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DAMAGE ASSESSMENT AND RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT FOR THE POINT COMFORT/LAVACA BAY NPL SITE RECREATIONAL FISHING SERVICE LOSSES

PREPARED BY

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AND
THE U.S. FISH & WILDLIFE SERVICE,
U.S. DEPARTMENT OF THE INTERIOR

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LIST OF ACRONYMS

AOC – Administrative Order on Consent
CEQ – Council on Environmental Quality
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
C.F.R. – Code of Federal Regulations
CMP – Coastal Management Program
CWA – Clean Water Act (also known as the Federal Water Pollution Control Act)
DARP/EA – Damage Assessment and Restoration Plan/Environmental Assessment
DOI – Department of the Interior
EPA – Environmental Protection Agency
TGLO – Texas General Land Office
MOA – Memorandum of Agreement
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NEPA – National Environmental Policy Act
NOAA – National Oceanic and Atmospheric Administration
NPL – National Priorities List
NRDA – Natural Resource Damage Assessment
PCO – Point Comfort Operations
RI/FS – Remedial Investigation/ Feasibility Study
RWC – Reasonable Worst Case
TDH – Texas Department of Health
TNRCC – Texas Natural Resource Conservation Commission
TPWD – Texas Parks and Wildlife Department
USFWS – United States Fish and Wildlife Service

INTRODUCTION AND SUMMARY CHAPTER 1

This Final Damage Assessment and Restoration Plan and Environmental Assessment (Final DARP/EA) has been prepared by state and federal natural resource trustees to address recreational fishing services affected by releases of hazardous substances from the Alcoa Point Comfort/Lavaca Bay NPL Site ('Lavaca Bay Site' or 'Site'). The designated natural resource trustee agencies involved in the development of this document are the Texas Natural Resource Conservation Commission, the Texas General Land Office, the Texas Parks and Wildlife Department, the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce, and the U.S. Fish and Wildlife Service on behalf of the U.S. Department of the Interior (collectively, 'the Trustees').

This Final DARP/EA is intended to inform members of the public on the Trustees' assessment of recreational fishing service losses attributable to this Site and on the restoration actions that the Trustees have selected for use to compensate for those losses. This document explains how the Trustees chose these restoration actions, how the actions selected differ from those proposed in the first public review draft of this document,[1] and the basis for those changes. This Final DARP/EA also serves as an Environmental Assessment pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq., and regulations guiding its implementation at 40 C.F.R. Part 1500. Accordingly, this document addresses the purpose and need for the restoration actions, the restoration alternatives considered, and the potential impact of restoration actions on the quality of the physical, biological, and cultural environment.

1.1 OVERVIEW OF THE SITE

Alcoa began operations at its Point Comfort, Texas (PCO) facility in 1948 on 3,000 acres of land on the eastern shore of Lavaca Bay. Between 1948 and the present, Alcoa has constructed and operated several types of manufacturing processes at this location, including alumina refining, aluminum smelting, carbon paste and briquette manufacturing, gas processing, and chlor-alkali processing.

The Site was added to the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), on March 25, 1994 (59 Federal Register 8794, February 23, 1994). The listing was primarily based on levels of mercury found in several species of finfish and crabs in Lavaca Bay, a fisheries closure imposed by the Texas Department of Health (TDH) in 1988 due to mercury levels found in fish, and levels of mercury detected in bay sediments adjacent to the facility (Texas Department of Health, 1998). Alcoa, the State of Texas and the U.S. Environmental Protection Agency (EPA) signed an Administrative Order on Consent (AOC) under CERCLA in March 1994 for the conduct of a remedial investigation and feasibility study

[1] The Draft Damage Assessment and Restoration Plan and Environmental Assessment (Draft DARP/EA) was released for public review and comment on September 28, 1999. In response to public comments, a Revised Draft DARP/EA was released for comment on May 12, 2000.

(RI/FS) for the Site. TDH amended the closure order in January 2000. Under this amended closure order, fish and crabs may be taken and consumed from Cox Bay.

The Trustees are responsible for evaluating potential injuries to natural resources and resource service losses resulting from releases of hazardous substances at the Site pursuant to Section 107(f) of CERCLA, the Federal Water Pollution Control Act, 33 U.S.C. Section 1251 et seq., (also known as the Clean Water Act or CWA) and other applicable Federal or State law, including Subpart G of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Sections 300.600 - 300.615, and regulations at 43 C.F.R. Part 11 which are applicable to natural resource damage assessments (NRDA) under CERCLA. The cost of actions appropriate to restore, replace or acquire resources or resource services equivalent to those lost is a primary basis for compensating the public for injuries to natural resources under these authorities.

The Trustees and Alcoa entered into a Memorandum of Agreement (MOA), effective January 14, 1997, which has allowed the evaluation of potential natural resource injuries and service losses attributable to the Site and restoration planning to address those losses to proceed on a focused and expedited basis. The goal of this process is to allow restoration actions, which will make the environment and public whole for resource injuries or losses that have occurred, to be identified and implemented in an expeditious and cost-effective manner.

1.2 STAGED APPROACH TO RESTORATION PLANNING

The Trustees have adopted a staged approach to restoration planning for this Site, consistent with 43 C.F.R. Section 11.32(a)(1)(iii). A staged approach allows restoration decisions for particular injury or loss categories to be made as soon as that injury or loss category can be quantified, based on available remedial and assessment information. This approach allows the Trustees to seek implementation of restoration actions as quickly as possible following the quantification of specific resource injuries and/or service losses. The staged approach may facilitate early implementation of many restoration actions. Where restoration actions can be expedited, restoration services (and public compensation credit) will begin to flow upon implementation, even before completion of the remedial process.

Consistent with this staged approach to restoration planning, this Final DARP/EA addresses the recreational fishing services affected by releases of hazardous substances attributable to the Lavaca Bay Site. The fisheries closure imposed by TDH in 1988 due to mercury levels found in fish adversely affects recreational fishing near the PCO facility. The Trustees' assessment of recreational fishing service losses is described in Chapter 4. To address recreational fishing service losses due to the closure, the Trustees have considered restoration actions that would increase or enhance recreational fishing opportunities in Lavaca Bay. The restoration alternatives evaluated and the final restoration actions selected for use to compensate for those losses are presented in Chapter 5.

Natural resource injuries or losses of an ecological nature attributable to hazardous substances at the Site, including those due to early and anticipated future response actions, are being addressed in a separate stage of the assessment and restoration planning process. A second stage Draft DARP/EA covering these ecological injuries and losses was completed and released for public review on July 14, 2000. If the actual remedy decision differs materially from that anticipated in that document, a third stage may be needed to complete the assessment and restoration planning process for ecological losses.

1.3 RESTORATION UNDER CERCLA

In general, restoration actions for natural resource injuries and service losses under CERCLA can be termed as primary or compensatory restoration. Primary restoration is any action taken to enhance the return of injured natural resources and services to their baseline condition, i.e., the condition or level that would have existed had the release not occurred. Compensatory restoration actions compensate for resource injuries and service losses during the interim period, which is the period from the date of injury or loss until recovery to the baseline condition. The scale of restoration actions required to compensate for these interim losses will depend both on the extent and severity of the resource injuries and how quickly each resource and its services return to baseline.

In contrast, removal and remediation actions (termed 'response actions') are conducted by EPA or State response agencies and focus on controlling exposure to released hazardous substances, by removing, neutralizing or isolating them in order to protect human health and the environment from the threat of harm. Although response actions can reduce the need for restoration, the two types of actions are separate and distinct. Trustees may elect to rely on natural recovery rather than other primary restoration actions in situations where feasible or cost-effective primary restoration actions are not available, where remedial actions are sufficient to allow for the recovery of injured resources, or where recovery can otherwise be expected to occur within a reasonable period of time without human intervention.

With respect to recreational fishing service losses in Lavaca Bay, it is only necessary for the Trustees to consider compensatory restoration. The baseline condition is represented by the recreational fishing use or access that would exist in the absence of the closure. The removal of the closure order is an objective of the remedial process and the Trustees expect actions undertaken within the remedial process will provide for the return of recreational fishing in Lavaca Bay to baseline service levels. Under these circumstances, further consideration of primary restoration alternatives for recreational fishing is not warranted. Therefore, this Final DARP/EA addresses restoration actions to enhance recreational fishing opportunities in Lavaca Bay in order to compensate for the interim losses extending from 1988 (the initiation of the closure) until the date the full closure is lifted, which is expected by 2010. Part of the closure area was reopened to the taking of finfish and crabs in early 2000. The remaining closure is approximately 60 percent of its original size.

1.4 PLAN OF THIS DOCUMENT

The remainder of this document presents further information about the natural resource damage assessment conducted for recreational fishing services in Lavaca Bay and the restoration actions that the Trustees have selected for use to compensate for recreational fishing service losses resulting from the closure.

- Chapter 2 briefly summarizes the history of Site releases, the legal authorities and regulatory requirements of the Trustees, and the role of both Alcoa, the potentially responsible party, and the public in the damage assessment and restoration process.

- Chapter 3 describes the physical, biological, and cultural environment relevant to recreational fishing in Lavaca Bay, in accordance with NEPA (42 U.S.C. Sections 4321, et seq.).

- Chapter 4 describes the method being used to assess recreational fishing service losses and the results of that assessment.

- Chapter 5 evaluates restoration options and identifies the restoration alternatives selected for use to address the recreational fishing service losses outlined in Chapter 4. The Chapter explains the proposals for restoration that were in the Draft DARP/EA and Revised Draft DARP/EA released for public review, the comments received on both review drafts, and the Trustees' responses thereto.

- Appendix A is a list of the documents in the Administrative Record for the recreational fishing loss assessment as of the date of this Final DARP/EA.

- Appendix B includes an analysis supporting the Trustees' determination that the benefits of the selected restoration projects provide sufficient compensation to offset the recreational fishing losses.

1.5 LITERATURE CITED

Texas Department of Health. 1998. Fish advisories and bans, 1997. Texas Department of Health, Seafood Safety Division, Austin, Texas. 21 p.

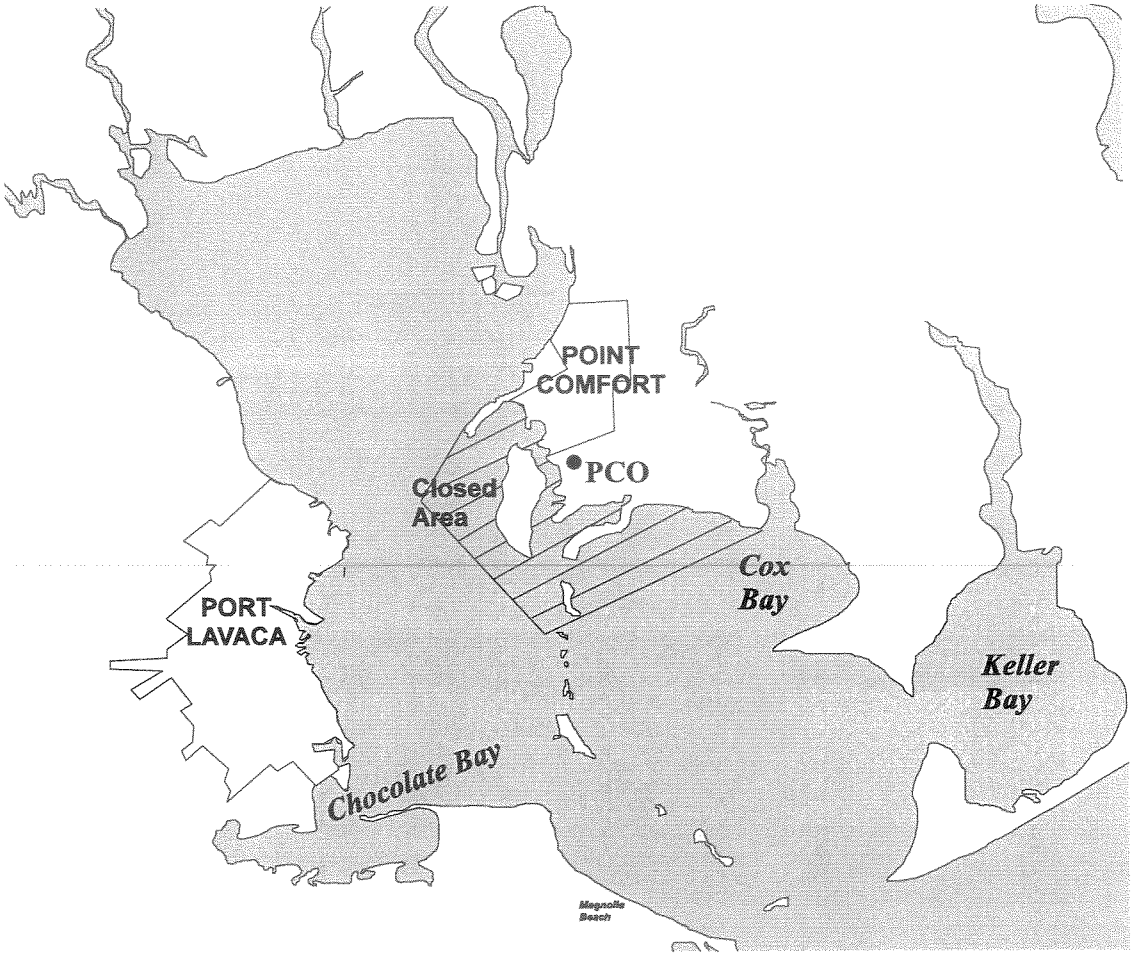
2.1 THE ALCOA POINT COMFORT/LAVACA BAY NPL SITE - SUMMARY OF RELEASE HISTORY

The Site is located in Point Comfort, Calhoun County, Texas and encompasses releases from Alcoa's PCO facility. The PCO facility has been in continuous service since 1948. The PCO facility began operation as an aluminum smelter. The smelting operation utilized alumina as the raw material and produced aluminum metal through an electrolytic process. Smelter construction began in 1948 and the unit operated until 1980. The alumina refining operation began in 1959 and continues to operate today. The alumina refining operation utilizes bauxite ore to produce alumina. Since the construction of the initial plotlines for the aluminum smelting plant, the PCO facility has developed into an integrated complex of operations that currently include bauxite refining, an aluminum fluoride plant, and a carbon paste plant. Past operations conducted at the facility that have been dismantled and removed include the aluminum smelter, a cryolite plant, and a chlor-alkali processing unit.

The PCO facility currently comprises approximately 3,500 acres and is located adjacent to Lavaca Bay on the west and Cox Creek/Cox Lake on the east. The Dredge Island is an island in Lavaca Bay, west of the facility buildings, that is approximately 375 acres. It has been historically used for the disposal of dredge material, gypsum, and waste water from the chlor-alkali processing unit.

From 1966 to 1970, the PCO facility discharged mercury-containing wastewater into Lavaca Bay from its chlor-alkali processing operations. Alcoa terminated the direct discharge of this wastewater into the bay in 1970 after the Texas Water Quality Board notified Alcoa of potential adverse environmental impacts associated with this discharge. In April 1988, the TDH issued a 'closure order' prohibiting the taking of finfish and crabs for consumption from a specific area of Lavaca Bay due to elevated mercury concentrations found in these species. This 'closed' area is shown in Figure 2-1. The Site was placed on the CERCLA's National Priority List in 1994. The listing was primarily based on levels of mercury found in several species of finfish and crabs in Lavaca Bay, the fisheries closure imposed by TDH in 1988, and levels of mercury detected in bay sediments in areas of the bay adjacent to the PCO facility. Alcoa, the State of Texas and the EPA signed an Administrative Order on Consent (AOC) under CERCLA in March 1994 for the conduct of a remedial investigation and feasibility study (RI/FS) for the Site. The remedial investigation undertaken for the Site demonstrated an ongoing release of mercury-contaminated groundwater from the PCO facility into Lavaca Bay.

Figure 2.1 – Lavaca Bay



2.2 AUTHORITY AND LEGAL REQUIREMENTS

This Final DARP/EA has been prepared jointly by the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce, the Texas Natural Resource Conservation Commission (TNRCC), the Texas General Land Office (TGLO), the Texas Parks and Wildlife Department (TPWD), and the U.S. Fish and Wildlife Service (USFWS) on behalf of the U.S. Department of the Interior (DOI) (collectively, 'the Trustees'). Each of these agencies is a designated natural resource trustee under Section 107(f) of CERCLA, Section 311 of the CWA, 33 U.S.C. Section 1321 and other applicable Federal or State law, including Subpart G of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Sections 300.600 - 300.615. As a designated Trustee, each agency is authorized to act on behalf of the public to assess and recover natural resource damages where natural resources and resource services are injured, lost or destroyed as a result of releases of hazardous substances covered by CERCLA or the CWA.

2.2.1 Overview of CERCLA Assessment Procedures

Damages recovered by Trustees for natural resource injuries or service losses due to hazardous substances releases must be used to restore, replace or acquire natural resources or services equivalent to those lost. 42 U.S.C. 9607(f)(1). The costs of actions appropriate to restore, replace or acquire such resources or resource services (hereafter collectively referred to as 'restoration') are a preferred measure of natural resource damages under CERCLA and the CWA. CERCLA Section 107 indicates, however, that the measure of damages is not limited to the sums which can be used to restore or replace injured resources or services. 42 U.S.C. 9607(f)(1).

