

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF LOUISIANA

UNITED STATES OF AMERICA, <i>et al.</i>	§	
	§	
Plaintiffs,	§	Civil Action No. 99-2961
	§	
v.	§	Section "D"
	§	
EQUILON PIPELINE COMPANY LLC,	§	Magistrate Div. 5
	§	
Defendant.	§	
	§	

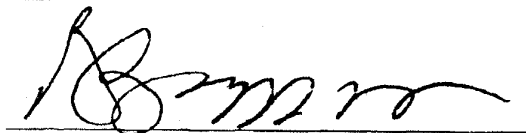
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**ORDER AUTHORIZING ENTRY OF CONSENT DECREE**

The United States, having received no comments in response to its published notice of lodging of a Consent Decree between the parties, has presented an unopposed motion for entry of the Consent Decree.

THEREFORE, IT IS HEREBY ORDERED that this Consent Decree is entered.

Dated this 15 Day of Nov, 1999.



Judge A. J. McNamara  
UNITED STATES DISTRICT JUDGE



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**EXHIBITS**

Exhibit 1. Final Restoration Plan

Exhibit 2. Grant of Particular Use for Construction

Exhibit 3. Monitoring Plan

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF LOUISIANA

UNITED STATES OF AMERICA  
and the STATE OF LOUISIANA,

Plaintiffs,

v.

EQUILON PIPELINE COMPANY LLC,

Defendant.

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Civil Action No.

Judge

Mag.

**CONSENT DECREE**

This Consent Decree is made and entered into by and between the Plaintiff United States of America ("United States"), on behalf of the Fish and Wildlife Service, acting on behalf of the Department of the Interior ("DOI"), the National Oceanic and Atmospheric Administration ("NOAA"), acting on behalf of the Department of Commerce, and the Coast Guard, acting on behalf of the Secretary of the Department of Transportation; Plaintiff State of Louisiana ("State") through the Louisiana Oil Spill Coordinator's Office ("LOSCO"), the Louisiana Department of Environmental Quality ("LDEQ"), the Louisiana Department of Wildlife and Fisheries ("LDWF"), and the Department of Natural Resources ("LDNR"); and Defendant Equilon Pipeline Company LLC ("Equilon") successor by way of merger to Texaco Pipeline Inc. ("Texaco").

**BACKGROUND**

A. On May 16, 1997, a pipeline operated by Texaco ruptured and discharged at least 275,000 gallons of crude oil into Lake Barre, Terrebonne Parish, Louisiana. The Oil Spill spread over open water, beach, reef, and marsh habitats and caused injury to natural resources, including

but not limited to marsh, intertidal, subtidal, and water column habitats and to the plant, fish, shellfish, and wildlife species that use those habitats. Approximately 4,327 acres of marsh were exposed to oil as a result of the Oil Spill, and oyster harvesting was closed in Lake Barre for 74 days.

B. Texaco removed the oil from the affected area. The United States Coast Guard directed and monitored removal activities that were financed by Texaco. State agencies also participated in the removal activities and incurred response costs. The removal did not provide compensation for the natural resources or the natural resources services injured or lost as a result of the Oil Spill. Texaco paid response costs of \$40,630.49 that were incurred by the Coast Guard, NOAA, and the Department of Interior when those federal agencies responded to the Oil Spill.

C. In order to protect the public health and welfare and the environment, the discharge of harmful amounts of oil is prohibited pursuant to Section 311 of the CWA, 33 U.S.C. § 1321.

D. The NOAA, DOI, LOSCO, LDEQ, LDNR, and LDWF, have been designated, pursuant to Section 1006(b) of the Oil Pollution Act of 1990 ("OPA"), 33 U.S.C. § 2706(b), and the National Contingency Plan, 40 C.F.R. Part 300, Subpart G, to act on behalf of the public as trustees for natural resources belonging to, managed by, controlled by, or appertaining to the United States and the State of Louisiana.

E. The United States, through NOAA and DOI ("Federal Trustees"), is authorized to seek natural resource damages, including the reasonable costs to assess the damages, pursuant to Section 1002 of OPA, 33 U.S.C. § 2702.

F. The State, through LOSCO, LDEQ, LDNR, and LDWF (“State Trustees”), is authorized to seek natural resource damages, including the reasonable costs to assess the damages, pursuant to Section 1002 of OPA, 33 U.S.C. § 2702. The State is further authorized, pursuant to the Louisiana Constitution, article IX, sections 1 and 7, L.R.S. 36:601, et seq., L.R.S. 56:1, et seq., Louisiana Environmental Quality Act, L.R.S. 30:2001 et seq., the Louisiana Coastal Wetlands Conservation, Restoration, and Management Act, L.R.S. 49:213.1 et seq., and the Louisiana Oil Spill Prevention and Response Act, L.R.S. 30:2431 et seq., to recover damages for injury to natural resources caused by the Oil Spill.

G. The Federal Trustees and the State Trustees (“Trustees”) have undertaken a natural resource damage assessment in accordance with NOAA’s Natural Resource Damage Assessment rule, promulgated at 15 C.F.R. Part 990.

H. Pursuant to Section 1006(c)(5) of OPA, 33 U.S.C. § 2706(c)(5), 15 C.F.R. 990.14(c), L.R.S. 30:2480(C)(6)(b) and (c), and LAC 43:XXIX.115, the Trustees invited Texaco to participate in the natural resource damage assessment process.

I. Subsequent to the Oil Spill, Equilon succeeded to the liabilities of Texaco, and both Texaco and Equilon participated in the natural resource damage assessment process.

J. The Trustees, Texaco, and subsequently Equilon, using assumptions protective of natural resources, have assessed the injuries to the natural resources and/or their services resulting from the Oil Spill, and they agree that the Oil Spill has or will result in 75.6 discounted acre-years of lost marsh services, over time.

K. The Trustees, Texaco, and subsequently Equilon, further agreed that 4 acres of marsh creation, or the ecological equivalent, would compensate for the injured birds and aquatic fauna.

L. Pursuant to the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 et seq., 40 C.F.R. Ch. V, and 15 C.F.R. § 990.55, the Trustees prepared a Draft Assessment and Restoration Plan and Environmental Assessment ("Draft DARP/EA"), which evaluated a reasonable range of restoration alternatives to restore, replace, or acquire the equivalent of the natural resources and services injured or lost as a result of the Oil Spill. The Trustees selected a preferred restoration alternative that is not expected to have any significant adverse environmental or economic impact, but instead is expected to have positive environmental and economic benefits.

M. The preferred alternative involves the planting of salt marsh vegetation on East Timbalier Island, where a Coastal Wetlands Planning, Protection, and Restoration Act ("CWPPRA") project is being undertaken to restore the island.

N. Pursuant to 15 C.F.R. §§ 990.23 and 990.55, the Draft DARP/EA was made available for public review, as provided in public notices published in the Federal Register on July 15, 1999, in the Baton Rouge Advocate and the Houma Courier on July 19, 1999, and in the Louisiana State Register on July 20, 1999. The Trustees received no comments on the environmental assessment provided in the Draft DARP/EA in response to the public notice. Comments on the preferred alternative were received in response to the public notice. After considering the comments, the Trustees concluded that the preferred alternative should be retained and issued the Final Restoration Plan on (date), 1999.

O. The Trustees and Equilon agree that, based on currently known information, the Final Restoration Plan is the appropriate restoration project to address the injury to natural resources and services resulting from the Oil Spill.



P. The United States filed a Complaint in this matter pursuant to Section 1002 of OPA, 33 U.S.C. § 2702. The United States in its Complaint seeks (1) natural resource damages for injuries to and loss of use of natural resources resulting from the Oil Spill, (2) past costs incurred by the Coast Guard, NOAA, and DOI in responding to and assessing the damage of the Oil Spill, and (3) future costs to be incurred by NOAA and DOI in implementing, overseeing, and monitoring the Restoration Project to be undertaken by Equilon.

Q. The State filed a Complaint in this matter pursuant to Section 1002 of OPA, 33 U.S.C. § 2702, L.R.S. 30:2025(A) and (B), and L.R.S. 30:2480(A) and (B). The State in its Complaint seeks (1) natural resource damages for injuries to and loss of use of natural resources resulting from the Oil Spill, (2) past costs incurred by the State Trustees in responding to and assessing the damage of the Oil Spill, and (3) future costs to be incurred by the State Trustees in implementing, overseeing, and monitoring the Restoration Project to be undertaken by Equilon.

R. The Trustees and Equilon recognize that this Consent Decree is a settlement of a contested matter and that neither this Decree nor payment or the acceptance of any consideration represents an admission of fact, liability, or responsibility by any Party, except where an agreement as to a fact or conclusion is expressly recited in this Decree at Paragraphs J, K, and O, above.

S. The Trustees and Equilon recognize, and this Court finds, that the Parties have negotiated this Consent Decree in good faith, that implementation of this Decree will expedite the restoration of natural resources and avoid lengthy and protracted litigation, and that this Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, IT IS HEREBY ORDERED, ADJUDGED, AND DECREED as follows:

**I. JURISDICTION**

1. This Court has jurisdiction over the subject matter and of this action pursuant to 28 U.S.C. §§1331 and 1345 and Section 1017(b) of OPA, 33 U.S. C. § 2717(b). This Court also has supplemental jurisdiction over the state law claims in the action pursuant to 28 U.S.C. § 1367. Venue is proper in this Court pursuant to 28 U.S.C. § 1391(b) and Section 1017(b) of OPA, 33 U.S.C. § 2717(b). Defendant has voluntarily appeared, and, solely for the purposes of this Decree, it waives all objections and defense it may have to the personal and subject matter jurisdiction of this Court or to venue in this District.

**II. PARTIES BOUND**

2. This Consent Decree shall apply to and be binding upon and inure to the benefit of the United States, the State of Louisiana, Equilon, and Equilon's predecessor Texaco, and as applicable, the present and former officers, directors, employees, and agents of each of the aforementioned entities.

3. Equilon shall provide a copy of this Consent Decree to its Supervising Contractor, to each contractor hired to perform the Work required by this Consent Decree, and to each person representing Equilon with respect to the Work, and it shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Equilon or its contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Equilon shall

nonetheless be responsible for ensuring that its contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree.

4. This Consent Decree shall apply to Equilon and to its successors and assigns, and a copy of this Consent Decree shall be provided to any successor in interest. Any change in ownership or corporate status of Equilon including, but not limited to, any transfer of assets or real or personal property, shall in no way alter Equilon's responsibilities under this Consent Decree, absent the prior written consent of the Project Manager. If the Project Manager approves, the grantee may perform some or all of the Work under this Consent Decree.

### III. DEFINITIONS

5. Unless, otherwise expressly provided herein, terms used in this Consent Decree that are defined in Section 101, et seq. of the Clean Water Act, 33 U.S. C. § 1251 et seq., including 1001 et seq. of OPA, 33 U.S.C. 2701, et seq., or in regulations promulgated under the CWA, including 15 C.F.R. Part 990, shall have the meaning assigned to them in such statutes and regulations. Whenever terms listed below are used in this Consent Decree, or in the exhibits attached hereto and incorporated herein, the following definitions shall apply:

- (a) "Assessment Costs" means the reasonable costs incurred by the Trustees in assessing the natural resource damages and in planning the Restoration Project, including but not limited to administrative and legal costs and costs associated with public participation.
- (b) "Day" means a calendar day.
- (c) "Federal Trustees" means the United States Fish and Wildlife Service (FWS) of the United States Department of the Interior (DOI) and the

National Oceanic and Atmospheric Administration of the United States  
Department of Commerce (NOAA).

- (d) "Final Approval of this Decree" means the later of (1) the date on which the District Court has approved and entered this Decree as a judgment and all applicable appeal periods have expired without an appeal being filed, or (2) if an appeal is taken, the date on which the District Court's judgment is affirmed and there is no further right to appellate review.
- (e) "Final Restoration Plan" means the Final Restoration Plan attached to this Consent Decree as Exhibit 1, and incorporated herein as a part of this Consent Decree, and any modifications to that Plan.
- (f) "Monitoring Plan" means the Monitoring Plan attached to this Consent Decree as Exhibit 3, and incorporated herein as a part of this Consent Decree, and any modifications to that Plan.
- (g) "Natural Resource" or "Natural Resources" means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the State of Louisiana or any of its parishes or by the United States.
- (h) "Natural Resource Damages" means civil compensatory relief, including Assessment Costs and Restoration Costs, recoverable by the Trustees on behalf of the public for injury to, destruction of, loss of, or

loss of use of any or all Natural Resources or services provided by the Natural Resources resulting from the Oil Spill.

- (i) "Oil Spill" means the discharge of crude oil from a ruptured Texaco pipeline on May 16, 1997, in Lake Barre, Louisiana, and the resulting Oil Spill onto lands, marsh, and navigable waters.
- (j) "Party" or "Parties" means Equilon, the United States, and the State of Louisiana.
- (k) "Project Manager" or "Alternate Project Manager" means the individual who has been designated as the representative of the lead Trustee for purposes of coordinating the review and approval of specified activities on behalf of the United States and the State. For purposes of this Consent Decree, the Project Manager is the Natural Resource Specialist at LOSCO assigned to this Restoration Project and the Alternate Project Manager is the Deputy Oil Spill Coordinator, LOSCO.
- (l) "Response Costs" means all costs, including, but not limited to, direct and indirect costs, that (i) the Coast Guard paid for costs incurred by the Coast Guard, NOAA, and DOI, and (ii) the State incurred in connection with the removal of oil as a result of the Oil Spill.
- (m) "Restoration Costs" means the reasonable costs to implement the Restoration Project, including monitoring and oversight costs.

- (n) "Restoration Project(s)" means those activities that will restore natural resources and/or services injured as a result of the Oil Spill, as described in the Final Restoration Plan, or any modification to the Plan.
- (o) "Restoration Property" means East Timbalier Island, Lafourche Parish, Louisiana, or any other property selected for the Restoration Project.
- (p) "State" means the State of Louisiana, and its departments and agencies.
- (q) "State Trustees" means the Louisiana Oil Spill Coordinator's Office (LOSCO), the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Department of Natural Resources (LDNR), and the Louisiana Department of Wildlife and Fisheries (LDWF).
- (r) "Supervising Contractor" means the principal contractor retained by Equilon to supervise and direct the implementation of the Work under this Consent Decree.
- (s) "Trustees" means those federal and state agencies designated or authorized pursuant to OPA and/or state law to act on behalf of the public as Trustees for the natural resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States or the State of Louisiana. Specifically, as used in this Decree, the Federal Trustees are the United States Fish and Wildlife Service (FWS) of the United States Department of the Interior (DOI), the National Oceanic and Atmospheric Administration of the United States Department of Commerce (NOAA), and the State Trustees are the

Louisiana Oil Spill Coordinator's Office (LOSCO), the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Department of Natural Resources (LDNR), and the Louisiana Department of Wildlife and Fisheries (LDWF).

- (t) "Work" means all activities that Equilon is required to perform under the Consent Decree, including the activities described in the Final Restoration Plan, and all other plans and reports required by this Consent Decree.

#### IV. GENERAL PROVISIONS

6. Objectives of the Parties. The objectives of the Parties in entering into this Consent Decree are to restore natural resources and services, to reimburse the Trustees for unreimbursed costs incurred in undertaking a natural resource damages assessment, and to resolve the natural resource damage claims of Plaintiffs against Defendant Equilon as provided in this Consent Decree.

7. Commitments by Equilon. Equilon shall finance and perform the Work required by this Consent Decree, including the Final Restoration Plan, the Monitoring Plan, and all designs, reports, plans, standards, specifications, schedules, and other information set forth herein or developed by Equilon and approved by the Project Manager pursuant to this Consent Decree and any modification thereto. For all payments, except where lump sum payments for future costs are specifically allowed at Paragraph 37(b) of this Decree, Equilon also shall reimburse the United States and the State for past unreimbursed documented Assessment Costs

and for future documented Assessment Costs and Restoration Costs that the Trustees will incur for planning, oversight, monitoring, and, if necessary, implementing the Restoration Project.

8. Compliance With Applicable Law. All Work and other activities undertaken by Equilon pursuant to this Consent Decree, shall be performed in accordance with the requirements of all applicable federal, state, and local laws and regulations. Where any portion of the Work requires a federal, state, or local permit or approval, Equilon shall submit a timely and complete application and take all other actions necessary to obtain all such permits and/or approvals.

9. Consent Decree Not a Permit. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation. The United States and the State do not, by their consent to this Decree, warrant or aver in any manner that Equilon's compliance with this Decree will constitute or result in compliance with any federal or state law or regulation.

10. Failure of Compliance with Performance Criteria. The Trustees do not, by consenting to the entry of this Consent Decree, warrant or aver in any manner that actions taken by Equilon pursuant to this Consent Decree will result in satisfaction of the Performance Criteria specified in the Monitoring Plan. Notwithstanding the Trustees' issuance of the Final Restoration Plan and the Trustees' approval and/or review of any designs, plans, reports, and other information formulated pursuant to this Consent Decree, Equilon shall remain solely responsible for compliance with the Performance Criteria specified in the Monitoring Plan in accordance with the terms of this Decree.



## V. STATE REAL PROPERTY ISSUES

11. Equilon has procured a Grant of Particular Use for Construction related to the Restoration Property from the State Land Office, Division of Administration, in accordance with the conditions established by Exhibit 2, attached hereto and incorporated into this Consent Decree.

## VI. NATURAL RESOURCE RESTORATION REQUIREMENTS

### 12. Supervising Contractor.

(a) Equilon has selected ENTRIX as its Supervising Contractor. If Equilon subsequently proposes to change its Supervising Contractor, it shall give written notice to the Trustees, and it must obtain authorization to proceed from the Project Manager, after obtaining approval from all Trustees, before the new Supervising Contractor may perform, direct, or supervise any Work under this Consent Decree.

(b) If the Project Manager disapproves a proposed Supervising Contractor, the Project Manager will notify Equilon in writing. Equilon shall submit to the Trustees a list of proposed Supervising Contractors, including the qualifications of each contractor, that would be acceptable to it within 30 days of receipt of the disapproval of the Supervising Contractor previously proposed. The Project Manager, after obtaining consensus among the Trustees, will provide written notice of the names of any contractor(s) that it disapproves and an authorization to proceed with respect to any of the other contractors. Equilon may select any Supervising Contractor from the list that is not disapproved and shall notify the Trustees of the name of the Supervising Contractor selected within 14 days of receipt of the authorization to proceed.

13. Implementation Schedule.

(a) If this Decree has been lodged with the Court by September 30, 1999, Equilon shall undertake the Work in accordance with the following schedule:

- (i) Equilon shall order plantings, and shall notify the Trustees that the plantings have been ordered within 5 days thereafter;
- (ii) If Equilon has received notice from the Project Manager by December 9, 1999, that the East Timbalier Island platform has been built in accordance with the specifications and approved by CWPPRA and Equilon has received the as-built survey or comparable information, Equilon shall arrange a pre-design inspection by Equilon and the Trustees to view the platform on East Timbalier Island, with transportation to be provided by Equilon, and Equilon shall provide notice to the Trustees of the inspection date at least 10 days in advance of the scheduled date so that the Trustees' representatives may accompany Equilon;
- (iii) If the schedule specified in subparagraph (ii) has been met, Equilon shall submit a Draft Planting Design no later than February 15, 2000. The Draft Planting Design shall include, at a minimum, the following information:
  - a. a substrate analysis that determines nutrient levels and contamination in the proposed planting area;
  - b. surveys, maps, and other information describing elevations and other site-specific information required by the Monitoring Plan;

- c. a planting configuration that satisfies the planting requirements in the Final Restoration Plan;
- d. any permit requirements.

The Trustees shall comment on the Draft Planting Design by February 28, 2000. Equilon shall make any recommended revisions to the Draft Planting Design and shall submit a Final Planting Design by March 15, 2000. The Trustees shall review the Final Planting Design in accordance with Section X (Trustees' Review of Submittals and Corrective Action).

