APPENDIX D

COORDINATION

SECTION 1:

FISH AND WILDLIFE COORDINATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
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TAKE PRIDE IN AMERICA

September 6, 1994

Colonel Robert B. Gatlin
District Engineer
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Dear Colonel Gatlin:

This Planning Aid Letter constitutes the Fish and Wildlife Service's (Service) initial comments and suggestions regarding the reconnaissance study initiated by the Galveston District, U.S. Army Corps of Engineers (Corps), in September 1993 on the potential for deepening and widening the Corpus Christi Ship Channel, Nueces County, Texas. The single plan of channel enlargement considered during the reconnaissance study, according to partial draft materials received from the Corps by FAXFORM on August 9, 1994, was to deepen the 45-foot-deep channel to 50 feet in its interior sections, and to widen it from 400 feet to 500 feet. The bar and jetty sections of the channel were planned to be deepened to 52 feet from 47 feet, and the existing outer bar channel was planned for an approximately 9,600-foot extension out to the 52-foot contour in the Gulf of Mexico.

This report was prepared under the authority of an in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It has been prepared in cooperation with Texas Parks and Wildlife Department and National Marine Fisheries Service.

The Corps held a public workshop in Corpus Christi on March 30, 1994 to describe the reconnaissance study and to solicit public input. The Service attended that workshop, provided oral comments at that time, and took note of the specific input the Corps desired. Addressing the following five areas of input requested became the purpose for this planning aid letter's format and content:

1) Environmental, economic, and other resources in the study area that this study may impact;

2) Problems associated with current operation and maintenance of the channel or problems that may result from channel enlargement;

3) Problems not directly related to the ship channel which have the potential to be alleviated incidental to channel improvements;

4) Opportunities for the beneficial use of dredged material or environmental restoration; and

5) Other opportunities that a channel enlargement project may present that could improve the overall well-being of the study area.

The Nueces-Corpus Christi Bay Estuary and the impacts upon it by dredging projects are discussed at length in a series of previous planning aid letters, Fish and Wildlife Coordination Act Reports, Environmental Impact Statements

(EIS's), and supplements to these documents, over the last 20 years. The 40-Foot Project and the 45-Foot Project are this reconnaissance report's antecedents in detail as well as time, so very little remains to be discussed for the first time in this document. One additional action of major importance to the consideration of the 50-Foot Project, as it will be called hereinafter, has been the construction of Naval Station Ingleside, which has recently affected the dimensions of the Corpus Christi Ship Channel and some of its associated dredged material disposal areas. The Department of the Navy's (Navy) EIS on Gulf Coast Strategic Homporting describes these effects as well as provides the most recent background information on the project area's fish and wildlife resources.

What follows is a summation of the issues described and/or anticipated by the previous studies of enlargements of the Corpus Christi Ship Channel. As each resource issue is described, potential mitigatory and/or investigatory actions will be suggested. The issues generally fall into two categories: dredging impacts and dredged material disposal impacts.

EFFECTS OF DREDGING

A. Salinity intrusion. A well-known effect of the enlargement of deep draft channels connected to the sea is to increase the volume of seawater conducted into an estuary via density currents. This is of particular concern in the Nueces-Corpus Christi Bay system since reduction of freshwater inflows has been recently evaluated there and found to be linked to a reduction in the system's productivity. Under the current terms of the water rights permit governing the withdrawal of water from the Nueces River watershed, increases in the upper bay system's salinity above certain levels, no matter what the cause, would trigger mandatory fresh water releases into Nueces Bay, thus reducing the availability of such fresh water for direct consumption by the population and industries of the Texas Coastal Bend. Consequently, before deciding whether to proceed with this or any similar channel enlargement, proper hydrologic modeling should be conducted to predict the enlargement-related changes in Nueces Bay's salinity and the quantity of freshwater releases required to offset those changes. Quantification of these releases, and an analysis of the economic and environmental costs of the means (acquisition of water rights, construction of reservoirs and conveyance systems, etc.) to provide them, are essential to the making of an informed choice in this matter.

B. Storm tides. Enlarging the pass between San Jose and Mustang Island would tend to increase the volume of water than an approaching tropical storm or hurricane would force into Corpus Christi, Redfish, and Aransas Bays through that pass. This would mean a larger area of the coastal plain and the islands surrounding the bays would be inundated and subjected to wave action than had previously been the case with storms of comparable intensity, course, and duration. Temporary impacts to coastal habitats via erosion and salt intrusion would therefore be more widespread then they were historically. The expected increase in storm runnup should be calculated and an estimate made of the additional acreage of habitats and properties affected thereby.

C. Tidal prism. Normal astronomical and wind tides would also carry greater volumes through the 50-Foot Project's channel dimensions than were formerly possible, allowing both higher and lower tides than before to occur in the bays within a certain radius of the ship channel. This increase in the tidal prism may decrease the areal coverage of seagrasses and certain high marsh plants, while allowing an increase in the areal coverage of smooth cordgrass and black mangroves. The tradeoff would not occur evenly, for there are other environmental parameters than tidal influence which determine plant growth and survival. In general, the guild of wading birds would benefit, because the high bay salinities combined with the increased tidal prism would tend to increase the scope of unvegetated tidal flats. Ducks and fish dependent upon seagrass meadows or intertidal marshes for winter food or nursery areas would not be generally as well off as before, however.

D. Turbidity. Dredging always results in temporary suspension of particulates in the water column. If currents are not too strong, the scope and severity of the turbidity can be mitigated with silt curtains, but the currents from the Gulf of Mexico to at least the middle of Corpus Christi Bay are likely to make the use of silt curtains infeasible. Inside the Inner Harbor, the channel is naturally enclosed, and no additional benefit from silt curtains would be expected. However, the possibility of silt curtain deployment should be explored between the middle of the bay and entrance to the Corpus Christi Inner Harbor.

E. Resuspension of contaminated sediments. Certain sediments in the Inner Harbor and, to a lesser extent, the La Quinta Channel, have a history of contamination with heavy metals, some PCB's, and oil and grease. Some of the worst of these were removed during maintenance dredging and the completion of the 45-Foot Project and buried beneath relatively clean materials. Opportunities to continue this practice should be sought. For this reason, it is important that sediment core samples be taken at discrete depth intervals from the channel sides and bottom before it is enlarged, and that the samples obtained not be mixed before analysis. Otherwise, it will not be possible to recognize which sediments are "hot" and therefore candidates for segregation during the dredging process.

F. Migration of estuarine organisms. There has long been sought a dredging "window"; i.e., a period when the dredging in the channel segment through a tidal pass like that at Port Aransas would not coincide and potentially interfere with the pass' use by some migrating estuarine organism of major sport or commercial interest. In practice, however, the window never opens; something of major economic importance is continually in that channel reach. If a window does exist, it probably exists not for the fish, but for the fisherman, and not in the pass itself, but between Port Aransas and Ingleside Point. We refer to the seasonal shrimp fishery in the fall when shrimp trawlers congregate in this reach of the ship channel. The dredging activity should be scheduled to take this brief but economically significant event into account. Contact the Texas Shrimp Association representative in Aransas Pass for specific timing.

G. Sea turtle hibernation. Sea turtles have been known to hibernate during the winter on the bottoms of channels along the Florida to the South Carolina Atlantic Coasts. Although no report of similar behavior has been made for the Texas channels, all species of sea turtles are included on the Federal threatened or endangered lists and consequently should receive consideration during dredging. The Corps' and its dredging contractors should solicit and follow the National Marine Fisheries Service's instructions for conserving the turtles.

H. Brown Pelicans. The largest colony of nesting eastern brown pelicans in this state is found on Pelican Island, a.k.a. Disposal Areas 7 and 8. A species still listed as endangered in Texas, Louisiana and Mississippi, the eastern brown pelican feeds in the vicinity of the ship channel the year around. The dredging is most likely to have a negative effect on the pelican during the February through September nesting season when turbidity in the channel reach from Pelican Island to the near shore portion of the Gulf of Mexico is a critical factor in its ability to forage for its nestlings. This reach should therefore be dredged during other times of the year.

I. Dissolved Oxygen. Deep channels, particularly landlocked portions like the Inner Harbor, generally lack sufficient means for vertical mixing, have bottoms below the photic zone, and accumulate oxygen demanding sediments that together result in anoxic conditions in the lower parts of the water column. As a result, deep channels tend to lack productive bottom fauna and may at times contribute to fish kills. Practically speaking, however, there would probably be little difference in the habitat quality of the channel bottom in the Inner Harbor at its current depth of 45 feet and its condition at the depth of 50 feet. Both situations are/would be inimical to life.

EFFECTS OF FILLING

A. Disposal area capacities. The statuses of the capacities of the existing disposal areas associated with the Corpus Christi Ship Channel are not precisely known, but none of the 45-Foot Project confined disposal areas are believed to have sufficient capacity to hold 50 more years of maintenance material. The capacities of the disposal areas around Point Ingleside have already been exhausted by the deposition of materials from the dredging at Naval Station Ingleside. Without additional disposal areas or major increases in the capacities of the existing ones, the 50-Foot Project confined disposal areas would likewise have a less than 50-year maintenance life.

B. Competing uses for disposal areas. Disposal Area (DA) 4 on Harbor Island is the proposed site of the Safeharbor Project. Chosen in part because it is currently considered full, construction of the supertanker berths and oil-handling facilities for this project would eliminate any remaining potential DA 4 may have for future use in maintaining the ship channel. The Navy is also looking for an isolated berth with land and deepwater access to serve as a facility for detecting and cancelling the electrical fields of its anti-mine vessels. Possible locations for this facility include the La Quinta Channel. Depending upon its location, dredged material generated by this facility's construction and maintenance might be placed in DA 13. Finally, the Port of Corpus Christi Authority has historically made it a practice to permit, if not to promote, development within the disposal areas on the north side of the Inner Harbor. One such development currently under the Port Authority's consideration is the construction of the Northside Road Project, a highway that would extend west from the lift bridge along the shore of Nueces Bay. Depending upon its precise location and the amount of coordination between the two projects, the road might interfere with or enhance the capacity of the Inner Harbor's DA's for holding the 50-Foot Project's materials.

C. Enhancing existing disposal area capacities. DA 13's capacity was extended in the early 1980's by the availability of new work material from the enlargement of the Reynolds Metals docking area, and DA 1's levees in the Inner Harbor were enhanced similarly after bore samples were taken to relocate some of the material dredged during earlier channel deepening. The 50-Foot Project's initial dredging would provide millions of cubic yards (MCY) of virgin material for levee construction (an estimated 4.03 MCY at DA 6/Point of Mustang, 2.74 MCY at DA 13, and a total of 8.23 MCY at the Inner Harbor disposal areas). If not immediately used for raising levees, this virgin material should at least be deposited in such a manner as to facilitate finding and excavating it for this purpose later. The proposed North Shore Road might be constructed upon dewatered fill material dredged during the deepening of the Inner Harbor to 50 feet, thus maximizing the capacity of the disposal areas.

D. Contaminants. The Inner Harbor and, to a lesser extent, the La Quinta Channel, have historically contained maintenance material laced with varying amounts of PAH's, PCB's, and some heavy metals. Left exposed on the surface, these contaminants have ways of getting into the food chain. Levees should not be made of this material, lest it erode into bays. Erosion occurring during and subsequent to Hurricane Allen in 1980 allowed zinc-contaminated spoil to wash into the mouth of the Nueces River between dredging cycles, so levees containing such material should be maintained continuously to prevent failure, even after the maintenance dredging ceases. Even when contained, the prevailing winds blow the dried contents of the disposal areas into the bays, and vegetation growing on the surface of the maintenance material has been shown to take up the zinc in significant quantities, adding it directly to the food chain. The best way to handle contaminated material is to sample so as to locate it specifically, segregate it during dredging, place it within a continually contained disposal area, and cover it over with the cleanest dredged material available.

E. Return flows. Regardless of the chemical content of the dredged material, the effluent from the disposal areas should always be directed into the body of water from which the material was dredged. This minimizes the combined scope of the water quality impacts associated with the dredging and the release of the effluent. This would also help limit the impact to the surrounding habitats if effluent quality is poor, or if the release rate is too rapid, as, for example, when the dredged material escaped through the weir at the Port Mansfield disposal area earlier this summer.