The DOI has developed regulations providing procedures for assessing natural resource damages under CERCLA and the CWA. These procedures are found at 43 C.F.R. Part 11 (1995), as amended (61 Fed. Reg. 20609, May 7, 1996) (hereafter, 'the DOI regulations'). These regulations recognize that 'damages' are to be based on the cost to restore injured resources, including interim lost resource services. Consistent with CERCLA Section 107, however, the DOI regulations also allow, at the discretion of the Trustees, 'damages' to include, for all or a portion of the interim service losses, the value (in monetary terms) of the loss to the public. 43 C.F.R. Section 11.80. Monetary values need not be determined where information and methods can be applied to identify and scale restoration actions directly.

The DOI regulations outline a phased approach[2] to the assessment of natural resource damages. Under the phased approach, the Trustees make an early determination, based on available information, as to whether natural resources have been or are likely to be injured by releases of hazardous substances, and whether such actual or potential injuries are sufficient to warrant an assessment of damages. Information considered by the Trustees at this early stage may include information collected during remedial investigations, existing injury studies, and other relevant studies or bodies of scientific work. The Trustees also consider the extent to which response actions will remedy present or future injuries to natural resources. Upon determining the appropriateness of further assessment action, the Trustees then proceed with actions to establish and quantify those injuries during the Assessment Plan phase. This phase focuses on planning and implementing methods for determining the nature and extent of any injuries to natural resources, including their baseline condition, recovery period, and any reduction in service levels pending recovery to baseline conditions. The Damage Determination phase is used to establish the appropriate compensation for the natural resource injuries identified and measured pursuant to the Assessment Plan. This phase contemplates development of a Restoration and Compensation Determination Plan as a basis for determining the amount of money to be sought from the potentially responsible party(s) (PRPs) as compensation for the assessed resource injuries and service losses. Damages determined in accordance

[2] Different from the 'staged' approach for this case, which refers to the timing of the separate injury assessments and publication of damage assessment and restoration plans (see Section 1.2 for a description of the 'staged' approach in this case).

with the final plan are presented to the PRP for payment at the conclusion of the assessment process. 43 C.F.R. Section 11.91. If not paid, they may be sought in litigation.

Under the expedited NRDA process underway in cooperation with Alcoa, the Trustees determined it to be preferable to use an assessment approach that directly facilitates the identification and scaling of restoration actions for all natural resource injuries and service losses. Where injury assessment and restoration planning components occur in parallel, assessment methods can be used that support the scaling or identification of restoration actions directly, rather than seeking to assess the dollar value of the service losses to the public. In this way, projects capable of restoring injured resources or lost services can be identified earlier in the assessment process. Further, in a cooperative assessment, this expedites the opportunity for restoration to occur as restoration actions selected by the Trustees can be implemented by the PRP, under Trustee oversight. In addition to expediting the restoration of injured natural resources or services, this early focus on restoration planning can substantially reduce transaction costs. This restoration-based assessment approach is consistent with DOI regulations, which allows restoration planning to be included as part of the Assessment Plan phase where available data are sufficient to support their concurrent development. 43 C.F.R. Section 11.31.

Consistent with this expedited NRDA approach, this Final DARP/EA describes both the injury assessment and the selected restoration actions for recreational fishing service losses. The goal of the injury assessment is to determine the effect of the 1988 closure on recreational fishing in Lavaca Bay, thus providing a factual basis for evaluating the need for, type of, and scale of restoration actions, including the extent to which considered restoration alternatives would provide recreational fishing service benefits comparable to assessed losses. The document incorporates and presents the plan for restoring recreational fishing services developed by the Trustees. It identifies and evaluates a reasonable range of restoration alternatives, identifies the preferred alternatives proposed in the Draft and Revised Draft DARP/EAs, documents public comments on the proposed plans, and explains the Trustees' actions in response to public comments. The Trustees anticipate the selected restoration actions will fully compensate for recreational fishing service losses due to the closure, pending the anticipated recovery of this system and removal of the closure.

2.2.2 NEPA Compliance

To comply with NEPA and its implementing regulations, this Final DARP/EA describes the purpose and need for action (Chapter 2), summarizes the current environmental setting (Chapter 3), identifies alternative restoration actions and assesses their applicability and environmental consequences (Chapter 5), and summarizes the opportunities that the public had to participate in the decision process (Section 2.4).

NOAA and DOI have reviewed this Final DARP/EA for consistency with NEPA requirements, and the impact of the selected restoration actions on the quality of the human environment. This review is contained in Chapter 7 of this Final DARP/EA.

2.3 COORDINATION WITH RESPONSIBLE PARTIES

The DOI regulations require the Trustees to invite PRPs to participate in the natural resource damage assessment process. 43 C.F.R. Section 11.32(a)(2)(iii). A PRP may contribute to an assessment in many ways; however, the nature and extent of such participation is subject to substantial agency discretion and final authority to make determinations regarding injury and restoration rests solely with the Trustees. Coordination between the Trustees and the PRP can help avoid duplication of studies, increase the cost-effectiveness of the assessment process, facilitate the sharing of information and expertise, and decrease the likelihood of litigation. Input from the PRPs is sought and considered, when provided, throughout the damage assessment process.

The Trustees' expedited assessment and restoration planning process for this Site has been aided and supported by Alcoa, pursuant to the cooperative planning process outlined in the January 1997 Trustees/ Alcoa MOA. The recreational fishing service losses assessed in this Final DARP/EA, including the restoration plan outlined herein, are the product of this cooperative assessment process. Alcoa has committed to directly implementing restoration actions identified by the Trustees through this cooperative approach.

2.4 PUBLIC PARTICIPATION

2.4.1 Review of Assessment and Restoration Plan

Public review is an integral component of the assessment and restoration planning process. Through the public review process, the Trustees seek public comment on the analyses used to define and quantify natural resource injuries and service losses and the methods proposed to restore injured natural resources or replace lost resource services.

Public review was important in the development of this Final DARP/EA. The Trustees released a Draft DARP/EA on September 28, 1999 for public review and comment. In response to comments, the Trustees finalized their selection of a subset of the projects proposed in the Draft DARP/EA and proposed other preferred alternatives. The revised preferred alternatives were explained in a Revised Draft DARP/EA that was released for public comment on May 12, 2000. After considering the comments received on the Revised Draft DARP/EA, the Trustees are finalizing the remaining restoration actions to be used to compensate the public for the recreational fishing losses. Comments on the Draft and Revised Draft DARP/EAs and the Trustees' responses thereto are summarized in Chapter 5 of this document.

Public review of the Draft and Revised Draft DARP/EAs is consistent with all state and federal laws and regulations that apply to the natural resource damage assessment process, including the DOI regulations, NEPA, and the regulations implementing NEPA at 40 C.F.R. Part 1500, et seq.

2.4.2 Availability of Administrative Record

The Trustees have maintained records documenting actions taken and information considered in developing the assessment of recreational fishing service losses and restoration plan outlined in this Final DARP/EA. These records are compiled in an administrative record, which is available for public review at the addresses listed below. The administrative record facilitates public participation in the assessment process and is available for use in future administrative or judicial review of Trustee actions, to the extent permitted by federal or state law. A list of documents included in the administrative record to date for this Final DARP/EA is provided in Appendix A.

Documents within the administrative record can be viewed in the offices of:

Richard Seiler
Texas Natural Resource Conservation Commission, MC142
12100 Park 35 Circle
Building D, Room 246
Austin, TX 78753
Tel. (512) 239-2523

Gladys Hunt – MFG, Inc.
Alcoa Information Center
320 E. Main
Port Lavaca, TX 77979
Tel. (361) 552-8839

Arrangements must be made in advance to review the record, or to obtain copies of documents in the record, by contacting the listed persons by letter or telephone.

AFFECTED ENVIRONMENT CHAPTER 3

This chapter describes the physical, biological, and cultural environment relevant to recreational fishing in Lavaca Bay, in accordance with NEPA. 40 U.S.C. Sections 4321 et seq. Basic information on the Lavaca-Matagorda Bay system may be found in publications by Armstrong (1987), Ward and Armstrong (1980), and Weixelman and Dailey (1997). Unless otherwise noted, these publications are sources for much of the information presented in the following sections.

3.1 PHYSICAL ENVIRONMENT

Lavaca Bay is located in the Coastal Prairies province of the Gulf Coast Plain physiographic region in North America. Climate in the region is humid subtropical with hot summers. Annual precipitation in the vicinity of the Site is approximately 106 cm or 42 inches. The prevailing wind direction is southeast.

Lavaca Bay is part of the larger Matagorda Bay system, which also includes Carancahua, Turtle, and Tres Palacios Bays. The Lavaca Bay system consists of Lavaca Bay and several smaller bays such as Cox, Keller, and Chocolate Bays (see Figure 2-1). Located in Calhoun and Jackson Counties, the Lavaca Bay system covers an area of 155 square kilometers or 60 square miles (approximately 16,200 hectares or 40,000 acres). It is a shallow bay, with an average depth of 1.2 meters or 4 feet. The combination of wind-induced surface waves and fine sediment creates a high level of turbidity.

Lavaca Bay contains a variety of habitats including intertidal mudflat, fringe marsh, high marsh, oyster reef, and open water, which support a large array of plant and animal species. Submerged vegetation is generally absent from Lavaca Bay, but shoalgrass (*Halodule wrightii*) and wigeongrass (*Ruppia maritima*) have been found on the southern shoreline of Keller Bay (Adair et al., 1994). Important habitats for many species include perimeter salt marshes, oyster beds, and freshwater marshes found in upper Lavaca Bay, Cox Bay, and Chocolate Bay. Smooth cordgrass (*Spartina alterniflora*) is prevalent around the northern section of the Dredge Island and along parts of the shoreline in proximity to Alcoa. It also occurs in mixed stands with other marsh grasses in upper Lavaca Bay near the mouth of the Lavaca River, and in portions of Cox Cove and Keller Bay. Marsh-hay cordgrass (*Spartina patens*) is found in the upper reaches of Keller Bay. Other marsh plants, such as shoregrass (*Monanthochloe littoralis*), saltgrass (*Distichlis spicata*), black rush (*Juncus roemerianus*), saltwort (*Batis maritima*), and glassworts (*Salicornia* spp.) are found along the shores and inland reaches of upper Lavaca Bay.

3.2 BIOLOGICAL ENVIRONMENT

A wide variety of fish species are found in Lavaca Bay, the most abundant of which include Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*),

bay anchovy (*Anchoa mitchilli*), hardhead catfish (*Arius felis*), gulf menhaden (*Brevoortia patronus*), striped mullet (*Mugil cephalus*), killifishes (*Fundulus* spp.), sheepshead minnow (*Cyprinodon variegatus*), and sand seatrout (*Cynoscion arenarius*). Less abundant fish species, some of which are also popular among recreational anglers, include gafftopsail catfish (*Bagre marinus*), spotted seatrout (*Cynoscion nebulosus*), sheepshead (*Archosargus probatocephalus*), black drum (*Pogonias cromis*), red drum (*Sciaenops ocellatus*), and southern flounder (*Paralichthys lethostigma*) (Campbell et al., 1991). Two state threatened fish species are seasonal or occasional visitors to the Lavaca-Matagorda Bay coastal ecosystem – they are the blue sucker (*Cycleptis elongatus*) and the river goby (*Awaous tajasica*) (Texas Parks and Wildlife Department. 1988; Texas Parks and Wildlife Department, 1997).

3.3 CULTURAL ENVIRONMENT

The Texas coast enjoys a rich history, dating back thousands of years. Archaeological remains indicate that Calhoun County was inhabited by the Karankawa people as early as 6000 B.C. (Hester, 1975). These people relied on some marine resources (oysters, roots of underwater plants) for sustenance but did not appear to travel beyond sight of land (Uecker and Kelly, 1979).

European contact in this area was initiated by Rene-Robert Cavelier, Sieur de La Salle, who landed on the west shore of Lavaca Bay in 1685. The Spanish began populating Texas in the early 1700s. In 1831, Juan J. Linn, a member of the De Leon Colony, established Linnville, near the present-day town of Port Lavaca. German immigration to this part of Texas was prevalent during the 1800s. In 1844, the port town of Indianola was established as the eastern terminus of the Indianola Railroad, which later became part of the Southern Pacific system.

In 1863, federal troops captured Indianola, following the Battle of Matagorda Bay. The only Civil War battle actually fought in Calhoun County was on Christmas Eve in 1863 at Norris Bridge. This port town flourished until its destruction by two hurricanes (in 1875 and 1886). Although the town was re-built following the first hurricane, it was abandoned following the second storm.

Today the Lavaca Bay system supports significant amounts of recreational fishing. It is a popular spot for saltwater anglers, offering numerous fishing access points in Point Comfort, upper Lavaca Bay, Port Lavaca, Chocolate Bay, Magnolia Beach, and Keller Bay (see Figure 2.1). Sites at these locations differ from one another in terms of facilities, access, aesthetics, and available species of fish. The human activities at the sites are dependent upon the condition of the coastal and marine habitats.

A recently conducted survey provides information on how anglers fish, where they fish, and where the anglers come from. The survey was conducted as part of the RI/FS process to assess the human health risk associated with fish consumption due to the Lavaca Bay Site and to assess the recreational fishing component of natural resource damages (see Chapter 4). The survey was administered to a sample of anglers from the

population of anglers (those with fishing licenses) in Calhoun, Jackson, and Victoria counties, the three counties surrounding Lavaca Bay. Forty-seven percent of the sample were from Calhoun, 34 percent were from Victoria, and 19 percent were from Jackson. The number of surveys administered in each county were weighted by the number of anglers in each county.

Survey respondents provided information about their fishing trips in November, 1996. Of the fishing trips in that month, 55.8 percent of the sample took boat-mode trips, 25 percent of the sample took pier or shore based trips, and 19.2 percent of the sample took both boat and pier/shore trips. For the boat trips in the sample, 62 percent occurred outside Lavaca Bay. Alternative destinations included Matagorda Bay, Espiritu Santo Bay, and Carancahua Bay. Thirty-eight percent of boat trips occurred in Lavaca Bay and 7.9 percent of those trips were within the closure area in Lavaca Bay. Of the pier trips, 54 percent were outside Lavaca Bay. For the remaining trips within Lavaca Bay, 13 percent of the trips were within the closure area.

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RECREATIONAL FISHING ASSESSMENT CHAPTER 4

The goal of the injury assessment for recreational fishing is to determine the nature and extent of the recreational fishing service losses resulting from the onset of the 1988 closure until baseline service levels are anticipated to return (via removal of the closure) and to provide a technical basis for evaluating the need for, type of, and scale of restoration actions.

The assessment process being used by the Trustees is guided by the DOI regulations at 43 C.F.R. Part 11. The Trustees' strategy in this assessment, however, reflects two important innovations. First, the Trustees have pursued an assessment approach that is linked to the ongoing RI/FS for the Site. This linkage is advantageous because data and other information developed as part of the RI/FS process have also been useful in assessing natural resource injuries and service losses. Integration of RI/FS and NRDA processes, where appropriate, promotes data sharing, saves time and minimizes costs in the assessment process.

Second, as noted earlier in Section 2.2.1, the Trustees elected to use an assessment approach that pursues in-kind compensation directly, rather than the dollar value of the service losses to the public. Under this approach, the focus is on quantifying the loss of natural resource services and identifying restoration projects that will return the same level, type, and quality of recreation services to the public. This approach – termed compensatory restoration scaling – is expressly provided for in regulations governing natural resource damage assessments under the Oil Pollution Act of 1990 developed by NOAA, found at 15 C.F.R. 990. Even though not yet commonly followed in assessments under CERCLA, this approach can be accommodated within the DOI regulations. The DOI regulations permit Trustees to use restoration as a basis for compensating for service losses and to include restoration planning in the Assessment Plan phase for that purpose.

As part of the cooperative assessment process underway for the Site, the Trustees and Alcoa agreed to use a Reasonable Worst Case (RWC) strategy as a basis for assessing resource injuries and service losses. Under this strategy, the Trustees and Alcoa agreed to use existing and site-specific data (see below), as well as traditional modeling techniques in determining the nature and extent of recreational fishing service losses attributable to the closure. Moreover, the RWC strategy incorporates conservative assumptions in defining these losses, an approach that tends to increase the size or number, or maximize the quality, of restoration actions needed to provide for in-kind compensation of services. The RWC approach results in service loss estimates that, in the judgment of Trustees, will lead to restoration actions which would clearly be sufficient to compensate for recreational fishing service losses.

4.1 EVIDENCE OF INJURY

The DOI regulations indicate that the existence of a ban on fish consumption is evidence of injury to the resource. 43 C.F.R. Section 11.62(f). The TDH closure order is a consumption ban as it prohibits anglers from keeping the fish they catch in the closed area. The lost use of or access to these fish for consumption may affect angler behavior, for example, because anglers may prefer to eat the fish they catch. If angler behavior is affected, then the closure has affected the recreational fishing services of resources in the closed area. Reductions in recreational fishing services in the closed area can be assessed by evaluating changes in the satisfaction that anglers derive from their fishing trips, also known as 'angler utility.' Angler utility serves as an index that can be used both to assess reductions in recreational fishing services and increases in such services based on the anticipated benefits of restoration actions.