- (iv) If the Trustees approve the Final Planting Design by March 31, 2000, then Equilon shall commence planting at the Restoration Property. Equilon shall provide notice to the Trustees of the commencement of planting at the Restoration Project at least 14 days prior to the commencement date.
- (v) Within 120 days of receiving notice of approval of the Final Planting Design, Equilon shall complete the planting on East Timbalier Island in accordance with the terms of this Consent Decree, including but not limited to the Final Restoration Plan, and the approved Final Planting Design.
- (vi) Equilon shall notify the Trustees of completion of the planting in accordance with the Final Restoration Plan and the Final Planting Design and shall arrange for an inspection of the Restoration Project to be conducted with the Trustees' representatives, with transportation to be

provided by Equilon, during the planting process and within seven (7) days after Equilon has finished planting at the Restoration Property.

b. If this Decree has been lodged with the Court later than September 30, 1999, or Equilon receives notice from the Project Manager later than December 9, 1999, that the East Timbalier Island platform has been built in accordance with the specifications and approved by CWPPRA, or if Equilon receives the as-built survey or comparable information after December 9, 1999, and the Trustees and Equilon determine that the proposed Restoration Project is still viable:

- (i) Equilon shall arrange a pre-design inspection by Equilon and the Trustees to view the platform on East Timbalier Island, with transportation to be provided by Equilon. Equilon shall provide notice to the Trustees of the inspection date at least 10 days in advance of the scheduled date so that the Trustees' representatives may accompany Equilon;
- (ii) The Trustees shall rescale the Restoration Project to account for the delay in implementation, and not later than September 1, 2000, the Project Manager, after obtaining concurrence from the Trustees, shall provide notice to Equilon of the revised scaling for the proposed Restoration Project;
- (iii) If the schedule specified in subparagraph (ii) has been met, Equilon shall order plantings, and shall notify the Trustees that the plantings have been ordered within 5 days thereafter, and Equilon shall submit a Draft Planting Design by the later of December 1, 2000, or within 60 days of receiving

the notice of completion of the platform, the as-built survey or comparable information, and notice of the rescaled Restoration Project. The Draft Planting Design shall include, at a minimum, the following information:

- a. a substrate analysis that determines nutrient levels and contamination in the proposed planting area;
- b. surveys, maps, and other information describing elevations and other site-specific information required by the Monitoring Plan;
- c. a planting configuration that satisfies the planting requirements in the Final Restoration Plan;
- d. any permit requirements.

The Trustees shall comment on the Draft Planting Design by December 15, 2000. Equilon shall make any recommended revisions to the Draft Planting Design and shall submit a Final Planting Design by January 17, 2001. The Trustees shall review the Final Planting Design in accordance with Section X (Trustees' Review of Submittals and Corrective Action).

- (iv) If the Trustees approve the Final Planting Design by February 18, 2001, then Equilon shall complete the planting on East Timbalier Island in accordance with the terms of this Consent Decree, including but not limited to the Final Restoration Plan and the approved Final Planting Design in accordance with the schedule specified by the Trustees which shall allow not less than 160 days for implementation.
- (v) Equilon shall notify the Trustees of completion of the planting in accordance with the Final Restoration Plan and the Final Planting Design

and shall arrange for an inspection of the Restoration Project to be conducted with the Trustees' representatives, with transportation to be provided by Equilon, during the planting process and within seven (7) days after Equilon has finished planting at the Restoration Property.

(c) The schedule described in subparagraphs (a) and (b), above, may be revised by agreement of the Project Manager, after obtaining the concurrence of the Trustees, and the Supervising Contractor or Equilon representative, as designated in Paragraph 21.

14. Planting Completion Date. The date upon which Equilon notifies the Trustees that the planting has been completed in accordance with the requirements of the Final Restoration Plan and the Final Planting Design shall be deemed the "Planting Completion Date." The Planting Completion Date must meet the applicable due date from Paragraph 13(a)(v), (b)(iv), or (c).

## VII. MONITORING AND COMPLIANCE WITH PERFORMANCE CRITERIA

### 15. Initial Monitoring and Report.

(a) Equilon shall monitor the progress of the planting within 60 days of the Planting Completion Date ("the Initial Monitoring"), provided however that the actual site visit to conduct the Initial Monitoring shall take place within 50-70 days of the Planting Completion Date. Equilon shall give notice of the Initial Monitoring to the Trustees 21 days in advance and arrange transportation so that the Trustees' representatives may accompany Equilon on the Initial Monitoring visit to East Timbalier Island. The date of the Initial Monitoring visit may be revised upon agreement of the Parties if weather conditions justify rescheduling.

(b) The Performance Criteria and monitoring requirements specified in the Monitoring Plan shall apply to the Initial Monitoring for the Restoration Project.

(c) Equilon shall submit a written report regarding the Initial Monitoring within 30 days of the Initial Monitoring site visit. The Initial Monitoring Report shall document compliance with the Final Restoration Plan, the Planting Design and the Monitoring Plan, including the Initial Performance Criteria. Documentation shall include maps showing the location of the plantings, elevations, and other relevant data as well as a narrative description of compliance with the requirements. The Trustees shall review the Report, and Equilon shall undertake any further actions in accordance with Section X (Trustees' Review of Submittals and Corrective Action) of this Decree.

16. Interim Monitoring. Equilon shall monitor the East Timbalier Island planting at intervals of (1) one year and sixty days, and (2) two years and sixty days following the Planting Completion Date, provided however that the actual site visit to conduct the Interim Monitoring shall take place within a three-week period more or less than the prescribed times. Equilon shall give notice of the Interim Monitoring to the Trustees 21 days in advance and provide transportation so that the Trustees' representatives may accompany Equilon on the Interim Monitoring visit to East Timbalier Island. The date of the monitoring visit may be revised upon agreement of the Parties if weather conditions justify rescheduling. Within 60 days after the site visit, Equilon shall provide to the Trustees a report describing the condition of the plantings compared to the Final Performance Criteria. After consulting with the Project Manager about the Trustees' written comments and any written recommended corrective action(s), Equilon shall take such corrective actions as are appropriate as a result of the Interim Monitoring in order to be

in a position to achieve compliance with the Performance Criteria for the Final Monitoring specified in the Monitoring Plan.

17. Final Monitoring and Report.

(a) Equilon shall monitor the progress of the planting within three years plus 60 days of the Planting Completion Date (“the Final Monitoring”), provided however that the actual site visit to conduct the Final Monitoring may take place within a three-week period more or less than the prescribed time. Equilon shall give notice of the Final Monitoring to the Trustees 21 days in advance so that the Trustee representatives may accompany Equilon on the Final Monitoring visit to East Timbalier Island. The date of the monitoring visit may be revised upon agreement of the Parties if weather conditions justify rescheduling.

(b) The Performance Criteria and monitoring requirements specified in the Monitoring Plan shall apply to the Final Monitoring for the Restoration Project.

(c) Equilon shall submit a written report regarding the Final Monitoring within 60 days of the Final Monitoring site visit. The Final Monitoring Report shall document compliance with the Performance Criteria in the Monitoring Plan. The Trustees shall review the Report, and Equilon shall undertake any further actions in accordance with Section X (Trustees’ Review of Submittals and Corrective Action) of this Decree.

18. Excused Performance.

(a) The Parties recognize that the risk of a named storm, drought, and/or disease exists and that, should such circumstances arise subsequent to the lodging of this Consent Decree, to the extent that Equilon demonstrates by a preponderance of the evidence that one or more of these circumstances affected Equilon’s ability to perform or to meet the Final



Performance Plan and/or Monitoring Plan requirements, then Equilon's performance obligations will be excused or altered to the extent specified below:

- (i) if a named storm results in Equilon being unable to plant at the Restoration Property, the Project Manager, after consulting with Equilon and the Trustees, shall designate another area for planting;
- (ii) if a named storm destroys the platform after planting has been completed, Equilon will be completely excused from future performance under this Decree after Equilon has paid all State Response Costs, Assessment Costs and Restoration Costs, and any penalty required by this Decree;
- (iii) if, after a named storm that adversely affects plantings at the Restoration Property or after a drought event or disease outbreak that adversely affects vegetation similarly at the Restoration Property and on other barrier islands included in the Barataria/Terrebonne National Estuary Program, more than 50% of the plantings do not survive at the Restoration Property, Equilon shall for the plantings in the remaining area, continue monitoring in accordance with the Monitoring Plan and meet the Performance Criteria for the Final Monitoring specified in the Monitoring Plan with respect to the remaining area.
- (iv) if, after a named storm that adversely affects plantings at the Restoration Property or after a drought event or disease outbreak that adversely affects vegetation similarly at the Restoration Property and on other barrier islands included in the Barataria/Terrebonne National Estuary Program,

25-50% of the plantings do not survive at the Restoration Property, then

Equilon shall either:

- a. implement physical improvements to stabilize the remaining plants, or
- b. if more cost effective and technically feasible, replant equivalent acreage in the same or another area of the island.

In the replanted areas, Equilon shall conduct Initial Monitoring and meet the Initial Monitoring Performance Criteria, and shall conduct Final Monitoring and meet the Excused Performance Criteria, specified in the Monitoring Plan; and for the plantings in the remaining area, continue monitoring the plantings and meet the Performance Criteria for the Final Monitoring specified in the Monitoring Plan.

- (v) if, after a named storm that adversely affects plantings at the Restoration Property or after a drought event or disease outbreak that adversely affects vegetation similarly at the Restoration Property and on other barrier islands included in the Barataria/Terrebonne National Estuary Program, less than 25% of the plantings do not survive at the Restoration Property, Equilon shall:

- a. replant the affected acres. In the replanted areas, Equilon shall conduct Initial Monitoring and meet the Performance Criteria for Initial Monitoring with respect to the replanted areas, and shall

conduct Final Monitoring and meet the Excused Performance Criteria, specified in the Monitoring Plan; and

- b. for the plantings in the remaining area, continue monitoring the the plantings and shall meet the Performance Criteria for the Final Monitoring specified in the Monitoring Plan.

(h) If one of the foregoing circumstances occur, Equilon shall notify orally the Project Manager or, in his or her absence, the Alternate Project Manager within 10 days of the date that Equilon, its contractors, or any entity controlled by Equilon first knew or should have known that the circumstances might justify excused or modified performance. For purposes of this Paragraph, Equilon or its contractors or any entity controlled by Equilon knew or should have known that circumstances might justify excused or modified performance based on information available upon request by Equilon or its contractors or agents from the National Weather Service and the Project Manager, East Timbalier Project, LDNR, Office of Coastal Restoration. Within 21 days thereafter, Equilon shall submit to the Trustees an Excused Performance Report describing the circumstances, the effect of the circumstances on the platform and the plantings at the Restoration Project, and the basis for Equilon's claim that the circumstances justify an excused performance pursuant to Paragraph 18(a). The Trustees shall review such Report in accordance with Paragraphs 22-29. The Project Manager, after consultation with the Trustees, shall notify Equilon whether the circumstances justify excusing Equilon's performance of the Restoration Project, and if so, the extent to which performance will be excused in accordance with Paragraph 18(a). The Project Manager will direct Equilon to submit an Excused Performance Plan for any actions required under Paragraph 18(a). Equilon shall submit an

Excused Performance Plan, in accordance with Paragraphs 24-26. Equilon will not be required to perform any additional corrective action or monitoring of the Restoration Project for more than two additional years after implementation of the first Excused Performance Plan.

(c) If Equilon elects to invoke the dispute resolution procedures set forth in Section XV (Dispute Resolution), it shall do so no later than 15 days after receipt of the Project Manager's notice regarding the excused performance claim. In any such proceeding, Equilon shall have the burden of demonstrating by a preponderance of the evidence that the circumstances described in Paragraph 18(a) occurred and justify Equilon's excused or mitigated performance. If Equilon carries this burden, Equilon's performance requirements under this Consent Decree will be modified and no stipulated penalty will accrue for the delay in submitting an Excused Performance Plan.

(d) Events that only delay rather than prevent or impede performance in whole or in part shall be dealt with under Section XIV (Force Majeure).

19. Certification of Completion. The Project Manager, after obtaining concurrence from the Trustees, shall issue a Certification of Completion after the Trustees have determined that Equilon 1) has satisfied the Performance Criteria for the Final Monitoring specified in the Monitoring Plan, 2) has been excused from the performance obligations in accordance with Paragraph 18, or 3) has satisfied the requirements of any Excused Performance Plan.

#### VIII. REPORTING

20. All plans and reports required to be submitted by the terms of this Consent Decree shall contain a certification signed by the Supervising Contractor or Equilon's representative, as designated in Paragraph 21. The certification shall read as follows:

“To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this (submission/document) is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

#### IX. NOTICE

21. Whenever under the terms of this Decree, written notice is required to be given or a report or other document is required to be forwarded by one Party to another Party or Parties, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the Parties:

As to the United States:

NOAA

Jed Brown  
NOAA/NMFS/RC  
Room 15245  
1315 East West Highway  
Silver Spring, MD 20910-3282

Linda Burlington, NOAA/GCNR  
1315 East West Highway  
SSMC3, Rm. 15132  
Silver Spring, MD 20910-3282

DOI

Sam D. Hamilton  
Authorized Official  
U.S. Fish and Wildlife Service  
1875 Century Blvd.  
Atlanta, GA 30345

Field Supervisor  
Attention: Buddy Goatcher  
U.S. Fish & Wildlife Service  
646 Cajundome Blvd., Suite 400  
Lafayette, LA 70506

Department of Justice ("DOJ")

Chief, Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Ben Franklin Station  
Washington, D.C. 20044-7611  
DJ # 90-5-1-1-06628

As to the State:

LDEQ

Bruce Hammatt, Administrator  
Office of Environmental Compliance  
P.O. Box 82215 street: 7290 Bluebonnet Road  
Baton Rouge, LA 70884-2215

LDWF

Louisiana Department of Wildlife and Fisheries  
Attention: Heather Finley  
P.O. Box 98000 street: 2000 Quail Drive  
Baton Rouge, LA 70898-9000

LDNR

Louisiana Department of Natural Resources  
Attention: Dr. Terry Howey  
P.O. Box 94396  
Baton Rouge, LA 70804-9396

street: 625 North Fourth St.; 13<sup>th</sup> Floor

LOSCO

Warren Lorentz  
Natural Resource Specialist  
LOSCO  
625 North 4<sup>th</sup> Street, Suite 800  
Baton Rouge, Louisiana 70802

Attorney General

Ian Lindsay  
Assistant Attorney General  
State of Louisiana  
P.O. Box 94005  
Baton Rouge, LA 70804

street: 301 Main Street, Suite 1250  
Baton Rouge, LA 70801

As to Equilon:

James B. Merrell (Representative for all purposes, including fiscal  
Senior Attorney representative.)  
Legal Department  
Texaco Group Inc.  
1111 Bagby  
Suite 2764  
Houston, Texas 77002

Jerry F. Hall (Representative for all purposes except fiscal.)  
Sr. Scientist  
TWEPSHE  
1111 Bagby  
Houston, Texas 77002

**State of Louisiana  
DIVISION OF ADMINISTRATION  
STATE LAND OFFICE**

**Grant of Particular Use for Construction  
East Timbalier Island Planting Project  
LaFourche Parish, Louisiana**

The State of Louisiana acting through the State Land Office, Division of Administration, hereinafter called the "Owner", hereby grants to Equilon Pipeline Company LLC and its assigned agents, contractors and subcontractors, hereinafter called the "Grantee", a grant of particular use upon the following terms and conditions:

1. The Owner hereby grants to the Grantee an irrevocable right to enter upon the lands and waterbottoms hereinafter described for a period starting September 1, 1999 through December 31, 2005 solely for the purpose of carrying out a natural resources restoration project, including planting vegetation and monitoring, on East Timbalier Island, Louisiana (hereinafter called the "Project"); reserving, however to the Owner, its successors and assigns, all such rights and privileges as may be used without interfering with or abridging the rights hereby acquired.
2. All tools, equipment, and other property (excluding project features) taken upon or placed upon the land or waterbottoms by the Grantee or its contractors shall remain the property of the Grantee or its contractors.
3. This grant of particular use includes the right of ingress and egress on other lands and waterbottoms of the Owner in the Project area not described below, provided such ingress and egress is necessary and not otherwise conveniently available to the Grantee.
4. The Grantee agrees to act in a reasonable manner in conducting its activities on the property covered by this grant of particular use. The Grantee acknowledges that in the event its employees are negligent, liability may attach for such negligence. The Owner has no responsibility to hold and save the Grantee harmless for such negligence.
5. The land and waterbottoms affected by this grant of particular use are located in LaFourche Parish, Louisiana, and is shown on Exhibit A, attached and hereto made a part hereof.
6. This grant of particular use includes the following activities during the term of this grant:
  - a) The right to plant marsh vegetation on approximately a 173 acre dredge spoil platform built in 1998 as part of the CWPPRA East Timbalier Island Sediment Restoration Project.



**State of Louisiana  
DIVISION OF ADMINISTRATION  
STATE LAND OFFICE**

**Grant of Particular Use for Construction  
East Timbalier Island Planting Project  
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2. All tools, equipment, and other property (excluding project features) taken upon or placed upon the land or waterbottoms by the Grantee or its contractors shall remain the property of the Grantee or its contractors.
3. This grant of particular use includes the right of ingress and egress on other lands and waterbottoms of the Owner in the Project area not described below, provided such ingress and egress is necessary and not otherwise conveniently available to the Grantee.
4. The Grantee agrees to act in a reasonable manner in conducting its activities on the property covered by this grant of particular use. The Grantee acknowledges that in the event its employees are negligent, liability may attach for such negligence. The Owner has no responsibility to hold and save the Grantee harmless for such negligence.
5. The land and waterbottoms affected by this grant of particular use are located in LaFourche Parish, Louisiana, and is shown on Exhibit A, attached and hereto made a part hereof.
6. This grant of particular use includes the following activities during the term of this grant:
  - a) The right to plant marsh vegetation on approximately a 173 acre dredge spoil platform built in 1998 as part of the CWPPRA East Timbalier Island Sediment Restoration Project.

- b) The right for the Grantee to survey all areas on East Timbalier Island during the life of the Project as often as deemed necessary by the Grantee.
  - c) The right to inspect, monitor and maintain the Project during the life of the Project as often as deemed necessary by the Grantee.
  - d) The right for representatives from state and federal agencies to inspect the Project during the life of the project as often as deemed necessary by the Grantee, or state and federal representatives.
  - e) The right to make physical improvements to stabilize the vegetation as appropriate and as directed by the state and federal agencies.
  - f) The right to assign or transfer in whole or in part, any or all of its rights hereunder, but only to the extent necessary to implement the purposes of the Project on the said Lands, and only with prior written approval from Owner.
7. Established trails and access canals shall be utilized whenever possible. Airboats and small outboards shall be used whenever practical to reduce the usage of marshbuggies. Marshbuggies, tractors, or 4 wheel all terrain vehicles (ATVs) may be used on unvegetated portions of the island, however, these vehicles should be used sparingly on vegetated portions.
8. In the event of surface damages resulting from activities of the Grantee, unless otherwise allowed by the Owner, the Grantee shall be responsible for restoring the site, to the greatest extent practicable, to conditions existing at commencement of Grantee activities, or the Grantee shall be responsible for the cost of such restoration. All litter shall be removed upon completion of authorized work.

IN WITNESS WHEREOF the parties hereto have signed these presents on the day and date set forth below and in the presence of the undersigned witnesses after due reading of the whole.

STATE OF LOUISIANA

By: Charles L. St. Roman  
State Land Office  
Division of Administration

Witnesses:

Beth Hodgkin

Title: Public Lands Admin.

