Naomi Siphon Outfall Management (BA-3c)

Candidate Project for the Fourth Priority List of the

Coastal Wetlands Planning, Protection and Restoration Act

Candidate Project Information Sheet
for WVA analysis

Proposed by:
USDA Soil Conservation Service
and
State of Louisiana

July 6, 1994

{Revised in accordance with the WVA Working Group Meeting of June 28, 1994}

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Coastal Wetlands Planning, Protection and Restoration Act
BA-3c Naomi Siphon Outfall Management
Project Information Sheet

Project Name: BA-3c Naomi Siphon Outfall Management
Submitted By: State of Louisiana
Project Area Size: 26,603 acres (12,953 acres (49%) wetland, 13,650 acres (51%) water)
Area 1 - Intermediate area = 7,747 acres (29% of the project area)
(5,699 ac. (**74%**) marsh + 2,048 ac. (**26%**) water)
Area 2 - Brackish area = 10,611 acres (39% of project area)
(4,670 ac. (**44%**) marsh + 5,941 ac. (**56%**) water)
Area 3 - Brackish area = 8,245 acres (31% of project area)
(2,584 ac. (**31%**) marsh + 5,661 ac. (**69%**) water)

Project Description:

This project calls for the management of the outfall from the Naomi (Lareussite) Siphon which is located near the community of Naomi along the Mississippi River in Plaquemines Parish. The diversion system consists of eight 72" diameter siphon pipes, a vacuum pipe, a discharge pond and a single outfall channel. Designed to operate at a maximum discharge of 2144 cfs., the project objective is to divert sediment-laden water from the Mississippi into the west bank wetlands to retard saltwater intrusion and enhance wetland productivity while providing access to estuarine organisms to the maximum extent practicable. The siphons became operational in November 1992 and have been open since February 1, 1993. The operational schedule for the siphons is to open all eight pipes from May through February and keep two pipes open during the months of March and April. This schedule is somewhat variable. The outfall management plan calls for the following structural components.

1. One weir with a boat bay on the Goose Bayou Canal connecting the Barataria Bay Waterway to The Pen at Lafitte. Weir dimensions are estimated at 300'W x 6'D set six inches below marsh level with a boat bay measuring 20'W x 6'D.

2. One weir with a boat bay on the Bayou Dupont Canal connecting the Barataria Bay Waterway to The Pen at and the southwest corner of The Pen. Weir dimensions are estimated at 200'W x 6'D set six inches below marsh level with a boat bay measuring 20'W x 6'D.

Present Conditions:

1. Acres of vegetated marsh and listing of most common plant species present.

   USFWS GIS data for 1988 and 1990 indicate 12,953 acres (**49%**) of the project area is covered by emergent wetlands.
   Area 1 - Intermediate marsh: 5,669 acres (74% of the intermediate area)
   Area 2 - Brackish Marsh: 4,670 acres (44% of the brackish area)
   Area 3 - Brackish Marsh: 2,584 acres (31% of the brackish area)

Marsh species common to the area observed during field investigation:

Intermediate Marsh

70%	*Sagittaria lancifolia or S. falcata*	Bulltongue
10%	*Spartina patens*	Marsh hay cordgrass or Wiregrass
5%	*Eleocharis* spp.	Spikerush
5%	*Polygonum* spp.	Smartweed or Knotweed
5%	*Scirpus californicus*	Bullwhip or Giant bulrush
Tr.	*Typha* spp.	Cattail
Tr.	*Phragmites communis*	Roseau cane
Tr.	*Sacciolepis striata*	Bagscale
Tr.	*Scirpus olneyi*	Olney bulrush or Three-cornered grass
Tr.	*Cyperus odoratus*	Fragrant flatsedge
Tr.	*Bacharris halimifolia*	Groundselbush
Tr.	*Salix nigra*	Black willow
Tr.	*Zizaniopsis miliacea*	Giant Cutgrass
Tr.	*Panicum hemotomon*	Maidencane
Tr.	*Ipomea sagittata*	Marsh morningglory
Tr.	*Solidago simpervirens*	Seaside goldenrod
Tr.	*Hibiscus lasiocarpus*	Marshmallow
Tr.	*Cladium jamaicense*	Sawgrass