F. Unconfined disposal areas. The unconfined disposal areas in Corpus Christi Bay between D.A. 13 and the Inner Harbor have not been historically associated with environmental effects more severe than temporary loss of infauna and turbidity of a more prolonged nature. Wave energy and depth in their vicinity apparently have precluded the formation of islands. Although these factors would also make their location engineeringly challenging, the paucity of long-term contained upland disposal alternatives weighs heavily in favor of exploring these uncontained disposal areas as locations for major beneficial uses projects. Potential goals would be to generate submerged or semi-emergent substrates for oyster reefs, seagrass beds or marshes. Besides the problems of depth and wave erosion, concerns to be addressed include avoidance of existing shell reefs and shrimping areas, effects on bay circulation, and consequences for navigation.

G. Bayward expansion of disposal areas. Past proposals to permanently enlarge existing disposal areas at the cost of diminishing the size of the bays and wetlands adjacent to them have met with almost uniform disapproval from the resource agencies, commercial fishermen and environmental groups. Examples include proposals to expand disposal areas into Tule Lake (40-Foot Project), Nueces Bay (45-Foot Project), and Corpus Christi Bay (Gulf Coast Strategic Homporting Project). Although there are many reasons for not decreasing the size of the estuary, the simplest and most comprehensive is that it results in an ecosystem-wide loss of productivity that is extremely difficult to offset. At a minimum, such loss requires in-kind and two-to-one mitigation, and experience has shown (e.g., the 200-acre wetland creation project attempted as a part of the 45-Foot Project's mitigation), that such mitigation is difficult to design, fund, and carry out.

None of these past proposals included the more recently developed beneficial uses programs that replace bay bottoms not with emergent land but with another aquatic habitat of hopefully higher value to the estuarine ecosystem. The Service believes of the examples given above, only the DA 13 area has sufficient potential for producing a higher value habitat to merit investigation of a beneficial uses of dredged material project. Tule Lake has a small but very diverse array of aquatic and wetland resources, while Nueces Bay provides an irreplaceable low salinity, soft-bottomed, detritus-rich fish and shellfish nursery. Corpus Christi Bay on the southwest side of DA 13 possesses a comparably less diverse and productive set of habitats, which might justifiably be converted to marsh, reef, or seagrass bed, provided there were no practicable, less damaging, upland confined alternatives.

H. Sharing disposal areas. One of the positive results of the controversy that arose over the Navy's proposal to expand DA 13 was the acquisition of its less-damaging alternative: an upland disposal site north of the La Quinta Channel. This site is as yet unused. As noted above, the Navy is seeking to construct a deep-draft berth somewhere nearby. Perhaps, if this berth were to be dredged along the La Quinta Channel, that dredging and the dredging for the 50-Foot Project could be accomplished simultaneously, thus reducing costs. Such a coordination of efforts would require a sharing of disposal areas, but again there may be an opportunity for mutual cost reductions. For example, if the Navy were to locate its facility at the west end of the La Quinta Channel, it would be most economical to dispose of the dredged material in the adjacent portion of DA 13, rather than to pump it to its own upland disposal site miles farther away.

The Corps could in exchange pump material from the reach of the La Quinta Channel nearest the Navy's upland site into that site instead of DA 13.

I. Pelican Island. Pelican Island and its expanding population of nesting pelicans owe a great deal to the successful integration of dredged material disposal activities and the habitat requirements of this species. The Corps has also enhanced the island with erosion protection for the sensitive woody vegetation on the island's northeastern portion where the pelican nesting has occurred most recently. Other nesting seabird species, particularly terns and skimmers, have benefited from the placement of maintenance material atop the herbaceous vegetation along the southern shores of the island. This deposition not only replaces the island itself about as fast as the prevailing winds wash it away, it also, albeit only for a few years, provides the unvegetated nesting substrate required by those particular birds. Potential beneficial uses of dredged material at DA's 7 and 8, which together form the distinctly double-lobed island, include stockpiling dredged material for intermittent spreading over the tern and skimmer nesting sites between the maintenance periods, which have historically been 8 years apart. Another possible beneficial use might be for the formation of marshes as wave buffers along most of the unarmored sections of the island's shorelines (one exception being the cove between island's lobes; this area already supports seagrasses and is heavily used by fledgling pelicans).

J. Long-term disposal solutions for the Inner Harbor. With little hope of subjecting Nueces Bay to future dredged material disposal without generating another controversial situation and subjecting the estuarine ecosystem to potentially irremediable adverse impacts, the planning for the 50-Foot Project should include another close examination of alternative long-term disposal areas for the Inner Harbor reach. These alternatives include but are by no means limited to the upland portions of the Nueces River Delta, the uplands north of ueces Bay, the open waters of Corpus Christi Bay (See F. above), and the undeveloped areas south and west of the Port of Corpus Christi. Another possible site may be that of a Corpus Christi subdivision near the Port's refinery district which may become a buffer zone between the City's populace and the refineries in the near future. All of these alternatives may be expensive, but for the sakes of the futures of the Port, the City, and Nueces Bay, they must be explored.

K. Other uses for fill material. Small bird nesting islands in the upper portion of Nueces Bay and near the Nueces Bay Causeway continue to need replenishment. The islands off Whites Point in the northern bay are the worst off and support precariously one of the few nesting colonies of roseate spoonbills, a state-protected species, found in the region. Unfortunately, the islands are remote and would not provide much disposal capacity. The two islands near the causeway are close enough to the Rincon Harbor to have received material from the maintenance of its entrance channel, and during the recent expansion of the causeway one of them received waste concrete from that activity as riprap. However, both could use additional fill, especially well-consolidated material.

Conclusion

This concludes our planning aid advice for the reconnaissance study on the enlargement of the Corpus Christi Ship Channel. We look forward to reviewing and commenting on subsequent documents from this planning activity. Please contact Johnny French at (512) 994-9005 if you have questions.

Sincerely,

Thomas E Grael

THOMAS E. GRAEL
Acting Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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December 10, 2002

Dr. Terrell W. Roberts
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Galveston District, Corps of Engineers
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Galveston, Texas 77553-1229

Dear Dr. Roberts,

Enclosed please find the final draft of the Fish and Wildlife Coordination Act Report for the Corpus Christi Ship Channel - Channel Improvement Project. This document fulfills the Fish and Wildlife Service obligation under the Military Interdepartmental Purchase Request #01-PL-006.

If you have any questions, please contact Clare Lee of our office at (361) 994-9005.

Sincerely,

Allan M. Strand

Allan Strand
Field Supervisor

U.S. Fish and Wildlife Service
Region 2

FISH AND WILDLIFE COORDINATION ACT REPORT

Corpus Christi Ship Channel, Texas

by

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Tom Shearer

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December 2002

INTRODUCTION

Regulatory Background:
The Rivers and Harbors Appropriations Act of 1938 (33 U.S.C. 540, and other U.S.C. sections; Chapter 535, June 20, 1938; 52 Stat. 802), provides for wildlife conservation to be given "due regard" in planning Federally authorized water resources projects. The Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401), requires consultation with the Fish and Wildlife Service and State fish and wildlife agencies where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

The Fish and Wildlife Coordination Act provides a basic procedural framework for the orderly consideration of fish and wildlife conservation measures to be incorporated into Federal and Federally permitted or licensed water development projects. The principal provisions of the Act include:

1. A statement of Congressional purpose that fish and wildlife conservation shall receive equal consideration with other project features;
2. Mandatory consultation with wildlife agencies with a view to achieving such conservation;
3. Full consideration by action agencies of the recommendations stemming from consultations;
4. Authority for action agencies to implement such recommendations as they find acceptable.

Project Background:
In 1922, President Warren G. Harding approved the Rivers and Harbors Appropriations Act that authorized construction of the Corpus Christi Ship Channel (CCSC). The State of Texas created the Port of Corpus Christi Authority (PCCA) in 1923, and it sponsored the dredging and construction that began in 1923. Opening of the City of Corpus Christi's deepwater port took place in 1926 (Handbook, 2001). The Corpus Christi Ship Channel has undergone several major improvements since it was originally dredged in 1926. The initial depth of the channel was 25 feet. Since then, the channel has been deepened four times. In 1989, the PCCA completed the most recent improvement to the Corpus Christi Ship Channel, a project that entailed dredging the Inner Harbor, a 9-mile segment, from a depth of 40 feet to 45 feet and enlarging the turning basins. As with most dredging projects, one of the greatest challenges was the placement of dredge material. The U.S. Army Corps of Engineers (USACE) presented the US Fish and Wildlife Service (Service) with five alternatives for placement. The alternatives included upland, non-tidal flat, and open water disposal sites. The Service evaluated these alternatives and made recommendations. An overview of the ecological resources in Nueces Bay along with Service

recommendations was included in the 1982 Fish and Wildlife Coordination Act report by French and Ramirez (1982). In addition to ranking the alternatives according to environmental impact, the Service recommended that no dredge material from the Inner Harbor be placed in Nueces or Corpus Christi Bays due to known historical contamination of the sediments and also that dredge disposal areas next to the Inner Harbor be designed to facilitate the return of supernatant fluids to the Inner Harbor itself and not to Nueces Bay. In 1994, additional deep-draft navigation improvements to the entire length of the channel were considered by the PCCA, the non-federal sponsor, and the USACE. This Fish and Wildlife Coordination Act report is intended as a supplement to the 1982 report (French and Ramirez 1982) as well as an assessment of the entire new project. According to the USACE, it will accompany the Final Environmental Impact Statement which is part of the Feasibility Report on the Corpus Christi Ship Channel-Channel Improvement Project (CCSCCIP). Comments received from the National Marine Fisheries (NMFS) Service and Texas Parks and Wildlife Department (TPWD) have been incorporated into this document.

Proposed Project Description

The US Army Corps of Engineers (USACE) and Port of Corpus Christi Authority (PCCA) evaluated the following alternatives during the Feasibility Study:

1) Deepen to 52 feet from the Gulf of Mexico to Viola Turning Basin and widen across Corpus Christi Bay

2) Deepen to 50 feet from the Gulf of Mexico to Viola Turning Basin and widen across Corpus Christi Bay

3) Widen only across Corpus Christi Bay

4) Deepen La Quinta Channel to 50 feet

5) Extend La Quinta Channel

6) Provide Barge Lanes across the Upper Bay in the Corpus Christi Bay

The USACE recommended and PCCA preferred alternatives for the CCSCCIP as of June 13, 2001 are described in the Preliminary Draft Environmental Impact Statement (PBS&J 2001) and reproduced below:

1) Deepen the CCSC from –45 feet MLT to –52 feet MLT, plus advanced maintenance and allowable over-depth. No deepening of La Quinta Channel. The deepened channel will extend roughly 10,000 feet into the Gulf of Mexico to the –56-foot isobath.

2) Widen the CCSC from Port Aransas to the Harbor Bridge to 530 feet. (Existing widths are 500 feet between Port Aransas and La Quinta Junction and 400 feet between La Quinta Junction

and the Harbor Bridge.)

3) Extend the La Quinta Channel 7,200 feet at a depth of –39 feet MLT and a width of 400 feet and include a turning basin.

4) Add 200-foot-wide barge shelves (-12 feet MLT) on both sides of the ship channel from La Quinta Junction to the Harbor Bridge. Shelf width measured from the toe of the widened and deepened ship channel. For most of the reach, no dredging would be required, only the addition of navigation aids.

Proposed Project Area:
Corpus Christi Bay covers approximately 320 sq km of open water (Texas Natural Resources Conservation Commission (TNRCC) 1996; currently Texas Center for Environmental Quality (TCEQ)), has an average bay depth of approximately 4 m (White et al. 1983), and an average salinity of 30 ppt (Shew et al. 1981). The area has a humid subtropical climate. The average annual rainfall is approximately 28 inches, although extremes due to tropical storm rainfall or droughts are not uncommon. Freshwater is provided to the bay by the Nueces River (via Nueces Bay) and by domestic and industrial TCEQ permitted outfalls which discharge into the bay. The TCEQ designated uses for Corpus Christi Bay waters are: contact recreation, exceptional quality aquatic habitat, and shellfish waters (Texas Water Commission 1996). With the exception of Mustang Island, Corpus Christi Bay is nearly surrounded by urban and industrial development. The bayshore includes urbanized areas with bulkheaded seawalls, industrial complexes, as well as fringe marshes, coastal prairies, and agricultural fields.