Michaela Vona

Date: 9/23/99

EQUILON PIPELINE COMPANY LLC

By: AM Doster  
Equilon Pipeline Company LLC

Witnesses:

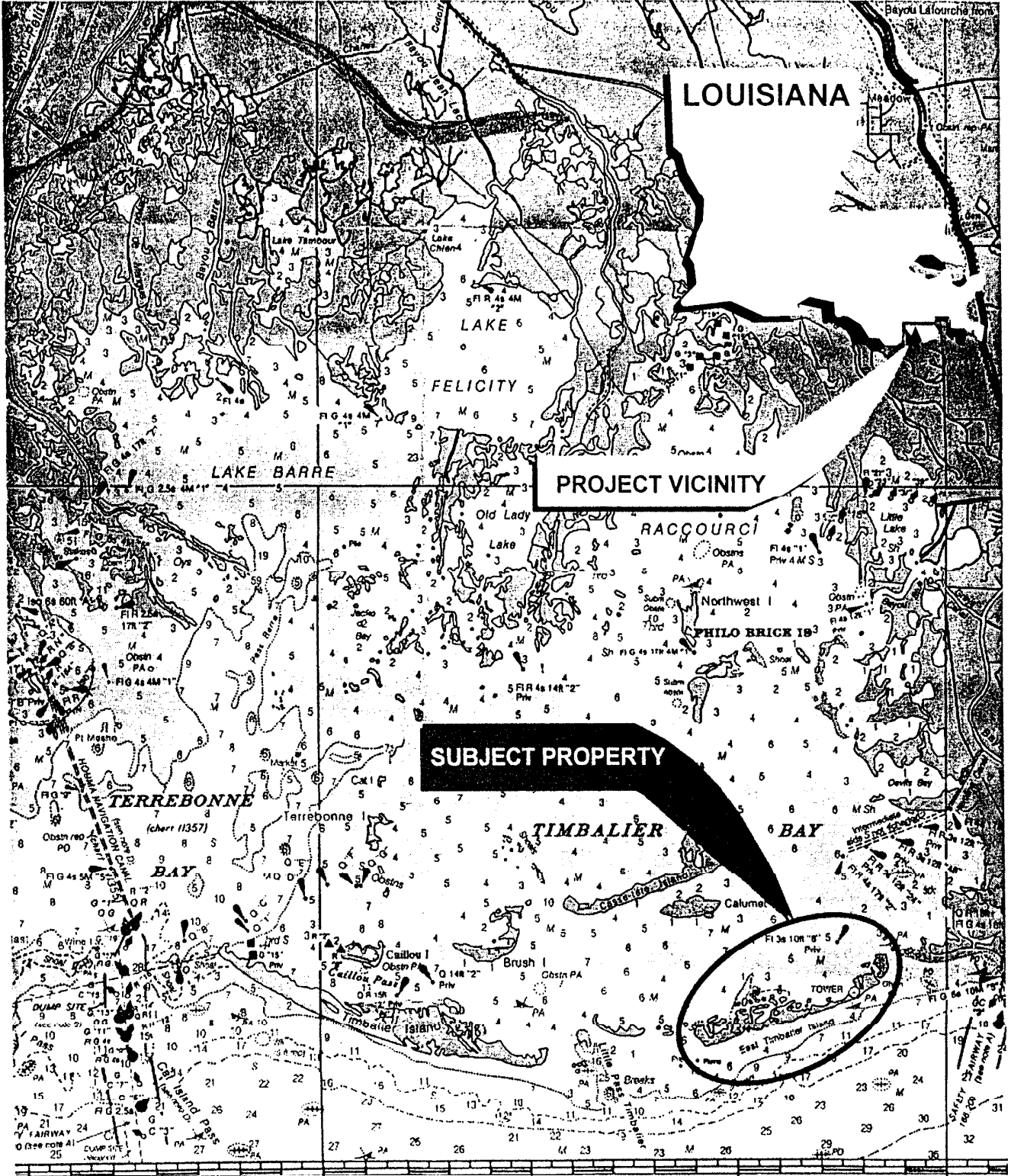
Richard L. [Signature]

Title: Resident

V. Will

Date: September 21, 1999

# EXHIBIT A



# **DAMAGE ASSESSMENT AND RESTORATION PLAN**

## **TEXACO PIPELINE INC. CRUDE OIL DISCHARGE**

**LAKE BARRE, LOUISIANA  
May 16, 1997**

Prepared by:

Louisiana Oil Spill Coordinators Office  
Louisiana Department of Environmental Quality  
Louisiana Department of Natural Resources  
Louisiana Department of Wildlife and Fisheries  
National Oceanic and Atmospheric Administration  
United States Fish and Wildlife Service

Final Version  
August 27, 1999

**Exhibit #1**

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## INTRODUCTION AND SUMMARY

## CHAPTER 1

This Damage Assessment and Restoration Plan (DARP) has been prepared by state and federal natural resource Trustees to address the restoration of natural resources and resource services injured by the Texaco Pipeline Company Lake Barre oil spill on May 16, 1997 (the "incident"). It was developed following consideration of comments received during the public comment period on the Draft Damage Assessment and Restoration Plan/Environmental Assessment (DARP/EA). It represents the Trustees' final determination concerning the appropriate restoration actions necessary to make the environment and public whole for natural resource injuries and losses of service resulting from the incident. This DARP also served as an EA as defined under the National Environmental Policy Act (NEPA) 42 U.S.C. 4321 et seq., and addressed the potential impact of selected restoration actions on the quality of the physical, biological, and cultural environment. However, as described in Section 2.2.2, the proposed action had been analyzed in a previous EA, and received a finding of no significant impact (FONSI), satisfying NEPA requirements.

The Trustees and Texaco have considered the injuries resulting from this incident, evaluated restoration alternatives suggested by the public and local scientists and other interested parties, ranked the alternatives according to established criteria, and proposed a preferred restoration alternative. After consideration of comments received on the preferred alternative, the Trustees selected the preferred restoration alternative as the appropriate final restoration project. The Trustees believe that the process undertaken to evaluate injuries to natural resources and services and select the restoration alternative to make the public and the environment whole for losses resulting from this incident has been consistent with regulatory requirements.

### 1.1 OVERVIEW OF THE INCIDENT

At around 4:00 PM CDT on May 16, 1997, a release from a sixteen inch crude oil transmission pipeline was discovered by Texaco Pipeline Inc. (hereafter "Texaco") in Lake Barre, Louisiana. The release was caused by a 34" long gash in the pipeline, which had been buried five to eight feet below the sediment surface. The site of the pipeline rupture was at 29° 14.8' N latitude, 90° 29.3' W longitude, which is approximately 27 miles southeast of Houma, in Terrebonne Parish. Texaco estimated that approximately 6,561 barrels (275,562 gallons) of crude oil were discharged as a result of the pipeline rupture. Oil skimming and booming operations began on May 17, 1997 in an effort to control surface oil, remove oil from the environment, and protect sensitive estuarine and marsh ecosystems.

State and federal agency personnel along with Texaco responded, as part of the unified command to the spill and observed potential indications of biological injury from the effects of the incident. Extensive areas of marsh were observed to have been exposed to black oil or sheen, birds were observed to have been oiled, and dead shrimp were collected in a Louisiana Department of Wildlife and Fisheries trawl from Lake Barre. Small dead fish and invertebrates were observed in



provided benefits to recreational shrimpers and fishermen in addition to other criteria so as to provide some degree of compensation for the potential recreational loss.

### 1.3 PROPOSED RESTORATION ALTERNATIVES

Restoration actions under OPA are termed primary or compensatory. Primary restoration is any action taken to accelerate the return of injured natural resources and services to their baseline condition. Trustees may elect to rely on natural recovery rather than primary restoration actions in situations where feasible or cost-effective primary restoration actions are not available, or where the injured resources will recover relatively quickly without human intervention.

Compensatory restoration is any action taken to compensate for interim losses of natural resources and services pending recovery. The scale of the required compensatory restoration will depend both on the magnitude of initial resource injury and how quickly each resource and associated service returns to baseline. Primary restoration actions that speed resource recovery will reduce the requirement for compensatory restoration.

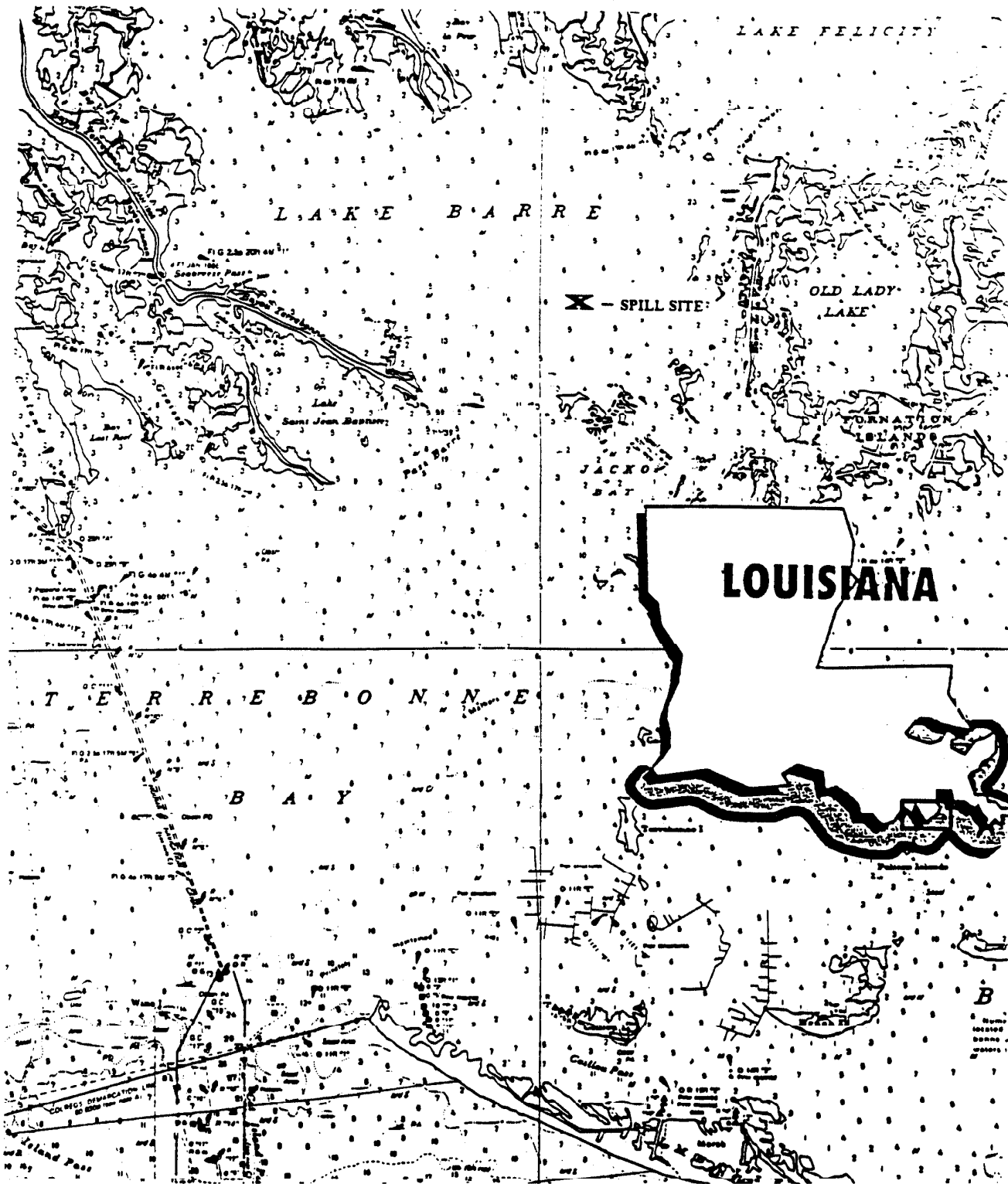
Based on observations made during the injury assessment studies, the Trustees determined that no active primary restoration actions were required to return injured natural resources and services to baseline (see Section 5.3.1). Therefore the natural recovery alternative was chosen for primary restoration. The Trustees evaluated more than 43 compensatory restoration alternatives with the potential to provide additional resources to compensate for the losses pending environmental recovery. As indicated in Exhibit 1-1 the Trustees propose compensatory restoration actions directed at marsh services, aquatic fauna, and birds.

Exhibit 1-1		
SELECTED RESTORATION ALTERNATIVES		
Injured Resource/ Service	Primary Restoration	Compensatory Restoration
Aquatic Fauna	Natural Recovery	Marsh enhancement
Birds	Natural Recovery	Marsh enhancement
Marsh habitat	Natural Recovery	Marsh enhancement
Human Use	Natural Recovery	Achieved through benefits to recreational fishing resulting from ecological restoration actions (marsh enhancement)

### 1.4 PLAN OF THIS DOCUMENT

The remainder of this document presents further information about the natural resource injury studies and the preferred restoration action for the Lake Barre incident that was selected after evaluation of the public comments received.

Figure 1. Location of Pipeline Break in Lake Barre, Louisiana.



acres of vegetated marsh was exposed to light oiling or sheen, and approximately 162 acres of vegetated marsh were exposed to heavy oiling.

## **2.2 AUTHORITY AND LEGAL REQUIREMENTS**

This DARP has been prepared jointly by the Louisiana Oil Spill Coordinator's Office (LOSCO), the Louisiana Department of Wildlife and Fisheries (LDWF), the Louisiana Department of Natural Resources (LDNR), the Louisiana Department of Environmental Quality (LDEQ), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of the Interior (DOI) which is represented by the United States Fish and Wildlife Service (USFWS) (collectively, "the Trustees"). Each of these agencies is a designated natural resource Trustee under the Oil Pollution Act of 1990 (OPA), 33 U.S.C. Section 2706(b), and the National Contingency Plan, 40 CFR Section 300.600, for natural resources injured by the Lake Barre incident. As a designated Trustee, each agency is authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages, and to plan and implement actions to restore natural resources and resource services injured or lost as the result of a discharge of oil.

### **2.2.1 Overview of OPA Requirements**

A natural resource damage assessment, as described under Section 1006 of OPA (33 U.S.C. Section 2706(c)) and the regulations for natural resource damage assessments under OPA at 15 CFR Part 990, consists of three phases: 1) Preassessment; 2) Restoration Planning; and 3) Restoration Implementation. The Trustees may initiate a damage assessment provided that an incident has occurred; the incident is not from a public vessel or an onshore facility subject to the Trans-Alaska Pipeline Authority Act; the incident is not permitted under federal, state or local law; and Trustee natural resources may have been injured as a result of the incident. Injury is defined as "an observable or measurable adverse change in a natural resource or impairment of a natural resource service" (15 CFR Section 990.30).

Based on early available information collected during the Preassessment Phase, Trustees make a preliminary determination whether natural resources or services have been injured and/or are threatened by ongoing injury. Through coordination with response agencies (e.g., the USCG), Trustees next determine whether response actions will eliminate injury or the threat of ongoing injury. If injuries are expected to continue, and feasible restoration alternatives exist to address such injuries, Trustees may proceed with the Restoration Planning Phase. Restoration planning also may be necessary if injuries are not expected to continue but are suspected to have resulted in interim losses of natural resources and services from the date of the incident until the date of recovery.

The purpose of the Restoration Planning Phase is to evaluate potential injuries to natural resources and services, and use that information to determine the need for and scale of restoration actions. Natural resources are defined as "land, fish, wildlife, biota, air, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining

## COORDINATION WITH THE RESPONSIBLE PARTY

The OPA regulations require the Trustees to invite Responsible Parties to participate in the damage assessment process. Although the Responsible Party may contribute to the process in many ways, final authority to make determinations regarding injury and restoration rests solely with the Trustees.

Accordingly, the Trustees delivered a formal invitation pursuant to the OPA regulations for participation in the damage assessment, then in the preassessment phase, to Texaco on June 9, 1997. Texaco responded that it wished to participate in the cooperative process in a letter dated June 20, 1997. The designated technical representatives of Texaco participated actively in the damage assessment following the spill; they were involved in the design and implementation of many studies completed as part of this assessment. They also participated actively in Cooperative Assessment Groups (CAGs), which were created to design and interpret the studies and evaluate potential injuries. Coordination between the Trustees and Texaco helped reduce duplication of studies, increase the cost-effectiveness of the assessment process, increase sharing of information and experts, and is expected to decrease the likelihood of litigation. Input from Texaco was sought and considered, when provided, throughout the damage assessment process.

Subsequent to the incident, approximately one year into the cooperative assessment process, Equilon Pipeline Company LLC ("Equilon") succeeded to the liabilities of Texaco, through a merger. Therefore Equilon became the Responsible Party for this incident at that point in the process. To avoid confusion, however, "Texaco" is used throughout this document, rather than use "Texaco" sometimes and "Equilon" in others.

## PUBLIC PARTICIPATION

Public review of the Draft DARP/EA is an integral component of the restoration planning process. It is consistent with all state and federal laws and regulations that apply to the natural resource damage assessment process, including Section 1006 of OPA, the regulations for Natural Resource Damage Assessment under OPA (15 CFR Part 990), NEPA (42 USC Section 4371, et seq.) and the regulations implementing NEPA (40 CFR Part 1500, et seq.). Through the public review process, the Trustees seek public comment on the analyses used to define and quantify natural resource injuries and the methods being proposed to restore injured natural resources or replace lost resource services. The Draft DARP/EA provides the public with current information about the nature and extent of the natural resource injuries identified and restoration alternatives evaluated.

The Draft DARP/EA was made available for a 30-day federal public comment period beginning with the publication of a notice of its availability in the Federal Register on July 15, 1999. This comment period ended on August 16, 1999 (the first working day following the 30<sup>th</sup> day). A 10-day state public comment period began with the publication of a notice of its availability in the Louisiana Register on July 20, 1999, and ended on August 2, 1999. The availability of the Draft DARP/EA and the state and federal public comment periods was also published in the Houma Courier and Baton Rouge Advocate newspapers on July 19, 1999. All comments received during

in the Draft DARP/EA is selected. It will provide sufficient compensation to the public for injuries to, and loss of services from, resources affected by the incident plus will have additional benefits (not considered in the calculations) such as protection of existing marshes and infrastructure.

*ENTRIX, Texaco's contractor, made some minor suggestions to clarify language regarding flexibility in timing and design of planting, and of the monitoring program and performance criteria. They also suggested that anchors not be used to hold pots, due to possible hazards to wildlife that they could pose.*

The Trustees carefully evaluated these suggestions and accepted many of the clarifications. The Trustees recognize that the timing of planting will depend on several factors, including the availability of plants with the appropriate characteristics (e.g., acclimation to local climate and habitat conditions) and the weather conditions during the actual planting. The Trustees also recognize that the precise planting design followed will depend on the conditions that exist at the site following settling of the dredge material and the action of winter storms. One of Entrix's suggestions regarding timing was modified to include restrictions as to how close planting may occur to nesting wading and seabirds. The suggestion regarding anchors was also accepted.

The Trustees did not accept two suggestions regarding use of different plant material and size than that specified in the Draft DARP/EA. Regarding plant materials, it was thought that this is a reference to the use of other plant species. The use of plant species other than the two *Spartina* species for the initial planting is not approved since the primary plants affected by the spill were *Spartina*, and therefore they are more appropriate to restore the types of services lost. As discussed in Section 5.4.2.5.4, the use of different species may be considered as a corrective action measure, if necessary. The reference to plant size is thought to refer to use of multi-stem clumps. The use of multi-stem clumps of plants are thought to be less resistant to erosion than potted plants (Jim Holcombe, LDNR, pers. comm.), and the Trustees felt that it would be too risky to use clumps at a barrier island site. Although these two suggestions were not adopted, the Trustees feel that there is sufficient flexibility in the DARP to allow whatever minor modifications may be necessary, with the approval of the Trustees, to maximize the likelihood of the success of the project.

#### 2.4.2 Administrative Record

The Trustees developed records documenting the information considered by the Trustees as they planned and implemented assessment activities and addressed restoration and compensation issues and decisions. These records have been compiled into an administrative record, which is now available for public review at the addresses given below. Although the record is still being added to, it presently contains the information that the Trustees relied upon to make the decisions described in the DARP. The administrative record facilitated public participation in the assessment process and will be available for use in future administrative or judicial review of Trustee actions to the extent provided by federal or state law. A list of those documents submitted to the administrative record through August 26, 1999 is attached as Appendix A to this document. Documents within the administrative record can be viewed at:

## AFFECTED ENVIRONMENT

## CHAPTER 3

This chapter presents a brief description of the physical and biological environment affected by the Lake Barre incident. The physical environment includes the marine waters of Lake Barre and associated coastal salt marsh, rookery island, oyster reef, and mudflat habitat. The biological environment includes a wide variety of fish, shellfish, birds and other organisms.

Lake Barre and its natural resources are part of the large Barataria-Terrebonne estuary system (BTES). Commercial fishing, aquaculture, recreational fishing, hunting, and wildlife viewing provide contributions to the economy of Terrebonne, Lafourche, Plaquemines, and Jefferson parishes within the BTES. The wetlands in the BTES also provide ecosystem services such as protection from wind and storm surge damage and wastewater treatment. These benefits depend on a healthy marine and coastal ecosystem in the BTES, including the Lake Barre region. The Barataria-Terrebonne Bay complex is included in the National Estuary Program (BTNEP).

### 3.1 PHYSICAL ENVIRONMENT

The state of Louisiana is located along the north-central coast of the Gulf of Mexico. Lake Barre is located along the northern edge of the BTES. The surrounding land is classified as Gulf Coast Marsh and was created as a series of overlapping delta lobes of the Mississippi River during the past 10,000 years. The climate of the area is humid subtropical with abundant precipitation. Rainfall in May and June averages 4.8 and 6.7 inches, respectively. Summers are hot and winters are mild, with mean monthly temperatures of about 82°F and 57°F, respectively. The area is subject to tropical storms and hurricanes.

Lake Barre is protected from the open Gulf of Mexico by a series of barrier islands to the south, including Isles Dernieres, Timbalier Island, and East Timbalier Island. The shoreline in the Lake Barre area is predominantly saltmarsh. The edges of some marsh areas are armored with oyster reefs. Organic and shell beaches are also present. The land in this area is subsiding, due to low influx of sediment, with land loss occurring so rapidly that 1995 maps were not easily used by response or assessment personnel for the May 16, 1997 spill. The subsidence and resultant erosion of marsh has resulted in a very complex shoreline with a number of small islands and isolated patches of saltmarsh remaining in front of the main current shoreline. Numerous bayous, cuts, and canals in the shoreline of Lake Barre allow exchange of water into interior portions of the marsh. Ponds are present in some areas of the marsh due to subsidence.

The site of the May 16, 1997 pipeline rupture is approximately 4.5 miles southeast of the nearest affected marsh island ("Big Island"), which is used by nesting birds, including terns. Water depth near the site of the release is around two meters, which is relatively constant in Lake Barre except near the shore where water depth is shallower and in channels where it is deeper. Oil from the ruptured pipeline spread out over open water, beach, reef, and marsh habitats. The area exposed

these species depend. The Louisiana Department of Wildlife and Fisheries' Natural Heritage Program also lists species that are of special concern to the state. Exhibit 3.1 at the end of this chapter provides a list of federal and state recognized endangered or threatened species reported to reside in or migrate through south coastal Louisiana ecosystems.