Brackish Marsh

85%	*Spartina patens*	Marsh hay cordgrass or Wiregrass
5%	*Sagittaria lancifolia*	Bulltongue
Tr.	*Andropogon glomeratus*	Bushy bluestem
Tr.	*Solidago simpervirens*	Goldenrod
Tr.	*Eleocharis* spp.	Spikerush
Tr.	*Salix nigra*	Black willow
Tr.	*Bacharris halimifolia*	Groundselbush
Tr.	*Ipomea sagittata*	Marsh morningglory
Tr.	*Solidago simpervirens*	Seaside goldenrod

2. Acres of open water:

   Area 1: 2,048 ac (26%)

   Area 2: 5,941 ac (56%)

   Area 3: 5,661 ac (69%)

3. Percent of open water area listed in Item #2 dominated by aquatic plants ($\geq$ 50% canopy cover).

   Of the 13,650 acres of open water in the project area, October, 1992 and June, 1994 field observations indicate that **80%** of the water bottoms in Area 1, **65%** in Area 2 and **50%** of the water bottoms in Area 3 are covered with >50% submerged and/or floating aquatic vegetation (CRD, 1994).

Submerged and floating aquatic species present:

Ceratophyllum demersum	Coontail
Myriophyllum spicatum	Eurasian watermilfoil
Ruppia maritima	Widgeongrass
Eichornia crassipes	Water hyacinth
Vallisneria americana	Water celery
Cabomba caroliniana	Fanwort
Lemma sp.	Duckweed
Heteroanthera dubia	Water stargrass
Najas quadalupensis	Southern niad

4. Historical information on marsh loss trends (provide references, if available, or methods used to derive information given).

   COE land loss data:

1932 to 1958 (%/yr.)	1958 to 1974 (%/yr.)	1974 to 1983 (%/yr.)	1983 to 1990 (%/yr.)
0.202	1.027	0.533	1.008

   These loss rates include 10,000 acres of upland not in the project area. The total loss from 1983 to 1990 was 1,697 ac or 242.4 ac/yr. This loss was allocated to the three areas as using the equation:

$$\left[\frac{(\text{1983 marsh acreage} - \text{1990 marsh acreage}) / 7 \text{ years}}{\text{1983 marsh acreage}}\right] \times 100$$

   Area 1:509.1 ac (30% of baseline loss) or **1.17%/yr**
   [((6,208 - 5,699) / 7) / 6,208] x 100

   Area 2:339.4 ac (20% of baseline loss) or **0.967%/yr**
   [((5,009 - 4,670) / 7) / 5,009] x 100

   Area 3:848.5 ac (50% of baseline loss) or **3.53%/yr**
   [((3,433 - 2,584) / 7) / 3,433] x 100

5. Brief summary of significant historical hydrologic changes.

   The principal hydrologic changes in the area are due to land loss caused by saltwater intrusion, tidal scour, sediment starvation, wave and wake erosion as well as subsidence and nutria herbivory.

6. Shoreline erosion rate (provide source if available).

   Ocular estimation of 8'/yr. along the shoreline of the pen

7. Percent of open water area $\leq$ 1.5 feet in depth (relative to marsh surface)

   Area 1: 80%

   Area 2: 25%

Area 3: 30%

8. Available historical salinity data, including period of record, sampling location(s) in relation to project area.

   The mean salinity for the project area over the past 20 years is in the range of **0 to 5** ppt. Suggest using **1** ppt. for the intermediate marsh and **3** ppt. and **4** ppt. in the brackish marsh in Areas 2 and 3 respectively.

9. Location, type and operation schedule (if applicable) of existing permitted and unpermitted structures.

   The only structures in the area at the present are the siphons. The operational schedule for the siphons is to open all eight pipes from May through February and keep two pipes open during the months of March and April. This schedule is somewhat variable.

10. If there is an existing management plan for the area, is it permitted? Provide copy of permitted operational schedule scheme and permit number.

    A management plan has been proposed by SCS for the Citrus Lands tract which includes the area east of The Pen. Some of their recommendations are incorporated in this report. No permitted management plan exists at the present.

11. Location of structures, culverts, breaks in spoil banks, etc. that serve as hydrologic connections and are <u>not</u> identified above or are not easily seen by examination of aerial photography.

    Nothing remarkable.

12. Estimated subsidence rate (provide reference if available).

    Basin strategic planing meetings for this area indicate the area is subsiding at a rate of approximately 0.35-0.5 in./yr. This equates to 7-11 inches over 20 years and is among the highest in the state.

