E C O L O G I C A L R E V I E W

LaBranche Wetlands Terracing, Planting and Shoreline Protection
CWPPRA Priority Project List 9
(State No. PO-28, Federal No. PPO-7a)

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ECOLOGICAL REVIEW

LaBranche Wetlands Terracing, Planting and Shoreline Protection (PO-28)

I. Goal Statement

The goals of this project are:

- to reduce emergent marsh loss along the Lake Pontchartrain shoreline and the interior fringing marshes; and
- to create emergent marsh.

II. Strategy Statement

The project goals will be achieved through a combination of the following strategies/project features:

- shoreline protection;
- terrace construction;
- vegetation plantings; and
- herbivore control (if necessary).

III. Strategy-Goal Relationship

Shoreline protection via construction of a foreshore rock dike will stabilize the existing protective barrier between Lake Pontchartrain and the open water areas of the interior marsh of the LaBranche Wetlands. The rock dike will essentially create an armored, permeable shoreline that will buffer wave energy and prevent breaching of the shoreline.

The construction of terraces will not only result in the direct creation of marsh habitat, but will also facilitate marsh building by trapping suspended sediments in the shallow open water areas adjacent to the terraces. The terraces will also reduce erosive wave energy thereby protecting the surrounding edges of interior fringing marshes.

Vegetation plantings in shallow open water areas will provide protection to marsh edge by absorbing wave energies. An added benefit of the vegetation is the creation of fish and wildlife habitat. Plantings on the crown and slope of terraces will aid in stabilizing and consolidating the deposited spoil.

If determined to be essential to planting success, herbivore control in the form of intensive trapping will be conducted prior to planting and in the following year to minimize nutria depredation.

IV. Project Feature Evaluation

Foreshore rock dikes have been used often to stabilize lake and bay shorelines as well as navigation channels throughout the Louisiana coastal zone. Two shoreline protection projects on Freshwater Bayou Canal in Vermilion Parish, have provided preliminary results on rock dike success. The Freshwater Bayou Bank Stabilization (ME-13) project, constructed in 1998, has not only reversed wave-induced bank erosion, but initial monitoring efforts have indicated that the bank has prograded at a rate of 2.34 ft/yr (0.7 m/yr) (Louisiana Department of Natural Resources [LDNR] 1999a). The second project, Freshwater Bayou Bank Protection (TV-11) constructed in 1994, lacks postconstruction data but observations have emphasized the need for monitoring and potential maintenance of such projects. One year following construction completion, rocks in segments of the dike were washed away by boat wakes thus compromising its structural integrity and leaving the underlying geotextile fabric exposed (LDNR 1996). In the vicinity of the proposed project, two additional shoreline protection projects located on Lake Pontchartrain are worth consideration. The Turtle Cove Shore Protection (PO-10) project constructed in 1994 consisted of placing rock-filled gabions approximately 300 feet (91.4 m) from shore to form a breakwater which paralleled a rapidly eroding shoreline in the Manchac Wildlife Management Area on Lake Pontchartrain.. Five years after project construction, monitoring results indicated that the shoreline had prograded 3.36 ft/yr (1.02 m/yr) and that sediment deposition behind the gabions had increased land area 5.78 acres (2.34 ha) (LDNR 1999b). Like the Freshwater Bayou Bank Protection project, the continued effectiveness of the Turtle Cove breakwater relies upon repairing breaches that have developed over time. The LaBranche Shoreline Protection (PO-03b) project, located immediately west of the proposed project, was constructed in 1996 to protect the adjacent marsh from wave-induced shoreline erosion. Though no official monitoring data have been collected, recent observations from 1999 have indicated that the rock dike has remained intact and is functioning as intended.

Although terraces are a relatively new concept in marsh habitat creation and though similar projects have not had time to be fully evaluated (e.g., Little Vermilion Bay Sediment Trapping TV-12), we are reasonably confident that the proposed project feature will achieve the intent of the strategy based on sound engineering principles. LDNR engineers have designed the main terrace lines to run perpendicular to the prevailing wind direction (Northeast at 60°) in the project area in order to maximize wave fetch reduction. Also, cross terraces, perpendicular to the main terrace lines, will be constructed in order to reduce wave energy in both directions. Pending geotechnical investigation results, we expect local sediments to be conducive to terrace building due to the success of the Bayou LaBranche Wetland Restoration (PO-17) project in which containment levees, built in 1994 with local sediments, are still intact 6 years after construction (Troutman and Gaudet 1999). Furthermore, the initial success of the state funded Sabine Terraces project, constructed in the Sabine National Wildlife Refuge in Cameron Parish, validates the use of terraces in restoration efforts. Since construction in 1991, the terraces have significantly reduced wave heights, decreased erosion, increased primary productivity, increased vegetation coverage,

and re-established emergent marsh (LDNR 1999a). However, all terrace projects have not met with the same success. Based on observations of the 1996 Shell mitigation project, terraces constructed from the dredged spoil of Little Vermilion Bay eroded at a rate of 4 ft/yr (1.2 m/yr) (National Marine Fisheries Service 1999). Understanding that the terraces in the LaBranche Wetlands will not experience wave and tidal scour of the same magnitude as those in Little Vermilion Bay, due to the rock dike and decreased wave and tidal amplitude, the potential of terrace erosion should still be addressed.

