hardwoods	Levee	Pasture	Residential/ Commercial	Total Acreage Affected
1991	Without Project	648	911	2,017	74	729	0	184	35	4,598
	Plan 1 (GDM, CF, LL&E)	0	0	660	52	490	794	2,186	416	4,598
	PI	0	0	660	52	490	794	2,186	416	
	NC	0	0	0	0	0	0	0	0	
	Plan 2 (GDM & CF)	0	43	571	52	593	712	2,207	421	4,599
	PI	0	0	454	52	467	712	2,179	415	
	NC	0	43	117	0	126	0	28	6	
	Plan 3 (GDM & LL&E)	65	15	672	52	490	755	2,141	408	4,598
	PI	0	0	535	52	490	755	2,141	408	
	NC	65	15	137	0	0	0	0	0	
	Plan 4 (GDM)	65	67	573	52	593	673	2,162	413	4,598
	PI	0	0	329	52	467	673	2,134	407	
	NC	65	67	244	0	126	0	28	6	
	Plan 5 (LED)	403	93	1,150	42	480	799	1,370	261	4,598
	PI	0	0	621	19	241	799	1,310	250	
	NC	403	93	529	23	239	0	60	11	

TABLE A.6.1.

CULTURAL RESOURCES INVESTIGATIONS

LEVEE SEGMENT	STATUS OF CULTURAL RESOURCES INVESTIGATIONS
LAROSE FLOODGATE	Stout and Muller 1983
SECTION C NORTH AND SOUTH	Survey scheduled for FY 85
SECTION B NORTH AND SOUTH	Survey scheduled for FY 85
SECTION A WEST	Survey scheduled for FY 85
GOLDEN MEADOW FLOODGATE	Rader 1978
SECTION A EAST	McIntire et al. 1981
SECTION D	Survey scheduled for FY 85
SECTION E SOUTH	Ryan and Hicks 1984
SECTION F	McIntire et al. 1981
LL&E	Gibson 1978
CLOVELLY [illegible]MS	Gibson 1978

mately 1800-1900 years ago. The dates for this course are based on radio carbon dating of interdistributary peat deposits.

A.6.4. The first recorded site in the vicinity of the project, site (16LF1), was recorded by Kniffen in 1941, and was visited by Gibson (1978) during his cultural resources survey of the Clovelly Farms levee alinemnt. This site consists of Rangia cuneata shell and organically stained earth midden. This site will not be impacted by the proposed project.

A.6.5. In the immediate area surrounding site 16LF1, Gibson (1978) recorded seven small in situ Rangia shell middens (16LF57, 16LF58, 16LF59, 16LF60, 16LF61, 16LF62, 16LF63). These sites are located near, but outside of the project corridor, on the West Fork Bayou L'Ours natural levee, and will not be impacted by the proposed project.

A.6.6. In the vicinity of the Louisiana Land and Exploration Company (LL&E) farms, McIntire reported two sites, 16LF54 and 16LF88, in 1974 during a survey of the proposed Louisiana Offshore Oil Port. Site 16LF54 was visited by Gibson (1978), who described the site as "an earthen rangia shell midden with an associated earthen (apparently conical mound." The site is approximately 0.4 miles east of the proposed levee corridor and would not be impacted. Gibson (1978) searched, but was unable to relocate 16LF88. The site is reported to be on the Bayou Raphael natural levee. The site record indicated that it is "apparently a village or campsite with midden area." The record does not indicate a cultural association, but notes that it can only be "found in the fall or winter due to dense vegetation cover." Additional efforts will be made to relocate the site. If the site is to be impacted by the proposed project, a determination of site significance will be completed.

A.6.7. In 1975, Coastal Environments, Inc., performed a survey of archeological sites along the Gulf Intracoastal Waterway (GIWW) in Louisiana. The survey reported two sites in the vicinity of the

project, 16LF36, an earth and shell midden, and 16LF76, a buried shell midden. Neither site would be affected by the project. The waterway cuts across the earlier delta deposits, and the buried sites probably were situated on natural levee crests associated with this eariler system. The relatively large number of recorded archeological sites on the GIWW between Bayou Lafourche and Catahoula Bay are probably because the waterway parallels the general direction of levee development. Consequently, waterway construction parallelled the crests of the abandoned and now subsided natural levee.

A.6.8. Although the cultural resources survey conducted by McIntire et al. (1981) included subsurface testing, the survey failed to locate any surface or subsurface sites in the project alinement between Clovelly Farms and the GIWW. There is a potential of uncovering buried remains once extensive earth moving operations begin. This area has been identified as archeologically sensitive and would be periodically monitored by professional archeologists during construction. In addition, Corps project inspectors would be advised of the potential for buried remains.

A.6.9. One previously unrecorded archeologically site (16LF97) was discovered by McIntire et al. (1981). This site lies outside the proposed Corps levee alinement and would not be impacted by construction. Borings through the peripheral marsh indicate that the flaring edge of the midden base lies 1.0 meter below the present marsh surface. Although it was not possible to hand auger through shell midden, subsequent borings farther from the site showed a brown-amphorphous interdistributary peat 5.0 meters below the surface. This peat is associated with the relict Bayou Blue lobe course that extends east of Clovelly Farms. The peat was overlaid with about 1.5 meters of alluvial silt clay that was capped with approximately 3.5 meters of light brown fibrous peat to the marsh surface (McIntire et al. 1981). The silty clays probably represent sediments deposited by the progradation of the late Bayou Lafourche lobe, while the upper peat represents organic accumulation following subsidence of the natural levee. The presence of the late Bayou Lafourche progradation into the

area can be seen also on the aerial photographs. Although the hand auger did not penetrate to the base of the shell midden, Rangia cuneata shell fragments were found mixed with silty clay directly overlying the lower peat. If we can assume that these Rangia shell fragments are culturally derived, it is reasonable to postulate that site 16LF97 is situated on the crest of a Bayou Lafourche lobe natural levee. Traces of the levee crest can be seen on both the United States Geological Survey quadrangles and the aerial photographs. McIntire et al. (1981) reported finding two small decorated sherds which "appear to be Mississippian in age but with the possibility of extending into Coles Creek." The cultural association is consistent with the geologic dates.

A.6.10. South of the Clovelly Farms, the Corps levee alinement follows the natural levees of West Fork Bayou d' Ours and Bayou Raphael. Both streams are associated with the Bayou Lafourche lobe and are probably around 500-600 years old. Along the eastern edge of Clovelly Farms, hand augering uncovered Rangia shell at a depth of approximately 1.0 meter (Gibson 1978). These deposits did not contain artifacts and are presumed to be natural shell beds that accumulated in an interdistributary lake. Rangia shell also was also exposed in the disposal bank of the Clovelly Farms levee. Again, no artifacts were recorded.

A.6.11. The presence of Rangia shell indicates that Bayous L'Ours and Raphael were prograding across the eroded and subsided Bayou Blue lobe. The Bayou Blue interlevee flank depressions were occupied by brackish lakes and bays. As the active Bayou L'Ours and Raphael channels continued to prograde, the bays were filled with sediment and the surrounding areas probably were transformed into freshwater marsh. The presence of Rangia shell at sites 16LF97 and 16LF1 indicates the continued presence of brackish waters in the vicinity.

A.6.12. In the vicinity of the Larose Floodgate, Stout and Muller (1983) located no in situ archeological remains. Seven relatively recent standing structures were recorded during the survey. None of

these structures met the criteria for inclusion on the National Register of Historic Places. Stout and Muller did record a cultural resource of historical significance in the project imapct area, the passenger vessel "M/V Fox." The M/V Fox has been determined eligible for inclusion in the National Register. The "Fox" was pulled onto the bank as much as 50 years ago and is in deteriorating condition. The vessel's significance is based on its unique design and its contribution to local history. Alternatives to avoid adverse project impacts on the M/V Fox were investigated. No feasible and prudent alternative is available and demolition is necessary. A Memorandum of Agreement (MOA) stipulating mitigation measures for the M/V Fox has been completed. The MOA provides for documentation (photographs and narrative history) of the M/V Fox to Historic American Engineering Record standards and development of a public interpretive program. The HAER documentation has been completed and the interpretive program is now in process. The MOA also stipulates the procedures to be followed for the remaining portions of the project which have not been adequately surveyed to identify significant cultural resources. A copy of MOA is attached.

A.6.13. A cultural resources survey of Section E-South was conducted by Ryan and Hicks (1984). The survey provided updated information on Site 16LF1, but located no cultural resources in the project right-of-way.

LITERATURE CITED

Frazier, David, 1967. Recent deltaic deposits of the Mississippi River their development and chronology. Transactions: Gulf Coast Association of Geological Sciences. 17:287-315

Gagliano, Sherwood M., R. A. Weinstein, and E.K. Burden, 1975. Archeological Investigations along the Gulf Intracoastal Waterway, Coastal Louisiana Area. Manuscript prepared for the US Army Corps of Engineers, New Orleans District.

Gibson, Jon L., 1978. Cultural Resources Survey of LL&E Realinement and Clovelly Farms, Lafourche Parish, South Louisiana Manuscript prepared for the US Army Corps of Engineers, New Orleans District.

McCullough, David L., 1984. Cultural Resource Survey of the Section B North/Section B South Gap Closure, Larose to Golden Meadow, LA., Project, Lafourche Parish, Louisiana. Manuscript prepared for the US Army Corps of Engineers, New Orleans District.

McIntire, William G., 1958. Prehistoric Indian Settlements of the Changing Mississippi River Delta. Louisiana State University Studies, Coastal Studies Series.

McIntire, William G., D.W. Davis, W.H. Conner and R.A Detro, 1981. A Cultural Resources Survey of the Larose to Golden Meadow Hurricane Protection Levee, Sections "F" First Lift and "A" East First Lift. Manuscript prepared for the US Army Corps of Engineers, New Orleans District.

Rader, Bert F., 1978. Cultural Resources Survey of Golden Meadow Floodgate Area. Unpublished MS on file US Army Corps of Engineers, New Orleans District.

Stout, Michael E., and John W. Muller, 1983. Cultural Resource survey of Larose Floodgate, Larose to Golden Meadow, LA., Project, Lafourche Parish, Louisiana. Manuscript prepared for the US Army Corps of Engineers, New Orleans District.

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

SEP 5 1984

Colonel Robert C. Lee
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

REF: Larose to Golden Meadow Hurricane Protection Project
M/V/ Fox, Louisiana

Dear Colonel Lee:

The enclosed Memorandum of Agreement has been ratified by the Chairman of the Council. This document constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act and the Council's regulations. A copy of the ratified Agreement has also been sent to the Louisiana State Historic Preservation Officer.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,

(for) Thomas F. King
Director, Office of Cultural
Resource Preservation

Enclosure

MEMORANDUM OF AGREEMENT

Larose to Golden Meadow Hurricane Protection Project

WHEREAS, the U.S. Army Corps of Engineers (COE), New Orleans District has determined that the Larose to Golden Meadow Hurricane Protection Project will have an effect on property or properties eligible for listing in the National Register of Historic Places and has requested the comments of the Advisory Council on Historic Preservation (Council) pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. 470) and its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800),

NOW, THEREFORE, COE, the Louisiana State Historic Preservation Officer (SHPO) and the Council agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

1. COE shall consult with the National Parks Service (NPS), Historic American Engineering Record (HAER) to determine what level of documentation shall be required prior to the demolition of the M/V Fox. COE shall ensure, unless otherwise agreed to by NPS, that all documentation is completed and accepted by HAER prior to the demolition of the M/V Fox. Copies of the documentation shall be provided to the SHPO and local archives designated by the SHPO.

2. COE shall develop, in consultation with the SHPO, an interpretive program dealing with the M/V Fox to be made available to the public. The program shall consist of the preparation of a brochure or other media of public interest and benefit. The program may be implemented after the demolition of the M/V Fox.

3. COE shall complete the archeological survey of the areas to be impacted by the undertaking to identify the presence of archeological properties.

   a. COE shall consult with the SHPO to determine if any identified properties are eligible for listing in the National Register of Historic Places.

b. Should any eligible properties be identified, COE shall consult with the SHPO to determine if any of the properties identified will be affected by the undertaking.

c. Should any eligible properties be affected by the undertaking, COE shall develop plans to avoid the property. If avoidance is neither prudent or feasible, COE shall develop a data recovery plan in order to mitigate any adverse effects of the undertaking on the affected property or properties. The data recovery plan shall be consistent with "Archeology and Historic Preservation: The Secretary of the Interior's Standards and Guidelines" and the Council's "Treatment of Archeological Properties: A Handbook."

1. COE shall submit the data recovery plan to the SHPO for review and comment. If the SHPO has objection to the plan, COE shall consult with the SHPO to remove the objections.

2. If COE cannot resolve the SHPO's objections after good faith negotiations with the SHPO, COE shall submit the plan, together with the SHPO's comments, to the Council. Within 30 days after the receipt of all pertinent documentation, the Council's Executive Director shall either:

a. refer the matter to the Chairman of the Council pursuant to 36 CFR Part 800.6(b)(7); or

b. provide COE with recommendations on the plan, which COE shall take into account in implementing the final plan.

4. Failure to carry out the terms of this Agreement requires COE to again request the Council's comments in accordance with 36 CFR Part 800. If COE cannot carry out the terms of this Agreement, it will not take, or sanction, any action or make an irreversible commitment that would result in an adverse effect on a National Register eligible property, nor will COE foreclose the Council's consideration of modifications or alternatives to the undertaking until the commenting process has been completed.

5. If any of the signatories to this Agreement determines that the terms of this Agreement cannot be met or believes that a change is necessary, that party shall immediately request that the consulting parties consider an amendment to the Agreement. Such an amendment shall be executed in the same manner as the original Agreement.

Execution of this Agreement evidences COE has afforded the Council a reasonable opportunity to comment on this undertaking and its effects on historic properties and that COE has taken into account the effect of its undertaking on historic properties.

30 Jul 84
District Engineer (date)
Corps of Engineers

31 July 84
Louisiana State Historic (date)
Preservation Officer

Aug 14 1984
Executive Director (date)
Advisory Council on Historic Preservation

8/22/84
Chairman (date)
Advisory Council on Historic Preservation

A.7. RECREATIONAL RESOURCES

A.7.1. General.

The Larose to Golden Meadow Study Area is contained within and defined by the boundary of the southeastern Louisiana Parish of Lafourche. The natural and recreational resources of the study area provide wide and varied opportunities for outdoor recreational activities. The area is characterized by extensive fresh and brackish marsh and large lakes. Because of the excellent wildlife and fisheries habitat, hunting and fishing are the main recreational activities. Developed recreational facilities such as campgrounds, picnic areas, trails, and golf courses are very limited or completely absent because of the lack of suitable soils and topography. Support facilities such as boat launching ramps, access facilities, and retail stores are limited because construction of roads, buildings, and other structures is difficult and costly. Access is limited mainly to boats or special floating vehicles.

A.7.2. Existing Recreational Areas and Facilities.

Outdoor recreational facilities in the study area consist mostly of public and commercial boat launching ramps or slings. Additionally, there are two state wildlife management areas which offers public hunting for big game, small game, and waterfowl. Larger communities within the parish provide small-scale community parks, playgrounds, and picnic areas.

