LA Coastal Restoration Project
Lessons Learned
1990-2013

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U. S. Fish and Wildlife Service
LA Ecological Services Office
Lafayette, LA
Lessons Learned Topics

- Restoration Project Types
- Marsh Restoration
- Vegetated Earthen Terraces
- Shoreline Stabilization/Protection
- Hydrologic Restoration
USGS published land loss since 1932 and projected for the next 37 years.

Predicted Louisiana Coastline by 2050.

45% intertidal wetlands
90% wetland loss
Marsh Restoration

- Maintain marsh elevation for project life
- Geotechnical information (slurry, dikes)
- Degrade/gap retention levees post construction
- Tidal creek construction?
- Evaluate revegetation need?
- Beneficial Use considered
- Borrow from “outside the system”
Marsh Creation via Hydraulic Dredging

Hydraulic dredge

Dredge Cutterhead

End of Dredge pipe

Dredged material slurry/nourishment
Consider Relative Sea Level Rise

Projects should be designed & constructed using relative sea Level rise information

Grand Isle, LA

2.2 feet/century
0.7 feet/30 years
Oyster Bayou Settlement Curves

Marsh Creation Settlement Time Curves

- **Elevation (ft., NAVD88)**: Y-axis
- **Time (yrs.)**: X-axis

### Curves
- **El. 3.0**
- **El. 2.45**
- **El. 2.0**
- **MHW**
- **MLW**

**Annotations:**
- **Mean high water**
- **Mean low water**
- **Sea level rise**

**Note:** Time = 0 yrs. = 30 days after completion of dredging operation.
Marsh Restoration & Revegetation
Track-hoe Constructed Tidal Creeks
Tracked & dredged

Sabine Marsh Creation

Mud flat development

Dredged tidal creeks

Tracked

revegetation
“Tracked” Tidal Creek Construction

Degrading dike with track-hoe
Sabine Refuge Marsh Restoration
Tidal Flat Construction

- Marsh restoration area
- Drain excess water
- Mudflat development
- Effluent drain
- South Dike
- Marsh Restoration area
- Borrow ditch
- Shorebird use

Mud Flat Looking North From Lake

4/3/2002
Retention Dike Erosion

- Sabine MC – 2
- Raccoon Is.
- Timber dike Shoring
- E. Marsh Is. MC
- Sabine MC – 2
Vegetated Earthen Terraces

- Shallow water low energy environments with suitable clay soils
- Row spacings of < 500 feet with gaps
- Revegetate with suitable wetland vegetation (i.e., smooth cordgrass, seashore paspalum)
Sabine National Wildlife Refuge Terraces

- Collects sediment
- Reduces wave fetch
- Increases submerged vegetation

East Sabine Hydrologic Restoration Duck-wing terraces
250,000 linear feet (47 miles) constructed

$6.4 M
0.9 km²/225 ac

EPA funded terraces.
First Sabine terrace field
Duck-Wing Vegetated Earthen Terraces

Immediately After Construction

smooth cordgrass plantings

Target elevation = marsh level; 15 foot crown width.

One Year After Construction

first year’s growth

second year’s growth

Three to Five Years After Construction

smooth cordgrass (Spartina alterniflora)

marshhay cordgrass (Spartina patens)

Revegetated terrace
Shoreline Stabilization

- Suitable mineral/clay soils
- Allow natural hydrology (segmented breakwaters, gaps)
- Sufficient rock size
- Maintenance to prevent rock subsidence (navigation hazard)
- Non-rock shore protection in poor soils
- Warning signs
Segmented Rock Breakwaters

Rock breakwater with gap

Marsh restored
With dredged material

Gap for hydrology & fisheries

tombolo

Nesting pelicans & others
Wetland Soils Make Construction Difficult

Track hoe at Rockefeller Refuge

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EUSTIS ENGINEERING SERVICES, L.L.C.

LOG OF BORING AND TEST RESULTS

U.S. DEPARTMENT OF AGRICULTURE
ME-20 SOUTH GRAND CHENER
CAMERON PARISH, LOUISIANA

Water Content Percent: 41 44 44 43 43 42 42 39 39 45 45 45 45 44 44 44 24 20

Density: 88 90 101 90 90 89 89 87 92 92 91 91 91 90 90 90 26 115

Shear Tests: OB 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0


Education, recreation and volunteer service in restored wetlands
Non-Rock Shore Stabilization

Wave Attenuation Devices (WADS)

Buoyancy compensated erosion control mod. system

GIWW

Matting over PVC pipe
Hydrologic Restoration

- **Purpose** – manage water levels/salinities
- **Maintain coastal fisheries access**
  - Adjustable gates w logic controllers, operation plans, vertical slots, self regulating tide gates
- **Hydrodynamic modeling employed**
- **Real time data for operations**
Hydrologic Restoration Structures

Cameron Creole Control Structure
Motorized Slide Gates

Little Constance Bayou WCS
- concrete with stop logs & flapgates

Rockefeller Refuge

variable crest weirs with flapgates

Pump management

Bayou Sauvage NWR
Flapgates produce one-way water flow from marsh to lake for drainage & reduce saltwater intrusion.

Public access boat bay

$6.5 M
2,600 ac

Hydrologic Restoration
Cameron-Creole Watershed
Cameron Prairie NWR
Hydrodynamic Modeling

Base Run

Original Features

Salinity (p.p.t.)

Weir at S-shaped Canal

Pumps

4 culverts at Hwy 82
Real-Time Satellite Data

Data helps managers operate water control structures
Restoration Lessons Learned

- Incorporate Relative Sea Level Rise
- Maintain natural hydrology (breakwaters, tidal creeks, dike gaps, structure operations)
- Non-rock alternatives in poor soils
- Hydrodynamic Modeling
- Real-time Monitoring for operation