



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 13 1989

OFFICE OF
WATER

Honorable Robert Page
Assistant Secretary (Civil Works)
Department of the Army
Washington, D.C. 20310-0103

Dear Mr. Page:

Under the provisions of the Environmental Protection Agency (EPA), Memorandum of Agreement (MOA) with the Army under Section 404(q) of the Clean Water Act, I am formally requesting your review of the decision of the District Engineer, New Orleans District (NOD) to issue a Section 404 permit. As described in the Notice of Intent letter to Mr. Robert Layton, Jr., Regional Administrator of EPA's Region VI office dated December 14, 1988, the New Orleans District Engineer (DE) intends to issue a permit to Plantation Landing Resort, Inc. for a 59 acre resort to include condominiums, townhouses, a motel, a boat basin or harbor, a restaurant, a cafe, a bar, a harbor master office, a fishing and dive shop, and a convenience store. The project site is located on the Caminada Bay side of western Grand Isle, a barrier island within Jefferson Parish off the coast of Louisiana approximately 48 miles due south of New Orleans.

After a thorough review of available information relevant to the case, we have determined that this referral meets the criteria in the MOA for elevation under Sections 5.b.1 and 5.b.3. The criteria in Section 5.b.1 are met based upon our findings that there has been a failure to resolve stated EPA concerns regarding compliance with the Section 404(b)(1) Guidelines (40 CFR 230). Specifically, EPA believes that there are less environmentally damaging practicable alternatives to the project [230.10(a)], that the project will cause or contribute to significant degradation of waters of the U.S. by directly and indirectly impacting approximately 102 acres of wetlands and shallow open water bay bottoms and their associated fish and wildlife values [230.10(c)], and that the proposed mitigation plan will not offset project related impacts [230.10(d)].

We also believe that this referral meets the criteria in Section 5.b.3 because the DE has determined that the entire project is water dependent because it is proposed in conjunction with a marina. This determination relieves the applicant of the requirements of 230.10(a)(3), which presumes practicable alternatives for discharges in a special aquatic site are available for non-water dependent activities unless the applicant clearly demonstrates otherwise. The DE has also determined the significance

of the project impacts based upon the remaining wetland resources of Grand Isle, the Barataria Basin and of the State as opposed to viewing them within the context of historical losses. In addition, the DE based his decision, in part, upon the determination that the wetlands of the project site are eroding and will, therefore, be lost whether the project is constructed or not. This determination is inappropriately based upon predictions of erosion rates and fails to consider the ecological contributions of the project site over time. We believe that these determinations, if applied locally or nationwide to all permits, will: circumvent a crucial responsibility on the part of permit applicants proposing to fill special aquatic sites for non-water dependent projects; contribute to cumulatively significant wetland losses in piecemeal fashion; and, most importantly, lead to erroneous final permit decisions as they have in this instance. Therefore, we believe that these determinations constitute environmental issues of national importance requiring policy level review.

In the following sections, we outline each of these points in more detail.

Section 5.b.1. Criteria

A. Practicable Alternatives

Section 230.10(a) of the Section 404(b)(1) Guidelines requires that no discharge of dredged or fill material be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem so long as the alternative does not have other significant adverse environmental impacts. We believe that practicable alternatives for the proposed project do exist. In fact, EPA's Region VI office retained a consultant whose report revealed three groups of alternatives that we consider to be practicable after taking into consideration cost, existing technology and logistics in light of the overall project purpose. Copies of the Final Report were distributed on December 6, 1988 to both NOD and the Lower Mississippi Valley Division, and a copy is enclosed for your review.

The first group of alternatives identified consists of inland sites that are of sufficient size to accommodate both the proposed marina and related amenities with potential access by channel to the bayshore. The specific site identified within the report contains 85 contiguous acres of primarily upland property on the east end of Grand Isle which is owned by Exxon. According to the report, an Exxon representative stated his belief that this site could be declared surplus and sold and that a willing buyer could make an offer within 60 to 90 days of a request to Exxon for an expedited decision.

The second group of alternatives would involve splitting the project into a marina at one site and the development at another non-contiguous upland site. This alternative would have major savings compared to the proposed plan due to a reduced need for dredging and filling, and lower construction costs. Although the applicant "has



expressed an unwillingness to pursue the project in this manner, as it would not meet the project objectives",¹ we believe that this is a viable alternative that would fulfill the applicant's basic purpose of creating a water oriented recreational complex. The applicant has just proposed one way (full integration) to achieve the basic project purpose. The aforementioned Exxon site could also be used in this way. The report also revealed that there are individually owned tracts which could be purchased and consolidated to provide sufficient area to satisfy this alternative design.