<u>Future Conditions</u>

1. Location, type, and operation of <u>proposed</u> structures and water control systems including plugs.

   See project description and attached map.

2. Proposed hydrologic changes (water introductions, circulation routes, etc.) due to the project.

   The principal hydrologic change is the introduction of freshwater, nutrients and sediment from the Naomi Siphons. It is expected that the diversion will significantly benefit this area.

3. Predicted plant species composition of marsh for future-with-project and future-without-project (general, in terms of dominant species).

Without the project intermediate marsh may experience an increase in the relative abundance of *Spartina patens* due to continued infusions of salt water when the siphons are not running. With the project, neither the intermediate marsh is expected to remain in a fresher state because the proposed structures in conjunction with existing spoil banks will retard saltwater intrusion into the area. In contrast, species composition in the brackish marsh will likely reflect a greater abundance of intermediate vegetation in areas that do not experience long duration flooding. Wiregrass is expected to remain the dominant species in the brackish area.

WVA Variables

The benefits listed below should reflect the net benefits attributable to the project for the 20 year analysis period.

Emergent Marsh (V1)

Area 1 Future Without Project Scenario

a-1. Acres of emergent marsh predicted to be gained/lost without project.

Assumptions:

The siphons have reduced land loss in Area 1 by 75% from 1.17%/yr to 0.2925%/yr without outfall management.

Area 1 - Intermediate Marsh -

TY 0: **5,699** ac. of emergent marsh occupying **74%** of the 7,747 ac. intermediate project area.

TY 1: **17** ac. lost leaving **5,682** ac or **73%** of the intermediate project area covered with emergent marsh.

TY 20: **333** ac. lost leaving **5,366** ac or **69%** of the intermediate project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (5,699 ac. x 0.002925) x 20 yr. = - 333 ac.
   [where 0.002925 = 0.2925% land loss/yr.]

Area 1 FWOP Total: = - 333 ac.

Area 1 Future With Project Scenario

a-2. Acres of emergent marsh predicted to be gained/lost with the project.

Assumptions:

The siphons have reduced land loss in Area 1 by 93.5% (or by 18.5% over FWOP) from 1.17%/yr to 0.073125%/yr with outfall management.

Area 1 - Intermediate marsh

TY 0: **5,699** ac. of emergent marsh occupying **74%** of the 7,747 ac. intermediate project area.

TY 1: **4** ac. lost leaving **5,695** ,ac or **74%** of the intermediate project area covered with emergent marsh.

TY 20: **83** ac. lost leaving **5,616**. or **72%** of the intermediate project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (5,699 ac. x 0.00073125) x 20 yr. = - 83 ac.
   [where 0.00073125 = 0.073125% land loss/yr.]

Area 1 FWP Total: = - 83 ac.

AREA 1 SUMMARY:

Total acres of marsh lost without the project:	= - 333 ac.
Total acres of marsh lost with the project:	= -83 ac.
Net benefit:	**= + 250 ac**

Area 2 Future Without Project Scenario

a-1. Acres of emergent marsh predicted to be gained/lost without project.

Assumptions:

The siphons have reduced land loss in Area 2 by 25% from 0.967%/yr to 0.725%/yr without outfall management.

Area 2 - Brackish Marsh -

TY 0: **4,670** ac. of emergent marsh occupying **44%** of the 10,611 ac. project area.

TY 1: **34** ac. lost leaving **4,636** ac or **44%** of the project area covered with emergent marsh.

TY 20: **677** ac. lost leaving **3,993** ac or **38%** of the project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (4,670 ac. x 0.00725) x 20 yr. = - 677 ac.
   [where 0.00725 = 0.725% land loss/yr.]

Area 2 FWOP Total: = - 677 ac.

Area 2 Future With Project Scenario

a-2. Acres of emergent marsh predicted to be gained/lost with the project.

Assumptions:

The siphons have reduced land loss in Area 2 by an additional 25% from 0.725%/yr to 0.5437%/yr with outfall management.

Area 2 - Brackish Marsh -

TY 0: **4,670** ac. of emergent marsh occupying **44%** of the 10,611 ac. project area.

TY 1: **25** ac. lost leaving **4,645** ac or **44%** of the project area covered with emergent marsh.

TY 20: **508** ac. lost leaving **4,162** ac or **39%** of the project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (4,670 ac. x 0.005437) x 20 yr. = - 508 ac.
   [where 0.005437 = 0.5437% land loss/yr.]