### 3.4 CULTURAL ENVIRONMENT AND HUMAN USE

Ever since the early 1600's when the explorer Pierre Le Moyne, Sieur d'Iberville discovered the region for France, the BTES has been recognized as an area with an abundance of fish and wildlife resources (see the BTNEP website: <http://www.epa.gov/nep/bt.htm>). The BTES, including the Lake Barre area, is directly used for commercial and recreational crabbing, trapping and hunting, and fishing, and is also used for wildlife viewing ("Economic Value Assessment of the Barataria-Terrebonne Estuarine System", published research report 26, The Barataria-Terrebonne National Estuary Program). As discussed above, many of the commercially and recreationally important fish and shellfish species are dependent during at least part of their life-history on the habitats within the BTES. Ecotourism (primarily bird and wildlife viewing and hunting and fishing) is increasingly important to the area. The wetlands in Lake Barre also serve as protection from storms and saltwater intrusion, protecting both human development and freshwater supplies.

<b>Exhibit 3.1</b>		
<b>FEDERAL AND STATE ENDANGERED OR THREATENED SPECIES IN SOUTH COASTAL LOUISIANA</b>		
<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
<b>MAMMALS</b>		
Louisiana Black Bear	<i>Ursus americanus luteolus</i>	Threatened
Florida Panther	<i>Felis concolor corvi</i>	Endangered
<b>REPTILES</b>		
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered
Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	Endangered
Leatherback Sea Turtle	<i>Dermodochelys coriacea</i>	Endangered
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened
Green Sea Turtle	<i>Chelonia mydas</i>	Threatened
<b>BIRDS</b>		
Eskimo Curlew	<i>Numenius borealis</i>	Endangered
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Brown Pelican	<i>Pelecanus occidentalis</i>	Endangered
Piping Plover	<i>Charadrius melodus</i>	Threatened

#### **4.1.2 Bird Impacts**

Two oiled birds (a mottled duck and a tern) were found dead in the first week following the incident. Additionally, response personnel and Trustee representatives surveyed around ten percent of the spill affected area (Conzelmann, USFWS, pers. comm.) and observed at least 58 living, but oiled, birds in the days following the incident.

#### **4.1.3 Marsh Habitat Impacts**

Approximately 4,327 acres of marsh were exposed to oil (including sheen) from the pipeline rupture. In small areas of the exposed marsh, oil streamers collected and resulted in a near total loss of above-ground biomass. In the vast majority of the marsh, the exposure to oil had less dramatic consequences, resulting in a partial loss of marsh services. The oil caused stress to the marsh plants, resulting in an increase in chlorosis and potential reductions in primary productivity. The habitat value of the oiled marsh was also reduced. Some other marsh services were also potentially affected, such as reductions in remineralization processes.

#### **4.1.4 Human Use Impacts**

The incident affected human use service in the Lake Barre area. Under OPA, the Trustees are responsible for evaluating and obtaining compensation for public (but not private) lost human use. The Louisiana Department of Health and Hospitals issued a precautionary closure of oyster harvesting in the affected area on May 19, 1997 to alleviate public health and seafood quality concerns. The closure, which affected private commercial and not public interests, was lifted on August 1, 1997. During the early stages of the cleanup, public access to the area was limited by cleanup activities, including boom placement across access points to the area. In the judgment of the Trustees, the effect of the incident on recreational uses of Lake Barre was relatively limited in duration and magnitude. Recreational use of the area is believed to have returned to baseline levels shortly after the response actions ended. Therefore, no specific actions were required for recreational use to return to baseline conditions, allowing natural recovery to be the preferred alternative for primary restoration for this injury category. Additionally, there are numerous nearby substitute sites for fishing and shrimping that were not directly affected by the incident. Thus, there was little potential for significant interim loss and, therefore, it did not warrant further evaluation. Instead the Trustees considered benefits to recreational uses as an additional criterion in determining preferred restoration alternatives for other injury categories.

### **4.2 ASSESSMENT STRATEGY**

The goal of injury assessment under OPA is to determine the nature and extent of injuries to natural resources and services, thus providing a technical basis for evaluating the need for, type of, and scale of restoration actions. The assessment process occurs in two stages: injury determination and injury quantification.



relative to baseline, and therefore forms the basis for scaling restoration actions. Baseline refers to the condition that the resource would have maintained but for the effects of the incident.

<b>Exhibit 4-1</b>	
<b>LAKE BARRE OIL SPILL: ASSESSMENT METHODS FOR POTENTIAL RESOURCE AND SERVICE INJURIES</b>	
<b>Potential Injuries Assessed</b>	<b>Injury Assessment Method(s)</b>
1. Aquatic Fauna	Preliminary estimates developed independently by Trustees and Texaco using a combination of field data, modeling of oil fate and transport, and literature toxicity information.
2. Birds	Preliminary estimates developed independently by Trustees and Texaco. Trustees used a combination of field data and modeling of oil fate and transport; Texaco used observations made during the response effort.
3. Marsh Function	Trustees and Texaco cooperatively performed a field study designed to obtain data allowing use of a Habitat Equivalency Analysis. Input parameters for the model were jointly developed based on the field observations.
4. Human Use	Trustees determined that no specific assessment was warranted.

### 4.3 SUMMARY OF INJURIES

A summary of injury assessment results is provided in Exhibit 4-2 and described in the following sections.

<b>Exhibit 4-2</b>	
<b>LAKE BARRE OIL SPILL: SUMMARY OF INJURY ASSESSMENT RESULTS</b>	
<b>INJURED RESOURCE/SERVICE</b>	<b>INJURY QUANTIFICATION</b>
1. Aquatic Fauna	The Trustees estimate that approximately 7,465 kg of fish, crabs, and shrimp were lost as a result of this incident; Texaco estimates that less than 500 kg of fish, crabs, and shrimp were lost.
2. Birds	The Trustees estimate that approximately 333 birds were killed as a result of this incident; Texaco estimates that less than 100 birds were killed.
3. Marsh Function	Trustees and Texaco cooperatively performed a field study designed to obtain data allowing use of a Habitat Equivalency Analysis. Input parameters for the model were jointly developed based on the field observations. The injury is estimated to represent 75.6 discounted service acre-years of lost marsh ecological service flows.
4. Human Use	Trustees determined that no specific assessment was warranted.

#### 4.3.1 Summary of Assessment Methods

Injury quantification for aquatic fauna and bird resources begins with developing an estimate of the number of animals killed. Possible sublethal injuries to populations also are considered if the

## 4.4 INJURIES TO SPECIFIC RESOURCES

The following sections of this chapter describe the results of the injury determination and quantification efforts for the incident that were conducted subsequent to the preassessment phase. Potential injuries are organized into four categories: aquatic fauna, birds, marsh, and human use (recreation).

### 4.4.1 Aquatic Fauna

#### 4.4.1.1 Determination of Injury

The Lake Barre area is known to be used by aquatic fauna, including blue crabs, shrimp, and other invertebrates, and numerous species of fish. The LDWF has conducted trawl sampling in this area for many years, which documents this use. Oil from the incident was documented to cover thousands of acres of surface waters. Water samples collected near the time of the spill indicate that polycyclic aromatic hydrocarbons (PAHs) were present in the water column for a short period of time in the vicinity of the pipeline break at levels known to be toxic to aquatic organisms in laboratory tests. Additionally, possible injury from the incident is evidenced by the collection of some dead shrimp in a trawl taken by LDWF, and dead juvenile crabs in a crab pot. A few dead forage fish were also observed shortly following the spill.

#### 4.4.1.2 Injury Quantification Strategy

The Trustees and Texaco did not agree on a common method to quantify aquatic injuries. However, both parties agreed that the cost of conducting a large field study to investigate aquatic faunal injuries was not warranted, given the specific circumstances of this incident. A field effort designed to quantify injuries to fish, shellfish, and other aquatic organisms would be very expensive, and the natural variability that exists in the plankton of the Gulf of Mexico region would have made it difficult to detect the magnitude of injuries that the Trustees believed were present. Although some aquatic mortalities were observed, as noted above, there were not any dramatic fish kills or strandings of large numbers of organisms as sometimes occurs following releases of petroleum products (e.g., *Exxon Valdez* oil spill, *North Cape* oil spill, and others). Given the visual evidence suggesting that the magnitude of injury to aquatic organisms was relatively small, the Trustees decided to use a modeling approach.

The Trustees decided to develop a site-specific modeling approach, using some algorithms from the Natural Resource Damage Assessment Model for Coastal and Marine Habitats (Version 2.4, April 1996), some new algorithms to account for the specific circumstances of the incident, and some new data for habitats and aquatic fauna. The habitat data was developed from aerial photography taken after the incident, and the aquatic fauna data was provided by LDWF and derived from their long-term sampling efforts in the Lake Barre area. A preliminary model run was performed using two different estimates for the release volume: 5,000 BBL and 7,000 BBL. These input parameters for volume were chosen since the size of the release had been estimated to lie between these figures (the final release estimate was 6,561 BBL). Extrapolating from the results of the modeling effort suggest that approximately 7,465 kg of fish, decapods, and other

bird species composition and abundance data used in the model was from the Natural Resource Damage Assessment Model for Coastal and Marine Habitats (Version 2.4, April 1996) for species present in Lake Barre in spring. A preliminary model run was performed using two different estimates for the release volume: 5,000 BBL and 7,000 BBL. These input parameters for volume were chosen since the size of the release had been estimated to lie between these figures (the final release estimate was 6,561 BBL). The Trustees' model estimated that 333 birds were lost as a result of the incident from impacts due to oil released from the pipeline break (Kern, 1999). These figures include the estimated direct mortality that the model predicts for the first week of the spill. In this model, birds that are "oiled" in the model run by contact with the slick are assumed to have been killed. This is a conservative assumption in that it is possible that some of the oiled birds did not die. The Trustees believe, however, that a significant proportion of the birds that were exposed to oil likely died. It is not unexpected that only a small proportion of expected bird mortalities were found, since dead birds can be subject to predation, sinking, or could have been hidden in the thick marsh vegetation.

This injury category, as evaluated by the Trustees' modeling approach, estimates the bird injury that the Trustees believe resulted from death due to exposure to surface slicks that were present in the early days following the incident. It does not estimate the potential reduction in bird production that resulted from reductions in marsh service flows supporting birds. Losses due to a reduction in marsh services supporting birds are accounted for in the assessment of injury to marsh. In the judgment of the Trustees, assessing direct mortality of birds in the first few days of the incident and considering longer-term indirect injury to birds through reduction in marsh services to birds does not result in significant double-counting of bird injuries, under the specific circumstances of this incident.

Although the Trustees and Texaco disagreed on the magnitude of estimated bird losses, they agreed to move forward with selecting an appropriate restoration option and scaling the amount of restoration needed to compensate for these losses. The selection of the preferred restoration option and the scaling approach is discussed in Chapter 5. The Trustees' did not finalize the model using the final release estimate, 6,561 BBL, since an agreement on restoration was reached that, in the judgment of the Trustees, was clearly sufficient to provide adequate compensation for this injury. Therefore, there was no need for the Trustees to incur the additional expense of further modeling efforts.

#### **4.4.3 Marsh**

##### **4.4.3.1 Determination of Injury**

The trajectory of the oil into the marsh and the extent of oiling were documented on a frequent basis during the initial response using overflights and on-water surveys. Overflights occurred on at least a daily basis from May 17, 1997 through May 28, 1997. Trustees participated in surveys and field observations in May, June, July, and October 1997, and June 1998. It is estimated that approximately 4,165 acres of marsh were exposed to light oiling (including sheen) and 162 acres of marsh were exposed to heavy oiling. In limited areas, oil streamers hit the shoreline and oil accumulated on the sediment

3. *Heavy oiling with slow to moderate recovery*: Approximately 8.1 acres of marsh were exposed to heavier oiling than the first two categories, with a higher degree of service reduction and slower recovery. These areas were estimated to have suffered an initial service loss of 75%. During the July 1997 site visit, there were indications of some recovery of services, with service losses estimated at 65%. In October 1997 and June 1998 there were substantial signs of recovery, but service losses in June 1998 were estimated to be at 20%. The CAG estimates that recovery from the June 1998 estimate of 20% service losses to full recovery will occur within two years following the incident. The estimated interim loss of marsh services in this category is 4.6 acre-years with no primary restoration actions other than natural recovery.
4. *Heavy Oiling with slow recovery*: Approximately 0.28 acres of marsh were exposed to very heavy oiling, with the above-ground vegetation killed and slight signs of recovery in June 1998. Minimal marsh service flows were believed to be coming from these limited areas, with service flows gradually improving toward baseline service provision. Given the limited areal extent of this category, the CAG decided that it was not cost-effective to continue the field study to monitor the gradual recovery for such a small area. The Trustees and Texaco agreed to conservatively assume that full recovery for these 0.28 acres would not occur until 20 years following the incident for the purpose of calculating compensatory restoration needs, although the Trustees believe recovery will occur more quickly. As discussed in the following chapter, primary restoration actions to speed recovery to baseline was considered but ultimately rejected by the Trustees as not being necessary. The interim loss of marsh services in this category is estimated to be 2.6 acre-years with no primary restoration actions other than natural recovery.

This injury quantification approach attempts to take into account reductions in the entire flow of marsh services. It is intended to account for a reduction in bird production that resulted from reductions in marsh service flows supporting birds. Likewise, it is intended to account for a reduction in aquatic faunal production from reductions in marsh service flows supporting fish, shrimp, crabs, and other aquatic fauna. It is also intended to capture the loss of other marsh services. It is the judgment of the Trustees that accounting for reductions in marsh services with this approach does not result in significant double-counting of the bird and aquatic faunal injuries, under the specific circumstances of this incident.

This injury approach treats injury to marsh sediments as part of the overall loss of marsh services. That is, the effect of the oiling on the sediments was considered during the development of the estimates for loss of overall marsh services. Since affected sediments were virtually all in or adjacent to marsh, no separate injury assessment and restoration evaluation was performed for intertidal sediment injury. Chemistry results of subtidal sediment samples indicate that no significant injury occurred to this habitat. It is the judgment of the Trustees that consideration of intertidal sediment injury as part of the overall assessment of marsh injury was the most efficient approach to use under the specific circumstances of this incident.

**5.1 RESTORATION STRATEGY**

The goal of restoration under the Oil Pollution Act of 1990 (OPA) is to make the environment and public whole for injuries to natural resources and services resulting from the Lake Barre incident. Restoration actions under OPA are termed primary or compensatory.

Primary restoration is any action taken to accelerate the return of injured natural resources and services to their baseline condition. Natural recovery, in which no human intervention is taken to directly restore the injured natural resources and/or services to baseline conditions, is considered as a primary restoration alternative. Natural recovery is the appropriate restoration alternative in situations where feasible or cost-effective primary restoration actions are not available, or where the injured resources will recover relatively quickly without human intervention. Actual primary restoration actions (as opposed to natural recovery) are appropriate in situations where injured resources will not recover, or will recover slowly, without taking steps to bring about or speed recovery, and where feasible and cost-effective methods exist to assist recovery to baseline.

Compensatory restoration is any action taken to compensate for interim losses of natural resources and/or services pending recovery to baseline. The scale of the required compensatory restoration is dependent on both the initial size of the injury and how quickly each resource and/or service returns to baseline. Primary restoration actions that speed recovery will reduce the requirement for compensatory restoration.

To plan restoration for injuries resulting from the Lake Barre incident, the Trustees first consider possible primary restoration actions for each injury and determine whether primary restoration can and should be implemented. The Trustees then consider the type and scale of compensatory restoration that can best compensate for lost resources and/or services during the recovery period.

Restoration alternatives must be scaled to ensure that their size appropriately reflects the magnitude of injuries resulting from the incident. Where feasible, the Trustees employ a resource-to-resource scaling methodology. Under this approach, the Trustees determine the scale of restoration actions that will provide natural resources and/or services of the same type and quality and of comparable value to those lost. Here, equivalency is obtained between the resources and/or services lost and those to be provided through restoration.

If a reasonable range of alternatives providing natural resources and/or services of the same type and quality and comparable value to those lost cannot be identified, other compensatory restoration actions may be considered. These other compensatory restoration actions must, in the judgment of the Trustees, provide services of comparable type and quality as those lost. When restoration provides resources or services not of comparable value as those injured, the Trustees

Another suggestion was that Texaco should fund long-term monitoring to assess the impact of oil on deltaic marshes, or fund experimentation with planting various species of plants, site characteristics, planting techniques, and mechanical structures to contribute to the state of knowledge concerning these topics. The Trustees and Texaco jointly conducted a field assessment in the impacted marsh, sufficient to be able to develop estimates of injury to the marsh. Further assessment studies beyond that required for injury quantification are not justified within the OPA regulations. Basic research in marsh planting techniques as a restoration alternative is similarly not consistent with regulations since it will not replace the injured natural resources and services to the public.

Another restoration suggestion, trying to reduce erosion of existing marsh in the Lake Barre area by plantings done in critical areas and by plugging breaches and tidal cuts, was considered by the Trustees. The experts consulted by the Trustees, including those attending the February 13, 1998 meeting, told the Trustees that loss of marsh was occurring in this area due to two phenomena. The first is the subsidence that is causing the loss of marsh from the interior, with ponding occurring as the water depth becomes too deep for marsh vegetation. Plugging of interior cuts and breaches would have little affect on the rate of subsidence. The Trustees were told that the only way to slow subsidence would be to pump large volumes of sediment out onto the marsh, which would be very expensive and would have the potential to cause injury to existing resources during the implementation. There is also the practical problem of where to obtain the large amounts of sediment that would be required.

The other cause of marsh loss is erosion along the edge of the marsh, primarily along the southern shoreline. Reducing erosion through shoreline armoring and plugging exterior cuts was one of the restoration options considered as a viable alternative. It was screened as an alternative, but ultimately rejected both because of cost required to reduce erosion sufficiently to compensate for losses and because of the potential for impacting oyster leases during implementation. Movement of equipment in the area could cause impacts to oyster leases in the area, which was a concern expressed by oystermen participating in the two public meetings. With respect to the suggestion of reducing erosion through planting in critical areas, the Trustees and Texaco did not observe any locations where they believed that vegetation could be established to reduce shoreline erosion and where it would remain for a sufficient period of time to justify this approach. The CAG did not receive additional input as to appropriate areas for planting despite attempts to get this information.

As shown in Exhibit 5-1, most of the general restoration alternatives considered are for compensatory restoration. This is because the assessment studies have shown that resources and resource services impacted by the incident are, in the judgment of the Trustees, recovering to baseline conditions within an acceptably short time period. Therefore there was little need to consider active primary restoration alternatives. The only injured resource that is expected to take longer than two or three years to recover is the 0.28 acres of most heavily impacted marsh. Marsh replanting was considered as a primary restoration alternative for this small area but, as discussed in Section 5.3.1, the Trustees decided that it was not cost-effective to undertake actions to speed recovery for such a small area.

- The extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;
- The extent to which each alternative benefits more than one natural resource and/or service; and
- The effect of each alternative on public health and safety.

The regulations leave it up to the Trustees to consider how to prioritize the criteria, and allow additional criteria to be used. The key criterion for the Trustees is the second in the list, since it is the criterion that most clearly indicates whether the goal of making the public whole from losses resulting from the incident are met. The Trustees have, as indicated previously, also considered as an additional criterion the extent to which the restoration alternative will provide benefits to recreational uses (fishing and wildlife viewing).

Based on a thorough evaluation of a number of factors, including the criteria listed above, the Trustees selected preferred restoration alternatives for primary and compensatory restoration of injured natural resources and/or services (highlighted in Exhibit 5-1). Information supporting the Trustees' selection of restoration alternatives is provided throughout the remainder of this chapter. In compliance with OPA, the restoration alternatives were finalized following public review and comment on the Draft DARP/EA, with the preferred alternatives identified in the Draft DARP/EA being selected since there were no comments received that identified errors in the Trustees' screening or scaling approaches.

### **5.3.1 Primary Restoration**

Based on field indications of recovery, the Trustees and Texaco jointly determined that most of the impacted marsh only suffered a partial loss of services and expect that the areas will recover within 4 to 24 months of the incident. A small area, 0.28 acres, is expected to take much longer to recover. However, the Trustees determined that primary restoration actions to aid in the recovery of the marsh habitat were neither necessary nor cost-effective due to the very limited size of the slowly recovering area. Therefore, the No Action/Natural Recovery option is selected as the primary restoration alternative for this resource.

In addition, based on the magnitude of the estimated injury and site conditions, the Trustees determined that no additional actions were necessary to aid in the recovery of aquatic fauna, birds, or recreational resources. Therefore, the No Action/Natural Recovery option is selected as the primary restoration alternative for these resources. After determining the appropriate primary restoration alternative, the Trustees proceeded to determine the type and size of compensatory restoration to account for interim losses to injured resources and/or services (marsh, birds, aquatic fauna), which is addressed below.

alternatives for compensatory restoration: creation/restoration of oyster beds and marsh restoration (i.e., creation, enhancement, or protection).

Creation of an oyster bed by depositing cultch would increase habitat for oysters and other animals that require a hard surface for attachment. A created oyster reef would serve as a substrate for increased secondary productivity, and would provide habitat and/or feeding areas for some fish. Oyster reef construction could benefit recreational use by creating a new fishing location where fishes may aggregate. However, construction of an oyster reef would reduce the amount of area available for shrimping, and would have the potential to interfere with trawls. It would adversely impact the area of benthic habitat on which it would be constructed. Additionally, although oyster reef construction is technically feasible, there are no unleased waterbottoms within the area that have the appropriate salinity to support an oyster reef. Any cultch planting in the area would need to be on privately leased waterbottoms, not in the public realm, and therefore the Trustees could not guarantee that the oyster reef would provide the ecological services to the public since it would potentially be subject to harvest by private leaseholders.