Fish and Wildlife Resources Without the Proposed Project
The Corpus Christi Bay system has been studied over the last 10 years by the Coastal Bend Bays & Estuary Program (CBBEP). The CBBEP area covers a twelve county area that includes three estuaries, the Mission-Aransas, Nueces (which includes Corpus Christi Bay), and the Upper Laguna Madre. The CBBEP has published several peer reviewed volumes that characterize the Coastal Bend Bay system in great detail. Corpus Christi Bay provides nursery, spawning and feeding grounds for an abundance of fish, shellfish, and wildlife. There are approximately 234 fish species in the Coastal Bend bays, 79 mammal species, and 117 reptile/amphibian species that inhabit the surrounding bayshore and barrier island habitats. It is estimated that approximately 494 species of birds migrate through or nest in the Coastal Bend area (Tunnell et al. 1996), and 23 species nest on existing dredged material placement areas. Federally-listed threatened and endangered species are found in and around Corpus Christi Bay, including the Kemp's ridley sea turtle (*Lepidochelys kempii*), piping plover (*Charadrius melodus*), and brown pelican (*Pelecanus occidentalis*). Habitat types include open bay bottom, seagrass beds, coastal marsh, hard substrate habitats, and tidal flats.

The CBBEP has identified threats to the bay system which include reduced freshwater inflow, habitat loss, water quality degradation, altered circulation due to dredging and channelization, declines in living resources, and man-made debris (CBBEP 1994). Coastal development,

dredging activities, pollution and other factors may damage and impair habitats, and thereby reduce populations of estuarine wildlife. Nutrients, chemicals, metals, sediments, and other pollutants enter the bay waters from point and non-point urban, industrial and agricultural sources.

The area's commercial and recreational fishery and related recreational activities was estimated to generate $760,000,000 per year in 1987 (Jones et al. 1997). Because a large portion of the economics of the region is dependent upon the area's natural resources, it is essential to protect and maintain the estuarine habitats in the Corpus Christi Bay system.

Potential Impacts of Project

In the CBBEP Coastal Bend Bays Plan (TNRCC 1998), the Action Plan for Maritime Commerce and Dredging includes as goals:

1) Enhance maritime traffic safety while reducing the rate of maritime incidents from shipping, terminal operations, and marine pipelines

2) Ensure that all dredging activities are planned and conducted in ways that consider the cost effectiveness of the operation, while minimizing ecological impacts and maximizing the beneficial uses of dredged material.

With proper planning, it would be possible to minimize negative environmental impacts and maximize benefits to the bays regional economy. Parameters that may be affected by the proposed project include:

1. Changes in bay circulation.
2. Changes in bay salinity patterns.
3. Burial of bay bottom beyond the levees of proposed confined placement areas.
4. Increased bay turbidity during dredging, and subsequent resuspension due to erosion.
5. Release of toxic chemicals from the bay bottoms, and proliferations into the bay systems.
6. Reduced illumination levels at depth, and loss of photosynthetic biomass.
7. Burial of benthic organisms, including plants and animals.
8. Disturbance of adjacent colonial waterbird rookery islands.

Salinity intrusion was noted in the following excerpt from a previous Service Planning Aid Letter dated September 6, 1994 and the following recommendations were given at that time: "Salinity Intrusion. A well known effect of the enlargement of deep draft channels connected to the sea is to increase the volume of sea water conducted into an estuary via density currents. This is of particular concern in the Nueces-Corpus Christi Bay system since reduction of freshwater inflows has been recently evaluated there and found to be linked to a reduction in the system's productivity. Under the current terms of the water rights permit governing the withdrawal of water from the Nueces River watershed, increases in the upper bay system's salinity above certain levels, no matter what the cause, would trigger mandatory freshwater releases into Nueces

Bay, thus reducing the availability of such fresh water for direct consumption by the population and industries of the Texas Coastal Bend. Consequently, before deciding whether to proceed with this or any similar channel enlargement, proper hydrological modeling should be conducted to predict the enlargement-related changes in Nueces Bay's salinity and the quantity of freshwater releases required to offset those changes. Quantification of these releases, and an analysis of the economic and environmental costs of the means (acquisition of water rights, construction of reservoirs and conveyance system, etc.) to provide them are essential to making of an informed choice in this matter."

In addition, a monitoring and assessment program should be implemented to ensure that the predicted results of any hydrological models performed for salinity intrusion are verified. The monitoring and assessment program should work in collaboration with existing programs that monitor the Nueces Bay, such as the City of Corpus Christi's Nueces Bay Salinity Monitoring Project.

The Regulatory Agency Coordination Team (RACT) requested that a study be performed under the oversight of the Hydrodynamic and Salinity Modeling Workgroup to determine the effects of tidal elevation and salinity intrusion due to the channel improvement project. Results of the study (Matsumoto et al. 2001) indicate that tidal ranges would be minimal, increasing by approximately 0.04-0.06 feet in Corpus Christi and Nueces Bays and decreasing by a smaller range due to a negative effect in the northern adjoining bays within the system. Monthly average salinity, during dry periods, would increase by 0.1 ppt in Nueces Bay and by 0.1-0.4 ppt in Corpus Christi Bay. During normal periods, average salinity would decrease by up to 0.4 ppt and during wet periods, monthly average salinity would decrease by 3 to 4 ppt in Corpus Christi and Nueces Bay.

OPEN BAY BOTTOM AND BENTHIC ORGANISMS

Open-bay bottoms represent the largest estuarine habitat type along the Texas coast and play a key role in nutrient cycling and the production of the benthic community upon which higher trophic levels depend. The benthic community of Corpus Christi Bay is one of the most well studied of Texas estuaries (Figure 1). Quantification of the abundance and diversity of benthic organisms is dependent upon the depth, substrate and season in which the sample is taken. In Corpus Christi Bay, polychaetes are the dominant group followed by mollusks (Holland et al. 1975, Flint and Younk 1983). Holland et al. (1975) reported mean abundance of 5,000 benthic organisms/m^2 while Flint and Younk (1983) reported total abundances of 1,700 organism/m^2. Shoal areas were more diverse than channel areas. Castiglione (1983) found the density of molluscs in mud near the Inner Harbor of the Corpus Christi Ship Channel to be only 28 individuals/m^2, while densities in the proximity of the La Quinta Channel ranged from 150 to 1,000 individuals/m^2. Highest densities were noted in the spring. Armstrong (1987), in his review of benthic studies, reported peak abundances occurring in the winter and spring while minimum abundances were usually found in the late summer and fall. Peak species diversity occurred in the spring, and most recruitment by planktonic and benthonic larvae occur in the

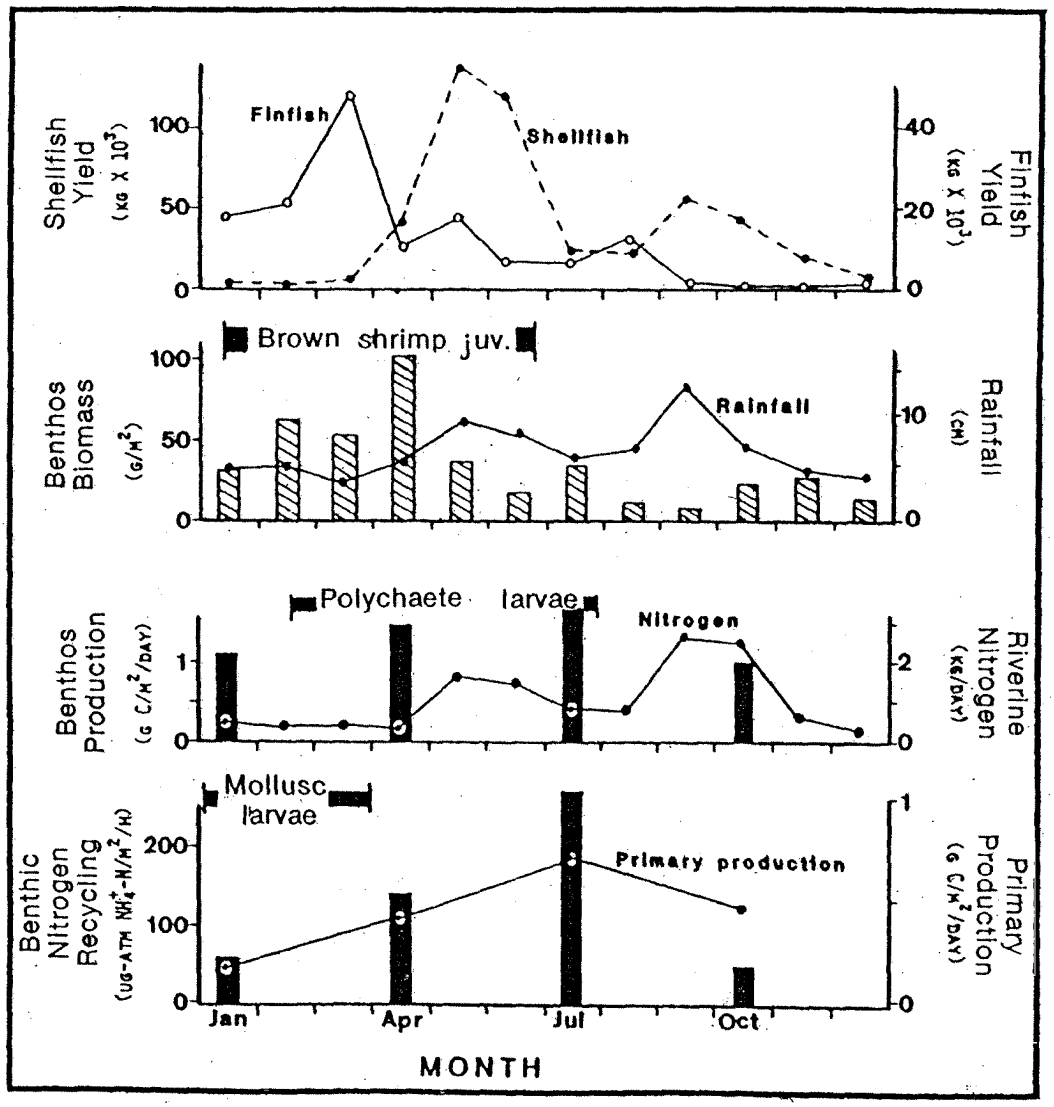

Figure 1. Multiyear data from the Corpus Christi Bay Estuary on fishery yields, benthic biomass, rainfall, benthic production, riverine nitrogen input, benthic nutrient regeneration, and phytoplankton production. Also shown are periods of peak brown shrimp (juvenile) and benthic larvae colonization. (Taken from Armstrong 1987).

winter, spring, and summer.

Summary of WES benthic recovery report

Open-water placement of dredged material results in the burial of benthos and a decline in productivity for estuarine-dependent fish and shellfish, as a result, efforts have been made to avoid this mode of disposal unless there are no other feasible alternatives available. Due to concerns over impacts to the benthic invertebrate community following open-water placement of maintenance materials, the USACE Waterways Experiment Station (WES) conducted a study to determine the recovery rates for Corpus Christi Bay (Ray and Clarke 1999). Sediment and infaunal samples were collected from five randomly located stations within each of eight placement sites and eight reference sites. Samples were taken prior to placement in August of 1995, near the end of placement, at six months, and at one year. Additional information obtained from sediment samples was sediment grain size and organic and calcium carbonate content. Another aspect of the study was the utilization of a sediment profiling camera system to obtain vertical cross-sectional imaging. These photographs provided information on depth of penetration, depth of dredged material, depth of redox potential, surface relief, presence of anoxic voids, feeding voids, and infaunal burrowing.

Benthic macroinvertebrate samples from reference areas were compared to those collected baywide and generally found to be similar to the study plots. Lowest biomass were found nearest the Laguna Madre and highest number of taxa were closer to the Corpus Christi Ship Channel. Results indicated that recovery time for placement areas was generally 1 year. For taxa richness and abundance, most sites recovered within six months to one year, recovery of biomass took longer with most sites requiring a full year; one site did not recover to pre-placement conditions within that time. For seven of the eight placement areas, species composition was recovered within a year with several sites recovering within six months; one site was not fully recovered by the end of one year. Recovery time would have been extended if placement had not been completed by early January. A major spring benthic recruitment period followed the dredging operations and placement, allowing for a shorter recovery period.