Area 2 FWP Total: = - 508 ac.

AREA 2 SUMMARY:

Total acres of marsh lost without the project:	= - 677 ac.
Total acres of marsh lost with the project:	= -508 ac.
Net benefit:	**= + 169 ac**

Area 3 Future Without Project Scenario

a-1. Acres of emergent marsh predicted to be gained/lost without project.

Assumptions:

The siphons have reduced land loss in Area 3 by 5% from 3.53%/yr to 3.35%/yr without outfall management.

Area 3 - Brackish Marsh -

TY 0: **2,584** ac. of emergent marsh occupying **31%** of the 8,245 ac. project area.

TY 1: **87** ac. lost leaving **2,497** ac or **30%** of the project area covered with emergent marsh.

TY 20: **1,731** ac. lost leaving **853** ac or **10%** of the project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (4,670 ac. x 0.0335) x 20 yr. = - 1,731 ac.
   [where 0.0335 = 3.35% land loss/yr.]

Area 3 FWOP Total: = - 1,731 ac.

Area 3 Future With Project Scenario

a-2. Acres of emergent marsh predicted to be gained/lost with the project.

Assumptions:

The siphons have reduced land loss in Area 3 by an additional 15% from 3.35%/yr to 2.93%/yr with outfall management.

Area 3 - Brackish Marsh -

TY 0: **2,584** ac. of emergent marsh occupying **31%** of the 8,245 ac. project area.

TY 1: **76** ac. lost leaving **2,508** ac or **30%** of the project area covered with emergent marsh.

TY 20: **1,514** ac. lost leaving **1,070** ac or **13%** of the project area covered with emergent marsh.

1. Interior marsh loss at TY 20:
   (4,670 ac. x 0.0293) x 20 yr. = - 1,514 ac.
   [where 0.0293 = 2.93% land loss/yr.]

Area 3 FWP Total: = - 1,514 ac.

AREA 3 SUMMARY:

Total acres of marsh lost without the project:	= - 1,731 ac.
Total acres of marsh lost with the project:	= -1,514 ac.
Net benefit:	**= + 217 ac**

Submerged and Floating Aquatic Vegetation (V2)

b-1. Percent of open water area dominated by aquatic vegetation predicted to be present at the end of 20 years with and without the project.

Area 1 Baseline:	80%
FWOP	80%
FWP	85%
Area 2 Baseline:	50%
FWOP	60%
FWP	75%
Area 3 Baseline:	50%
FWOP	50%
FWP	55%

Marsh Edge and Interspersion (V3)

4. The interspersion values below reflect those presented and accepted at the WVA Working Group meeting of June 28, 1994.

	Type 1 (%)	Type 2 (%)	Type 3 (%)	Type 4 (%)	Type 5 (%)
Area 1					
Baseline:	75	15	10		
FWOP	85	15			
FWP	90	10			
Area 2					
Baseline:	35		15	50	
FWOP	30		20	50	
FWP	31		19	50	
Area 3					
Baseline:	10	10	30	50	
FWOP			20	80	
FWP			25	75	

Shallow Water (V4)

Estimate of open water depth ($\leq$ 1.5 ft) in relation to marsh surface for future with project and future without project scenarios.

Area 1 Baseline:	80%
FWOP	85%
FWP	90%
Area 2 Baseline:	25%
FWOP	25%
FWP	30%
Area 3 Baseline:	30%
FWOP	10%
FWP	15%

Salinity (V6)

Predicted salinities, future-with and future-without project.

Area 1 Baseline:	1 ppt.
FWOP	1 ppt.
FWP	1 ppt.
Area 2 Baseline:	3 ppt.
FWOP	3 ppt.
FWP	3 ppt.
Area 3 Baseline:	4 ppt.
FWOP	3 ppt.
FWP	3 ppt.

Estuarine Fisheries Access (V6)

Estuarine fisheries access as accepted at the WVA Working Group meeting of June 28, 1994.

Area 1 Baseline:	1
FWOP	1
FWP	1
Area 2 Baseline:	1
FWOP	1
FWP	1
Area 3 Baseline:	1
FWOP	1
FWP	1

References

CRD; 1994, Naomi Outfall Management BA-3c CWPPRA Field Trip Report. Coastal Restoration Division, LA Dept. of Natural Resources, Baton Rouge, LA 2 pp.

Jones, Pete; 1994 (pers. comm.) Naomi Siphon Operation.