In early 2000, the Texas Department of Health revised the closure order. The area in western Cox Bay that was originally part of the closure area was opened for the taking of finfish and crabs (see Figure 2.1). This action reduces losses in the future until the closure is fully lifted.

4.2 METHODOLOGY FOR ESTIMATING SERVICE LOSSES AND RESTORATION BENEFITS

The objective of the RWC analysis for recreational fishing is to estimate the reduction in angler utility occurring as a result of the closure order that was put into effect in a portion of Lavaca Bay. The closure order can affect angler utility in three ways. First, in response to the closure order, anglers may choose to not go fishing. This decision means that the satisfaction associated with the trip is forgone. Second, anglers may choose to fish somewhere else that is less preferable. In this scenario, anglers experience a reduction in their utility because they derive the most satisfaction when fishing at their most preferred site. Finally, anglers may continue to fish in the closure area but not consume the fish. To the extent that being able to eat the fish that they catch provides utility to anglers, anglers who continue to fish in the closure area experience less utility than they would if the closure area were open. The RWC analysis is designed to estimate these types of losses in angler utility.

To estimate these losses, this assessment uses random utility models (see Adamowicz, Louviere, and Williams, 1994 and Adamowicz et al., 1997 as examples). These models are well-established in NRDA as an appropriate tool for measuring recreation losses (Hausman, Leonard, and McFadden, 1993; McFadden, 1995; Desvousges, Waters, and Train, 1996). Such models use observed site-choice behavior to estimate the probability that an individual angler will choose to visit a given recreation site, depending on the characteristics of that particular site and the characteristics of the other available substitute fishing sites. Fishing sites with more attractive characteristics provide

more utility to anglers and thus have a higher probability of selection by anglers. These models also explicitly incorporate substitute fishing sites.

Most of the data used in this assessment were obtained through an angler survey. This survey was implemented by augmenting the questionnaire for the fish consumption study being conducted as part of the RI/FS process at the Site (Alcoa, 1998). The fish consumption study targeted recreational saltwater anglers and asked them detailed questions about where they fished and the fish they caught and consumed. Adding questions appropriate to the assessment of recreational fishing service losses was a logical, cost-effective extension of the RI/FS process.

The survey was administered to almost 3,500 saltwater anglers residing in Calhoun, Jackson, and Victoria Counties. According to TPWD creel survey data, the Lavaca Bay system draws about 70 percent of its saltwater anglers from these three counties. There were approximately 13,000 fishing license holders in these three counties in 1994-1995. Of the three counties, about 50 percent of the anglers are from Calhoun County, 30 percent from Victoria County, and 20 percent from Jackson County. The sampling strategy employed in the study uses these same relative proportions. Almost 2,000 anglers participated in the survey. The respondents provided information about their fishing trips in November, 1996.[3]

Figure 4-1 depicts and provides a general description of the type of model used in this assessment.[4] The first concept to understand about the model is that different fishing sites have different characteristics. Relevant site characteristics include whether or not the site has a boat ramp, whether or not the site has a lighted pier, which fish species are prevalent at the site, and how far it is from an angler's home. The site characteristics are observed (e.g., whether or not the site has a boat ramp) or derived based on survey information (e.g., distance to site from angler's home). The model determines angler satisfaction associated with any site based on that site's fishing characteristics.

The concept that different fishing sites have different features is consistent with other types of consumer products and services. Different kinds of cars, for example, have different kinds of characteristics that distinguish them from one another. Consumer services, such as banking services, are also different in terms of fees, number of checks per

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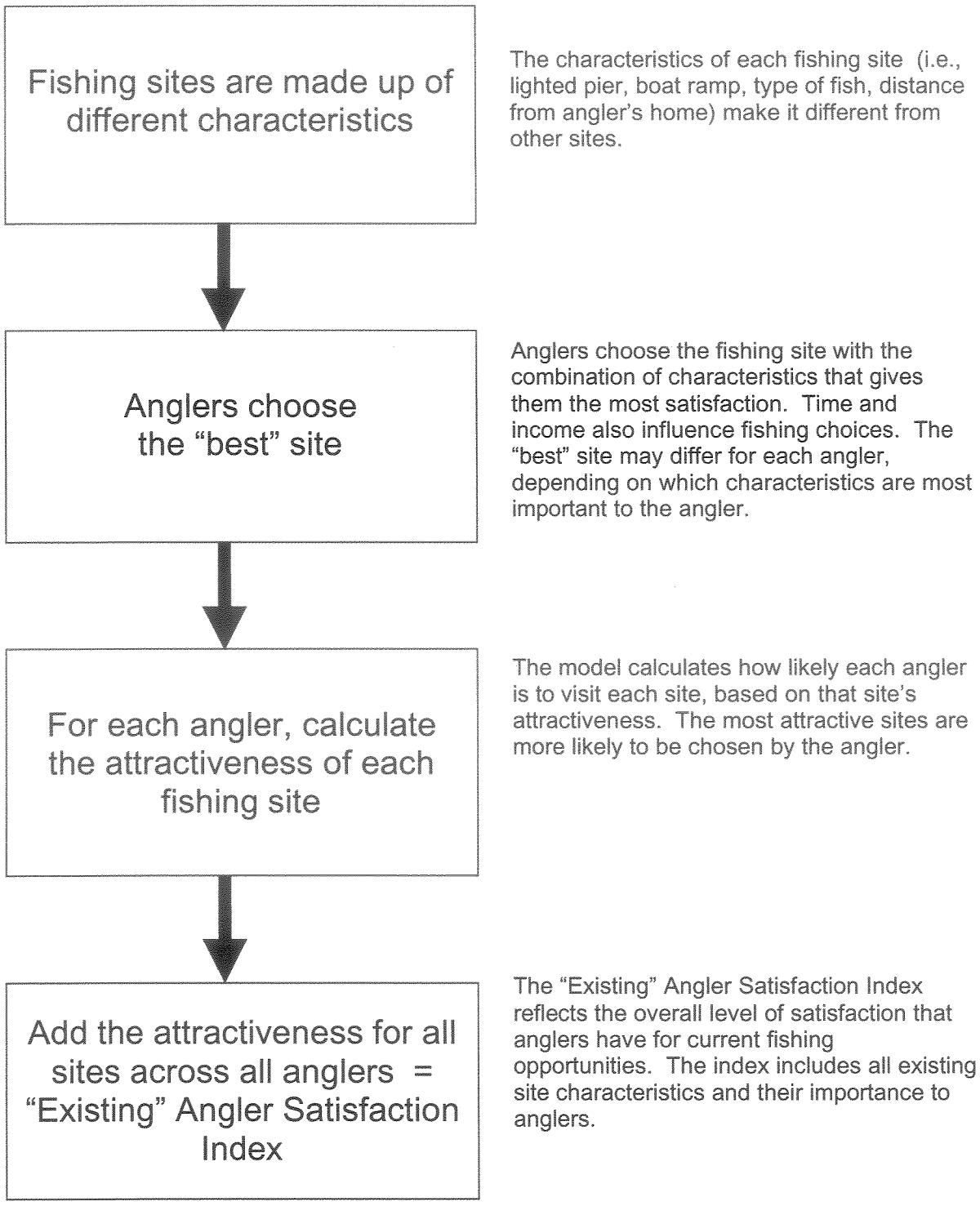
[3] Because the model is constructed based on trip information in November of 1996, the model quantifies losses and benefits for November, 1996. If November is a typical or representative month, then about 1/12, or 8.3 percent, of annual trips should be during November. Texas Parks and Wildlife Department creel data indicate that November is a representative month for 1996. According to the creel data, 7 percent of the anglers taking trips in Matagorda Bay (which includes Lavaca Bay) in 1996 took them in November. So, November is representative of 1996 and the model captures the benefits and losses for all of 1996. Section 4.4 describes how service losses are addressed in previous and later years.

[4] See Alcoa, 1998 for a full report on the methodology and results of the recreational fishing assessment.

month, minimum balance requirements, etc. Customer satisfaction with cars or banking services, then, is a function of the features of the car or service.

Figure 4.1: General Model



Faced with all these different choices of fishing sites, the angler chooses the 'best' site, which is the second box shown in Figure 4-1. Which site is best depends on what characteristics are most important to each angler and how he or she is willing to trade off different characteristics. For example, being close to a site might be more important to Angler A than the kind of fish he is likely to catch. Angler B, on the other hand, may be willing to drive farther to fish where sea trout are numerous.

The fact that anglers trade off different features of a fishing site is also consistent with how consumers make decisions about other goods and services. Returning to the car example, most consumers would agree that leather seats are nice. However, because they cost more, some consumers trade the leather seats for a lower price or for a bigger engine. When buying a car, each consumer weighs the different facets of different cars and makes the decision that is best for him or for her. The same is true for fishing sites. Each angler looks at the different choices and chooses the site that provides him or her with the most satisfaction, subject to his/her budget constraint.

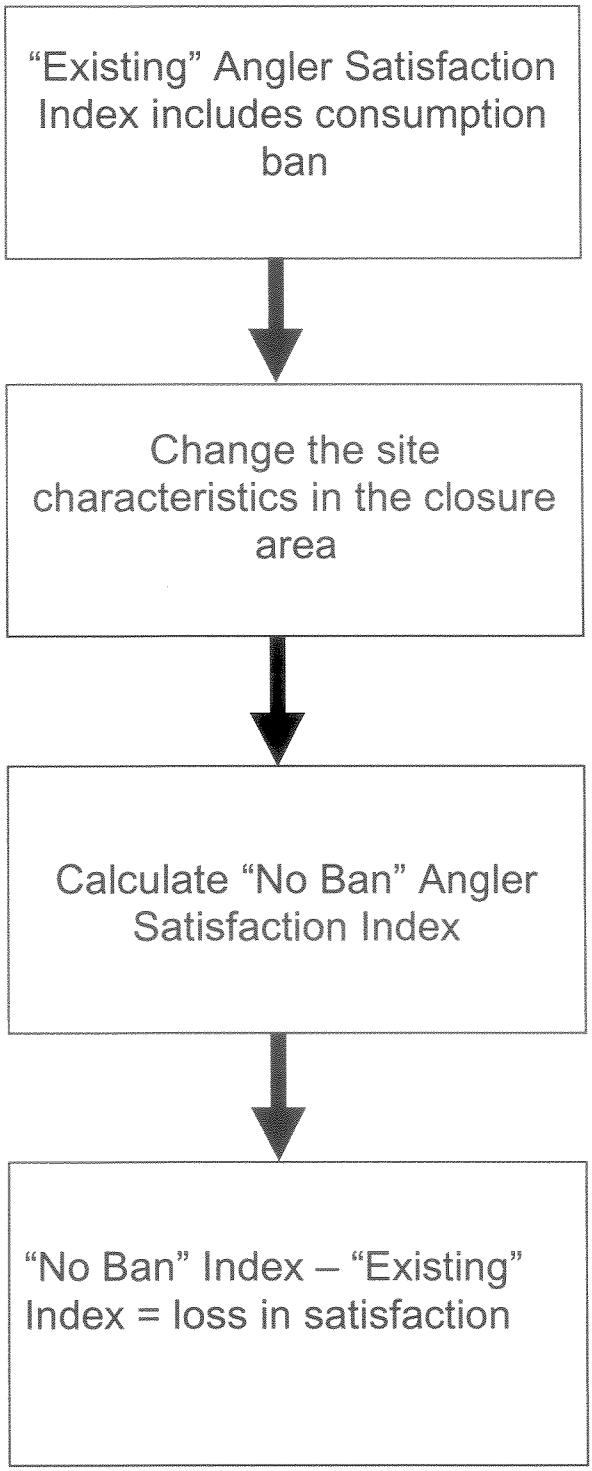
Since the angler survey requested information regarding past fishing experiences, survey data provide the actual fishing-site choices made by anglers from the three-county area. Based on the choices that each angler actually made, the model calculates an attractiveness index for each angler for each site, which is the third box shown in Figure 4-1. In calculating this index, the model takes into account each angler's preferences about different site characteristics and the different fishing sites available to anglers. Selected sites are more attractive and rate higher on the index.

For example, suppose that Angler A, who does not like to drive far to fish, has two fishing sites within 5 miles of his house. These sites would rate higher on Angler A's attractiveness index than any other sites. Angler B, on the other hand, places a premium on sites where she is likely to catch many sea trout. However, the best sites with sea trout are more than 15 miles from Angler B's house. Even so, on Angler B's attractiveness index, these more distant sites would rate higher than any other closer site.

The fourth box in Figure 4-1 explains that the attractiveness scores for each site for each angler are summed. This sum gives us an overall measure of angler satisfaction with the current fishing opportunities. This measure of angler satisfaction reflects the actual choices that anglers make and reveals what characteristics are important to each angler.

Figure 4-2 shows how the general model is used to estimate losses in angler utility associated with the closure area. The first box is the same as the last box on Figure 4-1, which is the existing angler satisfaction index. Because this satisfaction index reflects the current fishing sites that anglers have available to them, it includes the reduced satisfaction from not being able to eat the fish from the closure area. Being able to eat fish caught during fishing trips is important to some anglers, so the consumption ban reduces overall angler satisfaction.

Figure 4.2: Effect of Consumption Ban



This index reflects the satisfaction from current fishing choices, including the reduced satisfaction from not being able to eat the fish from the closure area.

The option of eating the fish is an important site characteristic to anglers. To measure the attractiveness of the closure area site without the consumption ban, the model is changed to remove the consumption ban.

Removing the consumption ban means that the closure area is a more attractive fishing site for more anglers. The "No Ban" Angler Satisfaction Index will be higher, reflecting the improved fishing opportunities.

The model calculates the difference in the "Existing" Angler Satisfaction Index and the "No Ban" Angler Satisfaction Index. This difference measures the loss in angler satisfaction from not being able to eat the fish caught in the closure area.

The second box in Figure 4-2 is the crux of estimating losses in angler utility. To determine how much angler satisfaction has been reduced as a result of the closure order, that site characteristic (i.e., whether or not anglers can eat the fish from that area) is altered in the model by removing the consumption ban. This change permits the assessment of the attractiveness of the closure area without the consumption ban. Thus, this model is like any other model because it predicts how something (in this case, angler satisfaction) would change if the model inputs were different.

As the third box in Figure 4-2 indicates, the model then recalculates the satisfaction index without the consumption ban. As a result, the closure area is more attractive to anglers. For some anglers, the attractiveness of the closure area increases, so the overall level of angler satisfaction increases. This 'no ban' satisfaction index is larger than the existing satisfaction index.

No angler will be worse off by removing the consumption ban, but some may not be better off. Whether or not a specific angler is better off depends on what fishing site characteristics are important to him or to her. For example, anglers who are farther from the closure area and who consider distance an important characteristic will not be made much better off. Even without the consumption ban, these anglers are unlikely to fish in the closure area because it is so far away. However, anglers who live close to the closure area and rate distance as an important characteristic will be better off. The satisfaction index will increase for these anglers, increasing the overall index.

Returning to Figure 4-2, the last box explains that angler utility losses are estimated by subtracting the existing satisfaction index (i.e., the level of angler satisfaction with the consumption ban in place) from the no-ban satisfaction index. This subtraction reveals how much more satisfaction there would be if the consumption ban were removed. In other words, it reveals how much loss in angler satisfaction has occurred as a result of the consumption ban.

The same models that are used to estimate losses in angler utility are also used to estimate gains in angler utility based on possible restoration actions. Anglers choose their fishing sites based on the different characteristics and are assumed to select the site that provides them with the most utility. To estimate gains in utility, specific enhancements to existing sites or the creation of new sites are incorporated into the calculation of angler utility. For example, suppose that a restoration alternative would add a fishing pier to a locale that currently has no pier. To estimate the gains associated with this restoration alternative, angler utility is re-calculated, adding another fishing pier to the set of fishing opportunities. Angler utility increases with the addition of this new pier because anglers now have more choices when selecting a fishing site. The specific increase depends on the overall attractiveness of the characteristics for the new site across the population of potential anglers.

4.3 MODEL SELECTION

A random utility model was developed based on the general method described in Section 4.2. A model was constructed based on the survey data to estimate the losses due to the closure and the benefits from different restoration actions. The model was additionally refined to assess impacts separately by two fishing modes – boat and pier. To ensure robustness of the model results, sensitivity analyses were conducted.[5]

Separate models were developed for boat anglers and for pier/shore anglers because boat and pier/shore anglers, based on the survey data, appear to have somewhat different preferences. The decision to develop separate models is also consistent with the RWC approach. Because about 20 percent of the surveyed anglers participate in both boat fishing and pier/shore fishing, segregating these models could overestimate losses. This could occur because separate models do not allow anglers to substitute boat fishing opportunities for pier fishing opportunities, or vice versa.

The initial recreational fishing models and analyses were subjected to peer review. Three peer reviewers, i.e. independent academic experts otherwise not involved in the case, were jointly selected by Alcoa and the Trustees. The peer reviewers were asked to comment on all aspects of the assessment methodology, including the modeling work. Review of the modeling work was particularly important as the models formed the basis of the recreational fishing assessment.

The peer reviewers provided a variety of comments (Adamowicz, 1998; Parsons, 1998; and Smith, 1998). Some questions and recommendations did not affect the foundation of the analysis. However, other comments raised questions about the modeling work, itself. Along with these comments, the peer reviewers suggested that alternative modeling approaches be considered.