Salt marshes are widely recognized as providing a suite of critical services for aquatic life. Marshes serve as spawning and nursery areas for many species of juvenile fish and shellfish, export detritus (energy source for the aquatic food web) into the estuary, and can increase water quality by filtering sediments and other pollutants from the water column. In addition, marsh habitat provides many collateral benefits such as storm surge protection and habitat for birds and mammals. As already discussed, marsh creation will benefit recreational use of the area by increasing production of important recreational species and their prey items. Marsh restoration, creation, and/or protection can be successfully and cost-effectively implemented. The rapid loss of coastal marshes in Louisiana due to subsidence and erosion is a serious threat to the ecology and economy of Louisiana and efforts to increase the amount of marsh through creation projects and functioning of existing marsh through enhancement projects are widely supported throughout the state. In addition, marsh restoration is consistent with state and federal policies concerning wetlands and essential fish habitat.

The Trustees decided that, for this incident, restoration in the form of creation, enhancement, or protection of marsh habitat is more consistent with the restoration selection criteria as compensation for aquatic faunal injuries than is oyster reef creation. Therefore, marsh restoration was identified as the preferred alternative as the compensatory restoration action for aquatic faunal injuries in the Draft DARP/EA, and selected as the alternative after consideration of all comments received.

### **5.3.2.3 Birds**

The Trustees feel that technically feasible and cost-effective alternatives exist to compensate for interim losses to birds. Thus, the Trustees determined that the No Compensation alternative was not appropriate compensatory restoration for this injury and considered three other alternatives for compensatory restoration: actions that would create, enhance, or protect bird nesting sites, oyster reef creation, and marsh restoration.



years for bird losses. For the 7,000 BBL model run, the estimated lost salt marsh equivalent was approximately 4.17 acre-years of lost marsh production for aquatic losses and approximately 27.65 acre-years for bird losses. Thus, the total estimated salt marsh equivalent for aquatic and bird losses was between 30.20 and 31.82 acre-years of marsh production.

Since each acre of marsh that is created will provide services such as primary production for a number of years, the number of acres that need to be created is less than the number of acre-years of marsh production presented above. These calculations are presented in Penn (1999). The Trustees estimated that the amount of marsh needed to be created in order to compensate for the aquatic fauna and bird losses lies between 3.18 and 3.35 acres. These values assume that the created marsh provide services for 25 years (assuming constant erosion beginning 3 years after creation).

As discussed in Chapter 4, Texaco did not agree with the method used by the Trustees to estimate aquatic faunal or bird losses nor with Trustee estimates of losses for these resources. Texaco also did not agree with the method used by the Trustees to translate aquatic faunal and bird losses into units of marsh production. However, Texaco offered four acres of marsh creation, or the ecological equivalent, as compensation for faunal injuries (both birds and aquatic organisms). The Trustees did not finalize or verify any model runs including runs using the final release estimate of 6,561 BBL, since the Texaco offer was clearly adequate as compensation for even a 7,000 BBL release.

#### **5.3.2.5 Human Use**

The No Action alternative is appropriate for compensatory restoration of recreational losses due to the small, anticipated magnitude of those losses. As discussed previously in Sections 1.2 and 4.4.4.1, the Trustees determined that, under the regulations and for the specific circumstances of this incident, the cost of conducting assessment studies to evaluate such a small potential injury was unjustified. However, the Trustees considered benefits to recreational uses as an additional criterion in determining the selected restoration alternative so as to provide some degree of compensation for potential recreational losses.

### **5.4 EVALUATION OF MARSH RESTORATION ALTERNATIVES**

The Trustees selected marsh restoration in the form of creation, protection, or enhancement as the preferred compensatory restoration project for all natural resource injuries. Since marsh restoration is a broad category that could include many types of actions and sites, the Trustees completed the second step of the selection process: the development of a range of project-specific marsh restoration alternatives and selection of a preferred alternative from this list. The selection process for these marsh restoration alternatives is described in greater detail below.

First, the Trustees compiled an initial comprehensive list of possible alternatives. The Trustees then conducted two "screenings" which narrowed the list to five alternatives. These five alternatives were then ranked in order of preference. For each screening and the ranking, two or more criteria, including the criteria listed in the OPA regulations, were applied to the list of alternatives. Section 5.4.1 describes the selection process. Sections 5.4.2 through 5.4.4 provide

Twenty alternatives that did not meet one or both of the proposed criteria were removed from the list (Exhibit 5-3). Ten of the projects were dropped due to the lack of a strong similarity in attributes to the injuries from the Incident. Of these ten, nine of them were dropped due to the fact that the project would benefit freshwater resources, and the incident impacted estuarine and marine resources. The Christmas Tree Sediment Fence project was eliminated based on a low nexus to the injured resources. This project is designed to trap sediments, which might eventually lead to marsh development, but this possibility was judged by the Trustees as too remote to be considered further. The remaining projects that were dropped during this first screen were dropped due to location. They were judged as being located too far away from the area impacted by the incident to serve as appropriate locations for compensating the members of the public that were most affected.

#### 5.4.1.3 Second Tier Screening

After the first tier screening was completed, the Trustees and Texaco collected additional, detailed information (e.g., project design, project status) on the remaining 23 alternatives. Once this information was assembled, a second set of screening criteria was applied and the list was narrowed to three alternatives: East Timbalier Island, Upper Bayou LaCache, and Raccoon Island. The Raccoon Island location was retained as an alternative, despite the lack of complete information at the time the secondary screen was conducted, due to its status as the most important rookery island off the Louisiana coast for brown pelicans, a threatened species in Louisiana. Although no brown pelicans were reported as being oiled or found dead, the results of the Trustee model suggests that some brown pelicans might have been killed. The Trustees therefore gave special consideration to this alternative, which would not have been the case in the absence of its importance to brown pelicans. The second tier screening criteria are described below, and the application of these criteria is shown in Exhibit 5-4.

*Project Status* - This criterion referred to the stage of the project. Projects that had already been completed, projects that were deauthorized under CWPPRA, and projects already fully funded from other sources were not considered for further evaluation.

*Site Ownership* - This criterion considered whether the site was publicly or privately owned and for private property, whether the landowner would agree to an appropriate conservation easement to ensure that the project would continue to provide benefits to the public far enough into the future to adequately fulfill compensation requirements.

*Likelihood of Success of Each Alternative (Technical Feasibility)* - This criterion considered whether a restoration project could be successfully implemented given currently available technology and expertise. Technically feasible alternatives were those that used proven methods, had a high rate of success as documented in the literature, and were well enough understood to characterize resulting natural resource service gains. This criterion also considered project and site-specific factors that may influence project success.

#	Project Name	Project Type	Method of Implementation	Source
13	Isles Dernieres (Whiskey Island) Planting Project	Marsh Enhancement	Planting or Supplemental Planting at TE-27/PTE-15bi	Trustees
14	Whiskey Island Restoration Project (TE-27/PTE-15bi)	Marsh Enhancement	Structure/Fill with Dredged Material and Plant	CWPPRA
15	Raccoon Island Project (TE-DWF)	Marsh Creation	Fill with Dredged Material and Plant	Trustees
16	Poseiden Pipeline Mitigation Project	Marsh Enhancement	Water Control Structure/Other?	Trustees
17	Penchant Sub-Basin Drainage Project	Marsh Enhancement	Hydrologic Modifications	BTNEP <sup>3</sup>
18	Penchant Basin Natural Resources Plan, Increment 1 (TE-34/PTE-26i)	Marsh Enhancement/Protection	Hydrologic Modifications	CWPPRA
19	Lake Boudreaux Wetland Project (TE-7)	Marsh Enhancement/Protection	Hydrologic Modifications	BTNEP
20	Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management Project (Alternative B) (TE-32/TE-7f)	Marsh Enhancement/Protection	Hydrologic Modifications	CWPPRA
21	L'Ours Ridge Restoration Project	Marsh Enhancement/Protection	Plug Cuts/Canals	BTNEP
22	Central Basin Tidal Drag Project	Marsh Enhancement?	Hydrologic Modifications	BTNEP
23	GIWW to Clovelly Project	Marsh Enhancement?	Hydrologic Modifications	BTNEP
24	Little Lake Oil and Gas Project	Marsh Enhancement?	Hydrologic Modifications	BTNEP
25	Salt Water Barrier or Lock in Houma Navigation Channel	Marsh Enhancement/Protection	Hydrologic Modifications	BTNEP
26	Avoca Island Lake Marsh Restoration Project	Marsh Creation	Sediment and Freshwater	BTNEP

#	Project Name	Project Type	Method of Implementation	Source
39	Point Au Fer Canal Plugs Project (TE-22/PTE-22/24)	Marsh Enhancement/ Protection	Plug Cuts/Canals, Shoreline Armoring	CWPPRA
40	Red Mud Demonstration Project (XTE-43)	Marsh Creation	Fill with Dredged Material and Plant	CWPPRA
41	Bay Chaland Planting Project	Marsh Enhancement	Planting	Trustees
42	West Belle Pass Headland Restoration Project (TE-23/PTE-27)	Marsh Creation/ Enhancement/Protection	Fill with Dredged Material, Plug Cuts/ Canals, Shoreline Armoring, Water Control Structures	Trustees
43	Houma Wastewater Facility Diversion Project	Marsh Enhancement	Wastewater Diversion	BTNEP

<sup>1</sup> Selected alternative is in bold

<sup>2</sup> Coastal Wetlands Planning, Protection & Restoration Act Comprehensive Plan

<sup>3</sup> Barataria-Terrebonne National Estuary Program Comprehensive and Management Plan

#	Project Name	Strong Similarity In Attributes?	Strong Proximity To Affected Area?	Insufficient Information To Screen?	Project Eliminated From Further Evaluation?
	<b>Introduction and Hydrologic Management Project (Alternative B) (TE-32/TE-7f)</b>				
21	L'Ours Ridge Restoration Project	*	No	No	Yes
22	Central Basin Tidal Drag Project	*	No	No	Yes
23	GIWW to Clovelly Project	*	No	No	Yes
24	Little Lake Oil and Gas Project	*	No	No	Yes
25	<b>Salt Water Barrier or Lock in Houma Navigation Channel</b>	?	Yes	Yes	No
26	Avoca Island Lake Marsh Restoration Project	No	No	No	Yes
27	Avoca Island Project (TE-35/CW-5i)	No	No	No	Yes
28	<b>Empire Waterway and Belle Pass Project</b>	Yes	Yes	No	No
29	<b>Falgout Canal Demonstration Project (TE-17)</b>	Yes	Yes	No	No
30	Lake Salvador Shoreline Protection Demonstration Project	No	No	No	Yes
31	Barataria Bay Waterway Shore Protection (west side) Project	*	No	No	Yes
32	Floatant Marsh Fencing Demonstration Project (TE-31/XTE-54b)	No	No	No	Yes
33	<b>Lower Bayou LaCache Hydrologic Restoration Project (TE-19)</b>	Yes	Yes	No	No
34	<b>Timbalier Island Demonstration Planting Project (TE-18)</b>	Yes	Yes	No	No
35	Bonnet Carre Freshwater Diversion Project	No	No	No	Yes
36	Dayou Lafourche Siphon Diversion Project (BA-25/PBA-20)	No	No	No	Yes
37	Brady Canal Hydrologic Restoration Project (TE-28/PTE-26b)	No	Yes	No	Yes
38	Lake Chapeau Sediment Input and Hydrologic Restoration Project (TE-26/PTE-23/26a/33)	Yes	No	No	Yes
39	Point Au Fer Canal Plugs Project (TE-22/PTE-22/24)	Yes	No	No	Yes
40	Red Mud Demonstration Project (XTE-43)	*	No	No	Yes

*Public Health, Safety, and Welfare* - This criterion evaluated the potential for a given restoration project to negatively impact public health, safety, and welfare.

Eleven of the projects surviving the first tier screen were eliminated in the second tier screen because funding had already been secured for the project, or the project had already been implemented. These projects are: East Timbalier Island Sediment Restoration (Phase one and two); Isle Dernieres Planting Project (East Island, Trinity Island, and Whiskey Island); Wine Island Eastward Expansion Project; Whiskey Island Restoration Project; Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management; Falgout Canal Demonstration Project; Timbalier Island Demonstration Planting Project; and West Belle Pass Headland Restoration Project. Another six projects were eliminated primarily based on project status either because the project has been deauthorized or there is no current intent to implement the project (Salt Water Barrier in Houma Navigation Canal; Empire Waterway and Belle Pass Project; Lower Bayou LaCache Hydrologic Restoration Project), or the project has not been developed beyond the conceptual stage (Poseiden Pipeline Mitigation Project; Lake Boudreaux Wetland Project; Bay Chalant Planting Project). As previously mentioned, the Raccoon Island Project remained under consideration, despite its status (conceptual stage), because of its special status as the most important rookery island for brown pelicans in Louisiana.

The Lake Barre Shoreline Armoring Project had a number of problems that caused it to be eliminated from further consideration. Although the experts consulted during the meeting on February 13, 1998 told the Trustees that such a project should reduce shoreline erosion, a very long barrier would have to be created in order to reduce erosion sufficiently to provide sufficient compensation for the injuries resulting from the incident. This would mean that the cost would be prohibitively high. There were also concerns expressed about the technical feasibility of construction of such a barrier in an area that is experiencing a high rate of subsidence. One of the major concerns was the potential impacts to oyster leases and subtidal benthic communities during the implementation of the project. Implementation of this project would require the use of deep draft barges in shallow water, probably requiring channels to be dredged to allow access. Given the concerns expressed to the Trustees at both public meetings conducted in 1997 about the potential impacts to oyster leases from implementing restoration in the area, as well as the other concerns identified above, this project was eliminated.

The Lake Pelto/Isles Dernieres New Cut Project was eliminated based on the estimated cost of the project (\$4-6 million). The benefits that would be derived from implementation of this project cannot justify this high expense, given the availability of other projects at significantly lower cost that would provide appropriate compensation to the public from the injuries to natural resources and services caused by the incident.

The Bayou Terrebonne Natural Levee Restoration Project was eliminated based on a number of concerns, but primarily on the cost. The first phase of the project is anticipated to cost \$7.9 million, and the second phase \$13.6 million. As with the Lake Pelto/Isles Dernieres New Cut Project, this is too costly to be a restoration alternative for this incident given the availability of other, more cost-effective projects that are sufficient to meet compensation needs.

Project Name	Project Status	Site Ownership	Technical Feasibility	Logistical Considerations	Cost Effectiveness	Avoids Additional Injury	Multiple Benefits	Social and Political Considerations	Public Health, Safety, and Welfare
Falgout Canal Demonstration Project (TE-17)	X								
Lower Bayou LaCache Hydrologic Restoration Project (TE-19)	X								
Timbalier Island Demonstration Planting Project (TE-18)	X								
Bay Chalard Planting Project	X								
West Belle Pass Headland Restoration Project (PTE-27)	X								

"X" denotes the project failed one or more criteria  
Projects remaining after this screening are in bold

**Exhibit 5-5  
Ranking of Preferred Restoration Alternatives**

Criterion	Upper Bayou LaCache Restoration Project	Raccoon Island Marsh Creation	Raccoon Island Segmented Breakwaters	Raccoon Island Stone Jetty/Groin	East Timbalier Island Planting Project
Site Location	+	+	+	+	-
Site Ownership	-	+	+	+	+
Similarity in Attributes to Injured Habitat	+	+	-	-	+
Project Stage	+	-	-	-	+
Project Timing	-	-	-	-	+
Recreational/Public Use Benefits	-	+	+	+	+

**Exhibit 5-6  
Explanation of Assigned Ranking**

Criterion	Explanation of Assigned Ranking	Project Given a "-" Ranking if:
Site Location	Project site within Terrebonne Parish	Project site outside of Terrebonne Parish
Site Ownership	Project implemented on public land or with appropriate conservation easements	Project located on private land without conservation easements arranged
Similarity in Attributes to Injured Habitat	Project will create or enhance brackish or salt marsh	Project is non-habitat based or will create other habitats
Project Stage	Detailed designs, studies, permitting, etc. have been completed	Project is in conceptual stage only; detailed designs or studies have not been completed
Project Timing	Project will not be subject to delays in implementation due to design issues, studies, permitting, landowner agreements, etc.	Project may be subject to delays in implementation due to design issues, studies, permitting, landowner agreements, etc.
Recreational/Public Use Benefits	Project will permit public access for recreational use opportunities	Project will not permit public access for recreational use opportunities



mangrove (*Avicennia germinans*) is also distributed across a large portion of the island (USDOC, 1993). In 1993, the total land area of East Timbalier Island was estimated as approximately 400 acres (GOTECH, 1998).

East Timbalier Island is part of a deteriorating barrier island system. The island is currently experiencing high rates of subsidence and shoreline erosion primarily due to an inadequate supply of sediments, high rates of relative sea level rise, and the impacts from periodic cold fronts, storms, and hurricanes (McBride and Byrnes, 1997). In 1992, Hurricane Andrew caused extensive breaching and erosion on East Timbalier Island resulting in a 25% decrease in the island's landmass. Breaching of the island and back levee was most extensive where the island was narrow or its width locally reduced as a result of bayside embayments. The recent extension of existing jetties at Belle Pass has also accelerated shoreline erosion by reducing the amount of new sediment supplied to East Timbalier. According to McBride et al. (1991), the island is currently experiencing average shoreline retreat rates of approximately 76 feet per year. The highest rates of loss are occurring in the island's central region (GOTECH, 1998).

Efforts to protect and restore East Timbalier Island have been ongoing since the mid-1960's and have included the construction of a bayside dirt levee, a gulfside rock revetment, and most recently, the creation of approximately 22 acres of smooth cordgrass marsh on dredge materials. A more detailed account of previous shoreline protection and restoration measures on the island is provided in GOTECH (1998). Without additional restoration efforts, however, it has been predicted that the island will disappear in as soon as three (Reed, 1995) to 25 (van Beek, 1993) years.

Current efforts by the National Oceanographic and Atmospheric Administration (NOAA) and the Louisiana Department of Natural Resources's Coastal Restoration Division to preserve the island are focused on creating approximately 250 acres of marsh and dune habitat as part of the East Timbalier Island Sediment Restoration Project. Dredge materials from Timbalier Bay will be placed in shallow water areas where the island was breached by Hurricane Andrew and where the island is narrow to increase its width (primarily in the central and eastern portion of the island). A rock revetment will be constructed on the gulfside where shoreline breakwaters have deteriorated, and dune habitat established northward of the revetment and gulf beach. The revetment and dunes will provide additional shoreline stabilization by reducing the frequency and magnitude of future washover events. Construction began on this project in April, 1999. It is projected that placement and consolidation of the dredge material will be completed in early September, 1999. CWPPRA has funds for placement of the spoil material and the construction of the rock revetment, but has no funding available for planting salt marsh vegetation. Planting of the marsh platform is conservatively anticipated to increase the lifespan of the project by over 33 percent.

The restoration project selected for the Lake Barre incident consists of planting salt marsh vegetation on the newly-deposited dredge materials on East Timbalier Island. Marsh vegetation (smooth cordgrass [*Spartina alterniflora*] and marshhay cordgrass [*Spartina patens*]) will be planted on 18.6 acres of the approximately 170-acre marsh platform. Plants will be installed in strips consisting of multiple rows. Strips will be oriented parallel to the shoreline and will be separated by unplanted areas. Strips will serve as a source of seed, as well as vegetative material (rhizomes) for colonization of unplanted areas within the marsh platform. The general planting

means that Texaco will be required to produce more marsh (through direct planting and vegetative spread) on the marsh platform on East Timbalier Island than they would have had to plant on a typical marsh creation project.

#### 5.4.2.3 **Restoration Scaling Approach**

The scaling approach used to determine the extent of resource restoration required as compensation for natural resource injuries is based on Habitat Equivalency Analysis (HEA). HEA begins with the injury assessment and an identification of the habitat-specific resource services that were lost due to the incident. A "debit" is specified for the lost services for each type of resource habitat. The debit equals the loss in service-acre-years from the injury to the habitat, as a result of the incident, in present-value terms. For each debit, the scale of a compensatory restoration project is determined by calculating the credit, per acre, that the restoration project will generate over its lifespan. This credit is the present value of the ecological services provided by the project. Then, the size of the compensating project is calculated so as to equate the total credit to the debit. Both the debit and per-acre credit are measured by service-acre-years, as discussed in Section 4.3.1.

This scaling procedure is summarized by the following equation:

$$\text{Debit} = (\text{Credit per acre from restoration project}) \times (\text{Acres of restoration project})$$

The first component is the debit for the injured resource services. The second component is the credit per acre from implementing the restoration project. The credit is based on a set of input parameters to the HEA model. Given the debit, and the credit per acre for restoration, it is a simple task to solve the equation for the acres of the restoration project needed to equal the debit.