Since 1991, vegetation plantings have been used in the LaBranche Wetland area in attempts to trap suspended sediment, buffer wave energies in shallow open water areas, and to provide habitat for fish and wildlife. Early plantings of *Spartina alterniflora* (Smooth cordgrass), *Paspalum vaginatum* (Seashore paspalum), and *Zizaniopsis miliaceae* (Giant cutgrass) either died within a year of planting or a lack of monitoring data following initial establishment renders an evaluation of planting success impossible. In May 1996, 1,600 gallon containers of *Schoenoplectous californicus* (California bulrush; formerly *Scirpus californicus*) were planted along the shoreline of interior borrow canals. Monitoring data from December 1997 indicated that in 7 of 8 planted segments *S. californicus* survival was between 85 and 100% while one planted segment experienced 75% survival (Crescent Soil and Water Conservation District 1998). Nutria damage was reported to be heavy in all segments even though plants were protected with nutria exclusion devices (NED's). In April 1998, 1,200 gallon containers of *S. californicus* were planted along interior borrow canal shorelines and were protected by NED's. Over a year and a half later, in November 1999, approximately 85% of the plants had survived with no indication of herbivore damage (Crescent SWCD 1998). However, plants closer to the shoreline experienced significantly lower survival rates, which was attributed to "higher water levels and a high level of under water trash" (Crescent SWCD 1998). An additional 1,000 gallon containers of *S. californicus* were planted in the interior marsh and along exposed shoreline in June 1999, but a lack of monitoring data precludes analysis of project success. However, a field investigation by LDNR personnel on November 27, 2000 indicated that *S. californicus* plantings from this current year as well as past projects were in poor condition, dead and/or dying. Recent drought conditions and increased salinities were cited as the cause of planting failure (Keith Lovell, personal communications). Biological and hydrologic factors including, but not limited to, soil conditions, water and salinity levels, herbivore depredation, and wave action should be fully evaluated before vegetation plantings are approved for the LaBranche Wetland project area.

The proposed project features, specifically shoreline protection, terracing, and vegetation plantings were identified by the Region 1, Regional Planning Team, as part of *Coast 2050,* as strategies that will directly benefit the LaBranche Wetland Mapping Unit (LCWCRTF & WCRA 1999).

V. Assessment of Goal Attainability

The project's physical effects were designed in order to achieve the desired biotic goals. To a certain extent, each of the proposed project features will contribute to the attainability of both stated goals: 1) to reduce emergent marsh loss along the Lake Pontchartrain shoreline and the interior fringing marshes, and 2) to create emergent marsh. Approximately 18,000 ft (5,486 m) of the western shore of Lake Pontchartrain, from the Blow Hole to the St. Charles/Jefferson Parish line, will be stabilized by construction of a rock foreshore dike (see Appendix). The riprap armoring will buffer the eroding bank from tidal scouring and dissipate wave energies. Additionally, it is expected that overtopping of the structure, during high water events, may potentially transport sediments for marsh accretion.

Marsh loss in the interior fringing marshes of areas A, C, D, and E (see Appendix) will be reduced through both terrace construction and vegetation plantings. A total of 70,000 linear feet of terraces will be constructed in areas A, D, and E. This will result in not only fetch reduction and wave buffering, but terraces will also directly create emergent marsh and increase edge habitat. The trapping of sediments will lead to the creation of additional marsh acreage in the terraced areas. Plantings of *S. californicus* and *S. alterniflora* on the crown and slope of the terraces will aid in stabilizing and consolidating the deposited spoil. *S. californicus* and *Z. miliaceae* plantings in the shallow open water areas of area C will serve to reduce erosive wave energies as well as create wildlife habitat. It is expected that plantings will propagate thereby resulting in emergent marsh creation.

Potential Risks

1. There is a degree of risk associated with the physical features of the project. The foreshore rock dike, subjected to continuous tidal scour and wave action could potentially experience structural failure or subside under its own weight. A monitoring and maintenance protocol should be developed to ensure project success.
2. In the absence of a detailed geotechnical investigation, it is impossible to guarantee that the soil source will be suitable for terrace construction.
3. Assuming terraces can be constructed, wave action may potentially erode the terraces over time. Monitoring and maintenance will be essential to project success.
4. The overall success of the terraces may depend upon the survival of *S. californicus* and *S. alterniflora* plantings on the crown and slope of the terraces, thus making the source and planting of the vegetative material a vital component.
5. Additional risks such as severe weather events could compromise the integrity of project features.

Recommendation

- Final recommendation pending the results of geotechnical investigation. However, if results indicate that soils are sufficient for terrace construction, we would recommend proceeding with the project as it is currently proposed.

References

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APPENDIX

CWPPRA PPL-9 Project Nominee: LaBranche Wetlands Terracing, Planting, and Shoreline Protection