In response to the peer reviewer comments, additional analysis (MacNair and Lutz, 1999) was conducted. Part of this work provided additional information on the angler survey and the survey results. Most importantly, in response to the peer reviewer comments, additional sensitivity analyses of the models were conducted. That is, alternative model formulations were developed to assess their impacts on the modeling results. After the additional modeling effort, there were thirteen models, with associated outcomes, for each fishing mode.

The Trustees considered the additional modeling work and how best to use the models in assessing recreational fishing impacts. For each fishing mode, the results across each of the thirteen models all fell within a narrow range. In other words, for each mode,

[5] Sensitivity analysis is a mechanism whereby alternative models are developed which incorporate different model assumptions. In this case, alternative models were investigated to ensure changes in model assumptions did not significantly change model results.

all estimates of the losses due to the closure and of the benefits from a particular restoration action were similar. The Trustees believed that actual losses as well as the restoration requirement needed to compensate for those losses fell within the ranges defined by the array of models. However, the Trustees were uncertain which of the thirteen models was most appropriate for the boat and pier mode assessments. Rather than trying to determine the 'right' model, the Trustees elected to base the restoration scaling on the models that led to the largest restoration requirement. This choice was conservative, accounting for the uncertainty associated with the model choice in a manner that assured the public would be sufficiently compensated for their losses. The models selected for use to quantify the recreational fishing service losses and determine the scale of compensatory restoration required are those labeled number VII in Tables 3 and 4 of MacNair and Lutz (1999).

4.4 LOSSES DUE TO THE CLOSURE AND BENEFITS OF RESTORATION

The model results describe the loss in utility for a typical trip in 1996. To fully compensate for losses, the model results must be 'aggregated' to account for losses over time. Because the TDH issued the closure order in 1988, recreational fishing service losses began in 1988. Losses will continue into the future. It is expected that what remains of the closure will be in effect and losses will continue through 2010. Alcoa has already removed some of the most highly contaminated sediments and has acted (or is currently acting) to control mercury sources to prevent future contamination of the bay. Additional response actions are possible as part of a final remedy decision for the Site. Lavaca Bay hydrologic models, developed as part of the RI/FS, suggest additional burial of contaminated surficial sediments will occur in some areas through natural processes and, taking into account response actions taken to date, will likely provide for fish tissue levels low enough to permit removal of the rest of the closure by 2010. That projection could be strengthened (if not accelerated) by any additional actions undertaken as part of the final remedy.

To aggregate losses over time, a discount factor is applied to the model results. Discounting is a standard economic technique that recognizes that people prefer to use or consume goods and services in the present rather than postpone their use or consumption to some future time. Specifically, people must be offered additional compensation before they are willing to postpone use or consumption. Interest-bearing savings accounts are based on this principle. In order to get people to save money (i.e., forgo present use or consumption), banks pay customers an additional amount of money in the form of interest. The same principle applies when discounting to incorporate differences in timing for the losses and for the gains associated with the restoration projects.

Thus, to compensate for past losses in utility, anglers must experience more utility from their future fishing opportunities than they lost in the past. The discount factor determines how much more utility is sufficient. For this analysis, the Trustees use a 3

percent real discount rate. This rate is consistent with DOI policy and with economic theory (Freeman, 1993; Lind, 1982).[6]

The discounted utility losses are then compared to the discounted utility gains associated with a number of restoration alternatives or a combination of restoration alternatives. This comparison is the restoration 'scaling' as it determines whether any given restoration alternative or any given combination of restoration alternatives provides anglers with gains in utility that are sufficient to offset the losses.

Chapter 5 describes the restoration alternatives that the Trustees considered in their evaluation of potential projects and identifies the final restoration projects and their locations needed to compensate for recreational fishing service losses.

The quantification of losses does not account for the opening of part of the closure area in 2000. The model as developed can not quantify the losses associated with a partial closure of a fishing site. The Trustees' estimate of losses from 2000 through removal of the rest of the closure assumes no reduction in the closure area and is therefore an overestimate of the recreational fishing losses.

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5.1 RESTORATION STRATEGY

The goal of restoration is to make the environment and public whole for the injury to fishery resources and services losses resulting from the recreational fishing closure. In developing the restoration plan to address those losses, the Trustees sought to identify and evaluate restoration alternatives that would provide recreational fishing services equivalent to those lost as a result of the TDH closure order. The recreational fishing service losses were quantified as pier/shore mode angling losses and boat mode angling losses. Likewise, restoration alternatives were identified and evaluated by their ability to provide pier/shore mode services and boat mode services.

Restoration actions are generally 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 undertaken to restore the injured natural resources and/or services to baseline condition, is considered 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. Primary restoration actions that require human intervention are appropriate when injured resources will not recover, or will recover slowly, and when 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. In planning for such restoration, trustees should consider alternatives that would provide services of the same type and quality and of value comparable to those lost. The scale of compensatory restoration is dependent on both the initial size of the injury and how quickly each resource and/or service will return to baseline. Primary restoration actions that speed the recovery of resources, including the services they provide, reduce the requirement for compensatory restoration.

With respect to the recreational fishing service losses in Lavaca Bay, the baseline condition is the removal of the closure order. The removal of the closure order is an objective of the remedial process. The Trustees believe, based on actions taken to date or anticipated as part of any final decision on remedy, that the remedial process will be sufficient to allow the closure to be fully removed (and for recreational fishing services to return to baseline) by 2010. In this instance, further consideration of primary restoration alternatives by the Trustees as part of a natural resource damage assessment process is viewed as unnecessary as remediation actions functionally equate to primary restoration of Site-related resource injuries or losses. Accordingly, this Final DARP/EA, focuses only on restoration alternatives which would appropriately enhance recreational fishing

opportunities in Lavaca Bay in order to compensate for the interim loss of recreational fishing services, from the time the closure was implemented until its anticipated removal.[7]

This chapter describes the different types and locations of fishing restoration projects considered by the Trustees and the process used to evaluate and identify the selected restoration alternatives for recreational fishing. The chapter is organized as follows. Section 5.2 discusses general restoration alternatives; Section 5.3 describes the potential types of restoration projects and their locations; Section 5.4 presents the Trustees' evaluation of the alternatives and identifies the restoration actions that were proposed in the Draft DARP/EA; Section 5.5 summarizes the public comments that were received on the Draft DARP/EA; Section 5.6 explains the Trustees' response to comments and the restoration actions that were proposed in the Revised Draft DARP/EA; Section 5.7 summarizes the comments on the Revised Draft DARP/EA; and the final restoration actions selected for use to compensate for recreational fishing services losses are discussed in Section 5.8.

5.2 GENERAL RESTORATION ALTERNATIVES

Under the legal and policy frameworks applicable to NRDA, the use of on-site, in-kind restoration actions are favored, wherever possible, to ensure the most direct relationship between resource injuries or service losses and the benefits of restoration actions. Consistent with this preference, the goal of restoration for recreational fishing service losses is to increase or enhance fishing opportunities in Lavaca Bay near the site of those losses, i.e., the closed area. Restoration alternatives were identified for consideration based on this restoration goal.

The Trustees considered several alternative approaches to providing recreational fishing opportunities and identified improving fishing access as the preferred approach. Increasing catch rates was considered as a means of providing fishing opportunities but the Trustees believe that the effect of possible restoration actions on catch rates was not measurable based on existing information for this case, so that the benefits of restoration in increasing catch rates could not be quantified. Therefore, in developing restoration project alternatives, the Trustees focused on identifying and evaluating restoration projects and project sites that would improve fishing access, by mode, as a means of providing recreational fishing services comparable to those lost.

The Trustees also evaluated the 'no-action' alternative, as required by NEPA. Under this alternative, the Trustees take no direct action to compensate for lost services pending resource recovery. As noted in Section 5.1, in this instance the Trustees expect that the remedial process will be sufficient to allow removal of the fishing closure (i.e.,

[7] Under the staged approach to restoration planning described in Section 1.2, the Trustees' determination regarding the necessity of further primary restoration planning for the recreational fishing services losses can be revisited after the final remedy for the Site is selected and addressed, if needed, in any final stage restoration plan that may be developed.

recovery to baseline). Notable recreational service losses due to the closure, however, have and will occur in the interim period as discussed in Chapter 4. Under laws applicable to public natural resource damage claims, the Trustees are responsible for seeking compensation for such interim losses where losses are significant and where feasible, cost-effective alternatives are available for use to define restoration-based compensation. Because the interim service losses associated with the closure would go uncompensated, the Trustees have determined that the 'no action' alternative will not satisfy compensatory restoration objectives and rejected it on that basis.

The Trustees identified suitable types of projects to improve fishing access using two sources of information. The first source of information is public input. The Trustees actively solicited suggestions and comments from the public about the types of restoration projects that the public would see as beneficial to recreational fishing in the affected area during public meetings in Port Lavaca in February and November 1998.[8] The second source of information was the recreational fishing models, which identified site characteristics that affect angler utility. These models rely on extensive information provided by the angler survey in the three county area. Although some of these site characteristics cannot be addressed by restoration projects, many could be changed and these changes represented potentially suitable restoration projects. For example, the survey data indicates that boat ramps with the capacity to accommodate large boats are better than ramps that only accommodate small boats. This is a characteristic of a boat ramp that can be changed as a restoration action. On the other hand, the survey data indicate that the view of an industrial plant during a fishing experience is worse than a fishing experience without an industrial plant in view. However, the characteristic of an industrial plant in view at a fishing site cannot feasibly be changed through a restoration action.

5.2.1 Types of Restoration Projects

The combination of public input and the recreational fishing models yielded the following list of potential restoration projects:

- Increasing fishing access, either by creating new launch facilities or by constructing new fishing piers;
- Improving existing launch facilities to accommodate larger boats;
- Increasing the number of launch lanes at existing launch facilities;

[8] Some of the projects proposed by the public were inconsistent with improving recreational fishing in Lavaca Bay. For example, some commenters proposed nature trails and inland fishing farms. Under the applicable federal statutes, the Trustees were required to give preference to restoration alternatives that provide the same type and quality of recreation services as the services that are lost before considering alternatives that provide dissimilar services. Since there were alternatives that provide similar services, the projects that provide dissimilar services were not evaluated further.

- Adding lights to fishing piers; and
- Adding parking at access points.

The next section of this Final DARP/EA lists the locations where fishing restoration projects of these types could be implemented.

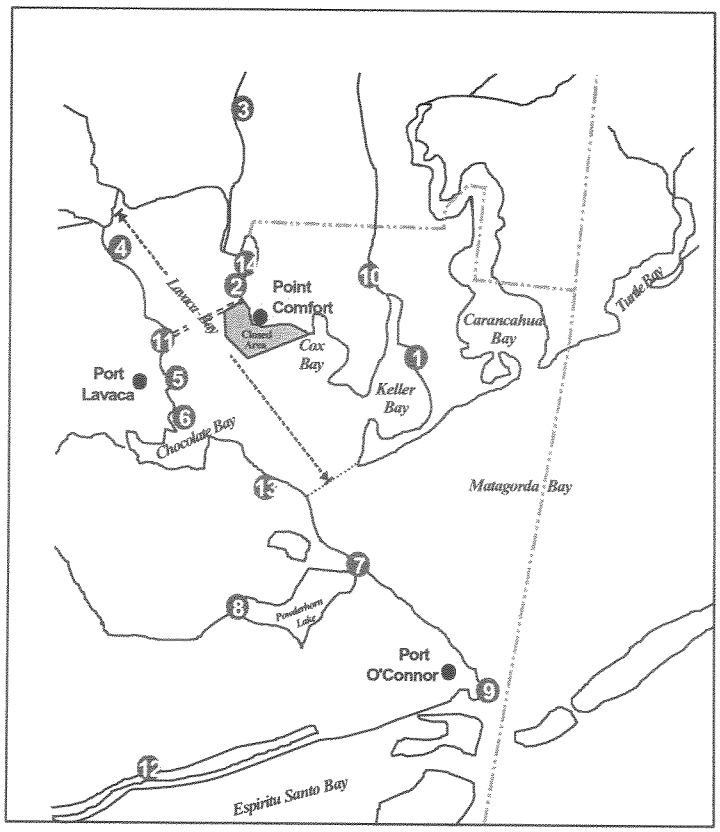
5.2.2 Geographic Locations for Restoration Projects

In addition to evaluating the different types of restoration projects, the Trustees also evaluated different geographic locations for these projects. Both public input and the recreational fishing models provided information on which the list of possible locations was based. None of the locations is in the closure area or in areas of other known contamination. The locations are shown on Figure 5-1. The combination of all possible project locations and project types resulted in several dozen possible restoration alternatives.

Figure 5.1:

Potential Locations for Recreational Fishing Projects

1. Olivia
2. Bean Property
3. Lolita
4. Six-Mile Park
5. Port Lavaca Bayfront
6. Harbor of Refuge
7. Indianola
8. Powderhorn Lake
9. Port O'Connor
10. Keller Creek
11. Lighthouse Beach
12. Fulghum Launch
13. Magnolia Beach
14. Point Comfort



5.3 PROJECT TYPES AND LOCATIONS

To evaluate the different restoration alternatives, the Trustees relied on a set of criteria or standards. The criteria used in this plan are based on guidance provided by the DOI regulations. 43 C.F.R. Sections 11.81 and 11.82. The criteria also reflect additional guidance found in the regulations developed by NOAA for restoration planning under OPA.[9] 15 C.F.R. Section 990.54. From the range of restoration alternatives, the Trustees identified preferred compensatory restoration alternatives based on the following criteria:[10]

- The extent to which each alternative is expected to meet restoration goals and objectives in compensating for interim losses;
- The likelihood of success of each 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.

In addition to the foregoing criteria, the Trustees also considered proximity to the Site as an important factor. The majority of the potentially affected anglers live within the three-county area, with nearly half of them residing in Calhoun County. Thus, restoration projects designed to compensate for the losses these anglers experienced should be located within the same general vicinity as the Site. Projects implemented within the Site, however, have the potential to be less effective in meeting restoration goals as their utility will continue to be adversely affected by the mercury that remains in the sediments until system recovery. Thus, projects within or immediately bordering the closure area were less attractive.

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[9] Although OPA is not directly applicable to NRDA for this Site, OPA and CERCLA have a common goal, i.e. the restoration of injured resources or services. Because the OPA regulations more directly outline planning appropriate to support restoration-based compensation decisions, the Trustees considered these regulations a useful reference in implementing restoration-based compensation planning in this CERCLA context.

[10] The cost to carry out the alternative is often also an appropriate criterion for evaluating restoration alternatives. When two or more restoration actions provide the same or a similar level of benefits, this criterion supports selection of the least costly alternative. The criterion is inapplicable where no two projects provide comparable benefits, are not equally preferable based on other criteria, or where the costs of such alternatives are comparable (or potential cost differences negligible). Consideration of the costs of the boat ramp and pier projects were not viewed as necessary to the identification of the preferred restoration alternatives as the ramp and pier projects represented similar cost alternatives.

Further, the Trustees considered an even distribution of the projects around the closure area, if there were to be multiple projects, to be an important factor in evaluating alternatives. In other words, if a number of projects were necessary to compensate for the interim losses, the Trustees decided it would be important to locate the projects in a number of communities near the closure area and not all in one community or location in order to ensure that as much of the population affected by the closure benefited from the restoration projects to be undertaken.

The Trustees also considered the level of support for a project from local communities when identifying preferred restoration alternatives. The Trustees recognized the importance of public participation in the restoration planning process, and the acceptance of selected projects in the community. All else equal, alternatives that complement or were compatible with other community development plans and goals were considered more favorably.[11]

In evaluating restoration alternatives, the Trustees first focused on possible locations for restoration projects. After narrowing the list of possible locations, the Trustees then evaluated specific projects that could be implemented at the preferred locations.

5.3.1 Evaluation of Possible Locations

The Trustees used proximity to the Site as a first-tier screening factor. More proximate locations are more likely to be successful in restoring lost fishing services, which is consistent with the legal and policy frameworks applicable to NRDA. Fulghum Launch, and Colomo Creek/Powderhorn Lake were screened out as restoration sites due to their relatively distant locations from the closure area. However, Port O'Connor, which is also a relatively distant location, was retained for further evaluation because it is such a popular fishing destination.

About half of the remaining locations were screened out for other reasons. Two of the locations, Indianola and Keller Creek, are privately held, and the owners were not interested in selling. In addition, the Keller Creek location is so close to the Olivia location that a project at Olivia would improve access to essentially the same fishing waters. The Harbor of Refuge is within two miles of the Port Lavaca Bayfront and already has a boat ramp. Since the Bayfront offers more opportunities for projects, it was selected in lieu of the Harbor of Refuge. The Bean property is adjacent to Point Comfort, but contains dilapidated buildings and industrial debris. A considerable effort and potential cost would be required before public access could be allowed. Therefore, Point Comfort was retained

[11] Throughout the entire evaluation process, the Trustees sought to ensure that restoration alternatives would also comply with all relevant laws, be consistent with all government policies, and not endanger public health or safety.

over Bean. A pending unresolved construction issue hampered use of the Lolita site. Proposed highway construction at the location could delay a restoration project.

The potential sites that remained after this initial screening were the Port Lavaca Bayfront, Six-Mile Park, Magnolia Beach, Olivia, Point Comfort, Port O'Connor and Lighthouse Beach sites.