The current Louisiana State Comprehensive Outdoor Recreation Plan (SCORP) includes 1980 inventories of existing recreational areas and facilities. Table A.7.1. lists the current supply of outdoor recreational facilities of the study area by category and proprietorship, and generally characterizes each site.

TABLE A.7-1

EXISTING OUTDOOR RECREATIONAL FACILITIES INVENTORY

LAROSE TO GOLDEN MEADOW STUDY AREA

Proprietorship/Facility Name	Boat Launching Lanes	Other Amenities
State Areas		
Point-au-Chien Wildlife Management Area		29,000 Hunting Acres
Wisner Wildlife Management Area		21,621 Hunting Acres
Parish/Local Areas		
Parish Landing	1	
Bell Pass Marina	1	
Choctaw Boat Ramp	1	
Raceland Boat Ramp	3	
Lockport Boat Ramp	6	60' Fishing Pier
Lake Fields Wildlife Community Ward		1,000 Hunting Acres
Larose Boat Ramp	2	
Golden Meadow Boat Launch	2	
Public Boat Ramp	1	
Peltier Park		18 Picnic Tables
Lockport Boat Ramp	1	
Acadia Park		20 Picnic Tables
Bayouside Boat Ramp	1	
Delta Farms Boat Ramp	1	
Thibodeaux Recreation Department		5 Picnic Tables 14 Tent Camping Sites 10 Trailer Camping Spaces
Levert's Bayou Side Park	1	
Exxon Boat Ramp on Breton Canal	1	
VFW Boat Launch	1	

TABLE A.7-1 (CONTINUED)

EXISTING OUTDOOR RECREATIONAL FACILITIES INVENTORY

LAROSE TO GOLDEN MEADOW STUDY AREA

Proprietorship/Facility Name	Boat Launching Lanes	Other Amenities
Harvey Cypress Inn Boat Launch	1	75' Fishing Pier
Jog Romes Boat Ramp	1	50' Fishing Pier
Melancon Boat Launch	1	100' Fishing Pier
Scuddy Boat Launch	1	
South Louisiana Recreation Resort Inc.	1	1,035 Hunting Acres 25 Trailer Camping Spaces
Sam Foret Boat Ramp	1	
Pleasure Ponds	1	20' Fishing Pier
Charlie Hardison's Grocery	1	
B-B's Marina	1	
Leeville Trailer Park	1	
Fourchon Boat Launch	4	
Gus's Boat Launch	1	
Clovelly Farms	1	

A.7.3. Recreational Potential.

Lafourche Parish is located within State Planning Region 3 which includes five other Louisiana parishes. The entire planning region represents only about 7.6 percent of the state's total population. Because of its close proximity to the Greater New Orleans Metropolitan Area, the study area will continue to supply outdoor recreational opportunities to the populus of both urban and suburban areas. Two major landscape divisions cover the entire region - alluvial flood plain in the northern portion and coastal marsh to the south. The coastal marsh and associated estuarine areas provide millions of user-days for water-related sports and offer vast potential for future development.

A.7.4. Recreational Supply, Demand, and Need.

Recreational needs are determined by comparing demand with existing supply. The State of Louisiana's Department of Culture, Recreation, and Tourism, Division of Outdoor Recreation, Office of Program Development, conducted a statewide recreational facility inventory in 1979-1980 and a recreational demand/participation survey in 1980. An analysis of the results of these recent surveys revealed substantial recreational demands and needs for additional recreational resource and facility development within the state planning region encompassing the study area. Recreational activities reflecting the greatest demand and need for the study area are generally classified as outdoor activities, and, of these, many are natural resource oriented such as hunting and fishing.

A.7.5. Plan Alternative Assessment.

Project construction would impact both the existing and future use of lands and waters which provide opportunity for fish and wildlife oriented recreation. Project impacts generally can be classified as direct or secondary. Direct impacts result directly from project

While it is most likely that the actual effluents and slurry waters derived from the proposed dredging activities would not increase in the proportions indicated by the elutriate simulations (because of the proposed use of bucket dredges versus hydraulic type), it is reasonable to assume that substantial nutrient enrichment could occur. Temporarily depressed oxygen levels, increased odors, and algal blooms could be expected in areas where nutrient levels dramatically increase.

(i) Eutrophication. As a direct result of the increased availability of nutrients in the waterways, occasional eutrophic conditions would be expected to occur. The occurrence of eutrophication, manifested in the form of algal blooms and increased aquatic plant growth, would be relatively short-termed, generally corresponding to actual dredging activities and favorable climatic conditions.

(2) Current Patterns and Circulation.

(a) Current Patterns and Flow. Several major waterways, as well as numerous minor interconnecting canals and drainage ditches traverse the project area (Plate 1). The majority of waterways in the area have undergone previous alterations from such activities as dredging, channelization and forced drainage. However, surface water drainage and hydrologic exchange occurs across the project area.

The proposed project right-of-way would essentially block five principal waterways which lend to the overall hydrologic regime presently established in the area. These principal waterways include the following:

(1) Yankee Canal (Section A East)

(2) Unnamed Oil & Gas Canals (LL&E Farm Segment)

(3) Breton Canal (Sections D and E)

(4) Bayou de la Gauche (Section E)

(5) Scully Canal-lateral drainage around Clovelly Farms (Clovelly Segment)

Additional blockage of minor waterways and drainage systems would also occur.

No information was available which characterized current patterns and/or water exchange trends in any of the waterways associated with the project, other than Bayou Lafourche.

However, Bayou Lafourche is probably the principal hydrologic element which directly and/or indirectly influences the circulation patterns and drainage of the adjacent waterways and tidal areas.

Bayou Lafourche originates at Donaldsonville, Louisiana, where water from the Mississippi River is pumped into the bayou. Except for storm water from its

In addition, the increased nutrient level made available by dredged-material disposal procedures could promote algal blooms during warmer months. Substances released during both the growth and decaying of these algal blooms are known to impart objectionable odors. Objectionable odors occurring as a result of the proposed construction are not likely to be sustained much beyond actual construction periods.

(f) Taste. Because of chloride concentration and generally poor water quality of the major waterways associated with the project area, no potable water intakes are known to exist in the region. Therefore, any reductions in taste quality as a result of the dredging activities, beyond what is presently experienced in the waterways, would be of little consequence.

(g) Dissolved Gas Levels. As a result of the proposed levee construction, dissolved oxygen (DO), should be the only dissolved gas in the affected waterways subject to possible concern.

Ambient DO within the project waterways is not considered to be a limiting ecological factor on the average (USGS, 1981; field observations). The Louisiana Water Quality Standards (LSCC, 1977) have established the minimum allowable DO standard for Bayou Lafourche, from Larose to the gulf to be 4.0 mg/l, while all other coastal waters not specifically identified (such as the adjacent marshes), should not fall below 5.0 mg/l. The most recent DO readings in these areas indicate no problems in attainment of these standards in the preproject setting.

As a result of the proposed actions, however, possible short-term and long-term oxygen deficits could be expected in waterways adjacent to the levee alinements. Short-term oxygen deficits induced by resuspension of highly organic sediments, release of excess nutrients, poor water circulation, increased turbidities and consequent reductions in photosynthetic actions, should result within the waterways in and around the immediate project area. Long-term impacts could include lowered DO levels due to the alteration in the hydrologic regime caused by the levees as well as the pumping stations. The exact duration and severity of impacts associated with oxygen deficits would be dependent on numerous factors, including season, precipitation, tidal effects, climatology, and other natural phenomena.

(h) Nutrients. The waterways evaluated in and around the project area appear to maintain high ambient nutrient levels (Tables 2 through 7; USGS, 1981). Storm water runoff from urbanized areas, and agricultural practices at local farms including Clovelly and LL&E Farms, could account for some portion of the nutrient enrichment observed in the area.

Based on the results of the elutriate tests performed in the study area, significant increases in nutrient values could be expected as a result of the dredging activities. Ammonia, total Kjeldahl nitrogen (TKN), and phosphorus were substantially increased above native water concentrations at Stations 3, 4, and 6. Most notable was Station 3 where ammonia nitrogen increased 3,480 percent, TKN increased 16,390 percent and phosphorus increased 9,000 percent.

elevated carbon dioxide values, and others. Based on these factors, a reduction in the pH of the receiving streams and associated waterways might be expected as a result of the proposed dredging activities. However, as indicated by the results of the elutriate tests (Tables 2 through 7), alkalinity, the buffering capacity indicator, would dramatically increase as a result of the disposal activities. Alkalinity values increased above ambient water concentrations by 37.5 times at Station 1 and by 150 times at Station 3 in the elutriate simulations. While not conclusive, this would suggest that any reductions in ambient pH during the dredging activities would be rapidly offset by the substantial alkalinity buffering capacity of the system. After-dredging pH should substantially resemble ambient conditions, with perhaps a trend toward a more alkaline condition.

No outstanding impacts would be anticipated as a result of minor pH variations.

(c) Clarity. Some reduction in water clarity is expected as a direct result of increased turbidity levels. Water clarity is expected to be decreased primarily in areas where disposal operations traverse adjacent waterways (i.e., Breton Canal, Bayou Raphael, Bayou L'Ours, and Scully Canal). Decreased clarity in this case is primarily a function of increased turbidity, and should therefore be localized and temporary, occurring at the time of construction operations and subsiding soon afterwards. Turbidity levels in the waterways in and around the project are, for the most part, naturally high, thus having reduced clarity. Any temporary increase in turbidity as a result of the project should create only minimal reductions in water clarity above background. Algal blooms, enhanced due to disposal operations, are also expected to contribute slightly to a decrease in the optical properties in the affected water columns.

Temporary reductions in water clarity would not cause significant impacts to any existing habitats.

(d) Color. No significant discolorations are expected in the water columns, other than the characteristic muddy-gray brown colors associated with increased turbidity levels. Water discoloration should fall into the same general esthetic pattern as that associated with water clarity, intensifying as water clarity is decreased. These temporary discolorations would be associated mainly with the release, into the water, of highly organic soils, which are characteristic of the bank and bottom sediments in the vicinity of the construction operations.

(e) Odor. Dredging operations would increase the availability of sulfate found in the sediments. This would consequently increase the bacterial reduction of the sulfate to the foul smelling hydrogen sulfide gas. The actual excavation of the highly organic soils and sediments in the marshes would release odors otherwise contained. The mechanical disposal could directly and indirectly kill many macroorganisms in the immediate vicinity, which could liberate disagreeable odors upon decaying. The anaerobic condition created by the compaction and containment of the highly organic excavate is likely to further stimulate decay with subsequent release of bad odors.

within the project right-of-way. As discussed in Section I.d.(1), all sediment samples along the project reach are essentially similar in makeup.

(3) Fffects of Fill Material Movement. No significant movement of excavated materials are anticipated from the placement of materials along the levee right-of-way. The dredged materials would be stockpiled in a continuous manner along the right-of-way and would ultimately be dressed to conform to final levee grades and specifications. As these elevated levees would not be subject to regular inundation, only minor losses of material, principally through erosion, would be expected. Refer to Section II.c.(1) for more detailed discussions on erosion and resulting turbidity.

(4) Physical Effects on Benthos. As a direct result of construction of the proposed levee resident benthic populations would be destroyed within the project right-of-way due to burial. As a result of erosion and corresponding turbidity increases along the flood side of the levee, as well as possible detrimental water quality impacts associated with contaminant releases from the dredged materials, benthic habitat adjacent to the levee system could experience various impacts including destruction and/or reduction in diversity and overall productivity. Approximately 3,200 acres of fresh to brackish benthic habitat could be secondarily impacted as a result of runoff in the floodside areas of the project (USCOE, 1982a).

Those benthic communities presently associated with the marsh habitats, which would be enclosed by the subject levee system, would be expected to be severely impacted as a secondary effect of the levee project. All wetlands within the protected system could be expected to be drained eventually for development purposes. This induced drainage of the wetlands would result in the loss of all benthic habitats inside the leveed area. See USCOE, 1982a for full discussion.

(5) Actions to Minimize Impacts. As a mechanism of reducing direct impacts to marsh habitats, borrow canals are to be located within the protected side of the levee system where possible. Alinement of the proposed levee along existing disturbed areas, levees and natural ridges would also serve to reduce overall impacts.

b. Water Circulation, Fluctuation, and Salinity Determinations.

(1) Effects on Water.

(a) Salinity. Direct salinity changes would not be expected to occur as a resul of the dredged fill material being utilized in construction of the protection levee. Secondary effects, however, would be expected and are discussed in paragraph II.b.(4).

(b) Water Chemistry. Ambient pH values within the project area range from 7.3 to 7.9 (USGS, 1981). Numerous factors typically associated with dredging activities tend to cause a shift in the pH toward a more acidic range in the receiving waters as a result of disposal activities (Canter, et. al., 1977). These factors include increased turbidity levels, organic enrichment, chemical leaching, poor water circulation, reduced DO concentrations,

(4) Types of Habitat. Predominant wetland and open water habitats comprising the protection levee alinement consist of fresh, intermediate, and brackish marshes; wet bottomland hardwoods; and, cypress-tupelo swamp. The total anticipated wetland and water acreage displaced by the alinement would be approximately 783 acres (USCOE, 1982 a and b). Severe alterations of these habitats would be expected as a result of the levee construction.

(5) Timing and Duration of Discharge. The anticipated construction of the protection levee would be accomplished in a series of three lifts with intervals of 3 1/2 years between lifts. Preferred timing would be suggested for the LL&E Farms alinement due to its proximity to a bird rookery. The timing selected should be correlated to avoid interruption of the nesting season (USCOE, 1982b). No preferred timing would be necessary for the remaining levee alinement.

f. Description of Disposal Methods. Mobilization for the initial lift in unleveed areas would be accomplished by barge-mounted draglines being pushed by tugboats through existing pipeline and natural canals to the borrow areas where the excavated materials would be dug and cast into the levee embankment section. In limited circumstances, minor enlargement and/or deepening and extension of existing canals would be required. Upon completion of levee construction, shell core and soil cover closures would be constructed at the flotation canals initially used to access the borrow areas. During subsequent lifts, the floating plant would cut through the existing levee to reach the borrow areas. Existing pipeline and natural canals would be utilized to access the job site on the flood side of the levee system. No new canal would be cut through the wetlands for job mobilization and demobilization except for minor enlargement and extension.

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations

(1) Effects on Substrate Elevation and Slope. Substantial alteration of the substrate elevation would result within the borrow area and levee right-of-way as a result of the fill associated with the levee construction. Levee construction would completely alter 1,749 acres along the construction right-of-way. The existing area is comprised of wetlands; waterways; fresh, intermediate, and brackish marsh; and natural and man-made levees and elevated spoils (USCOE, 1982a; USCOE, 1982b). The elevation for the protection levee would vary from 8.5 NGVD at the northern end to 13.0 NGVD at the southern end. The levee configuration would be a 1 vertical: 4 horizontal (1V:4H) side slope with a 10-foot wide crown. Berms would be constructed on both sides of the levee and would extend up to 230 feet from the 1V:4H levee slope.