Impacts to Corpus Christi Bay

Although excavation and disposal both impact benthic communities, of the two, disposal is potentially more deleterious (Montagna et al. 1998). According to Maurer et al. (1986) impacts are less severe when depth of dredged material is <20-30 cm and when dredged materials that are similar in composition are deposited. A similar study in Galveston Bay (Ray et al. 1996) examined new work material placement which was considerably stiffer than the natural bay bottom and found the benthic recovery time to be approximately 72-88 weeks. The Corpus Christi Bay study by Ray and Clarke (1999) examined open-water placement areas receiving maintenance material which were < 30 cm deep. Although the new work materials in the upper bay reach of Corpus Christi Bay are reportedly soft, silty clay which is probably very similar to materials already in the placement areas, the new work that is proposed would most likely be stacked to a much greater depth than maintenance material. Greater depth of dredged material will most likely lengthen the amount of time for recovery beyond one year in some sites.

Holland et al. (1975) indicated that at one site in Corpus Christi Bay dredging operations had upset the benthic community and re-establishment took twenty months.

The Service estimates that new work material from the proposed project will initially cover a footprint of ~ 935 acres of bay bottom for the creation of beneficial use sites. This acreage represents a temporary loss with an expected net gain over time following initial creation. In addition, there are approximately 100 acres in each of the eight open water placement areas in Corpus Christi Bay for a total of 800 acres which will receive new work material followed by periodic placement of maintenance material throughout the life of the project. A sister study to the WES benthic recovery report was to have determined the dispersal pattern of deposited sediment in Corpus Christi Bay (Ray and Clarke 1999) but this study was never completed. The 800 acre figure does not include impacts to bay bottom outside of the placement footprint area where as much as 40% of the dredged material may migrate and cover an area three times larger than the placement area, as estimated by Bassi and Basco (1974). The increased turbidity may also result in further benthic burial. The combined acreage of the beneficial use sites and the open water sites is ~ 1735 acres (3,237,485 m^2) of impacted bay bottom or 1% of Corpus Christi Bay. Using the mean and standard deviation for the baywide abundances as given in Ray and Clarke (1999), it is estimated that between 3 and 38 billion benthic organisms would be impacted by the proposed project from the placement of new work material. Fish and shellfish are not able to recover as much prey from the placement areas as from natural bay bottom (Minello and Wooten 1994) during the benthic recovery period of up to one year, which translates into lost production.

The Service continues to discourage the practice of open-water disposal. In the event that better management alternatives are not implemented, the following recommendations may reduce the impacts to the Corpus Christi Bay system:

1) The PCCA and USACE should continue to evaluate Best Management Practices for dredging as new techniques and technologies are developed and should continually seek alternatives to open-water disposal.

2) Open-water placement activities for maintenance dredging should be completed during the summer and fall. The benthic recovery study by Ray and Clarke (1999) indicated that recovery would have taken longer than 1 year had dredging not been completed prior to the first recruitment period. This time frame would be least disruptive to the benthic community allowing for peak recruitment of benthic organisms occurring during late winter and early spring to colonize the placement areas as quickly as possible thereby reducing the recovery period. Since the new work dredging will require significantly more time than maintenance dredging, new work dredging should be completed without seasonal restrictions to allow the recovery process in the bay to proceed as quickly as possible.

3) Long-term impacts occur when repeated deposition of sediments alter benthic habitat resulting in the loss of foraging habitat for fish and shellfish species. Open-water placement

areas 16A, 16B, 17A, 17B have a dredging cycle every three years while PA 14A, 14B, 15A and 15B have a six-year dredging cycle. A three year frequency barely allows for the recovery of the benthic community and utilization by nekton. Steps should be taken to reduce the frequency of dredging. Longer dredge pipes should be utilized to place material farther away from the channel and towards the far end of the placement area in order to prevent shoaling and reduce the frequency of dredging.

SHALLOW BAY BOTTOM

The Mitigation Workgroup recommended that the PCCA and the USACE determine the amount of shallow water habitat that would be impacted in the project footprint. The mitigation workgroup determined that mitigation would only be required for impacts to shallow bay bottom habitat (areas less than or equal to -4'MLT) and seagrass beds. All the direct impacts to shallow water habitat will occur in the vicinity of La Quinta Channel extension. A total of 45 acres of shallow bay bottom habitat will be converted into deeper water habitat. Eight of the 45 acres are located along the south side of the proposed La Quinta Channel extension near DMPA 13. The remaining 37 acres of shallow water habitat are located farther west along the north side of the channel extension and the new turning basin area. Although 45 acres of impacts will occur to shallow water habitat, 935 acres of shallow marine habitat will be created as a result of the proposed beneficial use sites associated with this project.

SEAGRASS BEDS

Volumes have been written on the value of seagrass meadows in estuaries. Seagrass roots and rhizomes reduce erosion by consolidating the bay bottom. The seagrasses provide increased substrate for epiphytic organisms, and provide nursery and foraging areas for marine animals. These meadows are very productive in terms of carbon output, and are comparable to coral reefs. With the exception of the Laguna Madre, Redfish Bay and the adjacent Harbor Island contain the most pristine seagrass beds in Texas. During the period between 1958 and 1994, the Redfish Bay area lost a net total of 795 hectares of seagrass which was attributed primarily to construction of the Gulf Intracoastal Waterway and the resulting dredged material deposition and channel impacts (Pulich et al. 1997). Seagrass beds on the western shoreline of Mustang Island increased by 1319 hectares between 1958 and 1974 (Pulich et al. 1997) due to a rise in sea level which allowed expansion of seagrasses into submerged wind-tidal flats (White et al. 1978). An additional 18% increase was noted for Mustang Island between 1974 and 1994 (Pulich et al. 1997).

There are five species of seagrasses that occur within the Corpus Christi Bay area (Tunnell and Judd 2002):

Halodule beaudettei [= *wrightii*] (shoal grass),
Cymodocea [=*Syringodium*] *filiformis* (manatee grass),
Thalassia testudinum (turtle grass),

Halophila engelmanni, (clover grass), and
Ruppia maritima (widgeon grass).

Direct Loss of Seagrass

Seagrass occurs in the proposed La Quinta Channel Extension area along the south side of the extension near DMPA 13. There will be a direct loss of five acres of seagrass due to the construction of this project. The Service recommends that the direct loss of seagrass be compensated for on a 3:1 mitigation ratio. The fifteen acres of mitigation may occur in the beneficial use site GH if 70% coverage can be achieved after 3 years, 45% of which should be shoalgrass (*Halodule wrightii).* Transplant technique and procedures, as well as monitoring requirements and success criteria, should follow the "Mitigative Procedures/Conditions For Seagrass Transplanting Efforts" as stated in the DEIS and attached as an Appendix to this document.

Indirect Loss of Seagrass

Seagrass distribution in Corpus Christi, Nueces and Redfish Bays was mapped and compared for 1956/58, 1975, and 1994 using GIS techniques. The area with the greatest decline in seagrass occurred in the north Redfish Bay and Harbor Island areas. Seagrass loss and fragmentation in these areas was attributed to possible water quality problems associated with shoreline development, propeller scarring, and channel impacts (Pulich and Blair 1997). Channel impacts to seagrass result from re-suspension of dredged material by waves and currents, re-suspension of material during maintenance dredging, and changes in water circulation patterns due to newly formed islands. Reduction in light can reduce photosynthesis, causing seagrass losses over time. Impacts due to dredging have been noted up to 1.2 km away (Onuf 1994).

The proposed Corpus Christi Ship Channel project has the potential to impact the extensive seagrass beds existing near Dagger Island, Ingleside-On-The-Bay, and seagrasses that are adjacent to the proposed beneficial use site GH. These areas need to be monitored for indirect losses and restoration or mitigation implemented for any impacts.

BENEFICIAL USE PLAN FOR DREDGED MATERIALS

The PCCA and the USACE solicited beneficial use ideas from the general public through a series of public forums held in 2000 in Corpus Christi, Rockport, Port Aransas, Kingsville, and Ingleside. A list of 77 ideas was compiled. The PCCA and the USACE were then directed by the Beneficial Uses Workgroup to design a beneficial use plan for the workgroup to review. The resulting beneficial use plan, which is conceptual in design, includes five shallow, open water sites, one upland site, two offshore sites, and three shoreline protection areas (Figure 2).

The proposed beneficial use (BU) Site I, located adjacent to and north of the ship channel and south of Dagger Island, is a triangular-shaped 163 acre open water site. Rip-rap and geotubes will enclose the south and east sides. This BU site will include a high mound 8-10' MLT in the protected corner, smaller mounds in the interior, and a meandering channel through the northwest

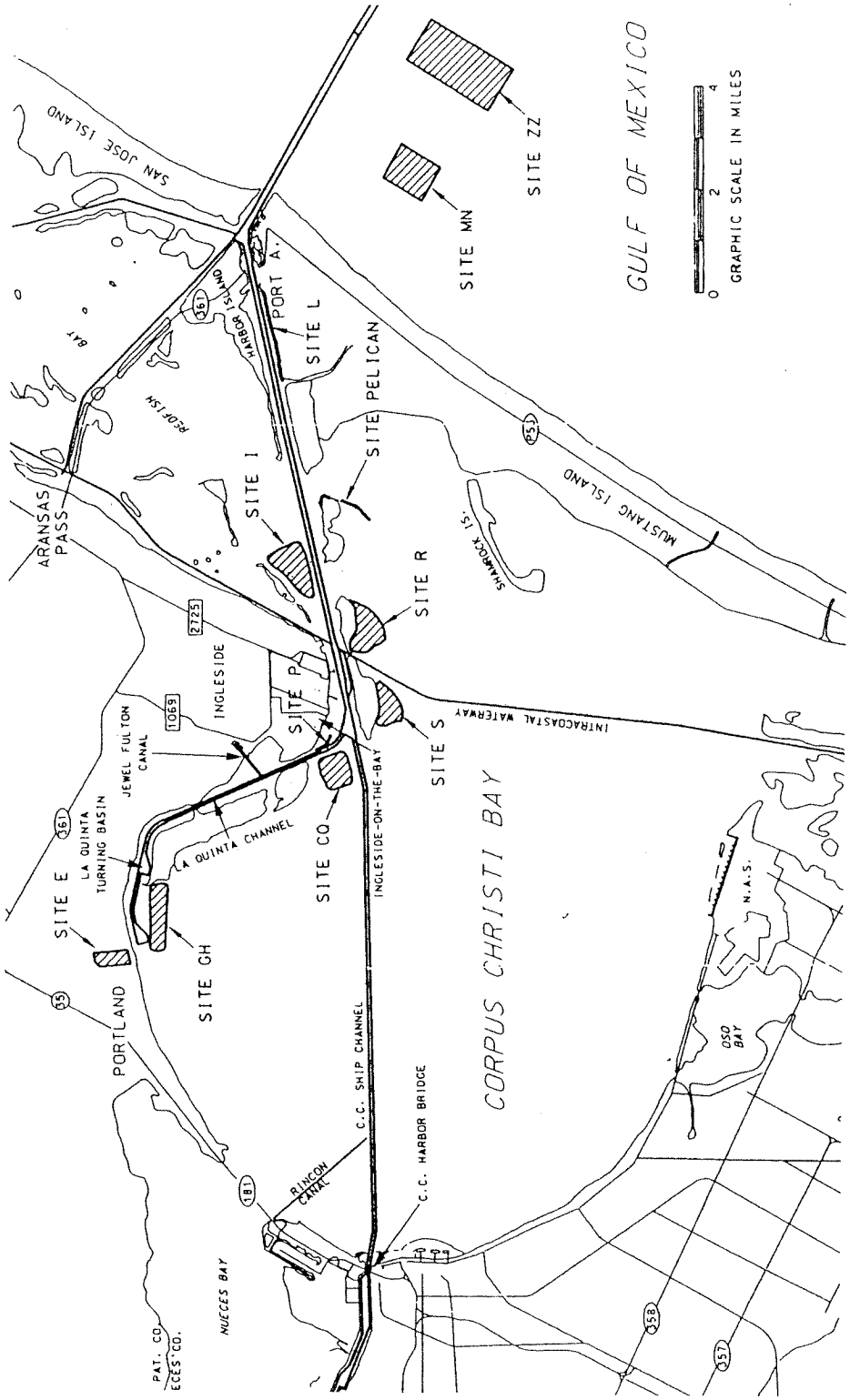

Figure 2. Beneficial use sites in the Corpus Christi Bay (taken from the DEIS, November 2001).

side. A fringe of *Spartina alterniflora* will be planted around the mounds including the perimeter of the largest mound. The Service is concerned that since the open north side of the BU site is not protected, it may allow sediments to migrate out of the BU site and into seagrass beds located east of Dagger Island. This is even more of a concern during storm or hurricane events. The Service therefore recommends that the seagrass beds near Dagger Island be monitored to determine if impacts are occurring and that the PCCA and the USACE continue to coordinate with the RACT and BUW on the final design of Site I in order to avoid impacts to seagrass beds. Monitoring should occur for a two year period following the initial creation of beneficial use Site I. If impacts result in seagrass loss, mitigation would be required.