5.3.2 Potential Site and Project Descriptions

The next phase of the screening process focused on evaluating specific potential projects at the remaining locations. Each of the remaining locations was visited by representatives of Alcoa and Trustees to assess the existing quality and type of facilities. In addition, county and port commissioners, city officials, local fishermen, and guides provided information and ideas. Proposed additions or enhancements at each remaining location were site-specific and depended on the quality and type of facilities already in place and the feasibility of action at each location to increase or enhance recreational fishing opportunities. Table 5-1 displays the specific projects considered for each of the remaining locations.

Table 5-1: Specific Projects at Remaining Locations

Location	Add or enhance boat ramp	Add or enhance pier	Add or enhance parking
Port Lavaca Bayfront	X	X	X
Six-Mile Park	X	X	
Magnolia Beach		X	X
Olivia		X	
Point Comfort		X	X
Port O'Connor		X	X
Lighthouse Beach	X		

Where piers are part of the project mix, the proposal was generally for a 300 foot lighted fishing pier. The boat ramp and parking projects were specific to each project site. Each of the projects listed in the table is discussed in the following paragraphs, as presented in the Draft DARP/EA.

Port Lavaca Bayfront

The Port Lavaca Bayfront area is currently being enhanced as a public recreation area. There is a master plan for the area that includes a new pier, boat ramp and parking area; these projects have yet to be funded. The plan originally located the ramp and parking on a peninsula of land south of the Marina. This property is privately held and the

owners are not willing to sell. The community's desire to have a ramp and parking could be realized if a location north of the Marina on public property were selected. A navigational channel for the Marina area already exists and is being maintained.

Six-Mile Park

Six-Mile Park currently contains a boat ramp, sheltered picnic area, playground, and parking area. The property is also an access point for wade fishing. The boat ramp is highly utilized and, during periods of heavy use, boaters have been observed launching from an auxiliary ramp that is in need of improvement. The proposed ramp project was to improve this auxiliary ramp and associated bulkhead such that the ramp can be maintained and utilized under most tidal conditions. The proposed pier project was the addition of a new pier. A pier at this site has potential since the area is known as a good fishing location and the pier would be supported by other existing facilities.

Magnolia Beach

Magnolia Beach has a boat ramp, a public beach, and a park with shelters, camper sites, and restroom facilities. The site is relatively more removed – as compared to other sites – from the closure area. The boat ramp does not have adequate parking to accommodate current use; therefore, an expanded parking area has been proposed. Since the existing parking is so limited, a project to expand parking should ease traffic and draw additional anglers to the site. The pier project was a proposal for a new pier. A lighted fishing pier could be supported by the existing facilities. Private piers in this general area are known as good fishing locations.

Olivia

At Olivia, Hatteras Park includes a new boat ramp, sheltered picnic area, playground, and parking area. The proposed project is a new fishing pier. A lighted pier could be supported by the existing facilities. The area is known for good fishing, but relative to other sites the location is more remote from the closure area. The boat ramp has begun to silt in, and it is configured such that mechanical dredging from the shore would be difficult. The proposed fishing jetty/pier project would provide access for the county's equipment, allowing the existing boat ramp to be maintained more easily.

Point Comfort

Point Comfort's park includes a boat ramp, sheltered picnic area, playground, and parking area. The proposal is for a new fishing pier. A lighted pier could be supported by the existing facilities. The best location for a pier would be on a peninsula adjacent to the boat ramp. The addition of some paved access and parking would also be attractive enhancements.

Port O'Connor

Port O'Connor has an existing fishing pier at King Fisher Beach and multiple boat ramp facilities around the area. The existing pier is in need of major improvements and a jetty project to help protect the public beach needs completion. The proposed fishing jetty/pier project could replace the existing pier and complete the beach protection project. Parking at the public boat ramp is inadequate to support periods of heavy use, so a project to provide more parking space was proposed.

Lighthouse Beach

Facilities at Lighthouse Beach include a boat ramp, picnic areas, and a pier. The potential for boat ramp improvements is limited. The channel that services the existing boat ramp needs maintenance and dredging. The boat ramp could be improved in order to provide access at low tides, which is currently limited.

5.4 PROJECT EVALUATION FOR DRAFT DARP/EA

This section summarizes the project evaluations presented in the Draft DARP/EA that was released for public review and comment on September 28, 1999.

5.4.1 Pier Project Evaluation

As noted previously, recreational fishing service losses were quantified separately for pier and boat mode anglers. Restoration projects to provide compensation for the losses then were evaluated by fishing mode. The restoration projects were grouped and evaluated by their ability to provide restoration benefit to compensate for pier mode or boat mode fishing service losses.

Table 5.2 shows the pier project locations and their initial evaluation based on a number of criteria. The first three criteria are from the regulations; the last three are specific factors the Trustees considered: close proximity (to the affected area), consistency with community development goals, and competition with other sites. Locations that met an individual criterion received a plus. Locations that did not meet a criterion received a minus. If there was no strong rationale for determining that the location either met or did not meet the criterion, it was left blank. For the competition criterion, locations received a plus if they did not present any anticipated direct competition with other sites.

All of the pier project locations provide good fishing opportunities at one time or another during the year and were expected to achieve success. The Bayfront location was downgraded relative to the other locations because it is anticipated to be a good fishery only in the winter months. Since all the pier projects would co-occur with other facilities, e.g., parks, picnic areas, or beaches, the piers were also expected to provide additional benefits to non-angling users. The Point Comfort site was to benefit public health and safety by providing a close substitute site outside the closure area. In other words, this

substitute site could be close enough to the Site to draw anglers away from the closure area. A replacement pier for the existing pier at Port O'Connor would

Table 5-2. Pier Projects at Remaining Locations

Location	Likelihood of success	Additional benefits	Affects public health & safety	Close proximity	Consistent with Community development goals	Compe-tition with sites	Total
Point Comfort	+	+	+	+			4
Six-Mile Park	+	+				+	3
Port Lavaca Bayfront		+		+	+		3
Port O'Connor	+	+	+	-		+	3
Magnolia Beach	+	+		-		+	2
Olivia	+	+		-		+	2

Table 5-3. Ramp Projects at Remaining Locations

Location	Modeled Sufficient Compen-sation	Likelihood of success	Additional benefits	Affects public health & safety	Close proximity	Consistent with Community development goals	Total
Port Lavaca Bayfront	+	+	+	+	+	+	6
Lighthouse Beach	-				+		0
Six-Mile Park	-	+					0
Magnolia Beach	-	+			-		-1
Port O'Connor	-			+	-		-1

also promote public safety as the current pier is unstable. With respect to the project location being near the closure area, the Bayfront and Point Comfort locations met the criterion; Magnolia Beach, Olivia, and Port O'Connor did not. Because the Bayfront had a master plan for development including a pier project, only a pier project there was judged to be consistent with identified community development goals. Projects at Six-Mile, Port O'Connor, Magnolia, and Olivia were judged to be isolated enough that they would not compete with other existing pier locations.

The pier projects also were evaluated according to whether the project or combination of projects were sufficient to compensate for the losses and whether the projects (combined with the boat mode project) were distributed in locations around the closure area and not all in one location. With respect to whether restoration benefits would compensate for the losses, any combination of two pier projects from among Bayfront, Six-Mile, and Point Comfort were sufficient to compensate for the losses. No one of these projects could provide enough restoration benefit alone, but any two could. Port O'Connor in combination with one of these projects did not provide sufficient compensation. For Port O'Connor to be included in the mix of locations two additional sites would require piers, which was not cost efficient. The desire for a distribution of both pier and boat ramp projects was used to select the two pier locations. However, before selecting the two pier locations, it was necessary to identify the appropriate boat mode project location(s).

5.4.2 Boat Ramp Project Evaluation

The boat mode project locations and the criteria used to evaluate the locations are listed in Table 5.3. Again, locations that met the individual criterion received a plus; those that did not meet the criterion received a minus. If there was no strong rationale for determining that the location either met or did not meet the criterion, it was left blank

Evaluating boat ramp construction options to compensate for boat fishing service losses indicated that only the Bayfront site would provide enough restoration benefit to compensate for the losses. No other one project or combination of projects provided enough benefit to offset recreational losses associated with boat mode fishing. The uncertainty about the Port O'Connor achieving success was attributed to the inability to identify property for the parking area. A boat ramp at Lighthouse Beach also may not have achieved success because it is difficult to access the ramp from the water during low tide (and potentially also at high tide if sedimentation continues). The added benefit of the project at the Bayfront location was that in addition to directly serving recreational anglers, the ramp would also provide service to an adjacent marina. Boat ramp projects at the Bayfront and Port O'Connor sites would have benefitted both public health and safety, as emergency, rescue and/or oil spill response boats would have been able to use these locations where they recently could not or may have had difficulty. The Bayfront and Lighthouse Beach projects are near the area of the closure; Magnolia Beach and Port O'Connor did not meet that criterion. Because only the Bayfront had a master plan for development that incorporated a boat mode project, a boat ramp project there was judged to be consistent with identified community development goals.

The results of project evaluation in Table 5.3 indicated that the Bayfront site was the best location for a boat mode project, in this case a boat ramp.

5.4.3 Environmental and Socio-Economic Impact

Although the restoration project alternatives considered presented some differences in meeting restoration planning criteria, as noted in sections 5.4.1 and 5.4.2, the alternatives considered all have a potential to affect the human environment in similar ways. At any of the potential locations, the construction of fishing piers, boat ramps or parking improvements would involve the temporary use of equipment, such as trucks or other machinery, which could increase noise, dust, and traffic in the immediate project vicinity for a short time. All project alternatives considered would occur in areas that have some existing facilities, e.g., parking lots and/or boat ramps at the proposed pier project locations. Because these sites have already been developed, further displacement of ecological habitats either would not occur or would be minimal (such as the minimal displacement or disturbance of submerged sediments from placement of support pilings). Minimization of any adverse ecological affects is also assured through project design and permitting processes. None of the potential projects has the potential to affect any historical resources, as no resources of this nature are located in the vicinity of any of the project sites.

In the long term, construction of fishing piers, boat ramps or parking improvements will facilitate access to Lavaca Bay for recreational fishing. As a result, projects at any location would be expected to experience increased use by recreational anglers and boaters. The construction or improvement of such facilities will be sufficient to accommodate these traffic increases. Where existing facilities are presently inadequate to support traffic during periods of heavy use, projects considered would be expected to alleviate those conditions.

These projects will facilitate access to fisheries resources. This is consistent with state and federal management objectives for fishery species targeted by recreational anglers in Lavaca Bay. Increasing fishing access in this area, however, is not expected to diminish or degrade these fish stocks or even lead to localized overfishing. The trustees do not expect that the proposed projects will result in increased fishing trips; rather, the projects will increase the options existing anglers will have for accessing and enjoying the fishing resources in this area. Communities in the counties surrounding Lavaca Bay are not experiencing rapid or uncontrolled growth, so the angler population utilizing this area is relatively stable. If such projects did result in any increase in trips or catches, the increases and, therefore, the potential to negatively impact fish stocks, would likely be minimal. Further, any such increases will be offset by restoration alternatives being considered in this assessment to compensate for ecological injuries. Although to be addressed in a subsequent Draft DARP/EA, all of the types of restoration actions under consideration would increase or enhance the habitats in Lavaca Bay which support fishery resources in this system.

All of the project alternatives considered would also potentially benefit non-anglers by providing or enhancing opportunities for other recreational activities, such as boating, walking, picnicking, and bird watching. In addition, any of the project alternatives would also help support existing property values and fishing-related commercial activities.

Long term benefits associated with any of the project alternatives would outweigh any potential for negative effects on the environment, which are expected to be minimal. None of the project alternatives considered in Sections 5.3.2, 5.4.1, and 5.4.2 is believed to have any significant

differences relative to potential ecological or socioeconomic impacts and none of the potential impacts, whether considered independently or cumulative, would be significant.

5.4.4 Preferred Restoration Alternatives Identified in Draft DARP/EA

With the identification of a boat ramp at the Bayfront site as preferred compensation for recreational fishing service losses associated with boat mode fishing, it was possible to identify the pier project locations preferred to compensate for the pier mode losses. The selection of two pier projects from among the three locations – Bayfront, Six-Mile, and Point Comfort – was based on ensuring an equal distribution of projects (combined with the boat mode project) in the vicinity of the affected area. Since the boat mode project was proposed for the Bayfront, the Trustees proposed pier projects at the Six-Mile and Point Comfort sites to achieve a balanced distribution of projects.

Based on the foregone analysis, the Draft DARP/EA identified fishing piers at Point Comfort and Six-Mile as the preferred restoration projects to compensate the public for pier-mode recreational fishing service losses and a boat ramp at the Bayfront as the preferred restoration action to compensate for boat-mode losses.

5.4.4.1 Pier Projects

The pier at Six-Mile was proposed for Six-Mile Park at Park Road. A lighted pier was to be constructed off the promenade; it would span a minimum of 300 linear feet and would be 8 feet wide. The pier would be located so as to minimize interference with boat ramp traffic while maximizing access to better fishing spots. The initial design for the pier included handrails and lighting, both flood and area lighting.

A pier was also proposed for Point Comfort's park. A lighted pier was to be constructed off of the peninsula west of the existing boat ramp. The plan for the pier at Point Comfort mimicked the specifications of the pier at Six-Mile. Again, the pier would be designed to maximize access to better fishing spots; however, its location would not interfere with the boat ramp. In addition to the pier, the project would include construction of a paved access road and a parking area with roughly twenty spaces.

5.4.4.2 Boat Project

The preferred restoration alternative to address boat mode fishing service losses was a boat ramp at the Bayfront site. A two-lane boat ramp, 14 feet wide for each lane, capable of accommodating large boats, 25 feet or longer, was to be constructed on the promenade adjacent to the existing marina. Three walkways associated with the boat ramp – one down each side and one between the lanes – were also planned; the walkways would be 100 feet long and 4 feet wide. The project included a new parking area with approximately twenty spaces for boat trailers.

The Trustees expected the boat and pier projects to meet restoration objectives. There was some uncertainty associated with the assumptions used to determine the recreational fishing service

losses and evaluate the benefits of the preferred restoration alternatives. Of primary importance was uncertainty about the time the closure would be lifted and the lifespan of the restoration projects. However, even with these uncertainties factored into their analyses, the Trustees expected that the public would be fully compensated for the fishing service losses through these proposed projects.

With respect to the lifespan of the restoration projects, the Trustees assumed the projects will be designed and constructed to last 30 years.[12] Although, the fishing closure is expected to be lifted by 2010, the pier projects at Point Comfort and Six-Mile and the boat ramp at the Bayfront, based on construction design, were still likely to provide fishing access to the pubic beyond that time.

5.5 PUBLIC COMMENTS ON THE DRAFT DARP/EA

In the Draft DARP/EA released on September 28, 1999, the Trustees identified the boat ramp project at the Port Lavaca Bayfront and fishing pier projects at Point Comfort and Six-Mile Parks as the preferred restoration alternatives to compensate for the boat-mode and pier/shore-mode fishing losses, respectively. The Trustees sought public review and comment on the Draft DARP/EA, including the choice of these proposed restoration actions.

The Trustees received a number of comments on the draft plan, all related to the restoration projects proposed therein. Of the comments received, most were focused on the boat ramp project proposed for the Port Lavaca Bayfront location and/or the lack of a pier project at that location. Other comments received addressed or expressed support for the pier projects proposed at Point Comfort and Six Mile Parks.

The comments supporting a pier project at the Port Lavaca Bayfront location, in summary form, were:

- *Consider a lighted T-head fishing pier at the end of the Bayfront peninsula. This project will have a positive impact on the Bayfront and provide "the greatest benefit, and benefit the greatest number of citizens damaged by the contamination in Lavaca Bay." With a pier, there are multiple benefits – to anglers, birders, observers watching sailboats, sailboards and other vessel traffic. A fishing pier will also have "a tremendous impact on increased tourism to the city."*

- *Place a fishing pier at the Bayfront peninsula, which would "provide a means for everyone, even those who do not own boats, to enjoy fishing, bird watching and just walking and taking in the view of the bay." A pier should be located at the Bayfront in order to benefit the greatest number of people and to benefit the people who live nearest to where the damage occurred.*

- *A pier at the Bayfront would make fishing available to a number of senior citizens and young people who might otherwise not have access.*

[12] The 30-year period originated with the engineering estimates for the physical life of the structures. The thirty years became the time period over which the Trustees calculated project benefits.