(2) Effects on Sediment Type. Fill material utilized in construction of the I-wall in Section F of the levee, as well as concrete mats proposed for the floodside portion of the I-wall along the Intracoastal Waterway, and the shell utilized as core material at the waterway closures would represent a significant change in substrate. The material utilized for topping of the canal closures and for construction of the levee would not significantly alter sediment composition as these materials would be obtained from borrow areas

the approximately 2.0-mile segment (USCOE, 1982b). Shell for forming the core of the canal closures would be obtained from various supplies within the region.

e. Description of the Proposed Discharge Sites. Disposal of material dredged from the borrow areas in the usual interpretation is not applicable. The dredged material is being removed for utilization in the construction of

TABLE 1

MATERIAL QUANTITIES

Levee Segment	Embankment Fill	Shell	Sheetpile	Concrete
A East	3,220,000 c.y.	72,000 c.y.	-	-
L&E	2,744,570 c.y.	10,900 c.y.	-	-
D	300,000 c.y.	90,000 c.y.	-	-
E South	1,170,000 c.y.	40,000 c.y.	-	-
E South (Alt)	2,880,000 c.y.	30,000 c.y.	-	-
Clovelly	474,900 c.y.	40,500 c.y.	-	-
F	1,210,000 c.y.	25,000 c.y.	6,500 L.F.	3,600 c.y.

the hurricane protection levee. However, the wetland nature of the area in which some of the dredged material would be placed is of such character as to be classified as subject to the procedures and actions required by the Section 404 guidelines.

(1) Location. That portion of the protection levee project to be considered in the evaluation is located on the east side of Bayou Lafourche. (Refer to Figures).

(2) Size. The proposed levee construction would total approximately 25 miles in length along the east side of Bayou Lafourche. The total acreage of right-of-way to be utilized in the construction of the protection levee would consist of approximately 1,749 acres (USCOE, 1982b).

(3) Type of Site. The excavated material would be placed unconfined in the bayous, in adjacent marsh, and in upland areas associated with the proposed protection levee right-of-way alinement. All materials excavated from the borrow areas and that removed in the construction of the Larose floodgate would be utilized in construction of the protection levee.

South to the south and F to the north. The new levee would generally parallel the existing private levee around the farm approximately 15 feet landward. The total length of the segment would be approximately 5.5 miles and would have a design grade of 8.5 feet NGVD. The new levee segment would utilize outside borrow exclusively (USCOE, 1982b).

(7) Section F - Section F consists of approximately 1 mile of I-wall and approximately 5 miles of earthen levee. The floodwall ties into the Larose Floodgate at the upper end of the project. It extends in an easterly direction paralleling the Gulf Intracoastal Waterway. The floodwall constructed to elevation 9.5 NGVD consists of sheetpile with a concrete cap. The earthen levee section ties into the floodwall at elevation 9.5 NGVD and continues for a short distance in an easterly direction before turning south and tying into the northwest corner of the Clovelly Farms levee at elevation 9.5 NGVD. The relative borrow pit location, number of lifts, method of construction, and access to the job site are identical to that presented for Section A East.

c. Authority and Purpose. The initial authorization for the protection levee project was given in the 1st Session of the 89th Congress. Public Law 298 authorizing the project "Grand Isle, and Vicinity, Louisiana," was approved 27 October 1965 in House Document No. 184. The purpose of the project is to provide protection of the developed areas along Bayou Lafourche from Larose, Louisiana, to Golden Meadow, Louisiana, against hurricane tidal damage and loss of life. On 6 January 1977, additional authorization was approved for the subject "Larose to Golden Meadow, Hurricane Protection Levee Design Memorandum No. 1 General Design, Revision of Levee Alinement". This memorandum was for levee alinement around land-owned by LL&E at Golden Meadow, Louisiana, and Clovelly Farms at Cutoff, Louisiana (USCOE, 1982b).

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. The proposed fill material generally consists of river deposits of clays, silts, and sand which are overlaid with peat and soft organic clays (USCOE, 1982b). Specific sediment samples were taken in April 1982 from six stations along the project reach to indicate the consistency of the near surface sediments for each of the levee segments. Slight variations were exhibited in the surface sediments at each station. However, the overall classification of the materials was highly organic silts and clays with traces of fine sand and clays.

(2) Quantity of Material. The specific quantities of embankment fill (dredged materials), shell, sheetpile, and concrete to be utilized in construction of the levee are indicated below in Table 1.

(3) Source of Material. The embankment fill material for Section A East, Section E South, Section E South Alternate, Section D, and Section F would be taken exclusively from borrow areas parallel to and on the protected side of the levee. The embankment fill for the Clovelly Farms alinement would be from the floodside of the levee along the entire length of the segment. The LL&E segment would utilize outside borrow from Yankee Canal for approximately 4.1 miles. Inside borrow would be employed for the remainder of

constructed to elevation +13.0 National Geodetic Vertical Datum (NGVD) using bucket dredging techniques. Floating bucket dredge plants would access the job site through existing natural and artificial drainage ways and oilfield canals located in the area. Once inside the levee right-of-way, these floating plants would excavate adjacent interior borrow pits parallel to the levee alinement, thus providing floatation as the material is being placed into the levee section. A series of three lifts at approximately 3 1/2-year intervals are anticipated to provide sufficient material to compensate for losses resulting from consolidation and settlement. The levee borrow pit located on the protected side of the new levee would serve as an interior drainage canal for the project.

(2) LL&E Farm Levee - This levee segment is located east of Golden Meadow and begins on the north side of the drainage structure to be installed in Yankee Canal. The alinement would traverse eastward and then northward, parallel to and approximately 100 feet landward from an existing local levee grade until it reaches the northeast corner of the LL&E Farm property. From there it would generally follow an existing natural ridge along Bayou Raphael until the tie-in along general design memorandum (GDM) baseline station 720+00 (East Traverse). The total length of the segment would be approximately 6.1 miles. The design grade of the levee varies from 13.0 to 11.2 feet NGVD. Outside borrow (floodside) would be utilized in this segment beginning at the Yankee Canal pumping station through approximately mile 4.1. Beyond this point, the fill materials would be derived from inside borrow (USCOE, 1982b).

(3) Section D - Section D consists of a 2-mile segment of levee connecting the south end of Section E South levee to the north end of the LL&E Farm levee. It consists of an earthen levee built to elevation 10.0 NGVD on the northerly end transitioning to elevation 11.0 NGVD at the southerly end.

The borrow pit, number of lifts, method of construction, and access to the job site are identical to that presented for Section A East.

(4) Section E South - This segment starts near the southwest corner of the Clovelly Farms levee located approximately 4 miles south of Larose, Louisiana, and extends for approximately 4 miles in a southerly direction. Its southerly end ties into an existing low levee just north of the Breton Canal. It consists of an earthen levee constructed to elevation 9.5 NGVD at the northerly end transitioning to elevation 10.0 NGVD at the southerly end. The borrow pit location with respect to the levee, number of lifts, method of construction, and access to the job site are identical to that presented for Section A East.

(5) Section E South (Alternate) - This alinement is contained within the north and south boundaries of the Section E south described above. The alternate alinement veers to the west following an existing low levee and ridge around a wetland area. The alternate alinement is 6.5 miles long as compared to 4.2 miles for the GDM alinenent. All other factors for the alternate alinement are identical to the GDM alinement (i.e., grade, location of borrow pit, number of lifts, etc.).

(6) Clovelly Farm Levee - This levee segment intersects segments E

SECTION A.10.

LAROSE TO GOLDEN MEADOW
HURRICANE PROTECTION LEVEE

SECTION 404(b)(1) EVALUATION

I. PROJECT DESCRIPTION

a. Location. The Larose to Golden Meadow, Louisiana, Hurricane Protection Project (formerly Grand Isle, and Vicinity Hurricane Protection Project) is located in Lafourche Parish, Louisiana, approximately 25 miles inland from the Gulf of Mexico along and adjacent to Bayou Lafourche. Specifically, the project extends southward from the Intracoastal Waterway at Larose, Louisiana, to approximately 2.0 miles south of Golden Meadow, Louisiana, a distance along the bayou of approximately 16 miles (Refer to General Vicinity Map).

The overall project selected as the most practical and economical for protection of the urbanized, improved areas along this segment of Bayou Lafourche consists of a ring levee totaling approximately 43 miles in length and encompassing both sides of the bayou.

This evaluation, however, will be limited to seven specific and/or alternate levee segments which would be located along the east side of Bayou Lafourche (Refer to Specific Project Maps). The segments include:

- Section A East
- LL&E Farms
- Section D
- Section E South
- Clovelly Farms
- Section F

b. General Description. The overall authorized project consists of approximately 43 miles of flood protection levees and would encompass approximately 32,400 acres. The authorized project includes floodgates on Bayou Lafourche at the upper and lower limits of the protection levee, and eight multi-barrelled culverts to be located at strategic locations along the levee proper to regulate interior drainage. However, local interests plan to install pumping stations instead of the authorized drainage structures. The seven levee segments and alternatives included in this specific evaluation are described as follows:

(1) Section A East - This segment of the project is located at the lower, southerly end of the levee system on the east side of Bayou Lafourche. It consists of approximately 4 miles of earthen levee extending from the tie-in levee adjacent to the Golden Meadow floodgate, to the site of the drainage structure to be located on Yankee Canal. This segment is to be

SECTION A.9.

TABLE A.9.1

PRIMARY AMBIENT AIR QUALITY STANDARDS

Air Contaminant	Standard Maximum Permissible Concentration
Suspended Particulate	75ug/m^3 (Annual geometric mean) 260 ug/m^3 (Maximum 24-hour concentration not to be exceeded more than once per year)
Sulfur Dioxide (SO_2)	80 ug/m^3 or 0.03 ppm (annual arithmetic mean) 365 ug/m^3 or 0.14 ppm (Maximum 24-hour concentra- tion not to be exceeded more than once per year)
Carbon Monoxide (CO)	10,000 ug/m^3 or 9ppm (Maximum 8-hour concentration not to be exceeded more than once per year) 40,000 ug/m^3 or 35 ppm (Maximum 1-hour concentration not to be exceeded more than once per year)
Ozone	235 ug/M^1 (0.12 ppm). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 micrograms (ug)/M^1) is equal to, or less than, one as determined by 40 CFR 50 Appendix H.
Nitrogen Dioxide (NO_2)	100 ug/m^3 (0.05 ppm) (annual arithmetic mean)

SOURCE: Louisiana Air Pollution Regulations

TABLE A.8.1.

FUR CATCH AND VALUE

Species	Marsh Type: Fresh/Intermediate	Marsh Type: Brackish
Muskrat		
Average catch/acre[a/]	0.09[b/]	0.08
Value/pelt[c/]	$5.43	$5.43
Value/acre	$0.488	$0.46
Nutria		
Average catch/acre	0.40[b/]	0.09
Value/pelt	$7.39	$7.39
Value/acre	$2.15	$0.64
Mink		
Average catch/acre	0.0015[b/]	0.001
Value/pelt	$13.67	$13.67
Value/acre	$0.02	$0.015
Otter		
Average catch/acre	0.0005[b/]	0.0002
Value/pelt	$44.55	$44.55
Value/acre	$0.02	$0.01
Raccoon		
Average catch/acre	0.009[e/]	0.01[e/]
Value/pelt	$11.46	$11.46
Value/acre	0.11	0.09
TOTAL		
Average catch/acre	0.50	0.18
Gross value/acre[d/]	$3.57	$1.21
Net Value/acre[f/]	$2.68	$0.91

a/ Average catch per acre, unless otherwise noted, from Palmisano (1973).

b/ Represents mean of fresh and intermediate marsh average harvest/acre.

c/ Based on a 1976-81 running average of prices received by the trapper, expressed in 1981 dollars using the CPI Index for Hides, Skins, Leather, and Related Products.

d/ Represents one-half of the combined maximum production for fresh and intermediate marsh types.

e/ Represents one-half the maximum value.

f/ Cost of harvest is 25% of gross returns.

TABLE A.7.2.

LAROSE TO GOLDEN MEADOW
RECREATIONAL MAN-DAY ANALYSIS

ACTIVITY TYPE	MAN-DAYS OF SUPPLY						$ VALUE (UDV)	DOLLAR VALUATION					
	FWOP	1 TSP	2 GDM & CF	3 GDM & LL&E	4 GDM	5 GDM & LL&E CF & ES		FWOP	1 TSP	2 GDM & CF	3 GDM & LL&E	4 GDM	5 GDM & LL&E CF & ES
1975													
Big Game Hunting	406	406	406	406	406	406	$14.70	5,968	5,968	5,968	5,968	5,968	5,968
Small Game Hunting	1,155	1,155	1,155	1,155	1,155	1,155	4.10	4,736	4,736	4,736	4,736	4,736	4,736
Waterfowl Hunting	878	878	878	878	878	878	14.70	12,907	12,907	12,907	12,907	12,907	12,907
TOTAL	2,439	2,439	2,439	2,439	2,439	2,439		23,611	23,611	23,611	23,611	23,611	23,611
Big Game Hunting	13	1	2	2	3	6	14.70	191	15	29	29	44	88
Small Game Hunting	300	465	486	462	497	349	4.10	1,230	1,907	1,993	894	1,997	1,431
Waterfowl Hunting	147	0	4	5	12	26	14.70	2,161	0	59	74	176	383
TOTAL	460	466	492	469	502	381		3,582	1,922	2,081	1,997	2,217	1,902
Difference Between Years 1975-2096	-1,979	-1,973	-1,947	-1,970	-1,937	-2,058		-20,029	-21,689	-21,530	-21,614	-21,394	-21,709
Difference Between FWOP + FWP Year 2096		+6	+32	+9	+42	-79			-1,660	-1,501	-1,585	-1,365	-1,680

Abbreviations

FWOP - Future-Without Project
TSP - Tentatively Selected Plan
GDM - General Design Memorandum Alinement
CF - Clovelly Farms
LL&E - Louisiana Land and Exploration
ES - E south Alternative
UDV - Unit Day Value

a corresponding specific dollar value contained in a range of UDV provided in the most current published schedule. The approved FY 83 ranges of values are:

General recreation	$1.60 - 4.80
Specialized recreation	$6.50 - 19.00

UDV's selected for use in this study are based upon a point value of 60 for each hunting activity in its respective range classification under the FY 83 schedule.

Table A.7.2. is a summary of the recreational man-days of supply and associated dollar values for each plan alternative and the compara 've differences of each plan with those of the future-without project conditions.

Although the use of several existing boat launching facilities that provide access into local water bodies would be temporarily disrupted during levee construction, provisions for temporary access are being planned by the South Lafourche Parish Levee Board. Additionally, the Levee Board is planning to provide public boat access at eight pumping plants that would be constructed in conjunction with the project. These boat ramps would be constructed as time and funding permit.

construction, i.e., levee building, etc. Induced impacts occur as a result of the project being in place, i.e., pumping of leveed wetlands, clearing of bottomland hardwoods for agricultural, etc. Both types of impacts would, in this case, affect recreational resources from the land-use perspective. The impacts of each plan alternative are evaluated on the basis of sport hunting potential losses or gains which are incurred as a result of construction of the project.

The capacity of the land to support a given number of man-days per acre of hunting supply based upon a biological sustained harvest rate (hunting carrying capacity) can be measured and serves as an effective evaluation means of project impacts on consumptive wildlife recreation which predominates the study area. Man-days of supply were calculated by first assuming that, based upon a high market area demand, each acre of available hunting habitat afforded by the project would be used to its optimal carrying capacity for each respective hunting activity type. The hunting carrying capacity is expressed in terms of hunting man-days per acre for each habitat type and hunting activity type. Carrying capacity multiplied times the number of habitat acres yields man-days of potential hunting supply.