The third group of alternatives involves reconfiguration and redesign of the "upland portions" of the project either on pilings or on solid fill along the most landward edge of the project site. Although EPA would prefer construction on pilings, we would be willing to accept minimal wetland losses (with appropriate mitigation) in support of amenities to the proposed marina. Obviously, this alternative would require a reduction of the currently proposed project scope. The record reveals, however that the project, as currently proposed, will "tax" certain resources and/or services currently available on Grand Isle. The Mayor of the Town of Grand Isle objected to the issuance of the permit because sufficient potable water, as well as adequate transportation and storm evacuation services, are currently unavailable to support the project. NOD's environmental assessment reaches these same conclusions. It would seem, therefore, that the applicant should consider (indeed the Corps should require consideration of) a project of reduced scope in the range of potential, practicable alternatives.

We believe that the applicant should consider incorporating the previously proposed Phase B portion of this project into the reconfiguration alternative. Although NOD has concluded that the project at issue is independent and may stand on its own, correspondence from the applicant's consultant suggests that Phase B may, indeed be pursued in the future.² This phase is of concern to EPA because it involves and additional 153 acres of wetlands as well as additional shallow bay bottom. We, therefore, would welcome an opportunity to discuss a reconfiguration of both project phases along the most landward portion of these sites. Indeed, we believe that this approach represents a more responsible approach to environmental planning and is in the applicant's best interest. Again, the applicant has chosen only one of many possible designs to create the proposed recreation complex. We believe that design alternatives are available on both Phase A and Phase B properties that would minimize adverse impacts to the aquatic ecosystem as required by 230.10(d) of the Guidelines and would allow the applicant to achieve his basic project purpose.

The NOD statement of findings (SOF) concludes that there are no alternative sites considered feasible "under Corps policy because they would not allow the applicant to fulfill his intended purpose of establishing a contiguous fully-integrated waterfront resort complex as proposed on the property he now owns." EPA strongly disagrees with this conclusion because it places boundaries on the determination of practicability which are both unnecessary and inappropriate in this case. The Guidelines do not limit



practicable alternatives to sites "now own[ed]" by the applicant. As previously stated, we believe that the attached study shows that practicable alternative sites are available on Grand Isle which would enable the applicant to construct the project. We also believe that alternatives may exist away from Grand Isle which would serve the same target population. Although EPA has provided the Corps with some alternatives we believe are practicable, we do not believe that all alternatives have been exhausted and we still believe the applicant must fulfill his obligation to rebut the presumption of practicable alternatives for this proposed project, as required in 230.10(a) of the Guidelines.

B. Significant Degradation

Section 230.10(c) of the Guidelines requires that no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the U.S. They further provide that the effects on fish and wildlife diversity, productivity, stability, habitat, and life stages can constitute significant degradation. Effects on recreation and aesthetics may also contribute to significant degradation. For the reasons below, we believe the proposed Plantation Landing Resort is likely to result in significant degradation of waters of the U.S. and therefore violate this aspect of the Guidelines.

Construction of Plantation Landing Resort would result in the destruction of approximately 22 acres of valuable saline marsh wetlands and 37 acres of shallow open water bay bottom and intertidal flats by fill placement, and the modification of an additional 23 acres of shallow bay bottom by dredging (total direct impact 82 acres). In addition, the proposed project would isolate from tidal exchange approximately 20 additional acres of saline wetlands south of the proposed Caminada Road thereby eliminating fisheries access to the area and initiating vegetative succession (total impact 102 acres). Also, as noted in a project review by a consultant to EPA,³ project construction would accelerate erosion of marshes east and west of the proposed fill area due to increased erosive forces from boat wakes.

Both the wetlands and the shallow water areas of the project site provide a variety of habitat values to fish and wildlife species. Saline marshes and open water shallows like those of the project site are known to serve important functions during the life cycles of 80-90 percent of the seafood harvested commercially and recreationally in the United States.⁴ Also, a good linear correlation has been demonstrated between vegetated wetlands and commercial shrimp catches in Louisiana.⁵ In addition to habitat values, the wetlands of the project site also provide nutrients and detritus (important components of the estuarine food web) to the surrounding ecosystems of Caminada and Barataria Bays, function in flood storage and provide protection to Grand Isle by buffering storm surges.