- *The residents of Port Lavaca would be better served by: construction of a fishing pier with a minimum span of 300 linear feet and eight feet wide with handrails and both floor and area lighting, from the tip of the Bayfront peninsula (which is leased from the Texas General Land Office). The project should also include construction of a paved access road and a lighted parking area with a minimum of twenty spaces.*

The first two comments above were received from a number of commenters (as a form letter). Other commenters opposed the boat ramp project in conjunction with their support for the pier project at Port Lavaca Bayfront or simply provided unfavorable comments regarding a boat ramp at that location:

- *A boat ramp at the Bayfront is not needed. Port Lavaca already has two boat ramps and there are other boat ramps outside the City. In addition, the boat ramp at the Bayfront would interfere with the Bayfront Master Plan. The boat ramp would cause congestion and traffic problems in the narrow entrance to the Bayfront Park. A fishing pier would benefit a much wider segment of the population including young people under age 17 and senior citizens over the age of 65. A fishing pier would also provide benefits to tourists, who, without a pier, would not have a chance to be close to the water. A pier could be incorporated into the City's Master Plan, which includes a walkway from the present Formosa Walkway all the way to the Bayfront peninsula. "Give the city of Port Lavaca something that people could really use every day of the year and something that would be of use and benefit to the greatest number of our citizens."*

- *There is no need for another boat ramp in the City. There are already three launch locations in the City of Port Lavaca. A fishing pier at the Bayfront would provide opportunities for a wider number of people to enjoy fishing, bird watching, and views of the Bay.*

- *A fishing pier will draw and serve more anglers who have suffered and will suffer recreational fishing losses. The construction of a fishing pier at the Bayfront peninsula would provide access to the shallow waters adjacent to the Bayfront and serve the casual angler who motors or walks to fishing areas. A boat ramp at the Bayfront is not appropriate restoration. A boat ramp only serves those "fortunate enough to own a boat" and they are already served by two existing boat ramps in Port Lavaca. Also, "siting the additional (or enhanced) boat ramp parking area north of the Marina would conflict with the Bayfront Master Plan location of an open play area and picnic area."*

- *The boat ramp constructed on the north side of the Bayfront peninsula - where the water is shallow - was never intended for large motor craft or large sailboats.*

Two commenters supported one or more of the projects as proposed in the Draft DARP/EA:

- *Clean up, dredge out and make parking available for the launch area that is at the Bayfront peninsula at the end of Main Street. If there is any money left, build what fishing piers can be built.*

- *The restoration plan proposal for recreational fishing was well planned and the manner for choosing the type of project was more than fair to all parties involved. The pier*

proposal at Six Mile Park is consistent with long term plans for the area. The area is used by many wade fishermen. There are plans to support youth fishing tournaments and the pier will be a great asset. There have been "favorable comments regarding the plans to build a pier in Point Comfort and a boat ramp in Port Lavaca. Our existing boat ramps are in need of repair."

5.6 RESPONSE TO PUBLIC COMMENTS ON THE DRAFT DARP/EA

5.6.1 Selected Restoration Alternatives for Pier/Shore-Mode Fishing Losses

The public comments received by the Trustees included comments supporting the proposed fishing pier projects at the Six-Mile and Point Comfort sites, identified in the Draft DARP/EA. There were no comments opposing these two restoration projects or information that would indicate the projects were not feasible, not likely to achieve restoration objectives or were otherwise an inappropriate choice to compensate for the pier/shore-mode recreational fishing losses. Accordingly, the Trustees finalized their selection of these restoration alternatives in the Revised Draft DARP/EA released on May 12, 2000.

The Six-Mile project will occur at Six-Mile Park on Park Road. A lighted pier will be constructed off the promenade; it will span 300 linear feet and will be 8 feet wide. The pier will be located so as to minimize interference with boat ramp traffic while maximizing access to better fishing spots. The initial design for the pier includes handrails and lighting, both flood and area lighting.

A fishing pier will also be constructed at Point Comfort Park. A lighted pier will be built off the peninsula west of the existing boat ramp. The plan for the pier at Point Comfort mimics the specifications of the pier at Six-Mile. Again, the pier will be designed to maximize access to better fishing spots and minimize interference with the boat ramp. In addition to the pier, the project will include construction of a parking area for ten vehicles and a walkway from the parking area to the pier.[13] Further planning and engineering details of these projects will be developed and will be used to support implementation by Alcoa with Trustee oversight.[14]

5.6.2 Revised Restoration Plan for Boat-Mode Fishing Losses

[13] As envisioned in the Draft DARP/EA, the proposed project for Point Comfort included construction of a parking area for twenty vehicles and an access road. In the Revised Draft DARP/EA, it was clarified that the project at Point Comfort would provide access to the pier via a walkway and ten parking spaces. These features are expected to meet demand at the pier, even during periods of high use. The project does not differ significantly in function from that proposed in the Draft DARP/EA.

[14] If the Trustees were to implement the projects, a full restoration costs determination by the Trustees would be necessary.

The public comments on the Draft DARP/EA – received either as written comments (summarized herein) or as oral comments[15] made at a public meeting on September 28, 1999 – raised substantial issues or concerns regarding the Port Lavaca Bayfront boat ramp project proposed to compensate for the boat-mode fishing losses, including:

- The need for an additional boat ramp in the Port Lavaca area given the several existing ramps in that area.
- The limited utility of such a facility to the broader population or community in this area.
- Potential conflict with the Bayfront Master Plan, the community's development plan for this area.
- Increased congestion, traffic and possibly safety problems at the entrance of the Bayfront Park due to increased boater traffic.
- The ability of a ramp to accommodate larger vessels given the depth of the waters near that location.

Port Lavaca City officials were among those commenting against a boat ramp at the Port Lavaca Bayfront. In follow-up conversations with City officials, the Trustees were advised that no site at the Port Lavaca Bayfront location was acceptable for placement of a boat ramp. As a result of the public comments and information received, the Trustees determined that a boat ramp project at the Port Lavaca Bayfront could not be implemented, due primarily to lack of community acceptance.

Because the boat ramp at Port Lavaca Bayfront could not be implemented, the Trustees had to consider alternative restoration projects as a basis for compensating the boat-mode recreational fishing losses. Boat-mode restoration projects at four other locations were originally included and evaluated in the Draft DARP/EA. These project alternatives were at Lighthouse Beach, Six-Mile Park, Magnolia Beach, and Port O'Connor. The project alternative at Port O'Connor involved expanding a parking area at the existing public boat ramp. The existing parking area is known to be inadequate during periods of heavy use. However, since release of the Draft DARP/EA, the Trustees found there is no available property that could be used to expand the parking area. Without property to support the expansion, this project alternative was also not implementable. Thus, the potential alternative boat-mode projects/locations available for consideration were limited to Lighthouse Beach, Six-Mile Park, and Magnolia Beach. Each of these projects involved improvements or enhancements to existing ramp facilities.

The Draft DARP/EA identified the needed improvements at Lighthouse Beach, Six Mile Park, and Magnolia Beach boat ramps (see the next section for details). According to the Trustees' assessment analyses, however, implementing all of these boat ramp improvement projects would not provide enough benefit to fully offset the boat-mode fishing losses. However, neither the Trustees nor the public identified any other feasible project alternatives in the area that would provide additional boat-mode fishing benefits to offset losses. Therefore, to provide as

[15] The oral comments were all addressed in the written comments and, thus, were not summarized separately here.

much benefit as possible to the boat-mode anglers, the Trustees proposed – in the Revised Draft DARP/EA that was released on May 12, 2000 – to implement the projects at Lighthouse Beach, Six Mile Park, and Magnolia Beach.

To address the boat-mode restoration shortfall, the Trustees proposed, also in the Revised Draft DARP/EA, to construct a fishing pier at the Port Lavaca Bayfront location. The pier at the Bayfront location was considered the next best project alternative in the Draft DARP/EA due to its central location relative to the population distribution in the three county area in the vicinity of the Site. It also had substantial public support, as evidenced by the public comments received on the Draft DARP/EA. The public support expressed for the project also indicated to the Trustees that the Bayfront area would support recreational fishing year round, overriding the Trustees' initial judgment that the site would only be a good seasonal fishery. The Trustees' assessment analyses indicated that the boat ramp improvements at these three sites together with the pier projects at the Port Lavaca Bayfront, Six Mile and Point Comfort Park were sufficient to offset the losses to the angling population as a whole.[16]

5.6.2.1 Preferred Restoration Alternatives Identified in Revised Draft DARP/EA

At Six-Mile Park, improvements were proposed for the auxiliary boat ramp. The project included replacing the existing auxiliary ramp with a one-lane ramp, 15 feet wide and 75 feet long. Next to the ramp, a 50-foot timber dock would be constructed to be used for taking boats to and from trailers. A 25-foot wide by 200-foot long by 4-foot deep channel would be dredged to provide access to Lavaca Bay and the bulkhead/shoreline at the ramp would be stabilized.

Needed improvements at the Lighthouse Beach boat ramp were related to maintaining the channel that serves the existing boat ramp. In discussion with the Port Lavaca City Council, the Trustees learned that the City is unable to dredge the channel because the City's dredge disposal facility is at capacity. The City's confined disposal facility would be cleaned out and the facility's decant structure repaired as one part of the project at Lighthouse Beach. This action would enable future dredging of the channel by the City. In areas of the channel, shoals have formed, including around the bulkhead, that limit access to the Lighthouse Beach ramp. The project at Lighthouse Beach would include removal of these shoals. Finally, to help boat-mode anglers get in and out of their boats, a 100-foot timber dock would be constructed adjacent to the boat ramp.

The project proposed at Magnolia Beach involves actions to reduce siltation at the existing boat ramp. In the Draft DARP/EA, potential parking area improvements were identified; however, since release of the Draft DARP/EA, the Trustees learned that the greater need is for sediment control at the boat ramp.[17] Therefore, the project proposed at this location was to widen the existing jetty east of the boat ramp and to extend the jetty by 60 feet. The improved structure

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[16] Appendix B summarizes the Trustees' analyses showing how the total benefit from the three piers and the three boat ramp improvements compensates the public for total fishing losses. This analysis does not reflect the re-opening of Cox Bay in January 2000. Although Alcoa agrees that this mix of projects provides sufficient compensation, Alcoa does not endorse the specific methodology or results described in Appendix B.

[17] Information obtained from Calhoun Commissioner Leroy Belk, who oversees maintenance of the Magnolia Beach boat ramp.

would reduce sedimentation of the boat ramp. In addition, jetty construction would be designed to accommodate a back-hoe, which would facilitate equipment access and sediment removal in the future. Dredging in this manner would be much less expensive than the cost of hydraulic dredging at this site.

A pier was proposed for construction at the Bayfront peninsula in Port Lavaca. The pier would be 350 linear feet and 8 feet wide.[18] The pier would be constructed to avoid interference with boat traffic. The initial conceptual design for the pier includes handrails and lighting, both flood and area lighting.

As with the projects outlined in the Draft DARP/EA, the projects were expected to exist and serve the recreational anglers for 30 years under normal coastal conditions. The Trustees would increase the likelihood of achieving 30-year project lifespans through design and construction plans, as appropriate.

5.7 PUBLIC COMMENTS ON THE REVISED DRAFT DARP/EA

In the Revised Draft DARP/EA released on May 12, 2000, the Trustees identified boat ramp projects at Six-Mile Park, Lighthouse Beach, and Magnolia Beach and a pier project at the Port Lavaca Bayfront as the preferred restoration alternatives to compensate for the remaining fishing losses. The Trustees sought public review and comment on the Revised Draft DARP/EA, including these proposed restoration actions.

The Trustees did not receive any written comments on the revised draft plan. The Trustees did receive oral comments supporting the projects from a number of public officials when the Trustees were considering the projects. The Mayor of Port Lavaca, a subset of the Calhoun County Commissioners, and the Calhoun County Navigation District indicated that the projects would be acceptable and that they would benefit recreational anglers. Also, public comments submitted on the Draft DARP/EA clearly supported the construction of a fishing pier at the Port Lavaca Bayfront.

5.8 RESPONSE TO PUBLIC COMMENTS ON THE REVISED DRAFT DARP/EA

5.8.1 Selected Restoration Alternatives

There were no comments opposing the proposed restoration projects or information that would indicate the projects were not feasible, not likely to achieve restoration objectives or were otherwise an inappropriate choice to compensate for the recreational fishing losses. Oral comments from public officials and written comments in response to the Draft DARP indicated support for one or more of those projects. Accordingly, the Trustees are finalizing their selection of the boat ramp improvements at Six-Mile Park, Lighthouse Beach, and Magnolia Beach and the

[18] The proposed pier at the Bayfront would be slightly longer than the piers at Point Comfort and Six-Mile so that anglers from the Bayfront pier could access a deeper part of the Bay. Deeper waters are typically better fishing locations.

fishing pier at the Port Lavaca Bayfront in this Final DARP/EA. Section 5.6.2.1 describes the selected projects.

5.9 SUMMARY AND CONCLUSIONS

In the Draft DARP/EA for the recreational fishing service losses, the Trustees identified two fishing piers – one each at Six-Mile Park and Point Comfort – as the preferred restoration alternatives to compensate for the pier/shore-mode recreational fishing losses. The public comments received by the Trustees supported these proposed restoration projects. Therefore, the Trustees finalized their selection of the pier projects at these locations after the comment period on the Draft DARP/EA.

In the Draft DARP/EA, the Trustees proposed a boat ramp at the Port Lavaca Bayfront to compensate for boat-mode fishing losses identified in the assessment. Based on information and comments submitted by the public in response to this proposal, the Trustees determined this restoration alternative could not be implemented, primarily due to lack of community acceptance. The Trustees considered the alternative restoration projects available to compensate for the boat-mode losses. To address these losses, the Trustees proposed to implement boat ramp improvement projects at Lighthouse Beach, Six-Mile Park, and Magnolia Beach and an additional pier project at the Port Lavaca Bayfront in the Revised Draft DARP/EA. There were no public comments received on the Revised Draft DARP/EA either against the projects or that would suggest the projects are inappropriate. Therefore, the Trustees are finalizing their selection of the boat ramp improvements and the additional fishing pier in this Final DARP/EA.

The selected projects to compensate for the recreational fishing losses are summarized in Table 5-4.

Table 5-4: Selected Compensatory Restoration Projects

Location	Enhance boat ramp	Construct fishing pier
Port Lavaca Bayfront		X
Point Comfort Park		X
Six-Mile Park	X	X
Lighthouse Beach	X	
Magnolia Beach	X	

The Trustees' project evaluations indicate that the boat and pier projects will meet the restoration objectives, i.e., that these projects will collectively provide sufficient benefits to recreational anglers to offset the recreational fishing service losses. There is some uncertainty about the assumptions that determine the recreational fishing service losses and the benefits from the preferred restoration alternatives. Of primary importance is uncertainty about the time the closure will be lifted and the lifespan of the restoration projects. However, the Trustees have factored that uncertainty into their analysis and even with the uncertainty, the Trustees expect that the public will be fully compensated for the fishing service losses.

With respect to the lifespan of the restoration projects, the Trustees assumed the projects would exist and serve the recreational anglers for 30 years. The Trustees will increase the likelihood of achieving 30-year project lifespans by designing and constructing the projects appropriately.

Several other factors provide additional assurance that the public will be fully compensated for the recreational fishing losses. First, in the assessment of recreational fishing losses, losses are quantified through 2010, the year by which the closure is expected to be removed. In fact, nearly half of the closure area was recently reopened to the taking of finfish and crabs. Second, the structures to be put in place at Magnolia Beach would help keep that boat ramp accessible to boat mode anglers in the future and, therefore, provide boat-mode fishing benefits. The particular project features at Magnolia Beach, however, are not readily quantifiable and as such have not been incorporated into the model-based analyses. Finally, as indicated in the public comments, the proposed pier at the Bayfront will provide fishing opportunities for some members of the public who do not currently fish. The fishing benefits associated with these new anglers cannot be quantified in the model. These factors reinforce the Trustees conclusion that the restoration projects will fully compensate the public for the recreational fishing losses associated with the consumption ban.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. Sections 9601 *et seq.*

CERCLA is the principle statute applicable to sites contaminated with hazardous substances. The statute establishes liability for site cleanup, prescribes a procedure for identifying and ranking contaminated sites, provides funding for site cleanups, establishes cleanup procedures that provide protection for humans and the environment, establishes liability for the injury to, destruction of or loss of natural resources caused by releases of hazardous substances and provides for the restoration of injured natural resources through provisions administered by designated natural resource trustees.

CERCLA provides a framework for conducting sound natural resource damage assessments that achieve restoration of natural resources or resource services. The process emphasizes both public involvement and participation by the PRPs. For the Point Comfort/Lavaca Bay NPL Site, CERCLA is a primary statute supporting the assessment and restoration planning process which has been undertaken by the Trustees. This Final DARP/EA is consistent with all applicable CERCLA provisions.

National Environmental Policy Act (NEPA), 42 U.S.C. Sections 4321, *et seq.*, 40 C.F.R. Parts 1500-1508

In considering and identifying the restoration actions selected herein, the Final DARP/EA for recreational fishing service losses integrates the elements of an Environmental Assessment (EA) in accordance with NEPA. Section 2.4 addresses public participation, which occurred as part of the assessment and restoration planning process. The no action alternative for restoring recreational fishing losses was considered in Section 5.2. Environmental and socio-economic impacts of the projects were considered in Section 5.4.3. The Trustees determined that none of the potential impacts, whether considered independently or cumulative, would be likely to result in a significant affect in the quality of the human environment.

Federal Water Pollution Control Act (also referred to as the Clean Water Act (CWA)), 33 U.S.C. Sections 1251, *et seq.*

The Clean Water Act (CWA) Section 311 is also a source of authority for seeking natural resource damages at this Site. Like CERCLA, NRDA claims under the CWA are also appropriately based on appropriate restoration actions and are addressed under the DOI regulations.

Section 404 of the law authorizes a permit program for the disposal of dredged or fill material into navigable waters. The Army Corps of Engineers (Corps) administers the program. In general, restoration projects, which move significant amounts of material into or out of waters or wetlands – for example, hydrologic restoration of marshes – require 404 permits. A CWA Section 404 permit will be obtained, if required, to implement any restoration projects identified in the Final DARP/EA.