These man-days of supply can be translated into an overall monetary worth, based upon a unit-day value (UDV) previously derived for this region in the recreational analysis of the Louisiana Coastal Area Freshwater Diversion Study which overlaps this study area. Unit-day values were assigned to each hunting activity through the analysis of evaluation criteria and standards as prescribed in the Water Resource Council's Principles and Guidelines. The five criteria and associated measurement standards are designed to reflect quality, relative scarcity, ease of access, and esthetic features of the recreational resource to be evaluated. The evaluation of these criteria with respect to the resource yields a point value which is converted into

limited drainage area, this accounts for the principal headwater flow along Bayou Lafourche. The water elevations of the waterway are tidally affected as far north as Larose (USGS, 1981). The gaging station at Larose, Louisiana, recorded a maximum stage range of 3.68 feet for the period of record 1966-1981. For the current recorded water year (1981), the maximum range was 2.27 feet. These ranges plus the recorded chloride values at the station indicate the significance of tidal influences in the project area.

Many of the lateral canals east of Bayou Lafourche, including those listed above, have direct connections to major lakes and/or interconnecting waterways. However, the ultimate connections of these canals is to the gulf. Thus free exchange between these major water sources via the lateral drainage waterways traversing the project does occur.

Based on field observations and review of available stage records in the area, it is concluded that the direction and intensity of flow between Bayou Lafourche and the connecting waterbodies to the east is dependent upon several factors including tidal stages, wind factors, rainfall and runoff, and stage heights in Bayou Lafourche. It is also assumed that there is no consistent direction of flow, but rather a mixture of east-west exchanges dependent on variations of the previously mentioned factors.

Without specific field studies to characterize the drainage patterns which might exist in the area, an exact determination of impacts which could result by blockage of individual waterways is not possible. It is assumed, however, that blockage of the canals by construction of the proposed levee would permanently alter the circulation patterns that exist within the project area. The alteration of such hydrologic patterns could result in impacts to the leveed area through changes in water quality, salinity and associated biological populations and habitats.

(b) Velocity. With the exception of storm water discharges associated with proposed pumping stations along the project alinement, water velocities would be reduced by the canal blockages mentioned above. Velocity reductions would be limited to those waterways inside the leveed area. Resulting water quality impacts are mentioned in other sections of this evaluation.

(c) Stratification. No significant impacts are anticipated as a result of stratification in the wetlands associated with the project.

(d) Hydrologic Regime. Long-term impacts to the waterways within the protected area are anticipated as a result of alterations in the existing hydrologic regime. Refer to Section II.2.(a) for further discussion (page no. 9).

(3) Normal Water Level Fluctuations. The normal water levels in the waterways outside the project area are generally dependent upon tidal action and storm water runoff (S.C. Planning & Development Commission, 1978). Water level fluctuation after completion of the protection levee would be expected to be similar in nature to that which presently exists. Water levels in Bayou Lafourche would not be affected by the project. Landside

borrow canals and channels that would serve as drainage pathways and temporary storage areas for stormwater would experience somewhat higher water levels during and after rainfall events than under existing conditions.

(4) Salinity Gradients. Data provided by the Louisiana Department of Wildlife and Fisheries, Seafood Division (1979 and 1980), indicated the salinity fluctuations in Bayou Lafourche ranged from 0.3 ppt at the northern end of the project to 12.2 ppt at the southern end*. These data indicate a salinity gradient exists in the area, however, aside from Bayou Lafourche stations, there is little or no data to characterize the marsh areas which would be impacted by the project. In general, saltwater intrusion into the project area is dependent largely on the amount of freshwater which flows through the area. The construction of the protection levee would severely alter the natural movement of freshwater through the project area. Freshwater movement from the project area would be controlled by the frequency of discharge rates from the levee pumping stations. The cessation of the natural freshwater flow would not, however, provide significantly increased opportunities for the saltwater to move farther up into the marsh and associated waterways on the floodside of the protection levee since the inhibited flows would be small in proportion to freshwater from other areas. Salinities within the leveed areas would decrease because of blockage of intrusion routes.

(5) Actions Taken to Minimize Impacts. No specific actions are proposed to minimize the impacts which might occur to the existing current patterns and circulation as a result of the protection levee construction.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. Ambient turbidity averages vary in the project area from 120 nephelometric turbidity units (NTU) in Bayou Lafourche (USGS, 1981) to 17.5 NTU in the adjacent open marsh and lateral canals (Tables 2 through 7). Based on the high organic content of the proposed dredged materials (Appendix A), and the indication of turbidity release potential simulated through the elutriate tests, substantial temporary increase in the level of suspended particulates in the waterways directly associated with the project is probable as a result of the disposal activities.

With the exception of waterways intersected by the initial fill material, increases in turbidity levels should be localized and only affect areas immediately adjacent to the borrow ditches and levee right-of-ways. As the borrow canals are to be principally located inside the leveed area, reduced transport potential exists for the highly turbid effluent waters, thus reducing potential impacts. Floodside runoff would increase suspended particulates in the immediate marsh areas adjacent to the construction areas, but because of dense marsh vegetation, should result in only a minor net transport potential.

In areas where floodside borrow canals would exist (LL&E and Clovelly Farm Segments), and at major waterway crossing locations (Section II.b.(2)(a)), increased sediment transport potential would exist for the highly turbid

effluent waters anticipated from disposal and effluent runoff. As a result of the transport, turbid water conditions could result for moderate distances away from the actual disposal activities. The extent of impacted areas would depend on the resulting water circulation patterns and ambient turbidity concentrations.

The most significant impacts associated with increased suspended particulates would be realized during the first lift of the levee construction. Direct disposal (placement) of the dredged material into the open waterway crossings would produce far higher suspended particulate levels during the first construction lift than subsequent lifts, where dredged materials would be placed onto existing spoil situated during the first lift.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Decreased light penetration would be associated primarily with water-column turbidity generated by disposal operations and effluent runoff. Reduced light penetration associated with the suspension of fine-grained material would be restricted to the general vicinity of the disposal operations and would decrease rapidly with increasing distance from the construction activities.

These effects would be limited to the euphotic zone, and would occur primarily during construction operations. Post-construction recovery of euphotic zone functions should be rapid.

(b) Dissolved Oxygen. Directly related to the anticipated increase in suspended particulates and turbidity levels in the project waterways, DO concentrations would be expected to temporarily decrease in the vicinity of the immediate construction (disposal) activities.

The combined effects of reduced photosynthesis and an increase in the availability of biological and chemical oxygen demanding substances (BOD/COD) would substantially increase the potential for DO to be depleted below acceptable levels within the project area. Direct reductions in DO levels could be expected in and around the waterways undergoing disposal operations, but should return to normal concentrations following completion of the construction. Short-term ecological restrictions could result should DO levels remain below 5.0 mg/l.

Additional reductions in the DO levels could result on a more long-term basis due to interruption and blockage of the existing water circulation and exchange patterns in the immediate area. Without adequate flushing potential many of the waterways blocked by the proposed levee would become "dead-end canals," increasing the likelihood of an ecologically restrictive, oxygen concentration. Any such DO reductions, however, should be limited to the immediate areas adjacent to the new levee. (See Section II b. (1)(g), page 8).

(c) Toxic Metals and Organics. Mobilization, release, and bioavailability of constituents from contaminated dredged sediments has proven to be the predominant concern in the on-going evaluations of the ecological/-

environmental impacts associated with dredging activities in the United States (DMRP, DS-78-72, 1978).

Of the potential contaminants associated with sediments in an aquatic environment, those of greatest concern have been considered to be toxic metals, certain organic compounds, and biostimulants. Two principal modes of availability are associated with contaminants released through dredging activities as documented in the current "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (40 CFR Part 230). As stated, the discharge of dredged or fill material can change the chemistry and the physical characteristics of the receiving water at a disposal site through the introduction of chemical constituents in suspended or dissolved form. However, previous studies have concluded that the overall potential for mobilization or release of constituents from dredged sediments to the water column, either in dissolved or suspended form, is directly associated with the degree of physicochemical changes in the disposal site conditions over those experienced in the predredged sediments. Contaminated aquatic sediments removed from a reduced environment (submerged), and disposed in similar reduced environments (submerged disposal), have shown relatively insignificant releases of constituents either in dissolved or suspended forms (DMRP, DS-78-22, 1978). Distinct changes in the environmental conditions of the dredged materials, on the other hand, have demonstrated accentuated capabilities for release of harmful chemicals through introduction of sediments to aerobic atmospheres where acid/oxidizing reactions prevail. Hoeppel (1980) concluded that upland containment of dredged materials produced increases in mobility of most metal carbonate complexes (following oxidation/reduction) through both dissolved releases as well as adsorption onto suspended particulates. The final summary report from the Dredged Material Research Program (DMRP, DS-78-22, 1978), concluded that the maximum release of toxic metals and organics was noted in upland contained or uncontained sites.

Samples of water, bulk sediment, and elutriates were taken at six stations along the project right-of-way (east of Bayou Lafourche) during April, 1982. The results of these samples were used in conjunction with previous analytical data collected in the project area in September, 1981 to characterize the project water quality. In review of the data (Tables 2 through 7), consideration should be given to variations in analytical procedures employed in the two sets of data (Stewart Laboratories, Inc., 16 December 1981; and West-Paine Laboratories, Inc. 20 May 1982) In preparation of the elutriates, the 16 December 1981 samples were filtered (45 micron) prior to analyses, while the 20 May 1982 samples were not. Unfiltered elutriate tests are more applicable to this project.

In review of the results of the analytical tests, and in comparison to the applicable water quality standards and criteria, a segregation was made between fresh and marine waters in the project area. Based on observed salinity conditions, Stations 1 and 2 were considered as marine waters, while Stations 3 to 6 were considered to be fresh. Differences between EPA fresh and marine water quality criteria were taken into account as appropriate when comparing analytical results to these criteria. (See Figure 2 for station locations.)

(1) Toxic Metals. Overall review of the elutriate results indicated significant potential for release of various toxic metals as a result of disposal (Tables 2 through 7). Cadmium, chromium, lead, and mercury were perhaps the most noteworthy of the metals released through the elutriate simulation. Tables 8 through 10 represent the magnitude of exceedance of the elutriate results relative to the applicable chronic and acute criteria established by EPA (28 November 1980).

Chronic criteria represent a parameter level which EPA recommends should not be exceeded by the average concentration over a 24-hour period. These criteria allow for relatively high concentrations as long as the duration is very short. Most aquatic life can withstand brief chemical stresses without adverse effects. Too large a stress, however, is intolerable for any period. This maximum level is indicated by the acute criteria.

In review of the data for toxic metals, and in consideration of the significant release potentials exhibited by the elutriate tests, several factors must be taken into account in determining the ultim te potential effects of disposal (placement) of the apparently contaminated sediments.

Background water quality levels for four of the toxic metals, (mercury, chromium, cadmium, and copper), exceeded the chronic EPA criteria at most stations. Mercury also exceeded the acute criteria at Station 2 and copper at Station 1. The fact that preproject metal concentrations are above EPA criteria for freshwater and marine aquatic life ranges was considered in evaluating water quality effects of the proposed actions.

The more significant toxic metal concentrations in the elutriate tests were associated with the elutriate samples that were not filtered prior to analyses. While settling periods were allowed for the nonfiltered elutriates (1 hour), the highly organic sediments still maintained high concentrations of suspended particulates following the settling period. In contrast to the filtered elutriates, the metal concentrations in the nonfiltered supernatants represent both dissolved and bound forms of metals in suspension. The nonfiltered elutriate is considered more representative of the actual total concentration of constituents to be experienced in the after-disposal water column since EPA criteria refer to total values rather than dissolved.

The elutriate test is a simulation of the slurry mixtures encountered in a typical hydraulic dredging plant. The proposed method of dredging to be employed during the subject project is bucket dredging (draglines), which has no semblance to the slurry ratios encountered during typical hydraulic operations. Therefore, direct comparison of the elutriate results is not a good indicator of the release of any constituent in this project.

A final consideration in evaluating the elutriate data is that the sites chosen for the six samples are considered worst case. Located at the base of drainage areas and comprised of surface sediment rather than a representative mix of surface and foundation material, the samples would be expected to represent more maximum than average levels. This sampling technique was used in order to limit the number of samples.

TABLE 2

LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 1 - YANKEE CANAL

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	6.1	--	--
BOD	5.0	--	138
COD	68.0	42,400	8,260
Turbidity (NTU)	10.5	--	14,000
Alkalinity	100	--	5,800
Oil & Grease	1.2	290	<0.2
Hardness	1,635	--	2,310
Hydrogen Sulfide	<0.01	0.19	<0.01
Ammonia - N	0.15	--	6.7
Nitrate/Nitrite	0.04/<0.01	--	<0.01/<0.01
TKN	0.25	--	249
Phosphorus	<0.03	--	0.136
Chlorides	4,774	2,411	4,524
Cyanide	0.002	--	0.008
Metals	mg/l	mg/kg	mg/l
Arsenic*	<0.001	1.00	0.012
Cadmium	0.0008	0.107	0.080
Chromium (Hex)	0.008	<1.0	0.097
Copper*	0.043	6.5	0.050
Iron*	0.10	6,530	3.4
Lead	0.003	11.4	14.4
Manganese*	0.122	85.0	1.1
Mercury	0.0010	0.0099	0.0102
Nickel*	<0.01	4.8	<0.01
Zinc*	0.005	27.0	0.027
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	0.000020	0.000263	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	0.000007	<0.0001	<0.000002
Endrin	0.000007	<0.0001	<0.000002
Heptachlor	0.000069	0.00615	<0.000002
Lindane	0.000025	0.00024	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	0.0001	<0.0001
2,4-D	<0.0001	<0.0001	<0.0001
Silvex	0.00018	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

TABLE 3

LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 2

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	7.4	--	--
BOD	2.9	--	68.0
COD	68.0	21,650	5,950
Turbidity (NTU)	11.5	--	22,000
Alkalinity	122	--	11,700
Oil & Grease	1.7	205	<0.2
Hardness	1,730	--	3,000
Hydrogen Sulfide	0.03	<0.9	<0.01
Ammonia - N	0.15	--	7.3
Nitrate/Nitrite	<0.01/<0.01	--	<0.01/<0.01
TKN	0.10	--	221
Phosphorus	0.037	--	0.419
Chlorides	5,100	1,780	5,000
Cyanide	0.001	--	0.006
Metals	mg/l	mg/kg	mg/l
Arsenic*	<0.001	1.98	0.004
Cadmium	0.0027	0.275	0.165
Chromium (Hex)	0.003	<1.0	0.019
Copper*	0.01	5.4	0.011
Iron*	0.62	8,930	3.9
Lead	0.003	17.1	16.0
Manganese*	0.223	330	2.8
Mercury	0.005	0.0369	0.0126
Nickel*	<0.01	7.9	<0.01
Zinc*	0.002	28.0	0.008
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	<0.000005	<0.0001	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	0.000012	<0.0001	<0.000002
Endrin	<0.000002	0.00044	<0.000002
Heptachlor	0.000024	0.01498	<0.000002
Lindane	0.000001	<0.0001	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	<0.0001	<0.0001
2,4-D	<0.0001	<0.0001	<0.0001
Silvex	0.00021	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