##### 5.4.2.3.1 **HEA Debit**

The debit is composed of two parts. The first part corresponds to the reduction in the full set of marsh services from oiled marsh, including faunal support services. This part of the debit corresponds to the marsh injuries described in Chapter 4. The second part of the debit corresponds to the direct aquatic faunal and bird injuries described in Chapter 4, translated into marsh services, required to restore direct faunal losses. Indirect injuries to fauna due to losses in marsh services to fauna are included in the marsh debit. The debit and scale of restoration needed to compensate for these two injury categories have been determined separately.

Regarding the full marsh services, based on the marsh injury studies, as described in section 4.3.2, the marsh injury debit is 75.6 discounted service acre years (DSAYs).

The Trustees and Texaco did not agree on the faunal debit. Texaco offered four acres of marsh creation as compensation, and the Trustees independently confirmed that the faunal debit could be compensated for via four acres of marsh creation. Because the selected restoration project on East Timbalier Island is one of marsh enhancement rather than marsh creation, there is a need to translate the credit that would be generated by four acres of marsh creation into an amount of

The scaling model and the parameters used are discussed in detail in the technical scaling memorandum (Tomasi and Penn, 1999) that is available in the administrative record. Based on all the considerations discussed above, the required area to plant in strips to compensate for the faunal debit is 3.7 acres. The required area to compensate for the marsh debit is 14.9 acres. Therefore, the total area to be planted is 18.6 acres. The total area enhanced (either planted in strips or more rapidly colonized because of the strips) is computed as 58.0 acres.

#### 5.4.2.4 Probability of Success

Planting salt marsh vegetation on dredge materials is a feasible and proven technique with well-developed methodologies and well-documented results. This technique has been used successfully at a number of sites along the Gulf coast including Grand Isle, and Wine, Raccoon, and East Islands. For the East Timbalier Island Planting project to be successful, it is important that smooth cordgrass and marshhay cordgrass are planted within the appropriate elevational range. The optimal elevational range for each of these species will be determined by measuring the elevational range of healthy and robust populations of smooth cordgrass and marshhay cordgrass in existing natural marshes on the island.

Several additional measures will be taken to improve the likelihood of project success. Plants will be contract-grown in Louisiana by a Louisiana licensed nursery grower. Most of the specified plants will be container-grown (potted). Bare-root plugs will also be used. Container-grown plants have well-developed root systems that have superior drought resistance. Smooth cordgrass pots and plugs will be *Spartina alterniflora* cv. *Vermillion*, a cultivated variety that is resistant to infection by the fungus *Rhizoctonia solani*. *Rhizoctonia* infections are prevalent in native stands of smooth cordgrass along the Gulf coast. Pots and plugs will also be acclimated to the local climate and habitat conditions found on East Timbalier Island for at least 90 days prior to installation. Planting will not be conducted during stormy weather or prior to predicted storms to avoid plant loss.

After elevations on the marsh platform have been determined, based on the configuration of the completed platform following settling of the dredge material and the reworking of this material by winter storms, Texaco will submit a detailed planting design for Trustees approval. The Trustees will carefully monitor plant handling and installation to ensure that the guidelines are being followed. All plant materials will be inspected to ensure that they are healthy and vigorous and will be protected during mobilization from drying and physical damage. Planting will occur in spring through early summer (to be concluded by July 31) to allow growers adequate time to grow and harden the plants prior to planting. Container-grown plants will be treated with a slow-release fertilizer at the time of planting. Other measures are under consideration for inclusion in the project design to increase the likelihood of success, including dune planting or the installation of sediment fence along the dunes to prevent the smothering of marsh plants by wind-borne sand. Replanting may occur if a significant number of the plants die within the first 60-days.

#### **5.4.2.5.4**      *Corrective Actions*

In the event that the performance standards are not achieved at the 60-day or 3-year monitoring, or if the interim monitoring suggests unsatisfactory project progress, corrective actions may be implemented by Texaco. Corrective actions may include, but are not limited to, the following:

- Allowing additional time for site to develop (no action);
- Replanting/seeding same species in same area;
- Replanting/seeding same species in different areas;
- Replanting/seeding different species;
- Sand fencing or other stabilizing structures; and
- Applying additional fertilizer.

#### **5.4.2.5.5**      *Reporting*

Texaco will prepare and submit monitoring reports to the Trustees after the 60-day monitoring event and following each annual monitoring event. Monitoring reports will contain the results of all annual monitoring events that will be presented in a cumulative fashion. Following receipt of the monitoring reports and based on observations made in the field, the Trustees will coordinate with Texaco regarding the performance of the project, including any need to perform corrective actions.

#### **5.4.2.6**      **Environmental and Socioeconomic Impacts**

Planting marsh vegetation on East Timbalier Island is not expected to have any significant adverse environmental or economic impacts. Any impacts to existing habitats from project implementation are expected to be temporary. [Impacts to subtidal sediments by placement of dredge material are due to the CWPPRA project and not due to planting- but even these impacts were judged to be insignificant relative to the benefits of restoring the island (GOTECH, 1998)]. Plantings may be conducted during the bird nesting season only while maintaining a minimum distance of 100 meters from nesting wading birds and 200 meters from nesting seabirds. Typically only the latter are expected on East Timbalier Island. If any nest sites are found within the project area, they will be mapped and flagged prior to planting to limit disturbance. Four threatened and endangered bird species were identified in an Environmental Assessment of East Timbalier Island as occurring in the vicinity of the project area: piping plover, brown pelican, least tern, and bald eagle (GOTECH, 1998). None of these species are known to nest on East Timbalier Island and therefore should not be impacted by the project.

bird watching, hunting, and nature study. For these reasons, the Trustees have determined that, compared to all other potential restoration alternatives investigated, marsh enhancement at East Timbalier Island best fits the OPA restoration selection criteria. This alternative best addresses the injuries to marsh habitat, aquatic fauna, and birds from the Lake Barre incident and was therefore the preferred alternative identified in the Draft DARP/EA and the selected alternative in this Final DARP.

Another important benefit of marsh enhancement at East Timbalier Island is sediment stabilization. Planted vegetation will stabilize newly deposited dredge materials by binding sediments with an extensive system of roots and rhizomes, dampening wave and current velocities during overwash events, and increase sedimentation through trapping wind-borne sediments. Although East Timbalier Island will still be susceptible to subsidence, erosion, and the impacts of storms and hurricanes, stabilizing sediments by planting vegetation will prolong the life expectancy of the island. Protection and stabilization of barrier islands is of particular importance to the Lake Barre Trustees because of scientific concern over the deterioration of Louisiana's barrier islands and strong public support for barrier island restoration projects. In fact, barrier island restoration is a key component of Louisiana's coastal restoration program (van Heerden and DeRouen, 1997). Additionally, restoration and maintenance of the Timbalier and Isle Dernieres barrier island chains is a strategic goal of the Coast 2050 project (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, 1998), a project that was developed with federal, state, and local agency, as well as community input.

The loss of Louisiana's barrier island system would have significant environmental and economic consequences. Barrier islands serve as the last defense for inland areas, protecting them against the destructive forces of hurricanes, storm surges, and saltwater intrusion (van Heerden and DeRouen, 1997). If the barrier island system were lost, inland bays and estuaries would be converted to less productive open water areas which would likely result in the diminishment of Louisiana's recreational and commercial fishing industries (GOTECH, 1998; van Heerden and DeRouen, 1997). Increased exposure of inland coastal areas to the physical influence of the open waters of the Gulf of Mexico would threaten navigational waterways, shipping routes, artificial levees, and other infrastructure (van Heerden and DeRouen, 1997).

The Lake Barre incident occurred in Terrebonne Parish, and the Trustees considered the benefits to Terrebonne Parish in all restoration alternatives considered. Although East Timbalier Island lies in Lafourche Parish, just east of the Terrebonne Parish boundary, it provides protection for inland marshes and coastal communities in the Terrebonne/Timbalier Bay system of both parishes. Over the past century, East Timbalier Island has endured several direct hits from hurricanes and tropical storms (GOTECH, 1998). East Timbalier Island also protects about 400 oil and gas wells (Miller, 1994) and numerous pipelines (GOTECH, 1998) in Timbalier Bay. These wells and pipelines were not designed to withstand open ocean conditions and exposure to these conditions would increase the risk of a major oil spill. Therefore, stabilization of the barrier islands will help reduce the chance of future oil spill incidents.

secured. Coordinating with landowners could cause delays in project implementation or possibly result in the cancellation of the project. In addition, it is difficult to establish the connection between the benefits of berm construction and the direct replacement of lost ecological services. This difficulty in establishing, and therefore quantifying, the benefits of this project would make it difficult for the Trustees to determine if the benefits would provide adequate compensation. Furthermore, because the site is privately owned and access is limited, there will likely be little or no direct recreational opportunities for the public.

Finally, Upper Bayou LaCache is an active marsh management project. The Tidewater District operates existing water control structures and pump stations in accordance with an approved Army Corps of Engineer's Operations and Maintenance Plan. The Trustees are concerned that site management goals may not necessarily coincide with NRDA restoration goals. For these reasons, the Upper Bayou LaCache project is not a preferred restoration alternative.

#### **5.4.4 Non-Preferred Alternative: Raccoon Island Restoration Projects**

##### **5.4.4.1 Site Description**

Raccoon Island is a 114-acre barrier island located in Caillou Bay in southwestern Terrebonne Parish. It is the western most island of the Isles Dernieres barrier island chain which extends from Raccoon Point to the west to Wine Island Pass to the east. Raccoon Island has been designated as part of the Terrebonne Barrier Islands Refuge along with Whiskey and Wine Islands. The island is owned by the State of Louisiana and managed by the LDWF. Raccoon Island is rapidly eroding. In 1992, Hurricane Andrew destroyed large portions of the island.

Restoration has been ongoing since the LDWF assumed management of the island in 1992. In 1993, dredged materials were used to plug breaches and create marsh and dune habitat. More recently, eight offshore, segmented breakwaters were installed along the eastern end of the island to reduce wave energy and trap longshore sediments. Three restoration projects are currently proposed for Raccoon Island: marsh creation, installation of additional breakwaters, and construction of a jetty.

##### **5.4.4.2 Salt Marsh Creation on Raccoon Island**

###### **5.4.4.2.1 *Project Description***

Salt marsh would be created using dredged materials from a borrow area north of the island in Caillou Bay. Dredge materials would be used to create either a series of elevated lobes extending from the northern shoreline into the bay or placed on top of and behind the sand spit on the western end of the island. Following placement and consolidation of materials, the area would be planted with both salt marsh vegetation and mangroves.

displacing the existing flora and fauna that depend on that type of habitat and replacing them with ones that rely upon a hard substrate. The environmental benefits of breakwaters include perching sites for birds, attachment sites for aquatic macroinvertebrates, and a source of cover and food for fish. In addition, by attracting fish, the breakwaters would provide increased recreational opportunities for local anglers.

#### **5.4.4.3.3      *Evaluation***

Extending breakwaters along the Gulf and/or bayside of Raccoon island will slow beach erosion by reducing wave energy and enhancing net sediment deposition, as well as protect the island during severe weather conditions. The existing breakwaters are used as sites for recreational fishing, and increasing the number of breakwaters would increase fishing opportunities for the public. Furthermore, there is strong public support for barrier island projects.

To date, however, the project has not advanced beyond the conceptual design stage. There have been no detailed engineering surveys to determine project feasibility. The success of the existing breakwater project is still being evaluated and the Trustees consider the use of breakwaters for habitat restoration to be too experimental at this point in time to justify its selection over the preferred alternative. Additional studies may cause delays in project implementation or reveal the project to be infeasible or not cost-effective. In addition, scaling this project to determine the appropriate number of breakwaters would be difficult. Although the breakwaters will protect existing beach, mangrove, and marsh habitats, it is difficult to establish the connection between the benefits of breakwater construction and the direct replacement of lost services. For these reasons, the Trustees have determined that breakwater construction is not a preferred project.

#### **5.4.4.4      *Jetty at Raccoon Island***

##### **5.4.4.4.1      *Project Description***

This project would construct a rock jetty at the western end of Raccoon Island at Raccoon Point. The jetty would extend 650-800 feet into the Gulf of Mexico. The purpose of the jetty would be to trap and retain sediments within the island system and build up the western end of the island. The jetty would be similar in design to the rock breakwaters, although oriented perpendicularly to the axis of the island rather than parallel.

##### **5.4.4.4.2      *Environmental and Socioeconomic Impacts***

Jetty construction would substantially alter the bottom characteristics of the offshore environment. The jetty most likely would be located on a sandy, featureless bottom, thereby displacing the existing flora and fauna that depend on that type of habitat and replacing them with ones that rely upon a hard substrate. The environmental benefits of a jetty include a perching site for birds, attachment sites for aquatic macroinvertebrates, and a source of cover and food for fish. In addition, by attracting fish, the jetty would provide increased recreational opportunities for local anglers.

this project from a broad range of general and site-specific alternatives that included marsh creation, enhancement, and protection alternatives.

The selected project will, in the judgment of the Trustees, provide more than sufficient compensation to make the public and the environment whole for injuries resulting from the Lake Barre incident. Although comments were received objecting to the project based solely on its location outside of Terrebonne Parish, as discussed in Section 2.4.1, there were no comments received that challenged the Trustees' evaluation of alternatives based on the screening criteria. The amount of planting to be implemented under this alternative was determined through calculations based solely on the benefits of the planting and subsequent vegetative spread on East Timbalier Island itself. This is sufficient to directly compensate for the injuries to marsh function, and loss of birds and aquatic fauna. No public comments were received that disputed the adequacy of the scale of the restoration project. Although the available information suggests that there was little lost recreational use associated with this incident there will be benefits to recreational fishing and wildlife viewing through the increased fish and bird populations that the newly created habitat will support. Therefore the chosen alternative will, in the judgment of the Trustees, provide adequate compensation for the limited public lost human use associated with this incident.

There are additional benefits to this project that are not considered in the calculation of how much planting is required. The longevity of East Timbalier Island will be increased through stabilization of the dredged material and the capture of sediments by the planting. This will, in turn, decrease the rate of loss of interior marsh in the Lake Barre area since storm surge and wave heights are reduced by the presence of barrier islands. It will also serve to protect coastal communities in Terrebonne Parish as well as the oil and gas infrastructure that are not designed for open gulf conditions. Considering these additional benefits for which Texaco has not received credit in the scaling calculations, the Trustees are confident that this restoration alternative provides more than sufficient compensation for injuries resulting from this incident.



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## Appendix A Administrative Record Index (through August 26, 1999)

Number	Date	Description of Contents
1	5-16-97	DEQ spill report
2	5-19-97	USCG POLREPS
3	5-19-97	Unified Command Center spill report
4	5-19-97	Spill notification to Governor Mike Foster
5	5-19-97	Notification of Closure of Molluscan Shellfish Waters
6	5-21-97	USCG POLREPS
7	5-23-97	Preliminary results from the Texaco Pipeline spill samples
8	5-30-97	USCG POLREPS
9	6-6-97	Biological sampling near oil spill site
10	6-9-97	LOSCO inviting Texaco to participate in cooperative NRDA assessment
11	6-19-97	Meeting with Entrix and ES <sup>2</sup> (for Texaco) and Trustees 6-17-97
12	6-20-97	Notice of Intent to Perform a NRDA
13	6-24-97	1) Tri-State Bird Rescue and Research, Inc., Final Bird Species List 2) Estimated Bird Mortalities/Oilings 3) Tri-State Bird Rescue and Research, Inc., Final Report
14	7-10-97	Lake Barre oil spill public meeting-report
15	7-11-97	July 1 meeting with FINA representatives
16	7-23-97	Follow-up of requests from 6-14-97 meeting
17	8-97	Texaco agreeing to fund NRDA preassessment phase costs
18	8-15-97	NOAA "HOTLINE" chronological spill reports of incident
19	10-24-97	Publishing of a notice of public meeting in Houma Courier
20	10-22-98	Marsh Assessment Study Plan Eugene Island Pipeline Incident
21	10-22-98	Data Summary Section for Inclusion in Pre-Assessment Screen Report
22	2-12-98	Notes on L. Barre Coordination Meeting of 2-12-98
23	5-18-98	Notification of Property Access
24	6-24-98	Draft Marsh Injury Assessment Workbook
25	6-9-97	Summary of CAG meeting
	6-24,25-97	Summary of CAG meeting and activities
	9-21-97	Summary of CAG meeting and activities
	11-10,11-97	Summary of CAG meetings
	12-8-97	Summary of conference call
	2-19-98	Correction of summary CAG meeting
	4-24-98	Summary of conference call
	5-12-98	Summary of CAG meeting
	5-18-98	Summary of conference call
	7-13-98	Summary of conference call
	7 28,29-98	Summary of CAG meetings
	9-3-98	Summary of conference call
	11-5-98	Summary of CAG meeting
	1-20-99	Summary of CAG meeting
	4-19,20-99	Summary of CAG meeting
	4-29-99	Summary of conference call

	7-2-99	Letter from Michael Robichaux (Louisiana State Senator) to Jack Caldwell (Secretary of DNR)
	7-2-99	Letter from Judith Gibson (Tidelands Seafood Co. Inc.) to Roland Guidry (LOSCO)
	7-7-99	Letter from John Siracusa (Louisiana State Senator) to Jack Caldwell (Secretary of DNR)
	7-12-99	Letter from Sam Hamilton (DOI/USFWS) to John Kern (NOAA)
	7-21-99	Letter from Ray B. Boudreaux, Jr. (Terrebonne Parish Council Chairman) to Warren P. Lorentz (LOSCO)
	7-23-99	Letter from Judith Gibson (Tidelands Seafood Co. Inc.) to Warren P. Lorentz (LOSCO)
	7-23-99	5 response letters from Jack Caldwell (Secretary of DNR) to Paul Labat (Terrebonne Parish Council Clerk), Michael Robichaux (Louisiana State Senator), Hunt Downer (Speaker of the House of Representatives), John Siracusa (Louisiana State Senator), and Reggie Dupre Jr. (Louisiana State Representative)
	7-28-99	Letter from Matthew B. Sevier (TPCG CZM Manager) to Oil Spill Coordinator
	7-28-99	Letter from Barry P. Bonvillain (Terrebonne Parish President) to Warren P. Lorentz (LOSCO)
	8-13-99	Letter from Gary Harmon (ENTRIX) to Warren P. Lorentz (LOSCO)
	8-16-99	Response letter from Terry Ryder (Governor Mike Foster's Deputy Chief of Staff) to Paul Labat (Terrebonne Parish Council Clerk). Attachment: Letter from Dr. Karolien Debusschere (LOSCO) to Governor Mike Foster
49	7-9-99	Meeting minutes from 6-21-99 Terrebonne Parish Council meeting
50	8-26-97	Entrix list of Action Items from 8-21-97 CAG meeting to LOSCO
51	8-12-98	Preliminary list of Restoration options, screening criteria
52	8-24-98	Proposed HEA debit curves for marsh injury
53	7-9-98	Letter from David Richard (Steam Wetland Services, L.L.C.) to Gus Stacy (LOSCO)

**Additional Material**

<u>Letter</u>	<u>Date</u>	<u>Description of Contents</u>
A	5-17-23-97	Color Oblique Aerial Photographs
B	10-2-97	Color Infrared Aerial Photography of Lake Barre Spill
C	5-10-98	Color Infrared Aerial Photography of Lake Barre Spill
D	4-26-99	Literature Review
E	7-22,24-97	Field Efforts filmed by Entrix (VCR tape)
F	10-7,8-97	Field Efforts filmed by Entrix (VCR tape)
G	6-97-10-98	John Kern's (NOAA) Field Log Book
	5-97-10-98	John Kern's (NOAA) Photographs and Photolog

vests the Corps with authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 Clean Water Act permits are likely also to require permits under Section 10 of the Rivers and Harbors Act. However, a single permit usually serves for both. Therefore, the Trustees can ensure compliance with the Rivers and Harbors Act through the same mechanism.

#### **Coastal Zone Management Act (CZMA), 16 USC 1451, *et seq.*, 15 CFR 923**

The goal of the CZMA is to preserve, protect, develop and, where possible, restore and enhance the nation's coastal resources. The federal government provides grants to states with federally-approved coastal management programs. Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the state the opportunity to concur that the project is consistent with the state's coastal policies. The regulations outline the consistency procedures. The selected restoration project will be consistent with the Louisiana CZMA program.

#### **Endangered Species Act (ESA), 16 USC 1531, *et seq.*, 50 CFR Parts 17, 222, 224**

The ESA directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authorities to further these purposes. Under the Act, the Department of Commerce through NOAA and the Department of the Interior through the US&FWS publish lists of endangered and threatened species. Section 7 of the Act requires that federal agencies consult with these departments to minimize the effects of federal actions on endangered and threatened species. The selected restoration project is expected to have no adverse impacts on threatened or endangered species and is expected to develop habitat enhancements beneficial to supporting ecosystems for threatened and endangered species, including, but not limited to brown pelicans and piping plovers. Consultation has been completed for the CWPPRA East Timbalier Island Restoration Project (GOTECH, 1998).