The proposed beneficial use Site S, located on the bay side of PA10, is a triangular-shaped 121 acre shallow open watersite. Rip-rap and geotubes will extend out from the east side of PA10 and a portion of the west side to partially enclose the site.

The proposed beneficial use Site R, located on the bay side of PA9, is a triangular-shaped 201 acre shallow open water site similar to Site S. Rip-rap and geotubes will extend out from the south side of PA9 to partially enclose it.

The proposed beneficial use Site CQ, located northwest of the La Quinta Junction, is a rectangular 250 acre open water site. Rip-rap and geotubes will enclose three sides of the site with the open side facing Ingleside Point. A fringe of *S. alterniflora* will be planted inside the perimeter.

The proposed beneficial use Site GH, located at the end of the La Quinta Channel extension and adjacent to placement area 13, is a rectangular-shaped 200 acre shallow open water site. Rip-rap and geotubes will armor the south side. A fringe of *S. alterniflora* will be planted inside the perimeter.

Although over 900 acres of deep bay bottom habitat will be buried during construction of the beneficial use sites, these BU sites will result in the creation of protected shallow water habitat that should be suitable for seagrass growth. Approximately 26 acres of emergent marsh habitat will also be created within these BU sites. Although 15 acres of seagrasses will be planted into a BU site in order to mitigate the 5 acres of seagrass that will be impacted by the actual dredging project, the protected shallow water habitat created throughout all of the BU sites should allow for the natural colonization of seagrasses in these areas. Seagrass beds represent a more diverse habitat than shallow open water habitat and act as nursery areas and foraging grounds for a variety of commercially and recreationally important species. One upland beneficial use site E will form a visual barrier between the community of Portland and the La Quinta Gateway Project. This 100 acre beneficial use site is currently agricultural farmland so no impacts are expected. Gulf offshore areas MN and ZZ are open water disposal sites with a combined area of 1,590 acres. Material will be deposited in these Gulf sites to provide topographical relief.

Recommendations:

1) Specific beneficial use goals for the five shallow, open-water beneficial use sites (I, CQ, GH, S, and R) need to be established to clearly define expected benefits, and success criteria need to be outlined for determining when those goals have been met.

2) It is essential that the Beneficial Use Workgroup (BUW) be maintained to provide input and oversight throughout the life of the project and to implement adaptive management strategies to ensure that natural resources continue to be protected.

THREATENED AND ENDANGERED SPECIES

A number of Federally listed threatened and endangered species occur within the project area and are listed in Table 1.

Although little information is available regarding the distribution and abundance of sea turtles in Corpus Christi Bay, the Kemp's ridley has been documented in the bay as well as in the channel itself (Manzella and Williams 1992). Turbidity during dredging operations may reduce the ability of turtles to locate food but such effects should be short term. Impacts could occur due to hopper dredges which are fast moving and more of a danger to turtles than the slow moving hydraulic pipeline dredges. National Marine Fisheries Services should be consulted for potential impacts to sea turtles.

Piping plovers begin arriving in their wintering habitat on about July 15 and may remain in or near the proposed project area through May 15. Piping plovers feed on benthic organisms that live in exposed wet sand in wash zones, intertidal ocean beach, wrack lines, washover passes, mud, sand and algal flats, and shorelines of streams, ephemeral ponds, lagoons and salt marshes. They use beaches adjacent to foraging areas for roosting and preening. Small sand dunes, debris, and sparse vegetation within adjacent beaches provide shelter from wind and extreme temperatures. Threats to wintering populations include habitat loss and degradation due to coastal development, recreation, navigation, and dredging. Shoreline stabilization and replenishment projects have been contributors to this species decline (USFWS 1996).

Table 1. Threatened and endangered species of potential concern within the CCSC project area..

Common Name	Status	Scientific name
Brown pelican	E	*Pelecanus occidentalis*
West Indian manatee (=Florida)	E	*Trichechus manatus*
Hawksbill sea turtle	E	*Eretmochelys imbricata*
Kemp's Ridley sea turtle	E	*Lepidochelys kempii*
Leatherback sea turtle	E	*Dermochelys coriacea*
Piping plover	T/CH*	*Charadrius melodus*
Green sea turtle	T	*Chelonia mydas*
Loggerhead sea turtle	T	*Caretta caretta*

*Designated Critical Habitat

The Service requested that a survey for piping plovers be conducted in the project area. Nine sites were chosen by the Service and TPWD to be surveyed. The sites were grouped into four areas and according to the results, piping plover are utilizing all four areas surveyed (PBS&J 2001).

Piping plover critical habitat was designated on July 10, 2001 [66 FR 36038]. Critical habitat is a term used in the Endangered Species Act (ESA) that refers to specific geographic areas that contain habitat features essential for the conservation of a threatened and endangered species. Within the project area, there are several critical habitat units including TX-6, TX-7, TX-8, TX-9, TX-10, TX-11, TX-12, and TX-16. Units closest to the project footprint are TX-14, located on the backside of Mustang Island, and Unit TX-13 located on the northwest side of the bay at Sunset Beach. As a result, additional safeguards may be required to ensure that there would be no adverse impacts.

Numbers of brown pelicans declined to less than 100 birds on the Texas coast in the late 60's to early 70's but have rebounded to 2600 breeding pairs in 2000. The limiting factors are human disturbance and restricted nesting habitat. Brown pelicans nest on only a few islands along the Texas coast. More than half the Texas population nest on the central coast on either Sundown or Pelican Island. Pelican Island is located in the project area adjacent to the ship channel and many of the pelicans nest on the northeastern edge of the island that is most susceptible to wave action and the accompanying erosional effects from the ship channel. The Service recommends that shoreline protection plans for this island be reviewed by TPWD, Audubon Society, and the Service to ensure that the design enhances the island and minimizes adverse affects to the brown pelican population.

Consultation Process

The dredging of the Corpus Christi Ship Channel is considered a major construction activity and an Environmental Impact Statement (EIS) should be completed. By regulation, a biological assessment (BA) is prepared for "major construction activities" if listed species or critical habitat may be present in the action area. The BA should address all listed and proposed species found in the action area, not just those listed and proposed species that are likely to be affected. The purpose of the BA is to help the Federal agency make the determination of whether the proposed action is "likely to adversely affect" listed species and critical habitat.

If a Federal agency proposing an action determines that a proposed action "may affect" listed species or designated critical habitat, on-site, off-site, and/or result in "take" of a federally listed species, then they must either initiate formal section 7 consultation with the Service regarding the degree of impact and measures available to avoid or minimize adverse effects, or seek written concurrence from the Services (USFWS and NMFS) that the action "is not likely to adversely affect". "Take" is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. In addition to the direct take of an individual animal, habitat destruction or modification can be considered take, regardless of whether it has been formally designated as critical habitat, if it would result in the death or injury

of wildlife by removing essential habitat components or impairing essential behavior patterns, including breeding, feeding or sheltering.

Section 7(a)(1) of the Endangered Species Act (ESA) requires Federal agencies to use their authorities to further the conservation of listed species. Section 7(a)(2) requires the Federal agency, the US Army Corps of Engineers, in this case, or its designated representative, to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat.

Section 7(d) of the ESA provides that, after initiation of consultation, the Federal Agency and any applicant shall make no irreversible or irretrievable commitment of resources. If the USACE or applicant makes a commitment of resources by beginning construction prior to any consultation with the Service, they may have eliminated any reasonable and prudent alternatives that would have allowed the USACE to comply with section 7(a)(2).

Destruction or adverse modification of critical habitat is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

Two figures (Figures 3 and 4) outlining the informal and formal section 7 process are included to assist in the preparation of the necessary documents and scheduling time lines. The informal process should be used as a time for the Service and the USACE to work together to identify potential impacts to listed species and measures to avoid or minimize those impacts. Once initiated, the formal consultation process does have a regulated time schedule of approximately 135 days to issue a final biological opinion. Extensions can be permitted if agreed upon by both agencies.

On November 27, 2002, the Service outlined measures to avoid and minimize impacts to sea turtles, piping plover, and brown pelicans. Once the USACE has reviewed and agreed to implement the proposed measures, the Service believes we could concur with a conclusion of "not likely to adversely effect" listed species would be appropriate.

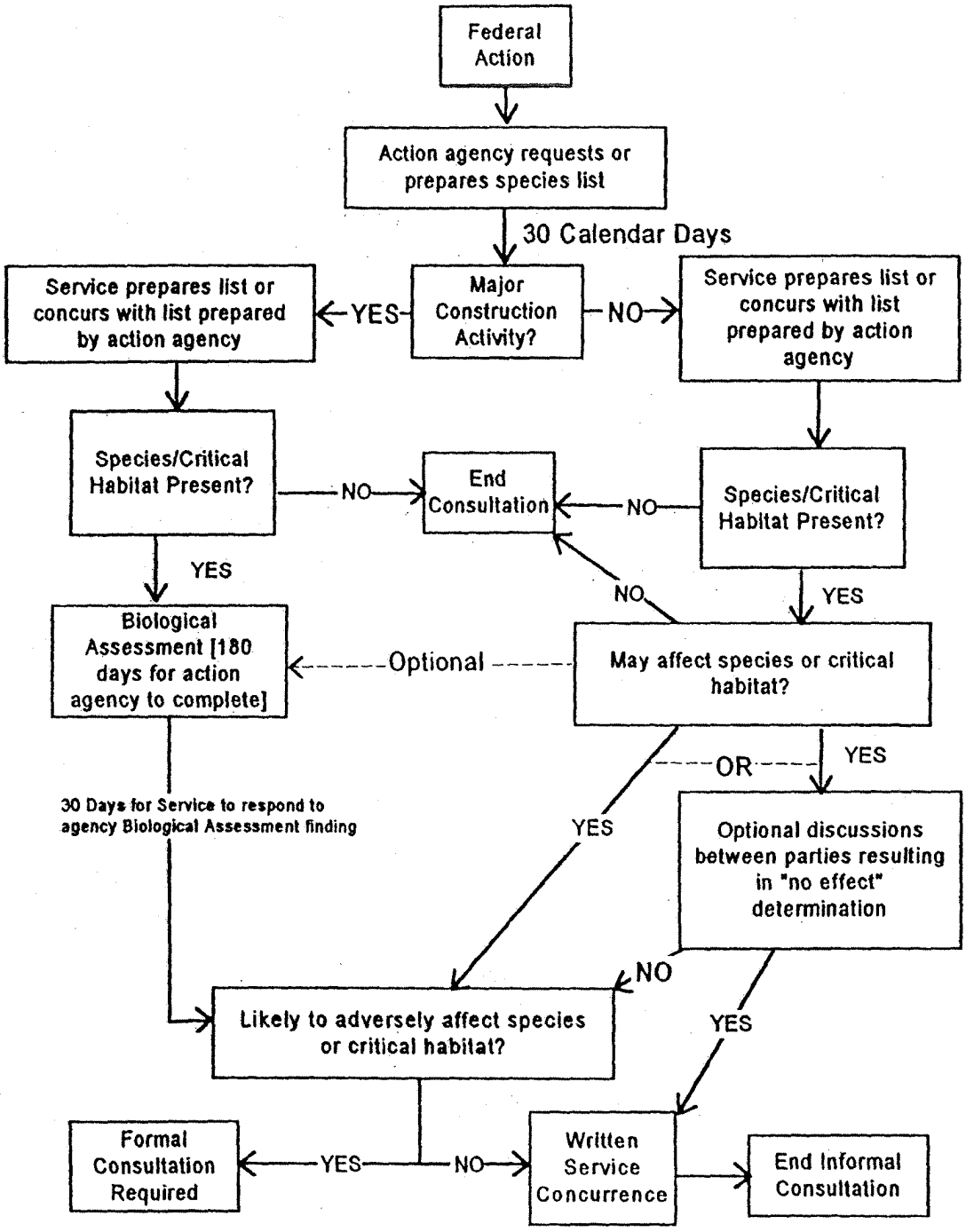

Figure 3. Informal consultation process.