Under an EPA contract, the National Marine Fisheries Service (NMFS) Galveston Lab completed an interim report on the proposed project site. This interim report, which was provided to NOD, suggests that the value of the wetland area proposed for development far exceeds the average quality of fishery habitat recognized by the NOD. As noted in the interim report, the project area has "unique features manifested in the variety of species" found at the site, and "because of its location, environmental complexity and species richness this marsh is essentially irreplaceable." NMFS has completed a final report which includes the interim report and compares the project site at issue with another wetland site in Caminada Bay. Region VI advises that the final report supports the aforementioned conclusion concerning the fisheries value of the proposed project site. A copy of the final report is attached for your information.

The shallow open water and intertidal flats of the site provide feeding and nursery habitats as well as migration routes for numerous species of fish and shellfish.⁶ In addition, these areas support many species of benthic organisms. Benthic organisms are very important to the estuarine food web and the overall productivity of estuaries. Intertidal flats and shallow waters also provide excellent foraging areas for a variety of wading shore birds which personnel of the Fish and Wildlife Service have observed in the proposed project area.⁷ This list of observed birds includes the federally endangered brown pelican. NOD's EA states that the federally endangered peregrine falcon and several species of ducks, herons, egrets and ibises as well as other birds have either been observed or are expected to occur in the proposed project area and lists the raccoon, swamp rabbit, muskrat, otter and nutria as other common wildlife species expected to occur.

Because of the depth and length of the proposed boat basin and entrance channels, we are also concerned that the proposed project would be conducive to the development of poor water quality conditions within the project area.^{8 9 10} Specifically, we believe that the dead-end basin and channel (which would be dredged at least 8 feet deeper than the adjoining water bottoms) would suffer from poor water circulation, inadequate flushing and low dissolved oxygen (D.O.) levels, especially during the hot and relatively calm summer months. When low D.O. levels occur, there may be die-offs of those fishes and crustaceans inhabiting the basin and channel.

The water quality of the project area would be further impaired by urban pollution loading from fertilizers and pesticides contained in runoff from the fill area, and by hydrocarbons from spills in the marina and contained in runoff from paved streets. Additional pollution problems may occur from the dumping of trash and grass cuttings into the marina waters. These poor water quality conditions could spread to adjacent water bodies. In fact, the EA listed several water quality concerns including: exhaust emissions from boats; sewage disposal in marina waters; upland runoff into marina waters; lack of flushing in the marina; accidental fuel spills or leaks in marina waters;



leaching of preservatives used to treat bulkheads into marina waters; regular and seasonal maintenance of boats; the use of anti-fouling paints; and random discard of waste products into the marina. The EA states that "resultant effects may be the disruption of biological food chains; killing of fish, shellfish, and wildlife; aesthetic impairment; and undesirable effects to human health and safety."

All of the above noted effects are included under 230.10(c) of the Guidelines. We believe that the cumulative impact of these effects would result in significant degradation of waters of the U.S. as defined in the Guidelines and should warrant permit denial as required by 230.10(c).

C. Mitigation

Section 230.10(d) of the Guidelines states that no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts on the aquatic ecosystem. We have reviewed the Corps' discussion in its statement of findings as well as the proposed permit conditions relating to mitigation and continue to have the following major concerns.

The applicant has proposed a conservation management plan which involves installing two water control structures to a 300 acre wetland area northwest of the project site. The berms (incidental to the creation of oil and gas canals) which currently border the site are breached and allow tidal inundation and fisheries access. The installation of the two water control structures and other measures to prevent saltwater intrusion in and erosion of this area is a condition of the State's Coastal Use Permit/ Consistency Determination and the plan is referred to in NOD's EA as a secondary project purpose.

We believe that this plan will adversely impact aquatic resources by preventing or restricting marine fishery access to the semi-impounded marsh. Based on a recent study,¹¹ we anticipate the proposed mitigation would reduce fishery production by 50% or more in the approximately 300 acre area. In addition, a mariculture permit was obtained from the State¹² for the proposed conservation area which we believe may further impact marine fishery resources. These factors lead EPA to question the ecological value of this action. Under these circumstances, we do not consider the establishment of this conservation area as mitigation for the anticipated project losses.