TABLE 4

LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 3

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	--	--	--
BOD	5.8	--	360
COD	108	57,800	15,170
Turbidity (NTU)	11.5	--	7,200
Alkalinity	102	--	4,400
Oil & Grease	1.6	408	0.2
Hardness	660	--	1,500
Hydrogen Sulfide	0.01	0.21	0.03
Ammonia - N	0.5	--	17.4
Nitrate/Nitrite	<0.01/<0.01	--	<0.01/<0.01
TKN	2.8	--	459
Phosphorus	0.070	--	6.34
Chlorides	500	824	650
Cyanide	0.002	--	0.015
Metals	mg/l	mg/kg	mg/l
Arsenic*	<0.001	3.3	0.008
Cadmium	0.0088	0.733	0.282
Chromium (Hex)	0.003	<1.0	<0.001
Copper*	0.009	62.0	0.13
Iron	1.4	10,700	2.7
Lead	0.003	10.1	9.6
Manganese*	0.508	120	1.3
Mercury	0.0005	0.0092	0.0104
Nickel	<0.01	25.0	<0.01
Zinc	0.017	120	0.022
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	<0.000005	<0.0001	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	0.000012	0.00169	<0.000002
Endrin	0.000005	<0.0001	<0.000002
Heptachlor	0.000029	0.00323	<0.000002
Lindane	<0.000001	<0.0001	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	<0.0001	<0.0001
2,4-D	0.00015	<0.0001	<0.0001
Silvex	0.00052	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

TABLE 5

LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 4

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	9.5	--	--
BOD	5.1	--	93.0
COD	71.0	87,000	14,020
Turbidity (NTU)	12.5	--	14,000
Alkalinity	128	--	4,800
Oil & Grease	1.7	695	<0.2
Hardness	470	--	1,350
Hydrogen Sulfide	0.03	<0.9	<0.01
Ammonia - N	0.2	--	25.0
Nitrate/Nitrite	<0.01/<0.01	--	<0.01/<0.01
TKN	1.1	--	428
Phosphorus	0.086	--	0.502
Chlorides	950	1,060	980
Cyanide	0.001	--	0.003
Metals	mg/l	mg/kg	mg/l
Arsenic*	<0.001	2.71	0.002
Cadmium	0.0015	0.022	0.019
Chromium (Hex)	0.0001	<1.0	<0.001
Copper*	0.010	14.0	0.012
Iron*	0.73	13,000	2.0
Lead	0.003	8.6	8.0
Manganese*	0.614	230	4.9
Mercury	0.0011	0.0159	0.1008
Nickel*	<0.01	12.0	<0.01
Zinc*	0.022	55.0	0.012
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	<0.000005	<0.0001	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	0.000005	<0.0001	<0.000002
Endrin	<0.000002	0.00188	<0.000002
Heptachlor	0.000035	0.01831	<0.000002
Lindane	0.000017	<0.0001	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	<0.0001	<0.0001
2,4-D	<0.0001	<0.0001	<0.0001
Silvex	0.00018	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

TABLE 6

LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 5 - SKULLY CANAL

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	6.9	--	--
BOD	3.0	--	211
COD	100	27,600	7,100
Turbidity (NTU)	34.0	--	12,500
Alkalinity	117	--	11,000
Oil & Grease	0.8	825	1.2
Hardness	240	--	1,200
Hydrogen Sulfide	<0.01	0.13	<0.01
Ammonia - N	0.2	--	7.3
Nitrate/Nitrite	0.16/0.01	--	<0.01/<0.01
TKN	0.8	--	358
Phosphorus	0.29	--	0.735
Chlorides	635	694	605
Cyanide	0.002	--	0.012
Metals	mg/l	mg/kg	mg/l
Arsenic*	0.001	3.1	0.039
Cadmium	0.0038	0.788	0.266
Chromium (Hex)	0.001	<1.0	0.451
Copper*	0.017	85.0	0.018
Iron*	0.03	9,600	1.38
Lead	0.004	59.0	31.0
Manganese*	0.023	95.0	0.231
Mercury	0.0005	0.0937	0.0399
Nickel*	<0.01	11.0	<0.01
Zinc*	0.005	100	0.006
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	<0.000005	0.001478	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	<0.000002	0.01202	<0.000002
Endrin	<0.000002	<0.0001	<0.000002
Heptachlor	0.000080	0.01627	<0.000002
Lindane	<0.000001	<0.0001	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	<0.001	<0.0001
2,4-D	<0.0001	<0.000[illegible]	<0.0001
Silvex	0.00011	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

TABLE 7

LAROSE TO COLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION PROJECT
WATER QUALITY, SEDIMENT, AND ELUTRIATE DATA
STATION 6

PARAMETER	WATER	SEDIMENT	ELUTRIATE
Conventional	mg/l	mg/kg	mg/l
DO	--	--	--
BOD	8.4	--	110
COD	120	21,250	6,605
Turbidity (NTU)	25.0	--	24,000
Alkalinity	42.0	--	6,300
Oil & Grease	1.5	625	<0.2
Hardness	236	--	1,920
Hydrogen Sulfide	<0.01	0.9	<0.01
Ammonia - N	0.3	--	20.0
Nitrate/Nitrite	0.01/<0.01	--	<0.01/<0.01
TKN	2.0	--	229
Phosphorus	0.169	--	3.02
Chlorides	560	247	510
Cyanide	0.003	--	0.006
Metals	mg/l	mg/kg	mg/l
Arsenic*	0.002	4.73	0.002
Cadmium	0.0023	0.067	0.080
Chromium (Hex)	0.001	<1.0	0.017
Copper*	0.004	11.4	0.006
Lead	0.004	11.8	11.8
Mercury	0.0018	0.0105	0.0208
Nickel*	0.030	49.0	0.052
Zinc*	0.037	62.0	0.011
Chlorinated Hydrocarbons	mg/l	mg/kg	mg/l
Aldrin	<0.000005	<0.0001	<0.000005
Chlordane	<0.00001	<0.0001	<0.00001
DDT	<0.000001	<0.0001	<0.000001
Dieldrin	0.000009	<0.0001	<0.000002
Endrin	<0.000002	<0.0001	<0.000002
Heptachlor	0.000035	0.00333	<0.000002
Lindane	<0.000001	0.00120	<0.000001
PCB	<0.00005	<0.0001	<0.00005
Toxaphene	<0.0001	<0.0001	<0.0001
2,4-D	<0.0001	<0.0001	<0.0001
Silvex	0.00054	<0.0001	<0.0001

*Stewart Laboratories, Inc.
All Other Data - West Paine Laboratories, Inc.

An exact prediction of toxic metal impacts resulting from the dredging and placement of embankment fill along the Larose-Golden Meadow is, therefore, impractical. However, based on the analytical results of all tests, including native water, bulk sediment, and elutriates, as well as the particular variations involved in the analytical procedures and project specifications, a moderate hazard level for undesirable water quality conditions as a result of the disposal activities, particularly related to toxic metals, is anticipated. It is noteworthy to emphasize that a distinct factor of uncertainty is involved in attempting to predict valid water quality impacts associated with this project. Final deductions should be weighed objectively in light of all known contributing factors.

(2) Organics. Eleven chlorinated hydrocarbons were measured at each of the six sample stations within the project reach. The native water analyses revealed somewhat elevated concentrations of various chlorinated hydrocarbons when compared against the available EPA criteria. Dieldrin, endrin, and heptachlor were found to exist in the ambient waters above the EPA chronic criteria at most stations. Heptachlor also was above the acute criteria at Station 1 (Tables 2 through 7).

The elutriate results revealed no potential for release of any of the hydrocarbons analyzed. All elutriate values were below the detection limits of the analyses.

While ambient water quality samples were found to contain various chlorinated hydrocarbons, the elutriates indicated no release potential. The water quality appeared to actually improve as a result of the resuspension of the sediments, which corresponds to the adsorption principles suggested through the Dredged Material Research Program (DMRP, DS-78-22, 1978).

(d) Pathogens. Based on fecal coliform counts measured over a 2-year period at Larose, Salmonella is expected to occur periodically in various reaches of Bayou Lafourche, including the project area (USGS, 1981). The fecal coliforms are associated with insufficiently treated municipal discharges. No significant changes in fecal coliform counts are expected as a result of the proposed dredging and filling actions.

(e) Esthetics. The operation and clutter of project construction equipment and activities, as well as the creation of exposed disposal piles and water discolorations, could degrade the natural serenity and scenic qualities of the area to some degree. However, post-construction revegetation and periodic mowing of the new levee should restore most of the natural esthetic qualities.

(3) Effects on Biota.

(a) Primary Production, Photosynthesis. Temporary reductions in primary productivity of the waterways directly affected by turbidity increases would be expected. The loss of production would principally be associated with reduction in the photosynthetic processes associated with the euphotic zone of the water column. Reduced light penetration, resulting from elevated turbidity levels, would hinder productivity of many planktonic

Parameter	Station 1 Recorded Value	Station 1 EPA Criteria Chronic	Station 1 EPA Criteria Acute	Station 1 Louisiana Standard	Station 2 Recorded Value	Station 2 EPA Criteria Chronic	Station 2 EPA Criteria Acute	Station 2 Louisiana Standard
Ammonia mg/l	6.7	N.C.	N.C.	N.R.	7.3	N.C.	N.C.	N.R.
H_2S mg/l	<0.01	N.C.	DLAC	N.R.	<0.01	N.C.	DLAC	N.R.
Phosphorus mg/l	0.136	N.C.	1360x	N.R.	0.419	N.C.	4190x	N.R.
Cyanide mg/l	0.008	4x	<	N.R.	0.006	3x	<	N.R.
Arsenic* mg/l	0.012	N.C.	<	N.R.	0.004	N.C.	<	N.R.
Cadmium mg/l	0.080	17.8x	1.4x	N.R.	0.165	36.7x	2.8 x	N.R.
Chromium (Hex) mg/l	0.097	5.4x	<	N.R.	0.019	1.1x	<	N.R.
Copper* mg/l	0.050	12.5x	2.2x	N.R.	0.011	2.8x	<	N.R.
Iron* mg/l	3.4	N.C.	N.C.	N.R.	3.9	N.C.	N.C.	N.R.
Lead mg/l	14.4	576x	21.6x	N.R.	16.0	640 x	24 x	N.R.
Manganese* mg/l	1.1	N.C.	N.C.	N.R.	2.8	N.C.	N.C.	N.R.
Mercury mg/l	0.0102	102x	2.8x	N.R.	0.0126	126x	3.4x	N.R.
Nickel* mg/l	<0.01	DLAC	<	N.R.	<0.01	DLAC	<	N.R.
Zinc* mg/l	0.027	<	<	N.R.	0.008	<	<	N.R.
Aldrin mg/l	<0.000005	N.C.	<	N.R.	<0.000005	N.C.	<	N.R.
Chlordane mg/l	<0.00001	DLAC	<	N.R.	<0.00001	DLAC	<	N.R.
DDT mg/l	<0.000001	DLAC	<	N.R.	<0.000001	DLAC	<	N.R.
Dieldrin mg/l	<0.000002	DLAC	<	N.R.	<0.000002	DLAC	<	N.R.
Endrin mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Heptachlor mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Lindane mg/l	<0.000001	N.C.	<	N.R.	<0.000001	N.C.	<	N.R.
PCB mg/l	<0.00005	DLAC	<	N.R.	<0.00005	DLAC	<	N.R.
Toxaphene mg/l	<0.0001	N.C.	<	N.R.	<0.0001	N.C.	<	N.R.
2,4,-D mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.
Silvex mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.

3x - Exceeds the applicable marine criteria by this magnitude
< - Recorded value is less than applicable marine criteria
N.R. - Not regulated
N.C. - No criteria
DLAC - Detection limit is above marine criteria
* - Stewart Laboratories, Inc. data
All other data - West Paine Laboratories, Inc.

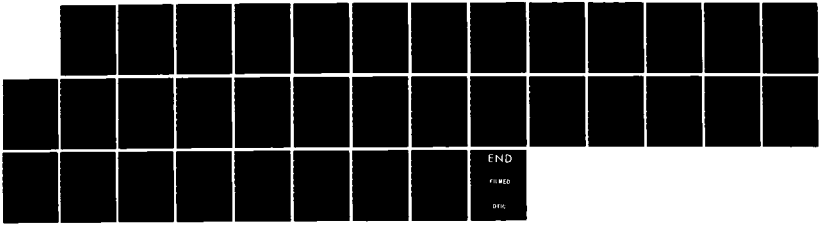
WATER QUALITY CRITERIA & STANDARDS EXCEEDED
BY ELUTRIATE DREDGED MATERIAL SIMILATION

Parameter	Station 3 Recorded Value	Station 3 EPA Criteria Chronic	Station 3 EPA Criteria Acute	Station 3 Louisiana Standard	Station 4 Recorded Value	Station 4 EPA Criteria Chronic	Station 4 EPA Criteria Acute	Station 4 Louisiana Standard
Ammonia mg/l	17.4	N.C.	10.9x	N.R.	25.0	N.C.	15.6x	N.R.
H_2S mg/l	0.03	N.C.	15x	N.R.	<0.01	N.C.	DLAC	N.R.
Phosphorus mg/l	6.34	N.C.	N.C.	N.R.	0.502	N.C.	N.C.	N.R.
Cyanide mg/l	0.015	4.3x	<	N.R.	0.003	<	<	N.R.
Arsenic* mg/l	0.008	N.C.	<	N.R.	0.002	N.C.	<	N.R.
Cadmium mg/l	0.282	2635x	21.7x	N.R.	0.019	177x	<	N.R.
Chromium (Hex) mg/l	<0.001	DLAC	<	N.R.	0.001	DLAC	<	N.R.
Copper* mg/l	0.13	23.2x	1.6x	N.R.	0.012	2.1x	<	N.R.
Iron* mg/l	2.7	2.7x	N.C.	N.R.	2.0	2.0x	N.C.	N.R.
Lead mg/l	9.6	95.3x	10.2x	N.R.	8.0	79.4x	8.5x	N.R.
Manganese* mg/l	1.3	N.C.	N.C.	N.R.	4.9	N.C.	N.C.	N.R.
Mercury mg/l	0.0104	52x	2.5x	N.R.	0.1008	504x	24.6x	N.R.
Nickel* mg/l	<0.01	<	<	N.R.	<0.01	<	<	N.R.
Zinc* mg/l	0.022	<	<	N.R.	0.012	<	<	N.R.
Aldrin mg/l	<0.000005	N.C.	<	N.R.	<0.000005	N.C.	<	N.R.
Chlordane mg/l	<0.00001	DLAC	<	N.R.	<0.00001	DLAC	<	N.R.
DDT mg/l	<0.000001	DLAC	<	N.R.	<0.000001	DLAC	<	N.R.
Dieldrin mg/l	<0.000002	DLAC	<	N.R.	<0.000002	DLAC	<	N.R.
Endrin mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Heptachlor mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Lindane mg/l	<0.000001	<	<	N.R.	<0.000001	<	<	N.R.
PCB mg/l	<0.00005	DLAC	<	N.R.	<0.00005	DLAC	<	N.R.
Toxaphene mg/l	<0.0001	DLAC	<	N.R.	<0.0001	DLAC	<	N.R.
2,4,-D mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.
Silvex mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.