#### **Fish and Wildlife Conservation Act, 16 USC 2901, *et seq.***

The selected restoration project will encourage the conservation of non-game fish and wildlife.

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

The FWCA requires that federal agencies consult with the U.S. Fish and Wildlife Services, the National Marine Fisheries Service, and state wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into

disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low income populations. EPA and the Council on Environmental Quality (CEQ) have emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations. The Trustees have concluded that there are no low income or ethnic minority communities that would be adversely affected by the selected restoration project.

**Executive Order Number 11514 (34 FR 8693) - Protection and Enhancement of Environmental Quality**

An Environmental Assessment has been prepared and environmental coordination is taking place as required by NEPA.

**Executive Order Number 11990 (42 FR 26961) - Protection of Wetlands**

The selected restoration project will help ensure the protection of wetlands and the services they provide.

**Executive Order Number 12962 (60 FR 30769) - Recreational Fisheries**

The selected restoration project will help ensure the protection of recreational fisheries and the services they provide.

## Monitoring Plan

### Project Performance Criteria and Related Monitoring Methods

#### Introduction

This Monitoring Plan for the East Timbalier Island Planting Project was developed to allow an objective assessment of project progress towards pre-determined performance standards. Monitoring is an important part of the restoration process, and is required to document restoration effectiveness pursuant to NOAA's Final Rule (15 CFR Part 990). The remaining sections of this monitoring plan describe performance criteria and monitoring methods.

The performance criteria are specified as (1) percent survival of each of the two species, *Spartina alterniflora* (smooth cordgrass) and *Spartina patens* (marshhay cordgrass) in the planted strips after 60 days, and (2) percent cover achieved at the end of year three of the project (interim monitoring will be conducted at years 1 and 2, but is not subject to performance criteria). Cover requirements are specified for each of two species, *S. alterniflora* and *S. patens*, and two areas, planted strips and gap areas where vegetative spread is expected. The gap area is a five-foot area on the landward side of the *S. alterniflora* planted strip and a three-foot area on each side of the *S. patens* planted strips (see Figure 1 and Figure 2, provided for illustrative purposes.)

Monitoring activities that will be undertaken are presented in Table 1.

**Table 1: Project Monitoring**

Monitoring Event	Activity		Performance	
	Aerial* Photographs	Ground Photographs	Percent Survival Estimate	Percent Cover Estimate
60 day		✓	✓	
1 and 2 years		✓		✓
3 years	✓	✓		✓

\*Aerial photographs will only be required if air photo interpretation is used to estimate percent cover.

The performance criteria by species and area are summarized in Table 2.

**Table 2: Performance Criteria**

Time Period	Performance Criteria	
<b>60 day</b>		
<i>S. alterniflora</i>	50% survival	
<i>S. patens</i>	50% survival	
<b>3 years</b>	<b>Strip</b>	<b>Gap</b>
<i>S. alterniflora</i>	Minimum of 50% cover; 80% average cover**	Minimum of 25% cover; 45% average cover**
<i>S. patens</i>	Minimum of 30% cover; 50% average cover**	Minimum of 15% cover; 25% average cover**

\*\* Average cover is calculated as the number of equivalent acres tallied divided by the acres required for each category. Calculations are shown below.

### **60-Day Monitoring Event: Measurement of Percent Survival**

The first project monitoring will occur approximately 60 days following the completion of planting. During the preparation of an as-planted survey to document the location of all plantings, the planted strips will be divided into multiple parcels approximately one acre in size. There will be two types of parcels: *S. alterniflora* in planted strips and *S. patens* in planted strips. Percent survival will be visually estimated for each parcel by a team composed of Trustee and Equilon representatives. If the team cannot agree on a visual percent survival estimate, one randomly selected location in the parcel will be sampled. At that location, the number of live and dead (or missing) plants will be counted within a 40-foot length of strip. If any member of the team is still not satisfied with the percent survival estimate, two more randomly selected locations will be sampled and all three estimates will be averaged to obtain the percent survival estimate for that parcel. The three randomly selected locations will be shown on the as-planted survey.

A minimum of ten fixed photo-monitoring stations will be established in areas of interest across the platform as approved by the Project Manager. Ground level photographs will be taken from each of the fixed photo-monitoring stations during the interim and final monitoring events to document general site conditions over time at the same location and vantagepoint. Additional monitoring stations may be established during subsequent monitoring efforts, if warranted. Ground level photographs will also be taken as needed in other locations to document specific site conditions such as erosion, breaching, and plant mortality. The fixed photo-monitoring stations will be marked using PVC pipe driven at least 3 feet below the surface. Differential GPS coordinates will be recorded for each station.

### **Interim Monitoring**

Interim monitoring will be done in years one and two. The purpose of interim monitoring is to assess project performance and to identify areas on the platform that may require corrective actions to ensure project success by the end of year three. A site visit to examine the planted parcels will be arranged for each interim-monitoring event at year one and year two. Planted areas where vegetative survival and spread do not appear sufficient for the area to meet performance standards in year three will be recorded. Photographs will be taken of key areas approved by the Project Manager within the project area. Transects and/or photographs (land based or aerial) or visual estimates will be used to estimate percent cover in the parcels. A summary of findings and recommendations associated with the interim observations will be provided to the Trustees. Based on interim monitoring results and discussions with the Project Manager, monitoring methods associated with the three-year assessment may be adjusted to take advantage of the best approaches developed during the interim monitoring efforts.

### **Third Year Monitoring Event: Measurement of Percent Cover**

The purpose of monitoring after three years is to determine if the project has reached the three-year criteria stated in Table 2 above. Percent cover is used as the criteria for success. In addition to the strip *S. alterniflora* and *S. patens* parcels, two additional parcel types (approximately one acre in size) will be defined: *S. alterniflora* in gaps and *S. patens* in gaps. Each of the four different types of parcels will have its own performance criteria (Table 2). The number of parcels of each type and the location of each parcel will be included on the as-planted survey.

Either of two different methods for determining percent cover in the individual parcels will be used. The traditional ground-based point-line intercept method could be cumbersome to apply and provides lower resolution for determining where plant performance problems exist. Air photo interpretation with ground truthing provides more precise data about the location of performance problems, but the Trustees feel that the method needs to be demonstrated as adequate for this specific application. Either method may prove acceptable after reviewing the year 1 and year 2 performance information. Equilon shall recommend either the air photo interpretation or the ground based point-line intercept method to determine percent cover in the parcels.

After reviewing the year one and year two performance information, the Project Manager with concurrence of Trustees, will notify Equilon of the acceptable method. A general description of the two methods is presented below.

#### ***Air photo interpretation***

Computer photo interpretation of aerial photographs may be used to determine percent cover in each parcel on the platform. A general description of the method can be found in Lilles and Kiefer (1994). The computer analysis will be calibrated by taking ground measurements of percent cover either immediately before or immediately after the aerial photographs are made. Overflights will not occur more than ten days prior to ground truthing. In the event that the overflight is not done at the same time or prior to ground truthing, it should be done as soon as possible afterwards, as allowed by the weather conditions.

Color infrared photographs will be digitized such that each pixel on the image will represent a small area of the platform. The specifications of the aerial photography must be approved by the Project Manager to assure an appropriate scale and coverage. The photographs will be imported into an image processing software program that can analyze the number of pixels by color.

Estimates of percent cover using ground transect measurements (as described below) will be made at approximately 15 selected locations (transects) to calibrate the computer analysis. Areas selected for calibration will represent the range of percent cover in the planted areas and the gap areas for both species. Areas on the ground will be located using a differential GPS receiver capable of one meter accuracy and the percent cover determined at these locations as described below. Percent cover will be computed in areas where the cover is fairly uniform so that minor differences between the area sampled on the ground and the area sampled from the photos will be inconsequential. The measurement of percent cover on the 15 ground transects will be compared to the calculation of percent cover from the geo-referenced aerial photographs and a



correction factor applied to the computer determined values. These corrected values from the aerial photographs will be used to assign percent cover classes to all parcels of the platform.

### ***Ground-Based Point-line Intercept Method***

On the ground, percent cover will be estimated using the point-line intercept method (Bonham 1989). Each transect will be defined by a tape measure drawn taut between two stakes at the endpoints of the transect. At six-inch intervals along the tape measure, a wire pin or wooden dowel will be lowered perpendicular to the ground through a wooden frame. If the pin intercepts plant material (leaves or stems), a "hit" will be recorded along with the plant species. If no plants are intercepted, a "miss" will be recorded. Percent cover will then be estimated by the following formula:

$$\text{Percent cover} = (\text{sum of hits}/\text{total number of possible hits}) * 100$$

The percent cover in each parcel will be obtained by averaging the percent cover estimate for all the transects in each parcel.

Initially percent cover will be estimated for a maximum of 6 randomly located transects per acre. This level of effort will provide a 95% confidence interval of +/- 8% cover if the sample variance is equal to the variance in data contained in Hester and Mendelsohn (1992). After each day of sampling, cover estimates for all transects sampled will be used to calculate a new level of sampling effort so that a 95% confidence interval of +/- 8% is maintained. In order to maintain a reasonable sampling effort a maximum of 8 transects per acre will be sampled.

### **Percent Cover Computation**

In order to standardize the units for each separate type of parcel, the percent cover computation will take place on an equivalent-acres basis. That is, the number of acres at 100% cover that would be equivalent to the required number of acres at the required percent cover will be calculated. For example, a hypothetical performance criteria for *S. alterniflora* of 6 acres at 80% cover would be equivalent to 4.8 acres at 100% cover (6 acres X 0.8 = 4.8). The equivalent acre requirements for each category of parcel will be calculated separately.

The number of acres of each parcel type that would be required if the preliminary planting plan (see the Assessment and Restoration Plan) were implemented is presented in Table 3. The performance criteria and the calculated equivalent acres are also shown. Table 4 shows the same information but shows the division of the total acreage into separate parcels and an alternative way to calculate the total equivalent acres required. The actual number of acres in each category is likely to change in accordance with the as-planted survey. These calculations are shown for illustration purposes only.

**Table 3: Example Planting Project with Calculation of Equivalent Acres**

Parcel Category	Required Acres	Performance Criteria	Equivalent Acres (acres x criteria)
<i>S. alterniflora</i> strips	11.7	80%	9.36
<i>S. alterniflora</i> gaps	1.7	45%	0.77
<i>S. patens</i> strips	6.9	50%	3.45
<i>S. patens</i> gaps	2.3	25%	0.58

In order to meet the performance criteria, Equilon must show that:

1. Sufficient acres above the minimum percent cover are credited to each parcel category so that the total equals or exceeds the required number of acres within a category (e.g., 11.7 acres for *Spartina alterniflora* strips in Table 3); and
2. The total equivalent acres (based on the performance criteria) required for each parcel category (e.g., 9.36 acres for *Spartina alterniflora* strips in Table 3) have been generated by the project.

Any parcel with a percent cover less than the minimum level will not count towards fulfilling the total number of required acres for that category. In addition, in the calculation of equivalent acres, parcels with a percent cover less than the minimum level will contribute zero equivalent acres for that category. The minimum percent cover requirements which differ for each parcel category are:

- *S. alterniflora* in strips = 50%
- *S. alterniflora* in gaps = 25%
- *S. patens* in strips = 30%
- *S. patens* in gaps = 15%

The equivalent acres can be accumulated in three areas: (1) the planted strip; (2) the associated acres of gap area; or (3) any additional contingency acres planted beyond those required for the restoration project. To calculate the number of equivalent acres generated by the project, each separate one acre parcel is assigned a percent cover rating during the three year monitoring event. The number of equivalent acres contributed by each parcel is then calculated. For example, a one acre parcel at 60% cover generates 0.6 equivalent acres. The equivalent acres for all the separate parcels within a parcel category are then summed to calculate the total number of equivalent acres generated within each parcel category.

For assessment of project performance, substitution between strip and gap parcels and between species is permitted. Parcels that do not meet the minimum requirements for a category can be used to meet the requirements in a category where minimum cover requirements are met. For example, a *S. alterniflora* strip parcel with a measured percent cover of 30% would not meet the minimum cover requirement for a *S. alterniflora* strip but could be counted as a *S. alterniflora* gap parcel. Contingency acres can be used to satisfy any parcel category provided that the contingency parcel meets the minimum cover for its own parcel category. In other words, the

only parcels that can be used to meet the requirements for a parcel category are those that meet the minimum percent cover for that parcel category or contingency parcels that meet the minimum percent cover for their own parcel category. Any parcel used to calculate the number of equivalent acres in each parcel category would also be used to calculate the number of acceptable acres generated. The minimum number of acceptable acres for each parcel category is determined from the as-planted plan and is equal to the number of required acres planted plus the gap areas generated.

An example is provided to clarify the process. Table 5 shows the hypothetical results of monitoring the project outlined in Table 3. Notice that additional contingency acres of *Spartina patens* were planted and the resulting gap areas were also monitored. Table 6 shows how the performance of each separate parcel category would be accounted for and how successful performance would be established.

### **Excused Performance**

The assessment of project performance will be conducted separately for excused performance planted acres (EPPAs) that are planted as a result of an excused performance, if these acres are required to meet the overall goals of the project. The EPPAs will be subject to the following pro-rated performance criteria at the time of the assessment of the project performance:

- *Spartina patens* EPPAs that have been growing for one-year will be required to have a percent cover of 10%;
- *Spartina alterniflora* EPPAs growing for one-year will be required to have a percent cover of 17%;
- *Spartina patens* EPPAs that have been growing for two-years will be required to have a percent cover of 20%;
- *Spartina alterniflora* EPPAs growing for two-years will be required to have a percent cover of 34%;
- Gap EPPAs for *S. alterniflora* and *S. patens* plantings will be required to meet the same minimum % cover requirements as the gap areas associated with the initial plantings (25% for *S. alterniflora* and 15% for *S. patens*).

If the above performance criteria are met for any EPPAs, then these acres will be considered as satisfying the requirements for inclusion as acceptable acres towards meeting the overall acreage and cover requirements of the project.

Table 7 is a hypothetical example of the monitoring results at year 3 when performance has been excused as a result of a named storm in year 1. Approximately 34% of the plantings were lost. The Trustees agreed to replanting rather than stabilizing the platform. In this example, when replanting was done it was not possible to replant all of the *S. alterniflora* that was lost. Under the replanting plan approved by the Project Manager, some of the lost acres were replanted as *S. patens*. Table 7 reflects the project performance for this example. Table 8 gives the accounting matrix for calculating project performance when replanting has been done.

If an excused performance plan does not require replanting or includes platform stabilization in lieu of replanting lost acres, the minimum number of equivalent acres and the minimum number of successful acres required to meet performance objectives will be reduced. The new criteria will be based on the percent cover and successful acre objectives on the unaffected portion of the platform. See Table 9 for an example of calculations used when platform stabilization is used to satisfy excused performance requirements.

### ***Erosion***

Erosion could result in part of a parcel being completely washed away while the remainder of the parcel, if considered separately, would meet the minimum performance requirements. Any parcel exhibiting erosion could be counted in either of two ways. The entire parcel can be counted at a lower density or only the portion of the parcel remaining can be counted at the higher density. For example, consider the situation where half of a one acre parcel is eroded away and the remaining half is at 100% cover. The parcel could be counted as 1 acre at 50% cover or 0.5 acres at 100% cover. The number of equivalent acres is the same but the total number of acceptable acres achieved differs.

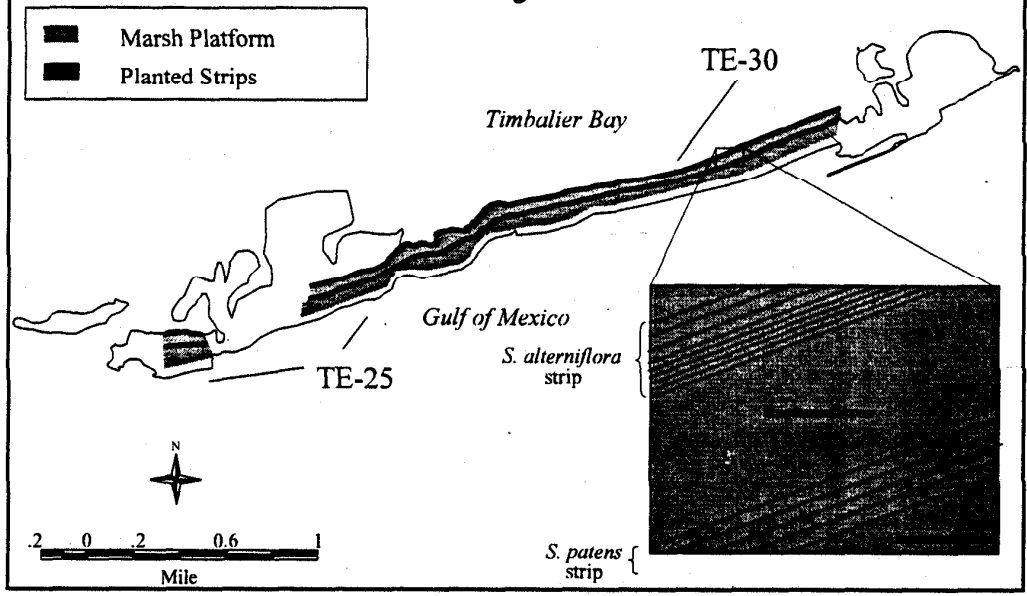
### **Literature Cited**

Bonham, C.D. 1989. *Measurements for Terrestrial Vegetation*. John Wiley & Sons, Publ. 338 pp.

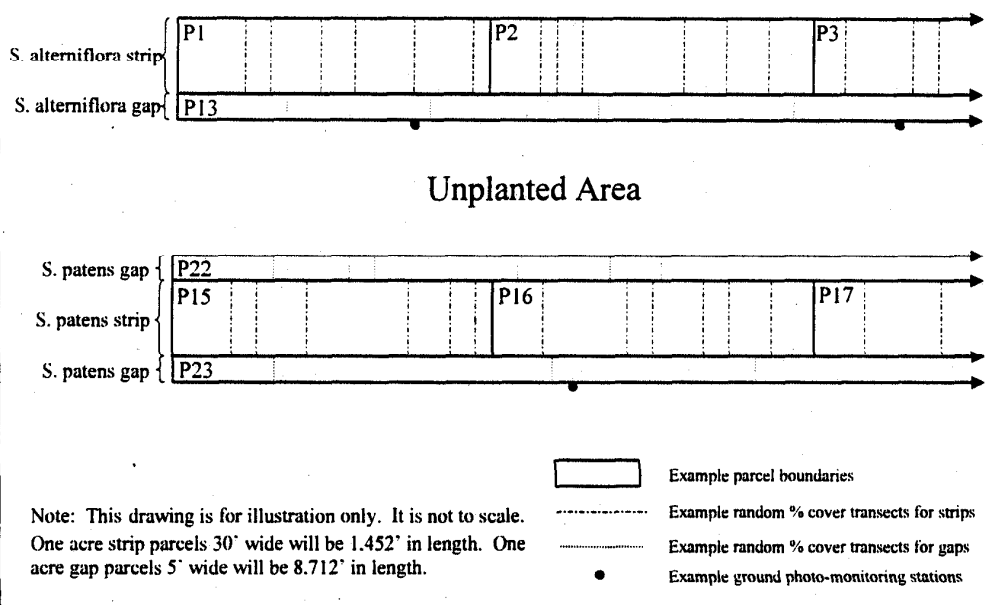
Hester, M.W. and I.A. Mendelssohn. 1992. *Barrier Island Vegetation Dynamics: Stabilization and Maintenance Projects on Timbalier Island*. Prepared for Texaco, USA, New Orleans Operations Division. 61 pp.

Lillesand, T.M. And Kiefer, R.W. 1994. *Remote Sensing and Image Interpretation*. John Wiley and Sons, Inc, Publ. 750 pp.

