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

North Lake Mechant Land Bridge Restoration, Construction Unit 1
CWPPRA Priority Project List 10
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ECOLOGICAL REVIEW

North Lake Mechant Land Bridge Restoration, Construction Unit 1

In August 2000, the Louisiana Department of Natural Resources initiated the Ecological Review to improve the likelihood of restoration project success. This is a process whereby each restoration project's biotic benefits, goals, and strategies are evaluated prior to granting construction authorization. This evaluation utilizes monitoring and engineering information, as well as applicable scientific literature, to assess whether or not, and to what degree, the proposed project features will cause the desired ecological response.

I. Introduction:

The north Lake Mechant land bridge (Figure 1) is located in the Terrebonne hydrologic basin and is comprised of an area delimited to the south by Lake Mechant, to the west by Lake Pagie, to the north by Bayou DeCade and to the east by the natural levee of Small Bayou LaPointe. The North Lake Mechant Land Bridge Restoration project encompasses approximately 7,572 acres of predominantly open water (>70%) and marsh, most of which is classified as intermediate, dominated by *Spartina patens*. The project is intended to protect and restore the north Lake Mechant land bridge by reducing interior marsh loss and shoreline erosion along lakes Mechant and Pagie. This land loss threatens the integrity of the land bridge that separates the intermediate and fresh marshes to the north from the marine and tidally dominated Lake Mechant system to the south. At the current rate of shoreline erosion (7.5 feet/year) (Paille and Segura 2000), it is projected that a 500-1,000 foot section of Lake Mechant's north shoreline will be breached within 10 years, thus compromising the hydrology and ecology of the adjacent intermediate marsh area. Additionally, the east Lake Pagie shoreline is eroding at a rate of 3.3 to 3.8 feet/year (Paille and Segura 2000), which also threatens the integrity of the land bridge. The project design call for the use of the following features to preserve the land bridge: marsh creation north of Lake Mechant, vegetation plantings along eroding lakeshores, hard shoreline protection along containment dikes, plugging of several oil-field canals, and the repair of a fixed-crest weir. It has been determined that construction of the project, as currently proposed, could potentially impact a number of oyster leases identified within Lake Mechant. The difficulties and associated delays in dealing with oyster lease compensation/relocation issues have prompted the federal and local sponsors to subdivide the project into construction units (CU). This action will enable those project features that will not impact nearby oyster leases to proceed in a more timely fashion through design and construction phases. This Ecological Review focuses exclusively on CU1, which is composed of the vegetation planting component (Figure 2).

II. Goal Statement:

Reduce erosion along the northern shoreline of Lake Mechant and the eastern shoreline of Lake Pagie.

III. Strategy Statement:

The project goal will be achieved through the planting of 44,307 linear feet of *Spartina alterniflora* (smooth cordgrass) along shorelines.

Figure 1. North Lake Mechant Land Bridge

Figure 2. North Lake Mechant Land Bridge Restoration, Construction Unit 1.

IV. Strategy-Goal Relationship:

The planting of *S. alterniflora* will reduce erosion along the northern Lake Mechant shoreline, and the eastern Lake Pagie shoreline, by stabilizing exposed soils and damping wind induced waves.

V. Project Feature Evaluation:

The vegetation plantings will consist of *S. alterniflora* Loisel cv. Vermilion. The *S. alterniflora* will be planted in the intertidal zone, along 44,307 feet of the northern shoreline of Lake Mechant and the eastern shoreline of Lake Pagie (Figure 2). A total of 10,000 trade gallons and 20,000 plugs will be used. The gallon containers will have a minimum of six live and actively growing stems per container, and the plugs will be multi-stemmed with bare root material. The plantings will include two rows of *S. alterniflora* plugs followed by one row of gallon containers. The *S. alterniflora* will be planted five feet on center. No Nutria Exclusion Devices (N.E.D.) will be used for this project.

VI. Assessment of Goal Attainability:

Marsh vegetation increases shoreline stability by dissipating wave energy, anchoring fragile soils, and creating a depositional environment. Consequently, vegetation plantings have been widely used in the United States for shoreline protection as a low cost alternative to hard structures since the mid 1950's (Knutson et al. 1981). *Spartina alterniflora* is a species widely selected for erosion abatement due to its tolerance of a wide range of intertidal environments (Knutson 1977) and its ability to stabilize shorelines (Benner et al. 1982, Knutson et al. 1982). In models developed by the United States Army Corps of Engineers, the energy of 6-inch waves was dissipated 64% within the first 8.2 feet of *S. alterniflora* marsh (Knutson et al. 1982).