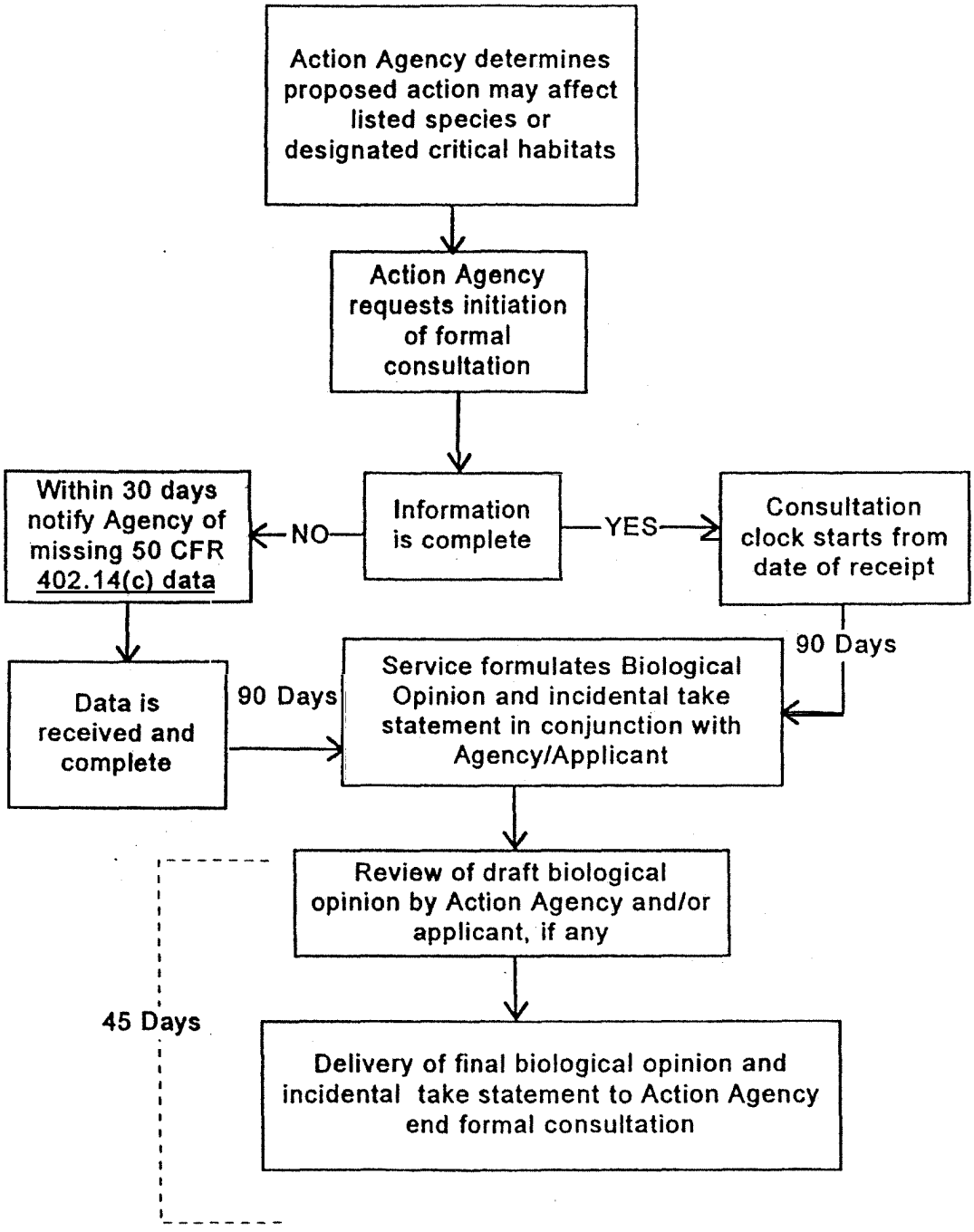

Figure 4. Formal consultation process.

SHORELINE EROSION

The RACT was concerned that completion of the project would allow deeper draft ships to be brought into the port. As a consequence, these ships would create larger wakes and stronger draw downs when passing through the channel, resulting in more shoreline erosion. In order to address this concern, the Port of Corpus Christi funded a modeling study (Pacific International Engineering 2001) to project rates of shoreline erosion with and without the project.

Factors included in the analyses were tidal current velocities, sea level changes, wind waves, vessel wakes, pressure fields effects, and channel morphology. Of these six factors it was concluded that only pressure fields and channel geomorphology would contribute to an accelerated rate of erosion beyond that expected under current conditions. Although vessel wakes contributed significantly to overall erosion in the Ingleside Cove area, post-project projections were lower due to the slightly smaller wakes that are created by deeper draft ships. Using the current fleet in a deeper channel would produce decreased pressure field effects. However, a deeper draft fleet will produce stronger effects and therefore more erosion but, theoretically, only at areas having a vertical bluff that are near the channel. These areas include Harbor Island, Mustang Island, Pelican Island, and Ingleside Point. Widening the channel will result in a reduction of the shallow bottom slope which would increase the impacts from waves and pressure fields causing a greater amount of erosion and landward bluff retreat. This channel slope stabilization effect has the greatest impact on Mustang and Harbor Islands, but Pelican Island, Cook's Island/Ingleside Cove, Dagger and Ransom Islands, and Ingleside Point will be affected as well. Shamrock Island is not expected to be affected by any of the erosion factors due to its distance from the channel. Without any shoreline stabilization, a greater amount of erosion is expected to occur over the 50-year life of the project than under existing conditions in some areas (Table 2).

Table 2. Percentage change in shoreline erosion expected post-project by two factors.

Area	Increase in erosion due to pressure field effects	Increase in erosion due to channel morphology
Harbor Island	17.2%	49.3%
Mustang Island	32%	65.1%
Pelican Island	32%	37.6%
Dagger and Ransom Islands	0%	31.8%
Cook's Island/ Ingleside Cove	0%	20.6%
Ingleside Point	17.2%	14.9%

To prevent the additional erosion from occurring, affected shorelines are proposed to be stabilized using additional dredged material, geotubes, stone, and rip-rap. The beneficial use Site P will be a rock breakwater to prevent further erosion of the shoreline at Ingleside-By-the Bay and also to provide protection to the seagrass beds that exist along that shoreline. Stone protection will be added to the existing shoreline of Mustang Island to prevent further erosion and protect the East Flats area. The beneficial use Site I is proposed to provide erosion protection for Dagger Island. The northeast end of Pelican Island has a high bluff that is eroding and is proposed to be stabilized with 1500' of protection. On the east side, a 5500 linear foot hydraulic fill embankment using geotube and riprap is proposed for protection

CONTAMINANT ASSESSMENT

To assess the suitability of both new work material and maintenance material from the Corpus Christi Ship Channel for beneficial use sites created by this project, the Regulatory Agency Coordination Team formed a subcommittee, the Contaminant Workgroup (CW). It was agreed to use the tiered approach, as described in the regulatory testing manual (USEPA/USACE 1991), to evaluate suitability for placement. Existing data that was reviewed and evaluated included Ward (1997), Barrera et al. (1995), Fugro (2000), USACE (2000), Carr et al. (1997), and U. S. Army Corps of Engineers maintenance material results for 1981, 1983, 1984, 1985, 1987, 1989, 1990, 1991, 1995, 1998, and 1999. Data for these documents were collected for a variety of purposes and therefore only those data pertinent to the channel project were considered. The USACE has divided the Corpus Christi Ship Channel into several reaches or segments for reporting purposes so these segments were used to facilitate discussion.

Sediment concentration levels were compared to sediment quality guidelines (SQG) contained in the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Table (Buchman 1998). Long and Morgan (1990) first devised this weight-of-evidence approach to develop biological effects-based sediment quality guidelines. A large database consisting of effects and no effects lab and field studies was ranked by percentiles according to chemical concentration observed or predicted to be associated with biological effects. The chemical concentrations ranking in the lowest 10% were defined as the effects range low (ERL). The ERL represents an estimate of the chemical concentration below which no effects were observed. Although these guidelines have been revised a number of times, the major weakness is the disregard for additive or synergistic effects and the failure to account for food chain bioaccumulation. However, these guidelines were used only as an initial screening tool to indicate areas that might require further evaluation.

Entrance channel

The entrance channel is defined as the beginning of the channel in the Gulf of Mexico (310+00) to Harbor Island (Inner Basin). Only one ERL was exceeded; mercury (2.0 mg/kg) in 1999 for station 100+00. No other ERLs were exceeded. Oil and grease concentrations ranged from 510 to 5790 mg/kg in 1984 but the USACE did not include this parameter in later testing. Given the low incidence of ERL exceedances there is not a high concern for contamination in this reach.

Material will be placed in offshore placement areas in berms. Open ocean disposal of material is regulated by the Environmental Protection Agency (EPA) and future maintenance dredging should adhere to the tiered approach to evaluate suitability of material disposed off the Texas coast (USEPA/USACE 2001).

Lower Bay

This stretch of the Corpus Christi Ship Channel extends from Harbor Island (Inner Basin) to the La Quinta Junction. Maintenance material is used to renourish Pelican Island. Sediment is described by Fugro (2000) as alternating layers of sand/silty sand and clay. Only a few data points were available from the USACE maintenance material. Although no ERLs were exceeded in 1998 or 1991, the detection limits for acenaphthene and DDT were above the ERL. U.S. Navy construction material data (as provided in the DEIS) for nine samples collected at in 1986 indicated that eight of nine samples exceeded the ERL for arsenic (8.2 mg/kg) and ranged from 11.3 to 64.4 mg/kg, four of nine exceeded the ERL for cadmium (1.2 mg/kg) and ranged from 1.21 to 4.14 mg/kg, two just barely exceeded the ERL for mercury (0.15 mg/kg), five exceeded the ERL for nickel (20.9 mg/kg) and ranged from 26.4 to 66.4 mg/kg. The PCCA has indicated that the material tested by the Navy has since been dredged and placed in upland placement areas (D. Krams, pers. comm.). Fugro (2000) analyzed borings from two stations and four depths in the Lower Bay reach. Results showed that there were no ERL exceedances at these two stations for metals. Since there is a paucity of data available for this segment, and some of the data points exceeded the ERL by as much as eight times, this segment is an area of concern to the Service.

La Quinta Channel

This segment extends from the La Quinta Junction to the La Quinta Turning Basin and includes the 8000' proposed extension from the terminal end of the existing turning basin. Sediments are silty sands below stiff clays and sandy clays (Fugro 2000). USACE maintenance material testing results were available for 1985 and 1990. Arsenic concentrations exceeded the ERL (8.2 mg/kg) at six of six stations (12 to 15 mg/kg) in 1985 but was below detection limits in 1990. None of the PAHs exceeded the ERLs, however, the detection limit for acenapthene was higher than the ERL. Data from the Fugro (2000) borings included five samples from three stations at depths between 9 and 20 feet below mudline. Although none of the samples exceed the ERLs, one sample at the shallowest depth (9 feet) approached the ERL for arsenic.

Upper Bay

The Upper Bay segment extends from the La Quinta Junction to Beacon 82 near the Harbor Bridge and the mouth of the Inner Harbor. Sediments in this segment consist of soft marine clays overlying medium dense silty sands (Fugro 2000). Data from maintenance material was available for nine years between 1981 and 1998. For some years when dieldrin (1981, 1985), chlordane (1981, 1985, 1994, 1995, 1998) and DDT (1994, 1995, 1998) were included in the analysis, the detection limit was greater than the ERL. For all years since 1987, the detection limit for acenapthene was greater than the ERL, so any exceedances are unknown. The ERL for DDT (1.58 ug/kg) was exceeded at two stations in 1981 (8.7 ug/kg at 700+00 and 1.8 ug/kg at 750+00). Oil and grease concentrations ranged up to 9000 mg/kg but this parameter was

discontinued in later years. In 1987, copper concentrations were 50.0 mg/kg at two stations and 40.0 mg/kg at one station, exceeding the ERL of 34 mg/kg. In this same year, a sample from a reference station also had a copper concentration of 50.0 mg/kg and a disposal area sample exceeded the DDT ERL. In 1989, copper exceeded the ERL at a reference station. Nickel and zinc slightly exceeded their respective ERLs at station 750+00 in 1995 and cadmium (3.64 mg/kg) exceeded the ERL at 1050+00 in 1997. In 1998 cadmium concentrations (4.04 mg/kg) exceeded the ERL (1.2 mg/kg) by four times at station 1000+00. Given the relatively few data points that exceed the ERLs over a twenty year period, this material would most likely be suitable for beneficial uses.