3x - Exceeds the applicable freshwater criteria by this magnitude
< - Recorded value is less than applicable freshwater criteria
N.R. - Not regulated
N.C. - No criteria
DLAC - Detection limit is above freshwater criteria
* - Stewart Laboratories, Inc. data
All other data - West Paine Laboratories, Inc.

AD-A154 983 LAROSE TO GOLDEN MEADOW LOUISIANA HURRICANE PROTECTION PROJECT FINAL SUPP..(U) ARMY ENGINEER DISTRICT NEW ORLEANS LA E S CLARK MAY 85 2/2

UNCLASSIFIED F/G 13/2 NL



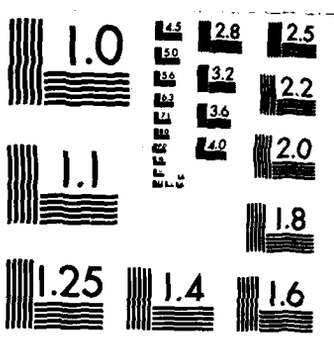


TABLE 10

WATER QUALITY CRITERIA & STANDARDS EXCEEDED
BY ELUTRIATE DREDGED MATERIAL SIMULATION

	Station 5				Station 6			
Parameter	Recorded Value	EPA Criteria Chronic	EPA Criteria Acute	Louisiana Standard	Recorded Value	EPA Criteria Chronic	EPA Criteria Acute	Louisiana Standard
Ammonia mg/l	7.3	N.C.	4.6x	N.R.	20.0	N.C.	12.5x	N.R.
H_2S mg/l	<0.01	N.C.	DLAC	N.R.	<0.01	N.C.	DLAC	N.R.
Phosphorus mg/l	0.735	N.C.	N.C.	N.R.	3.02	N.C.	N.C.	N.R.
Cyanide mg/l	0.012	3.4x	<	N.R.	0.006	1.7x	<	N.R.
Arsenic* mg/l	0.039	N.C.	<	N.R.	0.002	N.C.	<	N.R.
Cadmium mg/l	0.266	2486x	20.4x	N.R.	0.080	747x	<	N.R.
Chromium (Hex) mg/l	0.451	1555x	21.5x	N.R.	0.017	0.017	<	N.R.
Copper* mg/l	0.18	3.2x	<	N.R.	0.006	1.1x	<	N.R.
Iron* mg/l	1.38	1.4x	N.C.	N.R.	No Data	N.C	N.C.	N.R.
Lead mg/l	31.0	307x	33 x	N.R.	11.8	117x	12.6x	N.R.
Manganese* mg/l	0.231	N.C.	N.C.	N.R	No Data	N.C.	N.C.	N.R.
Mercury mg/l	0.0399	199x	9.7x	N.R.	0.028	104x	5.1x	N.R.
Nickel* mg/l	<0.01	<	<	N.R.	0.052	<	<	N.R.
Zinc* mg/l	0.006	<	<	N.R.	0.011	<	<	N.R.
Aldrin mg/l	<0.000005	N.C.	<	N.R.	<0.000005	N.C.	<	N.R.
Chlordane mg/l	<0.00001	DLAC	<	N.R.	<0.00001	DLAC	<	N.R.
DDT mg/l	<0.000001	DLAC	<	N.R.	<0.000001	DLAC	<	N.R.
Dieldrin mg/l	<0.000002	DLAC	<	N.R.	<0.000002	DLAC	<	N.R.
Endrin mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Heptachlor mg/l	<0.000002	<	<	N.R.	<0.000002	<	<	N.R.
Lindane mg/l	<0.000001	<	<	N.R.	<0.000001	<	<	N.R.
PCB mg/l	<0.00005	DLAC	<	N.R.	<0.00005	DLAC	<	N.R.
Toxaphene mg/l	<0.0001	DLAC	<	N.R.	<0.0001	DLAC	<	N.R.
2,4,-D mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.
Silvex mg/l	<0.0001	N.C.	N.C.	N.R.	<0.0001	N.C.	N.C.	N.R.

3x - Exceeds the applicable freshwater criteria by this magnitude
< - Recorded value is less than applicable freshwater criteria
N.R. - Not regulated
N.C. - No criteria
DLAC - Detection limit is above freshwater criteria
* - Stewart Laboratories, Inc. data
All other data - West Paine Laboratories, Inc.

species in the immediate project area, as well as in nearby reaches of major waterways affected by sediment transport away from the project area. Loss of phytoplankton in highly turbid waters could also be expected, due to light reduction and physical impacts.

While immediate impacts to net primary productivity in and around the project area could be expected, any losses in overall biomass production would be relatively minor and short-term in nature.

(b) Suspension/Filter Feeders. Suspension and/or filter feeding organisms residing in shallow waterways, or inundated marsh habitats along the immediate project right-of-way, could be expected to suffer total mortality as a result of the fill operations. This direct loss could possibly involve as much as 783 acres of suitable wetland and open water habitat (USCOE, 1982a and b). Landside areas of suitable habitat which could be impacted by pumping range as high as 3,200 acres (USCOE, 1982a). Filter feeding organisms on the floodside of the proposed levee alinement would also be expected to experience secondary impacts resulting from the proposed project. These impacts should generally be related to possible undesirable increases in suspended particulate levels and adverse water quality conditions associated with the actual construction phases.

As reported in previous dredging studies (DMRP, DS-78-22, 1978), filter feeders are capable of withstanding temporary increases in suspended particulates and can recover from minor amounts of new sediment deposits. Conversely, relatively minor increases in suspended particulate matter have been shown to substantially reduce nektonic filter feeders, primarily larval and juvenile forms.

A greater overall impact to the floodside suspension/filter feeders would occur in the intermediate and brackish environments due to the temporary loss or reduction in juvenile forms of commercially important marine species utilizing these areas.

Repopulation of any benthic or nektonic habitats impacted as a result of the project would begin shortly after completion of each construction lift.

(c) Sight Feeders. Sight feeders, primarily nektonic species, should not be adversely affected by increased turbidities. As such, sight feeders are generally highly mobile (fishes); they would escape or avoid any areas of undesirable turbidity and return to their original niches as conditions improved.

(4) Actions Taken to Minimize Impacts. To avoid the spread of undesirable turbidity levels from the borrow canals, blocking structures (plugs) are proposed at either end of the canals and at all water crossings.

d. Contaminant Determinations.

In order to provide current water quality data for the subject project, six sampling stations were established along the project reach. (See Plate 2.)

Samples were obtained from all collection stations on 13 and 14 April 1982, and delivered to an independent testing lab on 14 and 15 April 1982, respectively. All collection, preservation, and analyses were accomplished in strict accord with acceptable protocol (EPA, 1981). Selected parameters were analyzed in the water samples, bulk sediments, and standard elutriate. Elutriate preparation was accomplished by proportional mixing of water and sediment from each station. Elutriate mixtures were not filtered prior to analysis. Additional data by the Corps of Engineers from Stewart Lab, 1981 was utilized to supplement the data obtained in April, 1982.

The results of the analytical data are shown in Tables 2 through 7.

The data presented for toxic metals indicate that ambient levels of mercury, chromium, cadmium, and copper in the native water generally exceed established EPA chronic criteria for these constituents. Additionally, ambient levels of mercury and copper exceed EPA acute criteria in the native water. The elutriate data indicate a substantial level of potential increase for iron, mercury, lead, chromium, cadmium, and copper in the dredged effluents (Refer to Section II.c.(2)(c)1. page 13 for details of expected impacts).

The ambient levels for dieldrin, endrin, and heptachlor in the native water samples were shown to exceed the established chronic criteria at most of the sampling stations. Adsorption and deposition of the existing pesticides were indicated by the elutriate testing data.

As discussed previously, the impacts indicated by the elutriate data are not fully applicable in determining the potential constituent increases actually expected during construction of the protection levee (Refer to Section II.c.(2)(c)2., page 20 for details of expected impacts).

e. Aquatic Ecosystems and Organisms Determinations.

(1) Plankton Effects. The effects of turbidity on the plankton populations are discussed in paragraph II.c.(3)(a), page 24. The protection levee would be expected to result in alteration of natural circulation patterns in the immediate project area. Lack of sufficient water exchange, combined with possible nutrient-rich runoff from within the leveed area, would contribute to eutrophic conditions in these waterbodies. Therefore, it would be expected that planktonic species diversity would be reduced, limiting plankton populations to those species which would be capable of living in nutrient-rich and low DO conditions (USOCE, 1982a). Plankton within the 3,200 acres of inclosed areas would be destroyed as these areas become pumped dry. Plankton populations in the wetlands and water bodies along the levee right-of-way would be destroyed.

(2) Benthos Effects. The waterbodies in the project area generally support moderate populations of benthic organisms. The freshwater species are predominantly chironomid larva and tubificid worms. The benthic populations in the brackish waterbodies would be expected to include polychaete worms, clams, mysids, isopods, amphipods, and decapods (USCOE, 1982a).

The effects of construction and turbidity have been discussed in paragraphs

The effects of construction and turbidity have been discussed in paragraphs II.a.(4) and II.c.(1), pages 6 and 11, respectively.

Species repopulation of benthos would generally be contingent on the factors affecting plankton repopulation discussed in paragraph II.e.(1) above.

Based on the results of the analytical data, and the particular circumstances previously discussed which justify a reduction in the impacts anticipated from the actual dredging process, some minor increases in various constituents in the project waterways could be expected. Possible increases in heavy metal concentrations could result in minor impacts to benthic habitats immediately adjacent to the project area.

(3) Nekton Effects. The loss of suitable habitat for resident nektonic populations along the project right-of-way as well as ultimate loss of most open-water areas within the leveed area through drainage and development would account for the majority of direct impacts to be expected from the project. Where possible, most nekton species would avoid areas of construction and reestablish in more suitable niches.

Aquatic areas affected by increased turbidity and/or undesirable water quality resulting from the proposed project could be temporarily lost to nektonic usage. Populations should reestablish rapidly following a return to more ambient conditions.

Possible long-term changes to nektonic diversity in open-water areas in the immediate area of the project could occur. The alteration of existing drainage patterns and circulation would aid in diminishing the overall water quality of the immediate area, and possibly promote eutrophic conditions. Fish reestablishing these post-project waterbodies would require higher tolerance for nutrient-rich, low DO habitats. Reduced overall diversity near the construction areas should result.

(4) Aquatic Food Web Effects. Substantial overall impacts to the aquatic food web within the levee right-of-way and enclosed areas of the project would be expected from construction of the levee. Direct loss of habitats, loss of and feeding grounds, reduction in detritus transport and net productivity, and reduction in water quality should cumulatively produce adverse impacts on the immediate aquatic food web associated with these areas. Quantification of any anticipated long-term losses, especially to the final consumers associated with the affected areas, is not possible.

(5) Special Aquatic Sites Effects.

(a) Sanctuaries and Refuges. No sanctuaries or refuges exist within the immediate project area.

(b) Wetlands. A total of 783 acres of wetlands would be directly lost through fill placement along the project right-of-way (USCOE, 1982a and b; Chatry, 1982). An additional 3,000 to 4,000 acres, including marsh enclosed by the levee and adjacent to the floodside areas, would receive various impacts ranging from total loss to reduced productivity. Refer to the

FIS Supplement Main Report for additional discussions on wetland alterations.

(c) Mud Flats. Because tidal actions within the project area are mild, no mud flats as such exist.

(d) Vegetated Shallows. Due to local conditions all vegetated shallows were treated as wetlands in this evaluation.

(e) Riffle and Pool Complexes. Not applicable.

(6) Threatened and Endangered Species. No endangered or threatened species or their critical habitat is expected to be impacted by this project.

(7) Actions to Minimize Impacts. Revisions to the original GDM alinement have been employed, reducing overall habitat and wildlife losses. Alternate levee alinements, such as Section E South (alternate) are being considered as actions to minimize impacts. Construction actions such as inside borrow canals, plug dikes in borrow canals, and limited construction schedules in bird rookery areas are additional measures proposed for impact reductions.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determinations. Runoff from the dredged material would be viewed as a nonpoint source discharge. Mixing zone calculations under these conditions are not necessary and do not apply. Mixing zone calculations have not been determined for waterways involved in levee construction as dredging or disposal sites. In view of the existing high turbidity levels previously discussed and the proposed mechanical dredging operations, the anticipated mixing zone would be relatively small.

(2) Determinations of Compliance with Applicable Water Quality Standards. The water quality criteria established by EPA for freshwater and marine life (EPA, 1976, 1980) are contained in Table 11. The specific Louisiana water quality standards applicable to the project areas are contained in Table 12.

Review of the water quality analyses for the project area (Tables 2 through 7) reveals various constituents in the natural water to be in excess of applicable EPA criteria. The constituents which were found to exceed the applicable EPA criteria were various toxic metals, chlorinated hydrocarbons, cyanide, hydrogen sulfide, and phosphorus. The specific magnitude of the exceedance for each constituent has been described in the appropriate paragraphs herein. The limited Louisiana standards are not expected to be violated by the proposed project, with the probable exception of turbidity during first lift construction.

The elutriate testing results indicate that exceedance of the EPA criteria would occur for various toxic metals, ammonia, cyanide, and hydrogen sulfide during the dredging activities.

As previously discussed, the direct elutriate data results should be considered in light of the proposed construction methods, the worst case

sampling scheme, and variations in analytical techniques (see Section II.c.2.(c), page 12). For these reasons, it is reasonable to assume that the magnitudes of exceedance above the suggested criteria indicated by the direct elutriates would not be experienced during the dredging process. It is probable, however, that certain constituents would exceed the EPA criteria as a result of the dredging. As the EPA criteria have not been adopted as regulatory in Louisiana, exceedance of any suggested numerical indicator would not constitute a violation.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. Residents within the Bayou Lafourche project reach do not obtain their potable water supply from local surface waters; instead, water for consumption purposes is made available by pumping from the Mississippi River at Donaldsonville, Louisiana, 65 miles north of Larose. According to the State of Louisiana Water Quality Criteria of 1977, the water supply in areas designated as dredging and disposal sites is not fit for human consumption. Thus, construction activities in these areas pose no potential adverse effects on the municipal and private water supply.

(b) Recreational and Commercial Fisheries. Adverse impacts on fishery resources would be associated primarily with the elimination of habitat in the immediate project area. The value of existing wetlands inside the leveed area would be eliminated for spawning and nursery purposes by the proposed construction. The forced drainage system serving the leveed area would probably further enhance the conversion of the landside wetlands to drier and fresher habitats. Such a physical elimination of the habitat and food source within the leveed area is expected to be irreversible.

(c) Water-Related Recreation. Water-related recreation might be interrupted temporarily in the vicinity of dredging operations. The most obvious and immediate effects would be the upset in the esthetic and ecological values resulting from the short-termed increase in turbidity levels and subsequent adversities extending from it. However, normal water usage would be resumed once these values are restored. Habitat losses might eliminate some areas used for water-based recreation; but overall habitat losses would not preclude future recreational uses. Access to outlying marshes would be eliminated by levees blocking major waterways until boat ramps are provided at these sites.