In conjunction with other mitigation requirements, which include the purchase of a performance bond, water quality sampling and subsequent correction of water quality problems, if necessary, planting of a greenbelt area for migratory birds and installation of rip-rap in front of bulkheads along Caminada Bay, NOD proposes to require mitigation for the destruction, alteration and isolation of approximately 102 acres of waters of the United States (including 22 acres of wetlands) by requiring the applicant



to create (and provide erosion protection for) 5 acres of marsh in an unspecified area (additional area to be created as maintenance dredge material becomes available). According to a phone conversation with the District, this acreage figure was based upon the amount of dredged material predicted to be available, not upon ecological or functional values.¹³

From a technical standpoint, we do not believe that this is adequate mitigation for the anticipated project impacts. To summarize, the amount of proposed mitigation wetlands is inadequate, the ecological values of additional shallow water habitat will be lost to provide the mitigation area and, most importantly, we believe that the area at issue has unique and possibly irreplaceable fisheries values which may not be recreated by the mitigation effort.

We also object to the proposed mitigation from a policy standpoint. As you are aware, EPA believes that proper application of the Guidelines requires application of mitigation in sequential fashion; this begins with avoidance of adverse effects on wetlands, then the minimization of unavoidable adverse effects followed by compensation for unavoidable impacts as a last resort. We continue to believe that practicable alternatives to avoid and/or minimize potential adverse effects to the aquatic environment are available to the applicant and, therefore, that compensatory mitigation is not appropriate. In conclusion, EPA considers the proposed/required mitigation proposal to be both insufficient and inappropriate.

Section 5.b.3. Criteria

A. Water Dependency

We agree with the NOD's assessment that, "[i]ndividually most components comprising the proposed recreational complex are not dependent upon water to function" and that, "[t]he dominant non-water dependent usage of the proposed action, by definition, would be the conversion of barrier island marshlands to artificially-created, non-wetland waterfront residential and recreational property."¹⁴ However, we disagree with the SOF which concludes that "...the Corps considers the project to be water dependent in light of the applicant's purpose", which, the SOF states, is "establishing a contiguous, fully integrated waterfront resort complex."^{15 16} This differs from the applicant's stated purpose to construct a water oriented recreational complex and introduces the aforementioned boundaries to determining practicability which EPA considers inappropriate.¹⁷

EPA agrees that the proposed marina is certainly a desirable component of this project. However, the additional amenities which require a 404 permit do not require siting in or near waters of the U.S. NOD has essentially conferred a water dependent distinction to the entire project which we believe has the potential to cause significant



problems in evaluating projects of this nature. Under this scenario, it would be possible for permit applicants to avoid the Guidelines requirement concerning rebutting the presumption of available alternatives by incorporating water dependent components into their projects. EPA believes that this would be contrary to the letter and spirit of the Guidelines.

Therefore, EPA has concluded that while the project purpose as stated by the applicant is the construction and maintenance of a water oriented recreational complex and the project contains a water dependent element (i.e., the marina), this does not confer a water dependent distinction to the project in its entirety, nor relieve the applicant of meeting the burden of rebutting the presumption of the availability of environmentally less damaging alternatives as stated in 40 CFR 230.10(a)(3). Although there may be a public demand for waterfront housing,¹⁸ this does not relieve the applicant from meeting the requirements of the Guidelines nor justify the issuance of a permit which does not comply with the Guidelines.

B. Determination of Impacts on the Basis of Remaining Wetlands

NOD's EA contains a discussion of cumulative impacts. However, in the SOF, it is stated that one of the primary determinations that the NOD made in deciding to issue the proposed permit was based on the fact that the wetlands losses were insignificant because they represented 2.39% of the remaining salt marsh on Grand Isle, 0.014% of the salt marsh in the Barataria Basin and 0.0005% of the salt marsh in coastal Louisiana.¹⁹

EPA believes that NOD's line of reasoning must be rejected. Past rationalizations towards wetlands losses such as this are partially responsible for the significant nationwide wetlands losses. In the context of remaining wetlands statewide, especially in Louisiana, it is doubtful that any single proposed project would constitute a major loss of wetlands. In addition, this line of reasoning does not take the aforementioned conclusions of NMFS into account concerning the irreplaceability of the aquatic resources at issue.