Inner Harbor

The Inner Harbor segment extends from Beacon 82 to Viola Turning Basin. This segment warrants the most concern due the amount of industry present and the known historical contamination. Ward and Armstrong (1997) compiled an extensive review of all retrievable data available for Corpus Christi Bay and surrounding bay systems to determine status and trends. The most contaminated area in Corpus Christi Bay was the Inner Harbor which has high concentrations of PCBs and PAHs. Metal concentrations are similar to Houston Ship Channel with the exception of zinc which is an order of magnitude higher (Ward and Armstrong 1997).

Based on previous studies, the majority of concern for contaminants is in the Inner Harbor and the tongue east of the mouth where sediments from the Inner Harbor may be transported. Due to this concern both new work and maintenance material should be placed in existing approved upland placement areas. Placement areas should be designed so that all decant water and runoff is returned to the Inner Harbor and not into Nueces Bay.

Recommendations:

1) All future maintenance dredged material should be evaluated according to the tiered approach (USEPA/USACE 1991); material should be analyzed for bulk chemistry and grain size with the results presented to resources agencies three months prior to dredging for a determination of disposal options.

2) All material deposited in confined disposal sites should be retained long enough to allow suspended sediments to settle and excess water to meet the Texas Center for Environmental Quality (TCEQ) water quality criteria for the receiving waterbody.

3) Upland disposal sites along the Inner Harbor should be designed so that all decant water is returned to the Inner Harbor and does not enter Nueces Bay.

OTHER RESOURCES

Colonial Waterbirds

Colonial waterbirds nest on several of the dredge placement areas and spoil islands within the Corpus Christi Ship Channel project site. The following is a description of the islands and their

bird use. The number following the name of the island denotes the Colonial Waterbird Census designation and the dredged material placement area (PA) designation if used.

Point of Mustang (614-183) PA6
This island is adjacent to the northwesternmost portion of Mustang Island. It was used sporadically by herons in the 1970's and 80's and by black skimmers and least terns, both ground nesters, in the early 1990s. Its proximity to the mainland makes it accessible to predators and therefore unlikely to be heavily utilized by nesting birds.

West Harbor Island (614-181)
This small island is located across the channel from Point of Mustang. It is utilized primarily by least terns, gull-billed terns, and black skimmers.

Pelican Island (614-184) PA 7 and 8
Pelican Island is a large u-shaped island located on the south side of the channel next to Point of Mustang. It is one of the three largest brown pelican rookeries in Texas and one of the most active rookeries on the central Texas coast. Almost 8000 pairs of colonial waterbirds comprising sixteen species nested on this island in 2001, 1000 pairs were brown pelicans.

Corpus Christi Spoil (614-185) PA 9 and 10
This island is located directly across the Corpus Christi Ship Channel from the Navy's Homeport at Ingleside. Least terns (160 pairs) and black skimmers (60 pairs) used this island in 2000. It is used by terns in greater numbers following the placement of new spoil (R. Gibbons, pers. comm.). The adjacent nearshore on the south side of these islands is proposed to be used as beneficial use Sites R & S and will contain new work material only; PA 10 will be used for periodic placement of maintenance material.

Ingleside Point (614-182)
Ingleside Point is a large island that was once part of the mainland prior to the dredging of the La Quinta channel. It was used as a dredge material placement area for some time and is now privately owned. Black skimmers, terns, and great blue herons have nested on the island sporadically throughout the years.

La Quinta Spoil Island (614-160), PA 13
This island is a long, narrow, levied spoil placement area that runs parallel to the La Quinta Channel. It was most active between 1978 and 1986. However, in the late 1990s a few pairs of herons and egrets nested on it.

Ransom Island/Ransom Spoil (614-103)
This colony consists of a large natural island with several small spoil islands nearby. Fifteen colonial waterbird species have nested on this group of islands over time until it was abandoned in 1987, most likely due to predators.

Shamrock Island (614-186)
Located on the east side of Corpus Christi Bay, this island was at one time connected to Mustang Island. It is an extremely productive bird rookery with over 10,000 pairs comprising seventeen species nesting in 2001. Due to its distance from the ship channel it is not likely to be affected by the Corpus Christi Ship Channel Project.

Islands may be periodically abandoned for a variety of reasons including predators, human disturbance, changes in vegetation, etc. It is important to prevent disturbance to all the islands during nesting season regardless of whether or not they were used the in the previous year to ensure that nesting habitat is still available. Therefore, the Service recommends that dredging operations in the vicinity of dredge spoil islands be coordinated with the Service and TPWD and that placement of dredge material be timed to allow the material to consolidate and provide habitat for ground-nesting species such as terns. Executive Order 13186 reinforces the responsibility of Federal agencies to protect migratory birds under migratory bird conventions such as the Migratory Bird Treaty Act (16 U.S.C. 703-711). Each Federal Agency has been tasked to develop and implement a Memorandum of Understanding (MOU) with the Service to promote the conservation of migratory bird populations. The drafting of these MOUs was targeted for Spring of 2002. However, until the MOUs have been finalized, the Service recommends that dredging operations in the vicinity of dredge spoil islands be coordinated with TPWD and the Service.

SUMMARY OF RECOMMENDATIONS

1) A monitoring and assessment program should be implemented to ensure that the predicted results of any hydrological models performed for salinity intrusion are verified. The monitoring and assessment program should work in collaboration with existing programs that monitor the Nueces Bay, such as the City of Corpus Christi's Nueces Bay Salinity Monitoring Project.

2) The PCCA and USACE should continue to evaluate Best Management Practices for dredging as new techniques and technologies are developed and should continually seek alternatives to open-water disposal.

3) Open-water placement activities for maintenance dredging should be completed during the summer and fall. The benthic recovery study by Ray and Clarke (1999) indicated that recovery would have taken longer than 1 year had dredging not been completed prior to the first recruitment period. This time frame would be least disruptive to the benthic community allowing for peak recruitment of benthic organisms occurring during late winter and early spring to colonize the placement areas as quickly as possible thereby reducing the recovery period. Since the new work dredging will require significantly more time than maintenance dredging, new work dredging should be completed without seasonal restrictions to allow the recovery process in the bay to proceed as quickly as possible.

4) Long-term impacts occur when repeated deposition of sediments alter benthic habitat resulting in the loss of foraging habitat for fish and shellfish species. Open-water placement areas 16A, 16B, 17A, 17B have a dredging cycle every three years while PA 14A, 14B, 15A and 15B have a six-year dredging cycle. A three year frequency barely allows for the recovery of the benthic community and utilization by nekton. Steps should be taken to reduce the frequency of dredging. Longer dredge pipes should be utilized to place material farther away from the channel and towards the far end of the placement area in order to prevent shoaling and reduce the frequency of dredging.

5) Transplant technique and procedures, as well as monitoring requirements and success criteria, for beneficial use site GH should follow the "Mitigative Procedures/Conditions For Seagrass Transplanting Efforts" as stated in the DEIS and attached as an Appendix to this document.

6) The proposed Corpus Christi Ship Channel project has the potential to impact the extensive seagrass beds existing near Dagger Island, Ingleside-On-The-Bay, and seagrasses that are adjacent to the proposed beneficial use site GH. These areas need to be monitored for indirect losses and restoration or mitigation implemented for any impacts.

7) Specific beneficial use goals for the five shallow, open-water beneficial use sites (I, CQ, GH, S, and R) need to be established to clearly define expected benefits, and success criteria need to be outlined for determining when those goals have been met.

8) It is essential that the Beneficial Use Workgroup (BUW) be maintained to provide input and oversight throughout the life of the project and to implement adaptive management strategies to ensure that natural resources continue to be protected.

9) Section 7 consultation under the Endangered Species Act needs to be completed with the USFWS and NMFS.

10) All future maintenance dredged material should be evaluated according to the tiered approach
(USEPA/USACE 1991); material should be analyzed for bulk chemistry and grain size with the results presented to resources agencies three months prior to dredging for a determination of disposal options.

11) All material deposited in confined disposal sites should be retained long enough to allow suspended sediments to settle and excess water to meet the Texas Center for Environmental Quality (TCEQ) water quality criteria for the receiving waterbody.

12) Upland disposal sites along the Inner Harbor should be designed so that all decant water is returned to the Inner Harbor and does not enter Nueces Bay.

13) Executive Order 13186 reinforces the responsibility of Federal agencies to protect migratory birds under migratory bird conventions such as the Migratory Bird Treaty Act (16 U.S.C. 703-711). Each Federal Agency has been tasked to develop and implement a Memorandum of Understanding (MOU) with the Service to promote the conservation of migratory bird populations. The drafting of these MOUs was targeted for Spring of 2002. However, until the MOUs have been finalized, the Service recommends that dredging operations in the vicinity of dredge spoil islands be coordinated with TPWD and the Service.

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APPENDIX

MITIGATIVE PROCEDURES/CONDITIONS FOR SEAGRASS TRANSPLANTING EFFORTS

1. After final construction of beneficial use Site GH and following a sediment conditioning time of at least 90 days, an appropriate location for the mitigation will be selected within the eastern portion Site GH, and the mitigation area will be planted with shoalgrass (*Halodule wrightii*). Prior to mitigation site selection or planting, a survey will be performed in the candidate mitigation site area to determine the topographic condition and elevation of the deposited material. If excessive relief is encountered then planting will occur after a subsequent survey indicates that the topographic relief, elevation and sediment stability is condusive to shoalgrass transplant survival. Prior to conducting planting, the USACE (the Federal sponsor) will coordinate the results of the survey(s) and sediment stablity appraisal(s) with the USACE, USFWS, TPWD, NMFS and the non-federal sponser.

   If the topographic and elevation survey or sediment stablity appraisal is determined to be unsuitable for seagrass growth, then the proper course of action will be taken after coordination has taken place. Agency recommendations may include allowing for additional site conditioning time prior to conducting a full scale planting of the site, relocation of the planting effort within the candidate mitigation area, grading of the area, or even conducting a pilot planting effort.

2. Transplant source areas will be identifed and applicable permits obtained from either the TPWD and/or GLO and/or private landowners. Staking of the approved transplant harvest areas will be in accordence with applicable permits.

3. Shoalgrass planting may be conducted between mid-March and mid-June, or between mid-September and mid-October. Plantings outside of these times will need to be coordinated between the USACE, USFWS, TPWD, NMFS and non-federal sponsor at least two weeks prior to commencement of those plantings. The transplanting technique will be coordinated with the USACE, NMFS, USFWS, TPWD and the non-federal sponsor when the specific location and configuration of the mitigation site is being established. Initial sholagrass planting shall be completed within one year of completion of the mitigation site or during the first suitable planting time following detemination that site is conducive to transplant survival. The location of the mitigation site will be marked by PVC pipe.

4. A planting unit will consist of live shoalgrass material contained in a three-inch-diameter plug. No more than three 3-inch plugs of source material per square yard will be obtained from the designated transplant source areas. Incidental damage to source areas will be avoided. Alternate harvest techniques may be considered but they will require prior coordination with USACE, NMFS, USFWS, TPWD and the non-federal sponsor and, as necessary, permitted through TPWD and/or TGLO and/or private landowners.

5. A transplant survival survey of the planted site will be conducted between 60 and 90 days after completion of the initial planting effort. Using acceptable survey methods, a minimum of 15 percent of all transplant units will be surveyed for the initial transplant survival survey. A written report detailing the survival results shall be submitted to the USACE within 30 days of survey completion. The report will be distributed by the USACE to the NMFS, TPWD, USFWS and non-federal sponsor. If at least 50percent survival is not achieved, then the resource agencies shall be consulted to determine if the site should be modified prior to initiating a replanting effort. If it is determined that site modifications are not necessary and that the site should be replanted, then replanting shall commence within 30 days (or within the next suitable planting period) once the agency-coordinated decision to replant the site has been made.

6. At least six transects will be established for the purposes of pre-construction, pre-plant plant elevation, or existing-bed condition surveys, and for post-planting monitoring surveys. The ends of each transect will be marked by PVC pipe. More transects may be established depending on the size or

shape of the site selected, the transplanting plan and/or planting schedule. A minimum of two transects outside of the mitigation site in nearby seagrass beds and a minimum of four transects which cross the mitigation site are to be established and surveyed. The number and configuration of transects within the planting area will be coordinated with the USACE, NMFS, USFWS, and TPWD and non-federal sponsor after the size and configuration of the mitigation site has been established.