The large-scale use of vegetation plantings as a shoreline restoration technique in Louisiana began in 1986 through the Louisiana Geological Survey/Coastal Vegetation Section (Bahlinger 1995). Several vegetation planting projects utilizing *S. alterniflora* have been implemented in the vicinity of Lake Mechant, and are summarized in Table 1. Of these five *S. alterniflora* planting projects, four were funded under the Louisiana Department of Natural Resources/Natural Resources Conservation Service/Soil and Water Conservation Committee (LDNR/NRCS/SWCC) Vegetation Planting Program, and one was a Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) project (Lee et al. 2000). The five projects have met with mixed success. The plantings in three of the projects exhibited zero percent survival, and one of the two projects that appeared to be successful was only monitored one-month post planting. Low survival of plantings appeared to be due to several factors, including nutria (*Myocastor coypus)* herbivory, wave action, water hyacinth (*Eichhornia crassipes*) damage, and high water levels.

Table 1: Summary of vegetation planting projects utilizing *Spartina alterniflora* implemented in the vicinity of Lake Mechant.

Location	**Date planted**	**Length of plantings**	**# Plants**	**Technique**	**Soil Type**	**Water Depth**	**Nutria abundance**	**N.E.D. usage**	**% Survival**	**Field Observations**
Lake DeCade	04/88	4,000'	2,000	Single stem 2 rows 2' spacing	Lafitte	3"	High	No	0% @5 years	Nutria Wave action Hyacinth damage
Lake DeCade	08/05/91	8,000'	4,000	Single stem 2 rows 2' spacing	Clovelley muck	NA	Low	No	0% @ 1 month	Hyacinth damage
Blue Hammock Bayou	04/12/95	1,000'	200	Gallon (8) 1 row 5' spacing	Bancker	0-4"	High	Yes (50%)	90% @ 1month	Wave action
Four League Bay	05/12/95	2,000'	400	Gallon (8) 1 row 5' spacing	Bancker	0-3"	Low	Yes (50%)	58% @ 1 month 0% @ 18 months	Hyacinth damage
Falgout Canal (TE-17)	05/12/97	1,450'	300	Plugs 1 row 5' spacing	NA	NA	NA	No	32% @ 7months 20% @ 12 months 11% @ 23 months	High water

In November of 2000, the U.S.F.W.S. conducted a small test planting of *S. alterniflora* in the project area, on the north shore of Lake Mechant. They used plugs from existing clumps of *S. alterniflora* and evaluated the survival of the plantings in July of 2001. The test planting was also used to evaluate the effectiveness and requirement for N.E.D.s in the project area. The results of the test planting were positive as the *S. alterniflora* plugs all survived and propagated, and the plugs without the N.E.D.s showed no signs of grazing by herbivores. Though limited in scope and confined to a small portion of the total project area, this test planting does indicate a potential for success of vegetation plantings without N.E.D.s in the project area. According to communications with Greg Linscombe of the Louisiana Department of Wildlife and Fisheries, nutria herbivory, which has been cited as a principal factor in the failure of plantings in the project vicinity (Table 1), is not significant within the project area, possibly due to the higher salinities found in Lake Mechant. Based on this communication, N.E.D.s are not a proposed project feature. Water hyacinth, also a prime factor in the previously mentioned planting failures, has not been observed in high densities in the project area, according to Kennneth Bahlinger of the Louisiana Department of Natural Resources. This may also be attributed to the higher salinities found in Lake Mechant.

In addition to the success of the test plantings in the project area, field observations (Paille and Segura 2000) noted that clumps of *S. alterniflora* currently along the north shore of Lake Mechant have formed headlands where the adjacent *Spartina patens* shoreline has eroded away. The perceived success of the *S. alterniflora* at the expense of other marsh vegetation further emphasizes the potential success of the proposed plantings.

There are additional reasons to believe that the proposed vegetation plantings will be more successful than the previous plantings (Table 1). According to Kenneth Bahlinger of the Louisiana Department of Natural Resources, the firmer substrates found along the northern shoreline of Lake Mechant, and to a lesser extent Lake Pagie, are very suitable for the establishment and propagation of *S. alterniflora*. In addition, the project will include the use of both stem and gallon containers of *S. alterniflora*. Gallon containers provide the most reliable means of planting establishment, especially along shorelines and in areas of high wave energy.

We are reasonably confident in the success of the proposed vegetation plantings. However, in the event of initial planting failure due to unforeseeable events such as severe weather high water, this project has provisions for replanting. If plantings fail in what are considered favorable conditions, the project should be reexamined before proceeding with replanting efforts.

VII. Summary of Findings

Based on the evaluation of available ecological information, the Louisiana Department of Natural Resources, Coastal Restoration Division recommends that the North Lake Mechant Land Bridge Restoration, Construction Unit 1, project be approved for CWPPRA Phase 2. Existing conditions in the project area indicate that

vegetation plantings should experience higher survival rates as compared to the previously mentioned plantings. This project provides a very good opportunity to evaluate the long-term success of vegetation planting for shoreline protection through comprehensive monitoring.

References

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