(d) Esthetics. The existing local levee alinements have already obstructed the esthetic views in most of the project area except for Section A East below Yankee Canal. The construction of the proposed levee alinement in that section would obstruct the view of the natural landscape lying on the floodside of the new levee structure. No significant additional esthetic values are expected to be lost as a result of elevating and construction of the proposed new levee structure. However, some disturbance in esthetic value is expected to occur during the actual construction of the project. These disturbances are expected to be localized and short term.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Cultural resources surveys of various project features have been conducted by Louisiana and Dr. Jon L. Gibson, University of Southwest Louisiana and Drs. Randall Detro and Donald Davis of Nicholls State University. No sites eligible for the National Register have been located within the project area. Any unsurveyed alinements will be examined prior to construction and the results of the investigations coordinated with the Louisiana State Historic Preservation Officer.

(g) Determination of Cumulative Effects on the Aquatic Ecosystem. The most severe effects to occur as a result of the project would be the direct loss of habitat resulting from burial and enclosure of marsh and wetlands.

Other potential effects could include changes in species and species diversity in adjacent waterways due to project construction.

(h) Determinations of Secondary Effects on the Aquatic Ecosystem. The secondary effects expected to occur due to the construction of the protection levee have been discussed as necessary in the appropriate paragraphs herein. Further discussion of the environmental impacts are contained in the Supplemental EIS.

III. FINDING OF COMPLIANCE FOR LAROSE TO GOLDEN MEADOW, LOUISIANA, HURRICANE PROTECTION LEVEE PROJECT

1. The wetland nature of the area to receive the embankment material and the adjacent affected waterways classify this proposed disposal action subject to evaluation under Section 404 of the Clean Water Act. This evaluation is prepared in accordance with the 1980 EPA guidelines for Section 404(b)(1). The final guidelines were presented in the 24 December 1980 "Federal Register" and took effect on 1 October 1981 for the Corps of Engineers civil works. Minor adaptations of the guidelines were necessary for this evaluation.

TABLE 12

LOUISIANA WATER QUALITY CRITERIA AND STANDARDS

Parameter	Standards	
	Bayou Lafourche (Larose to Gulf of Mexico)	Gulf of Mexico and Other Open Coastal Waters
Designated Water Uses	ABC[1]	ABC[1]
Chloride	N/A	N/A
Sulfate	N/A	N/A
DO	4.0 mg/L	5.0 mg/L
pH	6.5 to 9.0	6.5 to 9.0
Bacterial Standard	Standard 4[2]	Standard 4[2]
Temperature	<35°C	<32°C
Total Dissolved Solids	N/A	N/A

[1]The designated water uses include -

A: Primary Contact Recreation

A surface raw water source intended for uses where the human body may come in direct contact with the raw water to the point of complete body submergence. It is not intended to be used as a potable supply unless acceptable treatment is applied. Water may be used for swimming, water skiing, skin diving, other similar activities, or as a raw water source for public water supply, support and propagation of aquatic fish and wildlife, agricultural, industrial and navigational uses.

B: Secondary Contact Recreation

A surface raw water source, suitable for the growth and propagation of fish, other aquatic and semi-aquatic life both marine and fresh water; waterfowl, furbearers, and wildlife. This water is also suitable for secondary water contact recreation such as fishing, wading, boating, or activities where ingestion of the water is not probable or as a raw water source public water supply, agricultural, industrial and navigational uses.

C: Propagation of Fish and Wildlife

A surface raw water source suitable for the growth and propagation of fish, other aquatic and semi-aquatic life, waterfowl, fur bearers, and other wildlife. This designation is at least equal to the standards for secondary contact recreation.

[2]Bacterial Standard 4

This standard was established to protect shellfish propagation. For this standard the monthly total coliform median most probable number (MPN) shall not exceed 70/100 ml and not more than 10 percent of the samples ordinarily exceed an MPN of 230/100 ml.

Source: State of Louisiana, Water Quality Criteria, Louisiana Stream Control Commission, 1977.

2. The alternatives considered in this project consisted of various alinements through marsh and forested wetlands. The alinement selected was based on economic practicability while achieving minimal impacts to the marsh and forest wetland areas. Other alternatives considered were to change building codes and to reinforce existing structures to obtain hurricane protection; however, these alternatives were deemed less effective.

3. The construction of the protection levee would not be expected to result in violation of applicable Louisiana Water Quality Standards, except possibly for temporary turbidity increases during first lift construction.

4. The 65 pollutants designated as toxic under Section 307(a)(1) of the Clean Water Act as revised under the EPA Water Quality Criteria Document FRL 1623-3, ("Federal Register" 28 November 1980) have not been adopted by the State of Louisiana and are not therefore regulatory as such, and are used in a comparative nature only.

5. The proposed action would not be expected to have an adverse impact on the threatened and endangered species known to frequent the area or their critical habitat.

6. There are no known marine sanctuaries associated with the project area.

7. The proposed disposal of sediments in construction of the protection levee would not be expected to result in significant adverse effects on various aspects of human health and welfare including municipal and private water supplies. Recreational and commercial fisheries, plankton, fish, shellfish, wildlife, and special aquatic sites such as wetlands in the project area would experience varying impacts as a result of the project. The net impacts of these items on human health and welfare are expected to be minor.

8. Appropriate and practicable steps would be taken when possible to minimize potential adverse impacts of the dredging and levee construction on the aquatic ecosystems.

9. On the basis of the guidelines, the proposed protection levee construction is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the affected aquatic ecosystem.

16 Nov 82
DATE

ROBERT C. LEE
Colonel, CE
District Engineer

REFERENCES

Canter, L.W. et. al., 1977. An Assessment of Problems Associated with Evaluating the Physical, Chemical, and Biological Impacts of Discharging Fill Material. Dredge Material Research Program. D-77-29 US Army Corps of Engineers, Washington, DC.

Hoeppel, R.E., 1980. Miscellaneous Paper. Proceedings of the Twelfth Dredging Seminar. Center for Dredging Studies. Texas A&M University.

Saucier, R.T. et. al. 1978. Executive Overview and Detailed Summary. Prepared for US Army Corps of Engineers Dredged Material Research Program. DS-78-22.

South Central Planning and Development Commission, 1978. Coastal Zone Management Program for Lafourche Parish. Second Year Study Vol. III. Thibodeaux, LA.

State of Louisiana, 1977. State of Louisiana Water Quality Criteria. Louisiana Stream Control Commission.

US Army Corps of Engineers. 1982a. Larose to Golden Meadow Supplemental EIS New Orleans, LA

US Army Corps of Engineers. 1982b. Clovelly Farms and LL&E. Design Memorandum No. 1 - General Design - Supplement No. 1. New Orleans, LA.

US Environmental Protection Agency 1976. Quality Criteria for Water. With Revisions "Federal Register" 28 November 1980. Part V.

US Environmental Protection Agency 1980. Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Federal Register, 24 December 1980.

US Environmental Protection Agency 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. US EPA and US Army Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material. EPA/CE-81-1.

US Geological Survey. 1981. Water Resources Data Louisiana Water Year 1981. Volume 3 Coastal Louisiana. US Geological Survey Water-Data Report LA-81-3. Baton Rouge, LA.

_____. 1979 and 1980 Unpublished Data Louisiana Department of Wildlife and Fisheries Seafood Division. Baton Rouge, LA.

APPENDIX B

CONSISTENCY DETERMINATION

LOUISIANA COASTAL ZONE
MANAGEMENT PROGRAM

Due to a misunderstanding with the Louisiana Department of Natural Resources, the following Consistency Determination published with the June 1983 Draft Supplemental EIS, analyzed all uncompleted features of the project (C North, F, E North, E South, D, A East, Clovelly Farms, LL&E, and the mitigation plan). Actually, all features approved for construction prior to inception of the Louisiana Coastal Resources Program in October 1980 are exempt from consistency, and the only features that should have been analyzed in the Consistency Determination were Clovelly Farms, LL&E, and the mitigation plan. The Corps has determined the entire project is consistent, to the maximum extent practicable, with the LCRP. Full consistency is expected when the revised mitigation plan is completed and approved. No significant changes are anticipated in mitigation from the way it is described in the following Consistency Determination. Acreages in the Consistency Determination are less than that examined in the FSEIS because the completed sections, C South and A East, were not assessed.

Guideline 2.5 Impoundment levees shall only be constructed in wetland areas as part of approved water or marsh management projects or to prevent release of pollutants.

Response 2.5: The proposed mitigation would involve constructing an impoundment levee for the intended purpose of marsh management. The alinement has been coordinated with the Louisiana Department of Wildlife and Fisheries.

Guideline 2.6 Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between inclosed wetlands and those outside the levee system.

Response 2.6: The proposed levee system would, to the extent practicable, avoid disruption of existing hydrologic patterns. However, several bayous and canals would be blocked off; this impact would be unavoidable. Aquatic habitat (fresh-brackish marsh and open water) inclosed within the protection levee would be drained, and most existing interchange of water, nutrients, and aquatic organisms with outside aquatic environments would be terminated. The floodgates on Bayou Lafourche would remain open except prior to and during hurricanes.

3. GUIDELINES FOR LINEAR FACILITIES

Response 3: Not applicable.

4. GUIDELINES FOR DREDGED SPOIL DEPOSITION

Response 4: Not applicable.

Guideline 2.2 Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.

Response 2.2: The tentatively selected levee alinement has been designed to avoid segmentation of wetlands to the maximum extent practicable.

Guideline 2.3 Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.

Response 2.3: The tentatively selected plan was designed in the early 1970's to provide hurricane protection for an area extending from Larose to Golden Meadow, by upgrading a previously constructed levee. The local levee inclosed 1,591 acres of marsh and forested wetlands in an era when the value of such wetlands was not generally recognized. Subsequently, the local assuring agency has requested inclosure of additional wetlands. As explained in Para. B.2.1., the request to inclose 2,700 acres of marsh/pond (740 of which was marsh) in the now completed A East reach was turned down at the insistance of the US Fish and Wildlife Service and National Marine Fisheries Service. It is felt that the amount of inclosed marsh has been reduced to the maximum extent practicable. The proposed mitigation plan compensates for this marsh loss.

Guideline 2.4 Hurricane and flood protection levees shall be located at the nonwetland/wetland interface or landward to the maximum extent practicable.

Response 2.4: The proposed protection levees would be located as near to the nonwetland/wetland interface as practicable.

Guideline 1.9 Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Response 1.9: Acknowledged.

Guideline 1.10 These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by La. R.S. 49:213.1 through 213.21, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.

Response 1.10: Acknowledged.

2. GUIDELINES FOR LEVEES

Guideline 2.1 The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Response 2.1: The tentatively selected plan has to the maximum extent practicable been designed to avoid highly productive wetland areas. However, some wetland marsh and open-water areas would be impacted under this plan. The proposed mitigation plan compensates for this loss. The levee alinement in the already completed A East reach was altered so as to exclude 1,500 acres of wetlands. An alternative that excluded 586 acres of marsh and 387 acres of forested wetlands was analyzed. However, this alinement increased the cost of the project by $4.3 million and was, thus, not selected.

saltwater intrusion as a result of hurricane tidal surges, but it would greatly reduce the volume of saline water which would enter the mitigation area. By reducing the wide flucuation of salinity and controlling water levels within the mitigation area, wildlife and fish productivity would be enhanced.

Guideline 1.8 In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site and the impacts of the use as set forth in Guideline 1.6, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from noncompliance with the modified standard and there are no feasible and practical alternative locations, methods and practices for the use that are in compliance with the modified standard and:

a. significant public benefits will result from the use, or;

b. the use would serve important regional, state or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or;

c. the use is coastal water dependent.

Response 1.8: Acknowledged.

Guideline 1.7 (r) Adverse disruptions of coastal wildlife and fishery migratory patterns.

Response 1.7 (r): The tentatively selected plan would not disrupt any known coastal wildlife or fishery migratory patterns.

Guideline 1.7 (s) Land loss, erosion and subsidence.

Response 1.7 (s): This project would not increase land loss, erosion, or subsidence appreciably.

Guideline 1.7 (t) Increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

Response 1.7 (t): The tentatively selected plan would provide increased protection for the residents of Larose and Golden Meadow from hurricane and high-water surges.

Guideline 1.7 (u) Reductions in the long term biological productivity of the coastal ecosystem.

Response 1.7 (u): Implementation of the tentatively selected plan would result in the permanent loss of approximately 1,050 acres of marsh, 727 acres of bottomland hardwoods and 141 acres of wooded swamp. These areas contribute significantly to the inshore and offshore estuarine fishery. Implementation of the mitigation plan would stabilize salinities and water levels within a 4,598-acre marsh/pond area. The management of the mitigation area through water-level control (water-control structures) would stimulate growth of floating aquatics, reduce shoreline and marsh erosion, and stablize salinity fluctuations resulting from normal and extreme high tides (storm events) or drought conditions in the marsh. The mitigation plan would not prevent

Guideline 1.7 (p) Adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

Response 1.7 (p): The tentatively selected plan would not adversely impact any critical habitat for endangered species. Approximately 1,050 acres of marsh and 630 acres of open-water habitat which serve as fishery breeding and nursery areas would be filled or enclosed with the levee system so as to exclude future use by estuarine-dependent organisms. In addition, approximately 73 acres of marsh and 9 acres of open water within the Pointe au Chien Wildlife Management Area (WMA) would be eliminated as part of the construction associated with the mitigation plan. The mitigation plan would compensate for project losses by stabilizing salinities and water levels within a 4,598-acre marsh/pond area in the WMA and insure its continued use by fish and wildlife organisms.

Guideline 1.7 (q) Adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

Response 1.7 (q): Implementation of the TSP would block four major waterways which provide access to outlying marshes for recreational and commercial fishermen and trappers. Also, shoreline access at Larose, Louisiana, along the GIWW would be blocked by the Larose floodwall. The levee and three water-control structures proposed for construction on the east side of the mitigation area would block fishermen access into the mitigation area via several small bayous. Boat launch ramps would be constructed at several major waterways blocked by the hurricane protection levee.

o Scully Canal-lateral drainage around Clovelly Farms (Clovelly Farm Section)

The mitigation plan would block several small bayous which provide shallow-water access into the mitigation area via Grand Bayou.

Guideline 1.7 (m) Discharges of pathogens or toxic substances into coastal waters.

Response 1.7 (m): No new discharge of pathogens would occur. A moderate hazard level for toxic metal releases as a result of disposal activities is possible.

Guideline 1.7 (n) Adverse alteration or destruction of archeological, historical or other cultural resources.

Response 1.7 (n): The cultural resources investigations are ongoing and are scheduled to be completed in FY 84. The following sites have been recorded in or near the proposed alinement: X162F1 (possible site), 16LF1, 16LF57, 16LF58, 16LF59, 16LF60,16LF61, 16LF62, 16LF63, and 16LF88. Project specific impacts and National Register eligibility will be determined as part of our continuing studies.

Guideline 1.7 (o) Fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

Response 1.7 (o): Implementation of the proposed project would result in the drainage of approximately 650 acres of marsh and 122 acres of wooded swamp inclosed by the hurricane protection levee. The mitigation plan would compensate for this loss.

inside the leveed area, reduced transport potential exists for the highly turbid effluent waters, thus reducing potentially impacted areas. Floodside runoff would increase suspended particulates in the immediate marsh areas adjacent to the construction areas, but because of dense marsh vegetation, should result in only a minor net transport potential.