7. All transects located within the mitigation site shall be surveyed post-planting, at 6 months, 1 year, 2 years, and 3 years to determine success of mitigation. To determine success, three samples will be taken at 10-foot intervals along the transects; one on the interval and one three feet to each side of the interval. Seagrass will be identified to species. Coverage of seagrasses will be to species and will be calculated by using the frequency of occurrence of live seagrass at each sample along the transect In addition to the percentage of vegetative cover, the monitoring surveys at all transects will note water depths (elevation) and any unusual sediment variations or other deposits.

8. If two years following planting the mitigation site is not as least 70 percent covered with shoalgrass, an additional planting effort will be made and those areas of the site not vegetated will be replanted to original specifications. The occurrence of manatee grass, if any, can be included in meeting the 70 percent coverage requirement.

9. The mitigation effort will be considered successful if the mitigation site is 70 percent covered by shoalgrass and/or manatee grass within three years following shoalgrass planting and if at least 48 percent of the total vegetative coverage is shoalgrass. If the mitigation is determined to be unsuccessful at the end of the three-year monitoring period, the federal sponsor will be required to consult with the USACE, NMFS, USFWS, TPWD and the non-federal sponsor in order to determine if corrective measures are warranted. If it is apparent that the site is unlikely to support seagrass vegetation then a detemination may be made to re-locate the mitigation project.

10. Some seagrasses currently exist nearby the proposed beneficial use Site GH. The survey of the transects established outside the mitigation area will be performed prior to constructing Site GH. The survey shall use a survey method similar to that used for the transects within the mitigation area and will also obtain information on the areal extent of the existing grassbeds. One purpose of the survey in the nearby seagrass beds is to obtain data to aid in the selection of the planting area within the mitigation site. This survey will be repeated within 30 days of completing construction of those portions of Site GH that could reasonably affect the existing nearby seagrass beds. If the survey results show that impacts have occurred to the existing seagrass beds, then the results will be provided within 30 days of completion of the survey to the USACE, TPWD, USFWS and NMFS and the non-federal sponsor. These agencies will be consulted in order to determine an appropriate course of action to restore and/or mitigate the impacts.

11. The federal sponsor will prepare monitoring reports detailing all required surveys. These monitoring reports will be submitted to the USFWS, TPWD, and NMFS and non-federal sponsor within 60 days of survey completion.

United States Department of the Interior

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Galveston District, Corps of Engineers
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Cons.# 2-11-03-I-0071

Dear Ms. Murphy:

This responds to your letter dated December 13, 2002, regarding measures presented by the U.S. Fish and Wildlife Service (Service) to the Corps of Engineers (COE) in a November 27, 2002 letter to avoid and minimize impacts to threatened and endangered species the Corpus Christi Ship Channel Improvements Project. We requested your review of the measures outlined and added to the Biological Assessment per a September 26, 2002 letter and additional measures after coordination with the Coastal Bends Bays and Estuary Program. We requested the COE inform the Service if the COE agreed to incorporate them into the proposed action. If the additional measure were acceptable, the Service could concur with your determination that the proposed project is not likely to adversely impact the brown pelican, piping plover and/or sea turtles.

The COE has reviewed the measures and have provided these comments:

1. All measures outlined to avoid and minimize impacts to sea turtles have been addressed in a recently completed Biological Opinion with the National Marine and Fisheries Service (NMFS). The COE has accepted the reasonable and prudent measures in the Biological Opinion and therefore, the Service is assured all measures will be incorporated into the project to fulfill their obligation under the Biological Opinion.

2. The COE has accepted each of the six measures listed for minimizing project impacts to the brown pelican and accepts the additional measure to avoid construction of the armoring and containment levee on Pelican Island during the nesting season from March 1 to September 1. Also, since there is only a small portion of the ship channel within 1,000 feet of the island the COE will coordinate any new-work dredging along this portion of the ship channel with the Service and the Coastal Bend Bay and Estuary Program prior to the nesting season to avoid disruption in the construction schedule and harrassment of brown pelicans.

3. For the piping plover the COE has reiterated that piping plover critical habitat will be avoided by placing new-work material in upland confined sites or in existing open-bay unconfined placement areas.

Therefore, with the acceptance of all measures, the Service can concur with the COE's determination that the Corpus Christi Chip Channel Improvements Project may affect, but is not likely to adversely affect Federally-listed species.

The Service thanks the COE for their cooperative efforts to protect listed species. If we can be of any further assistance, please contact Mary Orms at (361) 994-9005 or by email at mary_orms@fws.gov.

Sincerely,

Allan M. Strand

Allan Strand
Field Supervisor

cc:
Terry Roberts, COE, Galveston, TX

SECTION 2:

ENDANGERED SPECIES ACT CORRESPONDENCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33712
(727) 570-5312; Fax 570-5517

MAY 18 2001

F/SER3:TLG

Mr. Derek Green
Senior Staff Ecologist
206 Wild Basin Road - Suite 300
Austin, TX 78746

Dear Mr. Green:

In response to your letter dated May 8, 2001, enclosed is a list of species for the state of Texas that may be impacted by your proposed action to dredge the Corpus Christi Ship Channel in Nueces and San Patricio Counties, Texas. If you have any questions, please contact Eric Hawk, fishery biologist, at the telephone number listed above.

Sincerely,

Georgia Cranmore
Acting Regional Administrator for
Protected Resources

Enclosure

File: 1514-22 F.1 (TX)
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Endangered and Threatened Species and Critical Habitats under the Jurisdiction of the National Marine Fisheries Service

Texas

Listed Species	Scientific Name	Status	Date Listed
Marine Mammals			
blue whale	*Balaenoptera musculus*	Endangered	12/02/70
finback whale	*Balaenoptera physalus*	Endangered	12/02/70
humpback whale	*Megaptera novaeangliae*	Endangered	12/02/70
sei whale	*Balaenoptera borealis*	Endangered	12/02/70
sperm whale	*Physeter macrocephalus*	Endangered	12/02/70
Turtles			
green sea turtle	*Chelonia mydas*	Threatened[1]	07/28/78
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	06/02/70
Kemp's ridley sea turtle	*Lepidochelys kempi*	Endangered	12/02/70
leatherback sea turtle	*Dermochelys coriacea*	Endangered	06/02/70
loggerhead sea turtle	*Caretta caretta*	Threatened	07/28/78

Species Proposed for Listing

None

Designated Critical Habitat

None

Proposed Critical Habitat

None

Candidate Species[2]	Scientific Name
Fish	
dusky shark	*Carcharhinus obscurus*
sand tiger shark	*Odontaspis taurus*
night shark	*Carcharinus signatus*
speckled hind	*Epinephelus drummondhayi*
saltmarsh topminnow	*Fundulus jenkensi*
jewfish	*Epinephelus itajara*
Warsaw grouper	*Epinephelus nigritus*

1. Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

2. Candidate species are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
4700 Avenue U
Galveston, Texas 77551-5997

December 13, 2001

Mr. Martin E. Arhelger
Vice President
PBS&J
206 Wild Basin Road, Suite 300
Austin, Texas 78746

Dear Mr. Arhelger:

As you requested in your letter dated November 16, 2001, the National Marine Fisheries Service has reviewed the preliminary Draft Environmental Impact Statement (PDEIS) for the Corpus Christi Ship Channel Improvement Project. We find the PDEIS to be well organized and written, presenting most of the information required in an Environmental Impact Statement (EIS). We offer the following comments for your consideration.

1. In the Table of Contents, add a new Subitem number 2.2.3 Other Alternatives and following the discussion of Subitem 2.2.2 Preferred Alternatives beginning on page 2-3, add a discussion of other alternatives considered but not implemented.

2. Page 7-0. Section 7.0 Consistency With Other State and Federal Regulations. Please add a consistency discussion of The Marine Mammal Protection Act.

The discussions of Essential Fish Habitat and of the project habitat as a whole are well written and detailed. We may have further comments as the EIS is further developed, but at this time we believe the PDEIS is very well done. Please call me at (409) 766-3699 if you have any questions regarding our recommendations.

Sincerely,

William B. Jackson
Fishery Management Specialist

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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DEC - 5 2002

F/SER3:DK

Dr. Lloyd H. Saunders
Chief, Planning, Environmental and Regulatory Division
Galveston District, Corps of Engineers
Department of the Army
P.O. Box 1229
Galveston, TX 77553-1229

SUBJECT: Endangered Species Act Section 7 Consultation on the Corpus Christi Ship Channel Improvement Project

Dear Dr. Saunders:

This document represents the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) based on our review of the Corpus Christi Ship Channel Improvement Project to be conducted by the United States Army Corps of Engineers (COE), Galveston District and its effects on loggerhead turtles (*Caretta caretta*), Kemp's ridley turtles (*Lepidochelys kempii*), hawksbill turtles (*Eretmochelys imbricata*), green turtles (*Chelonia mydas*), and leatherback turtles (*Dermochelys coriacea*). This Opinion has been prepared in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1536 *et seq.*). The NOAA Fisheries' consultation number for this action is F/SER/2002/00731. Please refer to this number in any future correspondence regarding this consultation.

This Opinion is based on information provided in a draft environmental impact statement and draft feasibility report prepared by the COE, received by NOAA Fisheries' Protected Resources Division on July 1, 2002, additional information provided via email by Paul Carangelo of the Port of Corpus Christi, published and unpublished scientific information on the biology and ecology of threatened and endangered marine species within the action area, and other sources of information. A complete administrative record of this consultation is on file at the NOAA Fisheries' Southeast Regional Office in St. Petersburg, Florida.

The Opinion states NOAA Fisheries' belief that the proposed action is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles. However, NOAA Fisheries anticipates incidental take of these species and has issued an Incidental Take Statement (ITS) pursuant to section 7 of the ESA. This ITS contains reasonable and prudent measures with implementing terms and conditions to help minimize this take.

Pursuant to the essential fish habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)(2) and 50 CFR 600.905-.930, Subpart K), the NOAA Fisheries' Habitat Conservation Division (HCD) is being copied with this letter. The HCD biologist for this region is Rusty Swafford. If you have any questions about consultation regarding

essential fish habitat for this project, please contact Mr. Swafford at (409) 766-3699.

If you have any questions, please contact Dennis Klemm, fishery biologist, at the number above or by e-mail at Dennis.Klemm@noaa.gov.

Sincerely,

Rolland A. Schmitten
Acting Regional Administrator

Enclosure

cc: F/PR3
F/SER42 - R. Swafford

File: 1514-22 f.1 Galveston COE
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Endangered Species Act - Section 7 Consultation

Agency:	United States Army Corps of Engineers, Galveston District
Activity:	Corpus Christi Ship Channel Improvement Project
Consultation Conducted By:	National Marine Fisheries Service, Southeast Regional Office (F/SER/2002/00731)
Date Issued:	
Approved by:	Rolland A. Schmitten Acting Regional Director

This document transmits the National Marine Fisheries Service (NOAA Fisheries), Southeast Regional Office, Protected Resources Division's biological opinion (Opinion) for the above referenced project. This Opinion is based on our review of the June 2002 Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) for the Corpus Christi Ship Channel, Texas, Channel Improvement Project and its effects on marine mammals and sea turtles in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The DEIS along with a letter requesting consultation was received by NOAA Fisheries on July 1, 2002. A complete administrative record of this consultation is on file at the NOAA Fisheries SERO.

Consultation History

Informal consultation on the Corpus Christi Ship Channel, Channel Improvement Project was initiated in June 2002 by the Planning Division, Galveston District Corps of Engineers with the submittal of the BA that was prepared and incorporated as part of the Draft EIS that was transmitted June 28, 2002 and received July 1, 2002, pursuant to section 7 of the Act.

Additional information was received on September 6, 2002, from Paul Carangelo of the Port of Corpus Christi via e-mail. Mr. Carangelo sent a mock-up of a biological opinion including proposed action, conservation measures, and incidental take statement based upon the project parameters and results from past dredging projects to facilitate the completion of the Opinion.

BIOLOGICAL OPINION

I. Description of the Proposed Action

The action area (defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action") for this action is Corpus Christi Bay, Texas, and nearshore approaches to Corpus Christi Bay from about 6 miles offshore. The Galveston District Corps of Engineers (COE) proposes deepening of the Corpus Christi Shipping Channel (CCSC) from Viola Basin in the Inner Harbor to the end of the jetties in the Gulf of Mexico to