The significance of resource losses must be assessed on a site specific basis and within the context of historical losses of those resources. NOD's line of reasoning, for example, does not take into account that, in the 22 year period from 1956-1978, Grand Isle lost almost half (559 acres) of its saline wetlands²⁰ (incidentally with a corresponding gain in filled and developed land) and the Mississippi Deltaic Plain Region lost approximately 68% (964,490 acres) of its salt marshes.²¹ Recent studies suggest that the greatest wetlands losses in the Barataria Basin have been occurring in the saline and brackish marshes at a rate estimated to be about 1000 acres/year.²² Also, approximately 50 square miles of land are lost each year to natural forces and man's activities,²³ thus emphasizing the cumulative loss of wetlands within the Louisiana



coastal zone. In its EA, NOD discusses cumulative wetland losses from the permit program perspective; that is, those losses which have resulted from Corps permit actions within an arbitrarily delineated four mile radius of the project site as well as the potential for the development at issue to encourage future developments with subsequent losses of wetlands on Grand Isle. Substantial wetland losses have occurred, however, as a result of natural causes as well as those which are subject to the 404 program and a responsible cumulative impacts analysis must necessarily address the totality of these losses.

We would also like to point out that NOD's decision in this case fails to consider the implication of recent formal recognition of the national significance of Barataria Bay as designated in P.L.100-688, Title II amending the Clean Water Act. Also, as you are aware, Lee Thomas recently transmitted the EPA Coastal and Marine Policy to federal agencies asking for their support and participation in implementation. The policy establishes goals and objectives for protecting, restoring and maintaining the nation's coastal and marine waters to protect human health and sustain living resources. We believe that a review of this permit decision is in keeping with the intent of this policy.

C. Project Site Erosion

NOD's SOF states that the DE's decision to issue this permit is based, in part, upon the determination that "the project site is eroding at a rapid rate and will be lost regardless of project implementation." EPA objects to this determination for two primary reasons. First, this determination is inappropriately based on predictions of future erosion rates and subsequent wetlands losses. The erosion of the wetlands at issue depends upon the interrelationship of a number of factors which include sea level rise, subsidence, climatological factors and barrier island dynamics. The degree to which any of these factors occurs determines whether the erosion rate increases, decreases, or remains constant over time on the beach as well as the bayside wetlands of Grand Isle. For example, winds and waves from the south will tend to counter the erosion of bayside areas by providing windblown or overwash sand which provides substrate for the establishment of additional wetlands.

Second, this determination ignores the ecological contribution of the site in question over time. The wetlands will continue to provide detritus as well as fish and wildlife habitat. In addition, we anticipate that the shallow water resulting from the erosion of the wetlands will continue to provide valuable fish habitat.

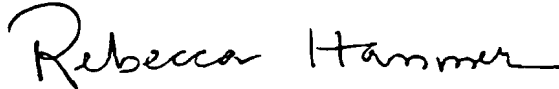
I realize that we have covered a number of issues in this correspondence and, in closing, I wish to summarize EPA's major concerns regarding the proposed Plantation Landing Resort. First and foremost, EPA believes that the loss and alteration of 102 acres of valuable wetlands and shallow open water bottoms would result in significant degradation of the aquatic ecosystem and would be in violation of Section 230.10(c) of



the Guidelines. Secondly, we believe that since practicable, less environmentally damaging alternatives are available, the project would be in violation of Section 230.10(a) of the Guidelines and that the impacts associated with same are unacceptable. Lastly, we consider NOD's determinations in this case, which include evaluating the significance of impacts by comparing anticipated losses to remaining resources, constricting the alternatives analysis and expanding the water dependency distinction, as well as determining that the potential for erosion of all wetlands of the project site in the future justifies filling same with the loss of its ecological values in the present, to be inappropriate. EPA believes that the goal of the Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the nation's waters is best served in this case by the Corps' denial of the proposed Section 404 permit for Plantation Landing Resort.

Therefore, I believe that the decision to issue the permit warrants additional review. I look forward to your response to our concerns and analyses as provided for in our MOA. If my staff can be of further assistance during your evaluation, please have your staff direct their questions to Kirk Stark in the Office of Wetlands Protection at 475-8796. You should also, of course, feel free to contact me, or David Davis, Director of the Office of Wetlands Protection at 475-7791.