# Figure 1: East Timbalier Island Planting Project



## Figure 2: Example of the Sampling Design For the Third Year Monitoring Event



**Table 4**  
**Example Initial Planting Design: Year Three Performance Objectives**

<b>4a. <i>S. alterniflora</i> strip</b>				
Parcel Number	Parcel Category	Original Parcel Size	Percent Cover Objective	Equivalent Acres
1	<i>S. alterniflora strip</i>	1acre	80	0.8
2	<i>S. alterniflora strip</i>	1acre	80	0.8
3	<i>S. alterniflora strip</i>	1acre	80	0.8
4	<i>S. alterniflora strip</i>	1acre	80	0.8
5	<i>S. alterniflora strip</i>	1acre	80	0.8
6	<i>S. alterniflora strip</i>	1acre	80	0.8
7	<i>S. alterniflora strip</i>	1acre	80	0.8
8	<i>S. alterniflora strip</i>	1acre	80	0.8
9	<i>S. alterniflora strip</i>	1acre	80	0.8
10	<i>S. alterniflora strip</i>	1acre	80	0.8
11	<i>S. alterniflora strip</i>	1acre	80	0.8
12	<i>S. alterniflora strip</i>	0.7 acre	80	0.56
<b>TOTAL</b>		<b>11.7</b>		<b>9.36</b>

<b>4b. <i>S. alterniflora</i> gap</b>				
Parcel Number	Parcel Category	Original Parcel Size	Percent Cover Objective	Equivalent Acres
13	<i>S. alterniflora gap</i>	1acre	45	0.45
14	<i>S. alterniflora gap</i>	0.7 acre	45	0.32
<b>TOTAL</b>		<b>1.7</b>		<b>0.77</b>

<b>4c. <i>S. patens</i> strip</b>				
Parcel Number	Parcel Category	Original Parcel Size	Percent Cover Objective	Equivalent Acres
15	<i>S. patens strip</i>	1acre	50	0.5
16	<i>S. patens strip</i>	1acre	50	0.5
17	<i>S. patens strip</i>	1acre	50	0.5
18	<i>S. patens strip</i>	1acre	50	0.5
19	<i>S. patens strip</i>	1acre	50	0.5
20	<i>S. patens strip</i>	1acre	50	0.5
21	<i>S. patens strip</i>	0.9 acre	50	0.45
<b>TOTAL</b>		<b>6.9</b>		<b>3.45</b>

<b>4d. <i>S. patens</i> gap</b>				
Parcel Number	Parcel Category	Original Parcel Size	Percent Cover Objective	Equivalent Acres
22	<i>S. patens gap</i>	1acre	25	0.25
23	<i>S. patens gap</i>	1acre	25	0.25
24	<i>S. patens gap</i>	0.3 acres	25	0.075
<b>TOTAL</b>		<b>2.3</b>		<b>0.575</b>

Table 5

## Example Initial Planting Design: Year Three Results Summary Sheet - No Excused Performance

5a. <i>S. alterniflora</i> strip					
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size, acres	Percent Cover Over Remaining Area	Equivalent Acres
1	<i>S. alterniflora</i> strip	1	1	70	0.70
2	<i>S. alterniflora</i> strip	1	1	80	0.80
3	<i>S. alterniflora</i> strip	1	0.5	80	0.40
4	<i>S. alterniflora</i> strip	1	0.9	65	0.59
5	<i>S. alterniflora</i> strip	1	1	45	0.00
6	<i>S. alterniflora</i> strip	1	0	0	0.00
7	<i>S. alterniflora</i> strip	1	1	90	0.90
8	<i>S. alterniflora</i> strip	1	0.8	85	0.68
9	<i>S. alterniflora</i> strip	1	1	75	0.75
10	<i>S. alterniflora</i> strip	1	1	80	0.80
11	<i>S. alterniflora</i> strip	1	0.75	95	0.71
12	<i>S. alterniflora</i> strip	0.7	0.5	80	0.40
totals		11.7	9.45		6.73

Eq acres deficit= 2.63

5b. <i>S. alterniflora</i> gap					
Parcel Number	Parcel Category	Original Parcel Size	Remaining Parcel Size	Percent Cover Over Remaining Area	Equivalent Acres
13	<i>S. alterniflora</i> gap	1	0.8	60	0.48
14	<i>S. alterniflora</i> gap	0.7	0.65	50	0.33
totals		1.7	1.45		0.81

5c. <i>S. patens</i> strip					
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size, acres	Percent Cover Over Remaining Area	Equivalent Acres
15	<i>S. patens</i> strip	1	1	60	0.60
16	<i>S. patens</i> strip	1	1	30	0.30
17	<i>S. patens</i> strip	1	1	25	0.00
18	<i>S. patens</i> strip	1	0.9	65	0.59
19	<i>S. patens</i> strip	1	1	50	0.50
20	<i>S. patens</i> strip	1	1	45	0.45
21	<i>S. patens</i> strip	0.9	0.9	60	0.54
totals		6.9	6.8		2.98

Eq acres deficit= 0.47

5d. <i>S. patens</i> gap					
Parcel Number	Parcel Category	Original Parcel Size	Remaining Parcel Size	Percent Cover Over Remaining Area	Equivalent Acres
22	<i>S. patens</i> gap	1	1	35	0.35
23	<i>S. patens</i> gap	1	0.9	45	0.41
24	<i>S. patens</i> gap	0.3	0.3	20	0.06
totals		2.3	2.2		0.82

5e. Contingency Planting					
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size	Percent Cover	Equivalent Acres
25	<i>S. patens</i> strip	1	1	35	0.35
26	<i>S. patens</i> strip	1	1	40	0.40
27	<i>S. patens</i> gap	1	1	30	0.30
28	<i>S. patens</i> strip	1	0.9	60	0.54
29	<i>S. patens</i> strip	1	1	50	0.50
30	<i>S. patens</i> gap	1	1	20	0.20
31	<i>S. patens</i> strip	1	1	40	0.40
totals		7	6.9		2.69

Table 6  
Accounting Matrix - No Excused Performance - Year 3 Monitoring

6a. <i>S. alterniflora</i> strip								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres Achieved	Counted acres	Equivalent Acres Required	Comments
<i>S. alterniflora strip</i>	1	1acre	1	70	0.70	1		
<i>S. alterniflora strip</i>	2	1acre	1	80	0.80	1		
<i>S. alterniflora strip</i>	3	1acre	0.5	80	0.40	0.5*		adjusted for erosion
<i>S. alterniflora strip</i>	4	1acre	0.9	65	0.59	1		
<i>S. alterniflora gap</i>	13	1acre	0.8	60	0.48	0.8		Replaces parcel 5
<i>S. patens strip (contingency)</i>	25	1 acre	1	35	0.35	1		Replaces parcel 6
<i>S. alterniflora strip</i>	7	1acre	1	90	0.90	1		
<i>S. patens strip</i>	15	1acre	1	60	0.60	1		Replaces parcel 8
<i>S. alterniflora strip</i>	9	1acre	1	75	0.75	1		
<i>S. alterniflora strip</i>	10	1acre	1	80	0.80	1		
<i>S. alterniflora strip</i>	11	1acre	0.75	95	0.71	1		
<i>S. alterniflora strip</i>	12	0.7 acre	0.5	80	0.40	0.7		
<i>S. patens strip (contingency)</i>	28	1 acre	1	60	0.60	1		add on for perf.crit.
<i>S. patens strip (contingency)</i>	26	1 acre	1	40	0.40	1		add on for perf.crit.
<i>S. patens strip (contingency)</i>	29	1 acre	1	50	0.50	1		add on for perf.crit.
<i>S. patens strip (contingency)</i>	31	1 acre	1	40	0.40	1		add on for perf.crit.
<b>Totals</b>					<b>9.38</b>	<b>14.5</b>	<b>9.36</b>	

6b. <i>S. alterniflora</i> gap								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. alterniflora strip</i>	5	1acre	1	45	0.45	1		Replaces parcel 13
<i>S. alterniflora gap</i>	14	0.7 acre	0.65	50	0.33	0.7		
<b>Totals</b>					<b>0.78</b>	<b>1.7</b>	<b>0.77</b>	

6c. <i>S. patens</i> strip								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. alterniflora strip</i>	8	1acre	0.8	85	0.68	1		Replaces parcel 15
<i>S. patens strip</i>	16	1acre	1	30	0.30	1		
<i>S. patens gap</i>	23	1acre	0.9	45	0.41	1		Replaces parcel 17
<i>S. patens strip</i>	18	1acre	0.9	65	0.59	1		
<i>S. patens strip</i>	19	1acre	1	50	0.50	1		
<i>S. patens strip</i>	20	1acre	1	45	0.45	1		
<i>S. patens strip</i>	21	0.9 acre	0.9	60	0.54	0.9		
<b>Totals</b>					<b>3.46</b>	<b>6.9</b>	<b>3.45</b>	

6d. <i>S. patens</i> gap								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. patens gap</i>	22	1acre	1	35	0.35	1		
<i>S. patens strip</i>	17	1acre	1	25	0.25	1		Replaces parcel 23
<i>S. patens gap</i>	24	0.3 acres	0.3	20	0.06	0.3		
					<b>0.66</b>	<b>2.3</b>	<b>0.58</b>	

6e. Unused Parcels					
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres
<i>S. patens gap</i>	27	1 acre	1	30	0.30
<i>S. patens gap</i>	30	1 acre	1	20	0.20
<i>S. alterniflora strip</i>	6	1 acre	0	0	0.00

\* Note: This parcel would have been considered unsuccessful if erosion were not considered because the percent cover calculated over the entire one acre parcel (original size) would have been 37.5 %.



**Table 7**  
**Example Performance: Year Three Results Summary Sheet - Excused Performance**

7a. <i>S. alterniflora</i> strip						
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size, acres	Percent Cover Over Remaining Area	Equivalent Acres	Excused Acres
1*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
2*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
3*	<i>S. alterniflora</i> strip	1	0.5	80	0.40	0.5
4	<i>S. alterniflora</i> strip	1	0.9	65	0.59	0
5*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
6*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
7*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
8	<i>S. alterniflora</i> strip	1	0.8	85	0.68	0
9*	<i>S. alterniflora</i> strip	1	0	0	0.00	1
10	<i>S. alterniflora</i> strip	1	1	80	0.80	0
11	<i>S. alterniflora</i> strip	1	0.75	95	0.71	0
12*	<i>S. alterniflora</i> strip	0.7	0.5	80	0.40	0.2
	<b>totals</b>	<b>11.7</b>	<b>4.45</b>		<b>3.58</b>	<b>6.70</b>

Eq acres deficit= 5.78

7b. <i>S. alterniflora</i> gap						
Parcel Number	Parcel Category	Original Parcel Size	Remaining Parcel Size	Percent Cover Over Remaining Area	Equivalent Acres	Excused Acres
13	<i>S. alterniflora</i> gap	1	0	0	0.00	1
14	<i>S. alterniflora</i> gap	0.7	0.65	50	0.33	
	<b>totals</b>	<b>1.7</b>	<b>0.65</b>		<b>0.33</b>	<b>1.00</b>

7c. <i>S. patens</i> strip					
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size, acres	Percent Cover Over Remaining Area	Equivalent Acres
15	<i>S. patens</i> strip	1	1	60	0.60
16	<i>S. patens</i> strip	1	1	30	0.30
17	<i>S. patens</i> strip	1	1	25	0.00
18	<i>S. patens</i> strip	1	0.9	65	0.59
19	<i>S. patens</i> strip	1	1	50	0.50
20	<i>S. patens</i> strip	1	1	45	0.45
21	<i>S. patens</i> strip	0.9	0.9	60	0.54
	<b>totals</b>	<b>6.9</b>	<b>6.8</b>		<b>2.98</b>

Eq acres deficit= 0.47

7d. <i>S. patens</i> gap					
Parcel Number	Parcel Category	Original Parcel Size	Remaining Parcel Size	Percent Cover Over Remaining Area	Equivalent Acres
22	<i>S. patens</i> gap	1	1	35	0.35
23	<i>S. patens</i> gap	1	0.9	45	0.41
24	<i>S. patens</i> gap	0.3	0.3	20	0.06
	<b>totals</b>	<b>2.3</b>	<b>2.2</b>		<b>0.82</b>

7e. Contingency Planting					
Parcel Number	Parcel Category	Original Parcel Size, acres	Remaining Parcel Size	Percent Cover	Equivalent Acres
25	<i>S. patens</i> strip	1	1	35	0.35
26	<i>S. patens</i> strip	1	1	40	0.40
27	<i>S. patens</i> gap	1	1	30	0.30
28	<i>S. patens</i> strip	1	0.9	60	0.54
29	<i>S. patens</i> strip	1	1	50	0.50
30	<i>S. patens</i> gap	1	1	20	0.20
31	<i>S. patens</i> strip	1	1	40	0.40
	<b>totals</b>	<b>7</b>	<b>6.9</b>		<b>2.89</b>

7f. Excused Performance Replanting					
Parcel Number	Replant Category	Replanted Acres	Replanted Percent Cover	Equivalent Acres	Year excused
32	<i>S. alterniflora</i> strip	1	0.45	0.45	1
33	<i>S. alterniflora</i> strip	1	0.35	0.35	1
34	<i>S. alterniflora</i> strip	0.5	0.4	0.20	1
35	<i>S. patens</i> strip	1	0.6	0.60	1
36	<i>S. patens</i> strip	1	0.4	0.40	1
37	<i>S. patens</i> strip	1	0.3	0.30	1
38	<i>S. patens</i> strip	1	0.5	0.50	1
39a	<i>S. patens</i> strip	0.2	0.6	0.12	1
39b	<i>S. patens</i> strip	0.2	0.6	0.12	1
40	<i>S. alterniflora</i> gap	0.3	0.15	0	1
41	<i>S. patens</i> gap	0.5	0.15	0.08	1
	<b>totals</b>	<b>7.7</b>		<b>3.115</b>	

\* denotes parcels with at least some excused performance.

\*\*Note: Parcels 39a and 39b were planted and monitored as one area but broken out into separate parcels for accounting purposes.

**Table 8**  
**Accounting Matrix - Excused Performance With Replanting - Year 3 Monitoring**

<b>8a. S. alterniflora strip</b>								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres Achieved	Counted acres	Equivalent Acres Required	Comments
S. alterniflora strip (EPPA)	32	1 acre	1	0.45	0.45	1		Replaces parcel 1
S. alterniflora strip (EPPA)	33	1 acre	1	0.35	0.35	1		Replaces parcel 2
S. alterniflora strip*	3*	1 acre	0.5	80	0.40	0.5*		adjusted for erosion
S. alterniflora strip (EPPA)	34	0.5	0.5	0.4	0.20	0.5*		supplements parcel 3
S. alterniflora strip	4	1 acre	0.0	65	0.60	1		
S. patens strip (EPPA)	35	1 acre	1	0.6	0.60	1		Replaces parcel 5
S. patens strip (EPPA)	36	1 acre	1	0.4	0.40	1		Replaces parcel 6
S. patens strip (EPPA)	37	1 acre	1	0.3	0.30	1		Replaces parcel 7
S. patens strip	15	1 acre	1	60	0.60	1		Replaces parcel 8
S. patens strip (EPPA)	30	1 acre	1	0.5	0.50	1		Replaces parcel 9
S. alterniflora strip	10	1 acre	1	80	0.80	1		
S. alterniflora strip	11	1 acre	0.75	95	0.71	1		
S. alterniflora strip*	12	0.7 acre	0.5	80	0.40	0.5		
S. patens strip (EPPA)	39a	2 acre	0.2	0.6	0.12	0.2		supplements parcel 12
S. patens strip (contingency)	25	1 acre	1	35	0.35	1		add on for perf.crit.
S. patens strip (contingency)	26	1 acre	1	40	0.40	1		add on for perf.crit.
S. patens strip (contingency)	28	1 acre	1	60	0.60	1		add on for perf.crit.
S. patens strip (contingency)	29	1 acre	1	50	0.50	1		add on for perf.crit.
S. patens gap (contingency)	30	1 acre	1	20	0.20	1		add on for perf.crit.
S. patens strip (contingency)	31	1 acre	1	40	0.40	1		add on for perf.crit.
<b>Totals</b>					<b>8.87</b>	<b>16.7</b>	<b>9.36</b>	

<b>8b. S. alterniflora gap</b>								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
S. patens strip (EPPA)	39b	0.2	0.2	0.6	0.12	0.2		Replaces parcel 13
S. patens gap*	41	.5 acre	0.5	0.15	0.08	0.5		Replaces parcel 13
S. alterniflora gap	14	0.7 acre	0.65	50	0.33	0.7		
S. patens gap (contingency)	27	1 acre	1	30	0.30	1		add on for perf.crit.
<b>Totals</b>					<b>0.82</b>	<b>2.4</b>	<b>0.77</b>	

<b>8c. S. patens strip</b>								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
S. alterniflora strip	8	1 acre	0.8	65	0.68	1		Replaces parcel 15
S. patens strip	16	1 acre	1	30	0.30	1		
S. patens gap	23	1 acre	0.9	45	0.41	1		Replaces parcel 17
S. patens strip	18	1 acre	0.9	65	0.59	1		
S. patens strip	19	1 acre	1	50	0.50	1		
S. patens strip	20	1 acre	1	45	0.45	1		
S. patens strip	21	0.9 acre	0.9	60	0.54	0.9		
<b>Totals</b>					<b>3.46</b>	<b>6.9</b>	<b>3.45</b>	

<b>8d. S. patens gap</b>								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
S. patens gap	22	1 acre	1	35	0.35	1		
S. patens strip	17	1 acre	1	25	0.25	1		Replaces parcel 23
S. patens gap	24	0.3 acres	0.3	20	0.06	0.3		
<b>Totals</b>					<b>0.66</b>	<b>2.3</b>	<b>0.58</b>	

<b>8e. Unused Parcels</b>					
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres
S. alterniflora gap*	40	0.3 acre	0.3	0.15	0.00
<b>Totals</b>					<b>0.00</b>

<b>8f. Excused Performance</b>					
Replant Category	Parcel Number	Replanted Acres	Replanted Percent Cover	Equivalent Acres	Year excused
S. alterniflora strip	32	1	0.45	0.45	1
S. alterniflora strip	33	1	0.35	0.35	1
S. alterniflora strip	34	0.5	0.4	0.20	1
S. patens strip	35	1	0.6	0.60	1
S. patens strip	36	1	0.4	0.40	1
S. patens strip	37	1	0.3	0.30	1
S. patens strip	38	1	0.5	0.50	1
S. patens strip	39a	0.2	0.6	0.12	1
S. patens strip	39b	0.2	0.6	0.12	1
S. alterniflora gap	40	0.3	0.15	0	1
S. patens gap	41	0.5	0.15	0.08	1
<b>totals</b>		<b>7.7</b>		<b>3.115</b>	

\*denotes parcels with at least some excused performance.

Table 9  
Accounting Matrix - Excused Performance With Substrate Stabilization - Year 3 Monitoring

9a. <i>S. alterniflora</i> strip								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres Achieved	Counted acres	Equivalent Acres Required	Comments
<i>S. alterniflora</i> strip*	1*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip*	2*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip*	3	1 acre	0.5	80	0.40	0.5*	0.4	partly excused
<i>S. alterniflora</i> strip	4	1 acre	0.9	65	0.59	1	0.8	
<i>S. alterniflora</i> strip*	5*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip*	6*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip*	7*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip	8	1 acre	0.8	85	0.68	1	0.8	
<i>S. alterniflora</i> strip*	9*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> strip	10	1 acre	1	80	0.80	1	0.8	
<i>S. alterniflora</i> strip	11	1 acre	0.75	95	0.71	1	0.8	
<i>S. alterniflora</i> strip*	12	0.7 acre	0.5	80	0.40	0.5	0.4	partly excused
<i>S. patens</i> strip (contingency)	25	1 acre	1	35	0.35	1		add on for perf.crit.
<i>S. patens</i> strip (contingency)	26	1 acre	1	40	0.40	1		add on for perf.crit.
<b>Totals</b>					<b>4.33</b>	<b>6.50</b>	<b>4.00</b>	

9b. <i>S. alterniflora</i> gap								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. alterniflora</i> gap	13*	1 acre	0	0	0.00	0	0	excused
<i>S. alterniflora</i> gap	14	0.7 acre	0.65	50	0.33	0.7	0.32	
<b>Totals</b>					<b>0.33</b>	<b>0.70</b>	<b>0.32</b>	

9c. <i>S. patens</i> strip								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. patens</i> strip	15	1 acre	1	60	0.60	1	0.5	
<i>S. patens</i> strip	16	1 acre	1	30	0.30	1	0.5	
<i>S. patens</i> gap	23	1 acre	0.9	45	0.41	1	0.5	Replaces parcel 17
<i>S. patens</i> strip	18	1 acre	0.9	65	0.59	1	0.5	
<i>S. patens</i> strip	19	1 acre	1	50	0.50	1	0.5	
<i>S. patens</i> strip	20	1 acre	1	45	0.45	1	0.5	
<i>S. patens</i> strip	21	0.9 acre	0.9	60	0.54	0.9	0.45	
<b>Totals</b>					<b>3.38</b>	<b>6.9</b>	<b>3.45</b>	

9d. <i>S. patens</i> gap								
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres	Counted acres	Equivalent Acres Required	Comments
<i>S. patens</i> gap	22	1 acre	1	35	0.35	1	0.25	
<i>S. patens</i> strip	17	1 acre	1	25	0.25	1	0.25	Replaces parcel 23
<i>S. patens</i> gap	24	0.3 acres	0.3	20	0.06	0.3	0.075	
					<b>0.66</b>	<b>2.3</b>	<b>0.58</b>	

9e. Unused Parcels					
Parcel Category	Parcel Number	Original Parcel Size	Remaining Parcel Size (After Erosion)	Percent Cover Over Remaining Area	Equivalent Acres
<i>S. patens</i> gap (contingency)	27	1 acre	1	30	0.30
<i>S. patens</i> strip (contingency)	28	1 acre	1	60	0.60
<i>S. patens</i> strip (contingency)	29	1 acre	1	50	0.50
<i>S. patens</i> gap (contingency)	30	1 acre	1	20	0.20
<i>S. patens</i> strip (contingency)	31	1 acre	1	40	0.40

\*denotes parcels with at least some excused performance.

Note: Parcel 3 and Parcel 12 were partly eroded by a named storm. Only a portion of these parcels were excused from meeting performance objectives.