In areas where floodside borrow canals would exist (LL&E and Clovelly Farm Segments), and at major waterway crossing locations, increased transport potential would exist for the highly turbid effluent waters anticipated from disposal and effluent runoff. As a result of the transport, turbid water conditions could result for minor distances away from the actual disposal activities. The extent of impacted areas would depend on the resulting water circulation patterns and ambient turbidity concentrations.

The most significant impacts associated with increased suspended particulates would be realized during the first lift of the levee construction.

Guideline 1.7 (1) Reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

Response 1.7 (1): Levee construction associated with the tentatively selected plan would block four principal waterways, and some other minor waterways and drainage systems:

- Unnamed Oil & Gas Canals (LL&E Farm Segment)
- Breton Canal (Sections D and E)
- Bayou de la Gauche (Section E)

Guideline 1.7 (h) Detrimental changes in existing salinity regimes.

Response 1.7 (h): Salinities within the leveed areas would be expected to decrease from their presently low levels. Salinities in the areas outside the project would not be significantly affected. Salinities in the mitigation area would be lowered, which would improve fish and wildlife productivity.

Guideline 1.7 (i) Detrimental changes in littoral and sediment transport processes.

Response 1.7 (i): No significant changes expected.

Guideline 1.7 (j) Adverse effects of cumulative impacts.

Response 1.7 (j): Construction of the tentatively selected plan would result in the loss of 1,050 acres of marsh and 630 acres of open water; and construction of the mitigation plan would eliminate 73 acres of marsh. This loss, combined with past agricultural clearing and residential and commercial development, would have a negative cumulative impact on the areas' biological productivity and esthetic value. However, without-project, marsh habitat would be lost due to subsidence and saltwater intrusion and as described above, compared to future-without project conditions, only about 300 acres of wetlands would be lost. The mitigation plan would compensate for this loss.

Guideline 1.7 (k) Detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging.

Response 1.7 (k): With the exception of waterways intersected by the initial fill material, increases in turbidity levels should be localized and only affect areas immediately adjacent to the borrow ditches and levee rights-of-way. As the borrow canals are to be principally located

would be dependent on numerous factors including season, precipitation, tidal effects, and climatology.

Guideline 1.7 (e) Destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

Response 1.7 (e): The tentatively selected plan would impact approximately 1,030 acres of fresh to brackish marsh, 727 acres of bottomland hardwoods, 141 acres of wooded swamp, and 630 acres of open water. When compared to future-without project conditions, only about 300 acres of wetlands would be lost. Construction of the mitigation plan levee would destroy 73 acres of marsh and 9 acres of open water. However, implementation of the mitigation plan would stabilize water levels and moderate salinity flucuations within a 4,598 acre pond/marsh area. This mitigation plan should provide a more stable environment for fish and wildlife communities, and thereby promote biological productivity within this area. The mitigation plan would compensate for the habitat lost due to levee raising activities.

Guideline 1.7 (f) Adverse disruption of existing social patterns.

Response 1.7 (f): Adverse disruptions of existing social patterns associated with the tentatively selected plan would be confined to the relocation of approximately eight residences and some commercial establishments.

Guideline 1.7 (g) Alterations of the natural temperature regime of coastal waters.

Response 1.7 (g): The temperature regime would not be altered significantly due to project construction or mitigation.

flows because these canals presently carry only minor amounts of such materials. The proposed pumping stations would export sediment and nutrients to the external system when they operate. The proposed water-control structures would not impact flow of sediment of nutrients.

Guideline 1.7 (b) Adverse economic impacts on the locality of the use and affected governmental bodies.

Response 1.7 (b): Adverse economic impacts of the tentatively selected plan would be limited to the burden of 30 percent of the construction costs and all operation and maintenance costs. However, the hurricane protection levee would provide substantial protection to life and property. The benefit cost ratio of this project is 4.7 to 1.

Guideline 1.7 (c) Detrimental discharges of inorganic nutrient compounds into coastal waters.

Response 1.7 (c): Temporary eutrophic conditions due to increased nutrient supplies accompanying dredging activities may occur in certain local waterways. These conditions would dissipate quickly.

Guideline 1.7 (d) Alterations in the natural concentration of oxygen in coastal waters.

Response 1.7 (d): Possible short-term and long-term oxygen deficits could be expected in waterways adjacent to the levee alinements. Short-term deficits induced by resuspension of highly organic sediments, poor circulation, increased turbidities and consequent reductions in photosynthesis, could occur in waterways immediately adjacent to construction operations. Long-term impacts could include lower DO levels due to alteration in the hydrologic regime caused by the levees blocking existing canals. The duration and severity of oxygen deficits

constructed in Grand Bayou and one in Cutoff Canal (see Draft Supplemental Environmental Impact Statement (DSEIS) Plate 3). The majority of the mitigation area is in Pointe au Chien Wildlife Management Area. This mitigation plan has been developed in conjunction with the US Fish and Wildlife Service and the Louisiana Department of Wildlife and Fisheries. It has been approved by the South Lafourche Levee District.

B.2.4. This Consistency Determination will consider work remaining to be done on the ring levee [C North, F, E North, E South, D, Clovelly Farms, and LL&E (see DSEIS Plate 6)] and the mitigation plan. Acreages quoted will be slightly different from the accompanying DSEIS because impacts in completed Sections C South & A East will not be considered. Impacts of these reaches are discussed in the DSEIS because they were not analyzed in the 1974 Final EIS, and because they must be considered in the mitigation analysis.

B.3. **Guidelines**

1. GUIDELINES APPLICABLE TO ALL USES

Guideline 1.1-1.6: Acknowledged.

Guideline 1.7 It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, and operated and maintained to avoid to the maximum extent practicable significant:

Guideline 1.7 (a) Reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

Response 1.7 (a): The blocking of four canals by the levee would alter freshwater flow but would not significantly reduce sediment and nutrient

seven multi-barrelled culverts for interior drainage. At the request of local interests, pumping stations replaced the culverts and the levee was realined to extend t , miles south of Golden Meadow. The realinement inclosed approximately 2,700 ares of marsh/ponds. In 1974, a Final Environmental Impact Statement was filed with the Council on Environmental Quality. In December 1974, a Section 404 Public Notice was issued and in their comments, the US Fish and Wildlife Service and National Marine Fisheries Service recommended changes in levee alinements in two reaches. In Section C South, the Corps of Engineers decided realinement was prohibitively expensive. In Section A East, the alinement that impacted 2,700 acres of marsh/pond was changed to impact the least amount of marsh/pond practicable (1,217 acres), and the Corps began to develop a mitigation plan. In 1975, construction began on the Federal project, and most first lifts have been completed on the west side. Local interests have requested that the Federal project be expanded to include two privately leveed agricultural properties on the east side of Bayou Lafourche. The EIS supplement analyzes the impacts of such work.

B.2.2. In summary, the Federal action consists of upgrading a local protection levee system extending from the Intracoastal Waterway at Larose, Louisiana, to 2 miles south of Golden Meadow, Louisiana; construction of floodgates on Bayou Lafourche at the upper and lower limits of the protection levee; and installation of pumping stations. The finished levee system would have a net grade elevation of 13.0 feet National Geodeic Verticle Datum (NGVD) at Golden Meadow and would vary to 8.5 feet NGVD near Larose, Louisiana.

B.2.3. The proposed mitigation plan consists of construction of 7 miles of low earthen levee (+4 NGVD) along Cutoff Canal, Grand Bayou, and Grand Bayou Canal. Two water-control structures also would be

APPENDIX B

CONSISTENCY DETERMINATION
LOUISIANA COASTAL ZONE MANAGEMENT PROGRAM

B.1. Introduction

Section 307 of the Coastal Zone Management Act (CZM) of 1972, 16 U.S.C. 1451 et seq requires that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent praticable, consistent with approved state management programs." In accordance with Section 307, a consistency determination has been made for the Larose to Golden Meadow Hurricane Protection Levee Project. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program, and serve as a set of performance standards for evaluating projects or proposals on their individual merits for compliance with the guidelines. Compliance with the Louisiana Coastal Resources Program, and therefore Section 307, requires compliance with applicable Coastal Use Guidelines. A determination of the consistency of the project with the guidelines is presented in the following text.

B.2. History and Project Description

B.2.1. In the early 1960's, local interests in Lafourche Parish constructed a low-ring levee from Larose to the vicinity of Golden Meadow. The levee was approximately 40 arpents from Bayou Lafourche and was drained by several low-lift pumps. They then requested Federal help in bringing the levee to a height to provide hurricane protection. In 1965, Congress authorized the raising of the local levee, construction of two navigable floodgates in Bayou Lafourche, and installation of

5. GUIDELINES FOR SHORELINE MODIFICATION

Response 5: Not applicable.

6. GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1 Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses will be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

a. on lands 5 feet or more above sea level or within fast lands; or

b. on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

(1) the land is already in high intensity of development use, or

(2) there is adequate supporting infrastructure, or

(3) the vicinity has a tradition of use for similar habitation or development.

Response 6.1: The tentatively selected plan would provide hurricane flood protection for existing residential and commercial businesses located within the project area. The inclosed wetlands that would be

developed for residential and commercial purposes are generally within 40 arpents of the Bayou - a "traditional" area for development in coastal Louisiana.

Guideline 6.2 Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

a. they protect or serve those areas suitable for development pursuant to Guideline 6.1; and

b. they are consistent with the other guidelines; and

c. they are consistent with all relevant adopted state, local and regional plans.

Response 6.2: The project would provide flood protection for existing residential and commercial development and support additional development within the project area.

Guideline 6.3 BLANK (Deleted)

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response 6.4: The tentatively selected plan would eliminate approximately 1,050 acres of marsh, 141 acres of wooded swamp, 727 acres of bottomland hardwoods and 630 acres of open-water habitat. These

impacts are unavoidable and have been reduced to the maximum extent practicable. Impacts would be compensated for by the proposed mitigation plan.

Guideline 6.5 Coastal water dependent uses shall be given special consideration in permitting because of their reduced choice of alternatives.

Response 6.5: Not applicable.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be revegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response 6.6: Upon completion of each levee lift, the area would be compacted, shaped, and vegetated in grasses.

Guideline 6.7 Site clearing shall to the maximum extent practicable, be limited to those areas immediately required for physical development.

Response 6.7: Levee raising activities would be done in such a manner as to clear only those areas necessary to accommodate the proposed protection levee.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.

Response 6.8: Construction impacts associated with the tentatively selected plan would not impact any wildlife preserves or management areas. However, the proposed mitigation plan calls for the construction of a levee 7 miles in length, located in the Pointe au Chien Wildlife Management Area. The intended purpose of the mitigation plan is to

compensate for wetland habitat loss due to levee construction by reducing saltwater intrusion into a 4,598-acre area located within the management area. Through the use of a levee and three water-control structures, salinity fluctuations and water levels within the mitigation area would be moderated, thereby reducing marsh loss and stimulating the growth of floating aquatics. The moderations of salinities and water level extremes within this area would promote fish and wildlife usage and productivity.

Guideline 6.9 Surface alterations which have high adverse impacts on natural functions shall not occur, to the maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Response 6.9: The tentatively selected plan would not impact any barrier islands, beaches, or isolate cheniers. Approximately 1,800 acres of wetland and aquatic habitat which is suitable for fishery spawning and/or nursery areas would be impacted. The proposed mitigation plan would compensate for this loss.

Guideline 6.10 The creation of low dissolved oxygen conditions in the water or traps for heavy metals shall be avoided to the maximum extent practicable.

Response 6.10: Levee raising activities would result in elevated turbidity levels in aquatic environments immediately adjacent to the work site. Increased turbidity levels could lead to a slight reduction in dissolved oxygen levels in turbidity-affected acres. This impact would be short termed and minor.

Guideline 6.11 Surface mining and shell dredging shall be carried out utilizing the best practical techniques to minimize adverse environmental impacts.

Response 6.11: Not applicable.

Guideline 6.12 The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Response 6.12: The proposed hurricane protection levee does not include any underwater structures or weirs which would affect fishing or navigation. However, the proposed mitigation plan does propose the placement of three water-control structures in association with a 7-mile-long levee. The placement of these structures would block several small bayous which provide access into the mitigation area.

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response 6.13: Limited testing indicates that implementation of the tentatively selected plan could involve the release of some heavy metals during levee construction.

Guideline 6.14 To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

Response 6.14: Fill material required to construct the protection levee would be obtained from on-site borrow pits.

7. GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

Guideline 7.1 The controlled diversion of sediment-laden waters to initiate new cycles of marsh building and sediment nourishment shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall

incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response 7.1: Not applicable.

Guideline 7.2 Sediment deposition systems may be used to offset land loss, to create or restore wetland areas or enhance building characteristics of a development site. Such systems shall only be utilized as part of an approved plan. Sediment from these systems shall only be discharged in the area that the proposed use is to be accomplished.

Response 7.2: Not applicable.

Guideline 7.3 Undesirable deposition of sediments in sensitive habitat or navigation areas shall be avoided through the use of the best preventive techniques.

Response 7.3: Not applicable.

Guideline 7.4 The diversion of freshwater through siphons and controlled conduits and channels, and overland flow to offset saltwater intrusion and to introduce nutrients into wetlands shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response 7.4: Not applicable.

Guideline 7.5 Water or marsh management plans shall result in an overall benefit to the productivity of the area.

Response 7.5: Implementation of the mitigation plan would result in the manipulation of water levels within a 4,598-acre area in the Pointe au Chien Wildlife Management Area. Stabilizing water levels, should result in a decline in salinity levels, improve waterfowl habitat, and increase the fur trapping harvest.

Guideline 7.6 Water control structures shall be assessed separately based on their individual merits and impacts and in relation to their overall water or marsh management plan of which they are a part.

Response 7.6: The mitigation plan as proposed would consist of constructing three water-control structures. The placement of these structures would allow the exchange of water and nutrients between the marsh and adjacent open water. However, the design of these structures would allow for marsh management through water level control.

Guideline 7.7 Weirs and similar water control structures shall be designed and built using the best practical techniques to prevent "cut arounds," permit tidal exchange in tidal areas, and minimize obstruction of the migration of aquatic organisms.

Response 7.7: The water-control structures as designed would prevent "cut arounds" and allow tidal exchange between the marsh and adjacent open water. The migration of aquatic organisms between the marsh and open water would be only hampered by the organisms' unwillingness to pass through or over the structure.

Guideline 7.8 Impoundments which prevent normal tidal exchange and/or the migration of aquatic organisms shall not be constructed in brackish and saline areas to the maximum extent practicable.

Response 7.8: The construction of the water-control structures (weirs) as proposed in the mitigation plan would allow surface tidal exchange.

Guideline 7.9 Withdrawal of surface and ground water shall not result in saltwater intrusion or land subsidence to the maximum extent practicable.

Response 7.9: Not applicable.

8. GUIDELINES FOR DISPOSAL OF WASTES

Response 8: Not applicable.

9. GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATER DRAINING INTO COASTAL WATERS

Response 9: Not applicable.

10. GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

Response 10: Not applicable.

B.4. **Consistency Determination**

Based on this evaluation, the New Orleans District, US Army Corps of Engineers, has determined the implementation of the Larose to Golden Meadow Hurricane Protection Project is consistent, to the maximum extent practicable, with the State of Louisiana's approved Coastal Zone Management Program.

END

FILMED

7-85

DTIC