Coastal Zone Management Act (CZMA), 16 U.S.C. Sections 1451, *et seq.*, 15 C.F.R. Section 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. Under Section 1456 of CZMA, restoration actions undertaken or authorized by federal agencies are required to comply, to the maximum extent practicable, with the enforceable policies of a state's federally approved Coastal Zone Management Program. NOAA and DOI reviewed the restoration actions identified in this Final DARP/EA for consistency with the Texas Coastal Zone Management Plan and found the restoration actions selected herein are consistent with that plan. NOAA and DOI submitted that determination to appropriate state agencies for review, as required under this Act; the State of Texas has agreed with that determination.

Endangered Species Act (ESA), 16 U.S.C. Sections 1531, *et seq.*, 50 C.F.R. Parts 17, 222, and 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 USFWS 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 actions described in this Final DARP/EA will not adversely impact any species identified as threatened or endangered under the ESA. The Trustees initiated consultation with the appropriate agencies pursuant to the ESA in order to ensure that the restoration actions undertaken under this plan are in accordance with all applicable provisions of the ESA. The Trustees determined and received concurrence from the agencies that the selected projects will not adversely impact any threatened or endangered species.

Fish and Wildlife Conservation Act, 16 U.S.C. Sections 2901 *et seq.*

The proposed restoration projects will neither encourage nor discourage the conservation of non-game fish and wildlife.

Fish and Wildlife Coordination Act, (FWCA), 16 U.S.C. Sections 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 the process of complying with Section 404 of the Clean Water Act, NEPA, or other federal permit license or review requirements; compliance of the selected projects with the FWCA will be determined through one of these processes.

Magnuson Fishery Conservation and Management Act, 16 U.S.C. Sections 1801 *et seq.*

The Magnuson Fishery Conservation and Management Act provides for stewardship of the nation's fishery resources within the Exclusive Economic Zone, covering all U.S. coastal waters out to a boundary at 200 miles. The resource management goal is to achieve and maintain the optimum yield from U.S. marine fisheries. The Act also establishes a program to promote the protection of Essential Fish Habitat (EFH) in the planning of federal actions. After EFH has been described and identified in fishery management plans by the regional fishery management councils, federal agencies are obligated to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH.

The Trustees do not believe that the selected restoration alternatives in this plan nor any of the restoration projects identified for implementation thereunder, will adversely impact any EFH designated under the Act. The NMFS Southeast Regional Habitat Protection Division has concurred with this finding.

Marine Mammal Protection Act, 16 U.S.C. Sections 1361, *et seq.*

The Marine Mammal Protection Act provides for long-term management and research programs for marine mammals. It places a moratorium on the taking and importing of marine mammals and marine mammal products, with limited exceptions. The Department of Commerce is responsible for whales, porpoises, seals, and sea lions. The Department of the Interior is responsible for all other marine mammals. The selected restoration projects will not have an adverse effect on marine mammals.

Migratory Bird Conservation Act, 126 U.S.C. Sections 715 *et seq.*

The selected restoration projects will have no adverse effect on migratory birds.

Archeological Resources Protection Act, 16 U.S.C. Sections 470, *et seq.*

Consistency with this Act is determined concurrently with either the review of the Section 404 permits or lease applications from the Texas General Land Office.

Rivers and Harbors Act of 1899, 33 U.S.C. Sections 403, *et seq.*

The Rivers and Harbors Act regulates development and use of the nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and 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. Any permits under this Act, if required, will be obtained prior to implementing the restoration actions selected in this Final DARP/EA.

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 activities will not adversely affect wetlands or the services they provide.

Executive Order Number 12898 – Environmental Justice

This Executive Order requires each federal agency to identify and address, as appropriate, 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 projects.

Executive Order Number 12962 (60 FR 30769) – Recreational Fisheries

The selected restoration projects will not adversely effect recreational fisheries and the services they provide.

Having reviewed the attached environmental assessment and the available information relative to the selected actions in Lavaca Bay, Texas, I have determined that there will be no significant environmental impacts from the selected actions. Accordingly, preparation of an environmental impact statement on these issues is not required by Section 102 (2) (c) of the National Environmental Policy Act or its implementing regulations.

William T. Hogarth Date 12-28-00

for Penelope D. Dalton
Assistant Administrator for Fisheries
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U. S. Department of Commerce

_____ Date _____

Nancy M. Kaufman
Regional Director, Region 2
Fish and Wildlife Service
U. S. Department of the Interior

Having reviewed the attached environmental assessment and the available information relative to the selected actions in Lavaca Bay, Texas, I have determined that there will be no significant environmental impacts from the selected actions. Accordingly, preparation of an environmental impact statement on these issues is not required by Section 102 (2) (c) of the National Environmental Policy Act or its implementing regulations.

_____ Date _____

Penelope D. Dalton
Assistant Administrator for Fisheries
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U. S. Department of Commerce

_____ Date FEB 15 2001

Nancy M. Kaufman
Regional Director, Region 2
Fish and Wildlife Service
U. S. Department of the Interior

In accordance with the Memorandum of Agreement among the National Oceanic and Atmospheric Administration of the U. S. Department of Commerce, the Fish and Wildlife Service of the U. S. Department of the Interior, the Texas Natural Resources Conservation Commission, the Texas Parks and Wildlife Department, and the Texas General Land Office, executed January 14, 1997, the following designated members of the 'Lavaca Bay Natural Resources Trustee Council' indicate by signature below their agreement to adopt, in its entirety, this Lavaca Bay Damage Assessment and Restoration Plan / Environmental Assessment.

The date of final approval for this document shall be the date of the final Trustee Representative's signature.

For NOAA _____ Date 3/5/01

Ron Gouguet
Coastal Resource Coordinator – Region 6
Office of Response and Restoration
1445 Ross Avenue, Dallas, TX 75202

For FWS _____ Date 03/08/01

Allan Strand
Ecologist, Division of Environmental Contaminants
U.S. Fish and Wildlife Service, c/o TAMU-CC, Campus Box 338
6300 Ocean Drive, Corpus Christi, TX 78412

For TNRCC _____ Date 3-5-01

Richard Seiler
Natural Resource Trustee Delegate
Texas Natural Resource Conservation Commission, MC142
P.O. Box 13087, Austin, TX 78711-3087

For TPWD _____ Date 3/5/01

David R. Sager, Ph.D.
Director, Freshwater Conservation Branch
Resource Protection Division, Texas Parks and Wildlife Department
4200 Smith School Road, Austin, TX 78744

For TGLO _____ Date 27 March 2001

William Grimes
Texas General Land Office
1700 North Congress Avenue, Austin, TX 78701

National Oceanic and Atmospheric Administration, U. S. Department of Commerce	Stephanie Fluke Ron Gouguet John Kern Pete Sheridan David Chapman Tony Penn Tom Moore
Fish and Wildlife Service, U. S. Department of the Interior	Allan Strand Tom Schultz
Texas General Land Office	Bill Grimes Ingrid Hansen
Texas Natural Resources Conservation Commission	Richard Seiler Carol Lear
Texas Parks and Wildlife Department	Don Pitts David Sager
Aluminum Company of America (Alcoa)	Kirk Gribben Kevin McKnight Ronald Weddell Lori McShea

Filing Structure for Lavaca Bay

Classification # ***Classification Name***

1. ADMINISTRATIVE RECORD INDEX
   1 Filing Structure for Lavaca Bay. (May 2001), 10
   Document ID 1674

2. TRUSTEE/RESPONSIBLE PARTY AGREEMENTS

2.01 Funding Agreements
   1 Funding Agreement 2/16/96
   Document ID 1657
   2 Funding Agreement (DOI/ALCOA) 2/16/96
   Document ID 1655

2.02 Memorandum of Agreement (MOA)
   1 Memorandum of Agreement 1/14/97
   Document ID 1658

2.02.1 Attachments to MOA
   1 MOA Attachment 97-01 9/3/97
   Document ID 1654
   2 MOA Attachment 98-01 3/9/98
   Document ID 1669
   3 MOA Attachment 99-01 9/9/99
   Document ID 1677
   4 MOA Attachment 2000-01 6/21/00
   Document ID 1926
   5 MOA Attachment 2000-02 10/4/00
   Document ID 1944

2.02.1.1 Annual Funding Actions
   1 Stephanie W. Fluke, to Ron Weddell, 4/25/97, Letter on Funds Request -- 1997
   Document ID 1653
   2 Stephanie W. Fluke, to Ron Weddell, 1/12/98, Letter on Funds Request -- 1998
   Document ID 1652
   3 Stephanie W. Fluke, to Ron Weddell, 1/19/98, Letter on Funds Request --1998
   Document ID 1651
   4 Stephanie W. Fluke, to Ron Weddell, 1/21/99, Letter on Funds Request -- 1999
   Document ID 1670
   5 Stephanie W. Fluke, to Ron Weddell, 10/23/00, Letter on Funds Request -- 2000
   Document ID 1943

3. INJURY ASSESSMENT PHASE

3.01 EPA Remedial Process
(NOTE: These Documents are not included in this file; however, they are available in other locations at the TNRCC and MFG Inc. Administrative Record repository sites. Please see Richard Seiler or Gladys Hunt for more information.)
   1 Preliminary Site Characterization Report for ALCOA (Point Comfort)/Lavaca Bay Superfund Site. ALCOA, (7/28/95)
   Document ID 1938
   2 Draft Technical Memorandum, Bay System Phase 2A Data Assessment, ALCOA (Point Comfort)/Lavaca Bay Superfund Site. ALCOA, (12/1/96)

Document ID 1937

3 Draft Fish and Bird Prey Item Investigation Study Data Report. ALCOA, (3/1/98)
Document ID 1936

4 Draft RI Workplan for the ALCOA (Point Comfort)/Lavaca Bay Superfund Site Volume B3: Sediment Transport Study: Radiochemistry Study, Data Report. ALCOA, (3/1/98)
Document ID 1934

5 Development and Application of a Modeling Framework to Evaluate Hurricane Impacts on Surficial Mercury Concentrations in Lavaca Bay. Hydroqual Inc. (4/1/98)
Document ID 1932

6 Baseline Risk Assessment Report, ALCOA (Point Comfort)/Lavaca Bay Superfund Site. ALCOA, (8/1/98)
Document ID 1935

7 Final Remedial Investigation Report, ALCOA (Point Comfort)/Lavaca Bay Superfund Site. ALCOA, (11/1/99)
Document ID 1933

8 Phase 2A: Bay System Data Report (Phase 2A Data Assessment Report) ALCOA. (3/16/00)
Document ID 1960

9 Draft Radiochemistry Study Data Report (ALCOA Radiochemistry Study Report). (3/16/00)
Document ID 1959

3.02 Benthos (Soft Bottom)

1 MOA Attachment 2000-01 Appendix A Reasonable Worst Case Analysis Direct Injury to Benthos. Trustees, ALCOA (6/21/00), 22
Document ID 1925

3.03 Birds

1 Survey of Willet and Tri-Colored Heron Populations and Habitats in the Potentially Affected Area Adjacent to the ALCOA Point Comfort Operations in Lavaca Bay, Texas. Trustees, ALCOA (3/1/00), 63
Document ID 1927

2 MOA Attachment 2000-01 Appendix C Reasonable Worst Case Analysis Direct Injury to Birds. Trustees, ALCOA (6/21/00), 26
Document ID 1924

3.04 Fish/Shellfish

1 MOA Attachment 2000-01 Appendix B Reasonable Worst Case Analysis Injury to Finfish. Trustees, ALCOA (6/21/00), 16
Document ID 1923

3.05 Groundwater/Water Column

1 MOA Attachment 2000-01 Appendix D Resonable Worst Case Analysis Injury to Surface Water. Trustees, ALCOA (6/21/00), 4
Document ID 1922

2 MOA Attachment 2000-01 Appendix E Reasonable Worst Case Analysis Injury to Ground Water. Trustees, ALCOA, (6/21/00), 4
Document ID 1921

3.06 Marsh

1 MOA Attachment 2000-01 Appendix A Reasonable Worst Case Analysis Direct Injury to Benthos. Trustees, ALCOA (6/21/00), 22
Document ID 1925

3.07 Oyster Reef

1 MOA Attachment 2000-01 Appendix A Reasonable Worst Case Analysis Direct Injury to Benthos. Trustees, ALCOA (6/21/00), 22
Document ID 1925

3.08 Terrestrial Habitats (including High Marsh)

1 Draft Technical Memorandum: Reasonable Worst Case Analysis Terrestrial Resources. Trustees, ALCOA, (6/1/00), 11
Document ID 1920

3.09 Lost Recreational Use

3.09.1 Technical Reports

1 Recreational Fishing Assessment Technical Memorandum (includes restoration scaling information). Trustees and Alcoa, (11/30/98), 230
Document ID 1664

3.09.2 Technical Comments

1 Tony Penn, to Bill Desvousges, 2/8/99, Memorandum on Follow-up Dissussion of Peer Reviewer Comments
Document ID 1659

2 Doug MacNair, Janet Lutz, to Ron Gouguet, Tony Penn, David Chapman, Don Pitts, Ron Weddell, Kirk Gribben, 2/22/99, Letter on Technical Memorandum
Document ID 1663

3.09.3 Peer Review

1 Adamowicz Peer Review Comments. Vic Adamowicz, (Department of Rural Economy, University of Alberta)(12/29/98), 18
Document ID 1662

2 Parsons Peer Review. George R. Parsons, (12/1/98), 9
Document ID 1661

3 V. Kerry Smith, to David J. Chapman, Douglas MacNair, 12/30/98, Letter on Smith Peer Review Comments
Document ID 1660

4. ASSESSMENT/RESTORATION PLAN DEVELOPMENT - Lost Recreational Use

4.01 Public Participation - Restoration Scoping

1 Port Lavaca Bayfront Masterplan. BRW, Inc., G & W Engineering, Gignac & Associates, (1/1/96), 61
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4.01.1 Notices

1 Public Meeting Annnouncement -- 17 February 1998. Alcoa and Trustees, (2/1/98), 3
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2 Public Meeting Announcement -- 5 November 1998. Alcoa and Trustees, (11/1/98),
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4.01.2 Meetings

1 Public Meeting Summary -- 17 February 1998. Ronald Weddell, (3/1/98), 13
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2 Public Meeting Summary -- 5 November 1998. Kristy Mathews, (11/9/98), 2
Document ID 1640

4.01.3 Public Comments

1 Public Feed Backforms. The Public, (2/17/99), 34
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2 C. Elaine Giessel, to Peter Sheridan, 2/18/98, Letter on Public Comment
Document ID 1646

3 Thomas J. Blazek, to Dr. Pete Sheridan, 2/19/98, Letter on Public Comment
Document ID 1642

4 Gary Cunningham, to Dr. Pete Sheridan, 2/23/98, Letter on Public Comment
Document ID 1644

5 Jack P. Traylor, to Peter Sheridan, 2/24/98, Letter on Public Comment
Document ID 1643

6 Leroy Belk, to Dr. Pete Sheridan, 3/1/98, Letter on Public Comment
Document ID 1647

7 J.C. Melcher, Jr., to Dr. Pete Sheridan, 3/1/98, Letter on Public Comment
Document ID 1645

8 Leroy Belk, to Dr. Pete Sheridan, 5/11/98, Letter on Public Comment
Document ID 1667

9 Thomas J. Blazek, to Dr. Peter F. Sheridan, 9/21/98, Letter on Public Comment
Document ID 1665

10 Patricia H. Suter, to Dr. Peter Sheridan, 10/19/98, Letter on Public Comment
Document ID 1666

11 Ted Dodson, to Dr. Pete F. Sheridan, 11/8/98, Letter on Public Comment
Document ID 1639

12 Linda Reese, to Dr. Sheridan, 11/30/98, Letter on Public Comment
Document ID 1638

13 Thomas Blazek, to Dr. Peter F. Sheridan, 12/18/98, Letter on Public Comment
Document ID 1637

4.02 Draft Assessment/Restoration Plan

1 Draft DARP/EA for the Point Comfort/Lavaca Bay NPL Site Recreational Fishing Service Losses. Trustees, (9/28/99), 59
Document ID 1679

2 Revised Draft DARP/EA for the Point Comfort/Lavaca Bay NPL Site Recreational Fishing Service Losses. Trustees, (5/12/00), 18
Document ID 1911

4.02.1 Notice of Availability

1 Newspaper Announcement, Notice of Availability and Request for Comments on Draft Damage Assessment and Restoration Plan/Environmental Assessment for Recreational Fishing Service Losses, Port Lavaca Wave. Trustees, (9/20/99)
Document ID 1682

2 Notice of Availability and Request for Comments on Draft Damage Assessment and Restoration Plan/Envir. Assessment for Rec. Fishing Service Losses, 64 Fed. Reg. 52,294 (Sept. 28, 1999)
Document ID 1680

3 Notice of Availability and Request for Comments on Draft Damage Assessment and Restoration Plan/Environmental Assessment for Recreational Fishing Service Losses, 24 Tex. Reg. 8,635 (Oct. 1, 1999)
Document ID 1681

4 Trustees, Newpaper Announcement, Notice of Availability of Revised Restoration Plan for Recreational Fishing Service Losses in Lavaca Bay Available for Comment, Port Lavaca Wave, 5/10/00,
Document ID 1913