Sincerely yours,



Rebecca W. Hanmer
Acting Assistant Administrator

cc: Mr. Robert Layton Jr.
Regional Administrator

ATTACHMENTS

ENDNOTES/REFERENCES

1. Coastal Environments, Inc. 1987. Environmental Assessment: Louisiana Department of Natural Resources Coastal Use Permit No. P85173. Baton Rouge, La.
2. Gagliano, S.M. 1987. Letter to Ron Ventola of the NOD on May 27, 1987 and letter to Jim Holcombe of Louisiana Coastal Management Division on June 22, 1987.
3. Pilkey, O.H. 1988. Comments prepared on Plantation Landing Resort Project for U.S. Environmental Protection Agency. Durham, N.C. 3 pp.
4. Lee, T.N. and C. Rooth 1973. Water Movements in Shallow Bays and Estuaries. Coastal Zone Management Series, Bulletin No. 3, University of Miami. Sea Grant Programs. 19 pp.
5. Turner, R.E. 1977. Intertidal Vegetation and Commercial Yields of Panaeid Shrimp. Trans. Am. Fish. Soc. 106: 411-416
6. Sabins, D.S. and F.M. Truesdale. Diel and Seasonal Occurrence of Immature Fishes in a Louisiana Tidal Pass. Proc. S.E. Game and Fish Comm. 28: 161-171.
7. Kinler, Q. 1988. Memo on Wildlife Survey of (Bayou Rigaud) 67 Project Area. U.S. Fish and Wildlife Service, Lafayette, LA. 1 pp.
8. Lindall, W.N. and L. Trent. 1975. Housing Development Canals in the Coastal Zone of the Gulf of Mexico: Ecological Consequences, Regulations and Recommendations. Mar. Fish. Review 37(10): 19-24.
9. U.S. EPA. 1975. Finger-fill Canal Studies: Florida and North Carolina. Athens, GA. 427 pp.
10. U.S. EPA. 1985. Coastal Marinas Assessment Handbook. EPA Region IV, Atlanta, GA.
11. Herke, E.E., Z.X. Chen, N.S. Green, P.A. Knudson, and B.D. Rogers. 1987. Final Report for the Cameron-Creole Watershed Fisheries Investigations. La. Coop. Fish Wildlife Res. Unit, School of Forestry, Wildlife, and Fish, La. St. Univ. Agric. Center, Baton Rouge, LA.
12. Lee, G.A. 1987. Application for an Experimental Mariculture Permit as Enacted in the: Louisiana Legislature Regular Session, 1987, Senate Bill No. 673 New Orleans, LA.



13. Personal Communication with Mr. Ronnie Duke of the New Orleans District of Corps of Engineers on November 4, 1988.
14. U.S. Corps of Engineers. 1988. Environmental Assessment for Plantation Landing Resort. New Orleans District, New Orleans. pages 85 and 87.
15. Manuel, Jr., H.E. 1988. Statement of Findings for Plantation Landing Resort. New Orleans District, New Orleans. page 7.
16. Manuel, Jr., H.E. 1988. Statement of Findings for Plantation Landing Resort. New Orleans District, New Orleans. page 10.
17. Revised Public Notice SC (Bayou Rigaud) 67 dated December 7, 1987.
18. U.S. Corps of Engineers. 1988. Environmental Assessment for Plantation Landing Resort. New Orleans District, New Orleans. pages 85 and 87.
19. Manuel, Jr., H.E. 1988. Draft Statement of Findings for Plantation Landing Resort. New Orleans District, New Orleans. pages 7 and 9.
20. U.S. Fish and Wildlife Service. 985. Habitat Changes in Grand Isle, Louisiana (1956-1978). National Coastal Ecosystems Team, U.S. Fish and Wildlife Service. Slidell, Louisiana.
21. Wicker, K.M. et.al 1980. The Mississippi Deltaic Plain Regional Habitat Mapping Study. Habitat Area Data Tapes. Off. Biol. Serv., U.S. Fish and Wildlife Service, Washington, D.C. FWS/OBS-79/07.
22. Craig, N.J., R.E. Turner, and J.W. Day, Jr. 1979. Land Loss in Coastal Louisiana (U.S.A.). *Envir. Management* 3: 133-144.
23. Gagliano, S.M., K.J. Meyer-Arendt, and K.M. Wicker. 1981. Land Loss in the Mississippi River Deltaic Plain. *Gulf Coast Association of Geological Societies Transactions* 31: 295-300.