5 Notice of Availability and Request for Comments on Revised Draft Damage Assessment and Restoration Plan/Environmental Assessment for Recreational Fishing Service Losses, 25 Tex. Reg. 4,379 (May 12, 2000)
Document ID 1914

6 Notice of Availability and Request for Comments on a Revised Draft Damage Assessment and Restoration Plan/Environmental Assessment for Recreational Fishing Service Losses, 65 Fed. Reg. 30,565 (May 12, 2000)
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4.02.2 Public Comments

1 Transcript From the ALCOA Public Meeting Held September 28, 1999, 33
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2 Don McCarn, 10/12/99, Public Comment
Document ID 1687

3 Elizabeth Rodriguez, 10/14/99, Public Comment
Document ID 1702

4 Richard Barton, 10/14/99, Public Comment
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5 Ken Lester, Jr., 10/14/99, Public Comment
Document ID 1689

6 Claughton Johnson, 10/14/99, Public Comment
Document ID 1690

7 Ralph Wall, 10/14/99, Public Comment
Document ID 1691

8 David Harg (sic), 10/14/99, Public Comment
Document ID 1692

9 Tamara Hoelch (sic), 10/14/99, Public Comment
Document ID 1693

10 Caren Ghiselin (sic), 10/14/99, Public Comment
Document ID 1694

11 David Ouley (sic), 10/14/99, Public Comment
Document ID 1695

12 Karl A Marno (sic), 10/14/99, Public Comment
Document ID 1696

13 Fo H L (sic), 10/14/99, Public Comment
Document ID 1697

14 Steven Jaschke, 10/14/99, Public Comment
Document ID 1698

15 Darron J Gann (sic), 10/14/99, Public Comment
Document ID 1699

16 Glenis King (sic), 10/14/99, Public Comment
Document ID 1701

17 Debbie Fisher, 10/14/99, Public Comment
Document ID 1703

18 Osan A Lu (sic), 10/14/99, Public Comment
Document ID 1704

19 Mary Johnson (sic), 10/14/99, Public Comment
Document ID 1705

20 Barbara Gibson, 10/14/99, Public Comment
Document ID 1706

21 Dennis Reddy (sic), 10/14/99, Public Comment
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22 Faith Garza, 10/14/99, Public Comment
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23 Russell Cain, 10/14/99, Public Comment
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24 Lawrence J Matyu (sic), 10/14/99, Public Comment
Document ID 1700

25 Tommy Hargrove, 10/15/99, Public Comment
Document ID 1710

26 Thomas A Innes, 10/18/99, Public Comment
Document ID 1712

27 Thomas Blazek, 10/18/99, Public Comment
Document ID 1713

28 Tiney Browning, 10/18/99, Public Comment
Document ID 1714

29 Lorraine Fabrygel, 10/19/99, Public Comment
Document ID 1711

30 Michael Balajka, 10/19/99, Public Comment
Document ID 1715

4.03 Final Assessment/Restoration Plan

4.03.1 Notice of Availability

4.04 NEPA Compliance Documents

1 Draft DARP/EA for the Point Comfort/Lavaca Bay NPL Site Recreational Fishing Service Losses. Trustees, (9/28/99), 59
Document ID 1679

2 Revised Draft DARP/EA for the Point Comfort/Lavaca Bay NPL Site Recreational Fishing Service Losses. Trustees, (5/12/00), 18
Document ID 1911

4.05 Coastal Zone Consistency Determination

1 Tony Penn, Tom Schultz, to Richard Seiler, 9/24/99, Letter on Coastal Zone Consistency Determination
Document ID 1678

2 Tony Penn, Allan Strand, to Richard Seiler, 5/5/00, Letter on Coastal Zone Consistency Determination
Document ID 1915

3 Richard Seiler, to Tony Penn, 6/30/00, Letter on State Review of Coastal Zone Consistency Determination
Document ID 1919

4.06 Other Compliance Documents

1 Tom Moore, to Rusty Swafford, 5/18/00, Memorandum on EFH Evaluation of Restoration Projects
Document ID 1957

2 Allan Strand, to Thomas D. Serota, 5/25/00, Memorandum on Endangered Species Act Consultation
Document ID 1942

5. ASSESSMENT/RESTORATION PLAN DEVELOPMENT - Ecological Injuries/Service Losses

5.01 Public Participation - Restoration Scoping

5.01.1 Notices

1 Public Meeting Annnouncement -- 17 February 1998. Alcoa and Trustees, (2/1/98), 3
Document ID 1650

2 Public Meeting Announcement -- 5 November 1998. Alcoa and Trustees, (11/1/98),
Document ID 1641

5.01.2 Meetings

1 Public Meeting Summary -- 17 February 1998. Ronald Weddell, (3/1/98), 13
Document ID 1649

2 Public Meeting Summary -- 5 November 1998. Kristy Mathews, (11/9/98), 2
Document ID 1640

5.01.3 Public Comments

1 Public Feed Backforms. The Public, (2/17/99), 34
Document ID 1648

2 C. Elaine Giessel, to Peter Sheridan, 2/18/98, Letter on Public Comment
Document ID 1646

3 Thomas J. Blazek, to Dr. Pete Sheridan, 2/19/98, Letter on Public Comment
Document ID 1642

4 Gary Cunningham, to Dr. Pete Sheridan, 2/23/98, Letter on Public Comment
Document ID 1644

5 Jack P. Traylor, to Peter Sheridan, 2/24/98, Letter on Public Comment
Document ID 1643

6 J.C. Melcher, Jr., to Dr. Pete Sheridan, 3/1/98, Letter on Public Comment
Document ID 1645

7 Leroy Belk, to Dr. Pete Sheridan, 3/1/98, Letter on Public Comment
Document ID 1647

8 Leroy Belk, to Dr. Pete Sheridan, 5/11/98, Letter on Public Comment
Document ID 1667

9 Thomas J. Blazek, to Dr. Peter F. Sheridan, 9/21/98, Letter on Public Comment
Document ID 1665

10 Patricia H. Suter, to Dr. Peter Sheridan, 10/19/98, Letter on Public Comment
Document ID 1666

11 Ted Dodson, to Dr. Pete F. Sheridan, 11/8/98, Letter on Public Comment
Document ID 1639

12 Linda Reese, to Dr. Sheridan, 11/30/98, Letter on Public Comment
Document ID 1638

13 Thomas Blazek, to Dr. Peter F. Sheridan, 12/18/98, Letter on Public Comment
Document ID 1637

5.02 Injury Assessment and Restoration Scaling

1 Ron Gouguet, to Administrative Record File, 6/13/00, Memorandum on Expert Scores for Relative Habitat Service Provision
Document ID 1930

2 Natural Resource Trustees, to Administrative Record File, 6/14/00, Relative Habitat Service Provision Exercise
Document ID 1929

3 Natural Resource Trustees, to Administrative Record File, 6/15/00, Memorandum on Created Marsh Function and Maturity
Document ID 1928

4 Lavaca Bay Injury Quantification and Restoration Determination. Natural Resource Trustees, (7/7/00), 20
Document ID 1931

5.03 Draft Assessment/Restoration Plan

1 Draft Damage Assessment and Restoration Plan for Ecological Injuries and Service Losses. Natural Resource Trustees, (7/14/00)
Document ID 1939

5.03.1 Notice of Availability

1 Notice of Availability and Request for Comments on a Draft Damage Assessment and Restoration Plan/Environmental Assessment for Ecological Injuries & Service Losses, 65 FedReg 43739 (July 14, 2000)
Document ID 1941

2 Notice of Availability and Request for Comments on Draft Damage Assessment and Restoration Plan/Environmental Assessment for Ecological Injuries and Service Losses, 25 TexReg 6843 (July 14, 2000)
Document ID 1940

3 Newspaper Announcement, Notice of Proposed Restoration Plan for Ecological Resources in Lavaca Bay Public Meeting at Bauer Community Center, Port Lavaca Wave (7/22/00 & 7/26/00). Trustees
Document ID 1948

4 Newspaper Announcement, Notice of Proposed Restoration Plan for Ecological Resource in Lavaca Bay, Public Meeting at Bauer Community Center, Victoria Advocate (7/25/00 & 7/27/00).
Document ID 1949

5.03.2 Public Comments

1 Transcript from the ALCOA Public Meeting Held Thursday, July 27, 2000 in Port Lavaca, Texas at the Bauer Community Center
Document ID 1946

5.04 Final Assessment/Restoration Plan

5.04.1 Notice of Availability

5.05 NEPA Compliance Documents

1 Draft Damage Assessment and Restoration Plan for Ecological Injuries and Service Losses. Natural Resource Trustees, (7/14/00)
Document ID 1939

5.06 Coastal Zone Consistency Determination

1 Ron Gouget, Allan Strand, to Richard Seiler, 7/12/00, Letter on Coastal Zone Consistency Determination
Document ID 1947

2 Richard Seiler, to Tony Penn, 8/24/00, Letter on State Trustee Consistency Review of Natural Resource Damage Assessment Restoration Plan
Document ID 1945

5.07 Other Compliance Documents

1 Tom Moore, Ron Gouget, to Chuck Oravetz, 10/27/00, Memorandum on Endangered Species Act Consultations
Document ID 1956

2 Tom Moore, Ron Gouget, to Rusty Swafford, 10/27/00, Memorandum on Essential Fish Habitat Evaluation
Document ID 1955

3 Kenneth Rice, to Allan Strand, 3/23/01, Memorandum on Endangered Species Act Consultation
Document ID 1972

6. ASSESSMENT/RESTORATION PLAN DEVELOPMENT - Resource Injuries/Service Losses Residual to Final ROD

1 Draft Technical Memorandum: Reasonable Worst Case Analysis Terrestrial Resources. Trustees, ALCOA, (6/1/00), 11
Document ID 1920

2 Draft Damage Assessment and Restoration Plan for Ecological Injuries and Service Losses (See Chapter 8). (7/14/00)
Document ID 1961

Appendix B – Quantification of Fishing Losses and Benefits

As indicated in Chapter 5 of this document, the Trustees are selecting improvements to existing boat ramps located at Six-Mile Park, Lighthouse Beach, and Magnolia Beach as well as a fishing pier project at the Port Lavaca Bayfront to offset part of the boat-mode losses. The pier at the Bayfront together with the piers at Point Comfort and Six Mile Parks and all of the boat ramp improvements are sufficient to fully offset the total recreational fishing losses. How the pier/shore-mode and boat-mode losses and benefits are combined to determine total losses and benefits is described in this section.

Typically, a random utility model (the type of model applied for this assessment) determines the change in value of a recreational trip for a change in an environmental condition at a recreation site. If a site's environment is degraded, the model estimates the lost value per recreation trip resulting from the degradation. Likewise, for an environmental improvement at a recreation site, the model determines the added value per trip resulting from the improvement. Because the values are defined in a common metric, i.e., dollars, it is possible to add lost values for different degraded environments and to compare these lost values with values gained from environmental improvements.

To calculate the change in value per recreation trip, the change in consumer surplus[19] per trip is divided by the cost coefficient in the random utility model. The cost coefficient estimates the effect of trip travel costs on the value of the individual's trip. Dividing the change in consumer surplus by the cost coefficient converts a utility measure into a dollar measure of value.

In the random utility models for this assessment, the Trustees did not include a cost variable and could not calculate the dollar value of losses due to the consumption ban and the dollar value of benefits due to different restoration actions. Instead, the Trustees developed two separate models – one for pier/shore-mode fishing and one for boat-mode fishing – and used the models to determine pier/shore mode restoration to offset pier/shore mode losses and to determine boat-mode restoration to offset boat-mode losses. The models were not initially developed to evaluate pier/shore mode restoration as compensation for boat-mode losses and vice versa.[20]

The Trustees employed a variation of the standard random utility model that calculates dollar values of losses and benefits to be able to compare fishing losses and benefits across fishing modes. The Trustees approximated the dollar values of the pier/shore and boat-mode losses and benefits. To approximate the dollar value of changes (either due to the consumption ban or restoration actions), the Trustees divided the change in consumer surplus by the coefficient on the distance variable. The distance variable, which was included in both models, acts as a proxy for trip cost since distance to a fishing site is directly correlated to fishing trip cost. Using the coefficient on the distance variable in place of the cost coefficient then, the Trustees calculated

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[19] Consumer surplus is the measure on an individual's value of a good, in this case a recreation trip, above and beyond any payments that are necessary to obtain the good. In a random utility model, consumer surplus is estimated in terms of utility, which is a measure of value.

[20] Chapter 4 of this document describes the development of the random utility models and the quantification of recreational fishing losses due to the closure and the recreational fishing benefits (consumer surplus) as a result of restoration.

value indices for the pier/shore and boat-mode fishing losses and benefits. These indices could then be used to compare the relative value of fishing across different fishing modes.

To assess whether or not the combination of restoration projects is sufficient to compensate for all of the losses, the Trustees added boat-mode losses to pier/shore-mode losses and then compared those to the sum of the boat and pier/shore-mode benefits. The boat-mode losses add 75 percent to the pier/shore-mode losses. The boat-mode benefits add 18 percent to the pier/shore-mode benefits.

Figure 1 shows the difference between the annual baseline (without consumption ban) pier/shore utility index and the utility index without the consumption ban, adjusted for the addition of the boat-mode losses. The losses begin with the imposition of the consumption ban, which was 1988. Losses occur until 2010, by which time the consumption ban is expected to be removed. This analysis does not reflect the re-opening of Cox Bay in January 2000. The utility losses that occur annually are discounted – at three percent, where 1999 is the base year – to account for differences in when the losses occur. The sum of the discounted utility losses from 1988 – 2010 is a measure of the total recreational fishing losses.

Figure 2 shows the difference between the annual pier/shore utility index with the restoration actions (no closure in effect) and the utility index at baseline, adjusted for the addition of the boat-mode benefits. The benefits start once the restoration actions are in place – planned for 2000 – and they will be designed and constructed to last for 30 years. As with the annual fishing losses, the fishing benefits are discounted annually at a three percent rate. The sum of the discounted utility benefits from 2000 – 2029 indicates the total recreational fishing benefits.

Given that the total discounted utility benefits from the pier/shore and boat-mode projects exceed the total discounted utility losses across both modes, the Trustees have determined that the projects described in this Final DARP/EA are sufficient to fully compensate the public for all the recreational fishing losses resulting from the release of contaminants at the Alcoa Point Comfort/Lavaca Bay NPL Site.

Figure 1. Estimate of Total Recreational Fishing Losses

Parameters	
Utility Index at Baseline - Utility Index with Closure (includes pier/shore and boat-mode losses)	0.5087
Closure Implemented	1988
Duration of Closure in Years (through 10 years after remedy in 2000)	23
Discount Rate	3%
Base Year	1999

Boat and Pier/Shore Losses		
Year	Raw Utility Loss	Discounted Utility Loss
1987	0	0.0000
1988	0.5087	0.7042
1989	0.5087	0.6837
1990	0.5087	0.6637
1991	0.5087	0.6444
1992	0.5087	0.6256
1993	0.5087	0.6074
1994	0.5087	0.5897
1995	0.5087	0.5725
1996	0.5087	0.5559
1997	0.5087	0.5397
1998	0.5087	0.5240
1999	0.5087	0.5087
2000	0.5087	0.4939
2001	0.5087	0.4795
2002	0.5087	0.4655
2003	0.5087	0.4520
2004	0.5087	0.4388
2005	0.5087	0.4260
2006	0.5087	0.4136
2007	0.5087	0.4016
2008	0.5087	0.3899
2009	0.5087	0.3785
2010	0.5087	0.3675
2011	0	0.0000
2012	0	0.0000
2013	0	0.0000
2014	0	0.0000
2015	0	0.0000
2016	0	0.0000
2017	0	0.0000
2018	0	0.0000
Sum of Discounted Utility Losses		**11.9263**

Figure 2. Estimate of Total Recreational Fishing Benefits

Parameters	
Utility Index with Restoration - Utility Index at Baseline (includes pier/shore and boat-mode benefits)	0.6774
Restoration Implemented	2000
Lifespan of project	30
Discount Rate	3%
Base Year	1999

Boat and Pier/Shore Benefits		
Year	Raw Utility Benefit	Discounted Utility Benefit
1999	0	0.0000
2000	0.6774	0.6577
2001	0.6774	0.6385
2002	0.6774	0.6199
2003	0.6774	0.6019
2004	0.6774	0.5843
2005	0.6774	0.5673
2006	0.6774	0.5508
2007	0.6774	0.5347
2008	0.6774	0.5192
2009	0.6774	0.5040
2010	0.6774	0.4894
2011	0.6774	0.4751
2012	0.6774	0.4613
2013	0.6774	0.4478
2014	0.6774	0.4348
2015	0.6774	0.4221
2016	0.6774	0.4098
2017	0.6774	0.3979
2018	0.6774	0.3863
2019	0.6774	0.3751
2020	0.6774	0.3641
2021	0.6774	0.3535
2022	0.6774	0.3432
2023	0.6774	0.3332
2024	0.6774	0.3235
2025	0.6774	0.3141
2026	0.6774	0.3050
2027	0.6774	0.2961
2028	0.6774	0.2875
2029	0.6774	0.2791
2030	0	0.0000
Sum of Discounted Utility Gains		**13.2773**