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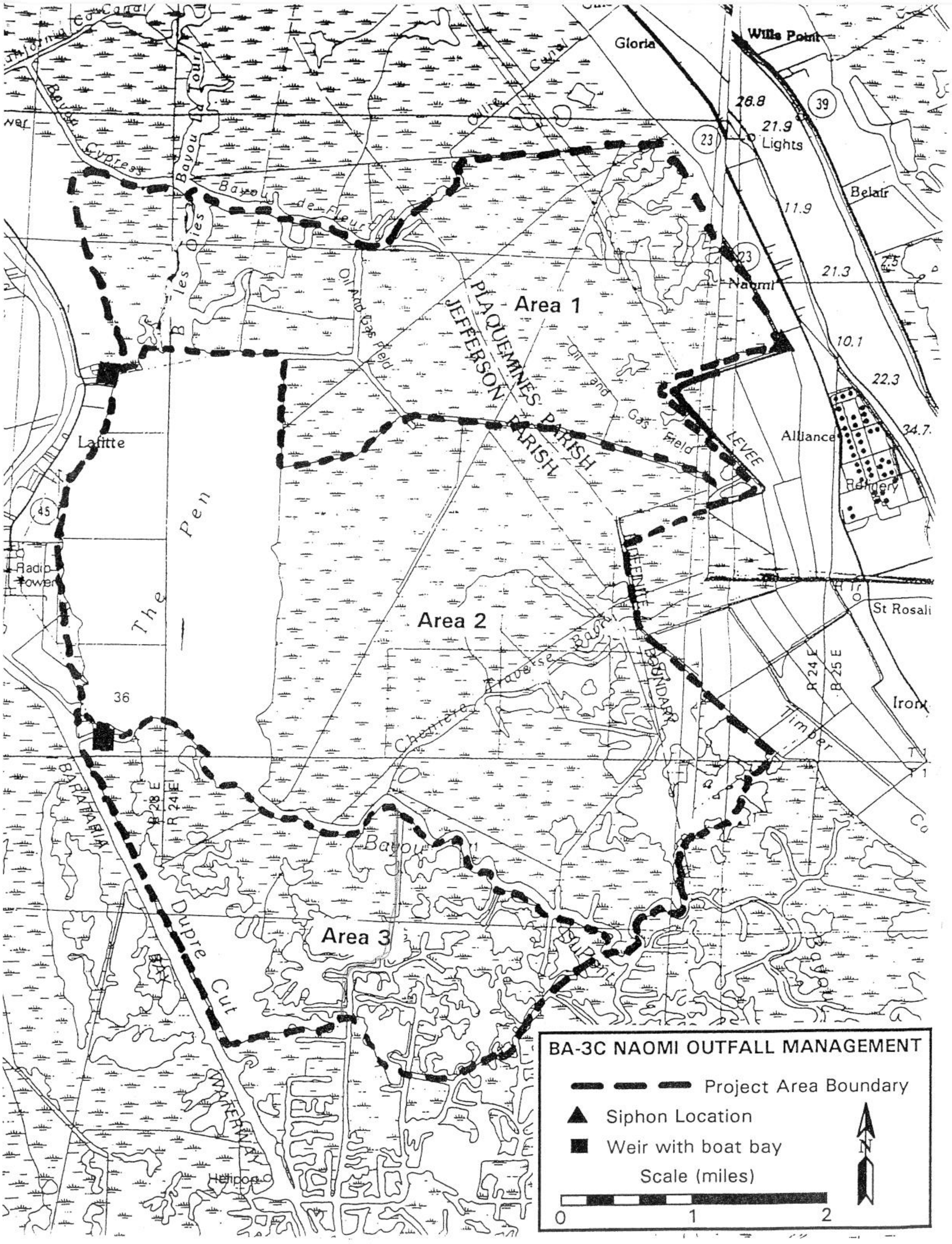
Britch, D., S. Hawes, 1994. COE Land loss data 1932-1990. USACE, New Orleans District, New Orleans, LA


BA-3C NAOMI OUTFALL MANAGEMENT
Project Area Boundary
Siphon Location
Weir with boat bay
Scale (miles)
0
1
2
N
Area 1
Area 2
Area 3
PLAQUEMINES PARISH
JEFFERSON PARISH
Gloria
Wills Point
Lights
Belair
Naomi
Alliance
Refinery
St Rosali
Lafitte
Radio Tower
The Pen
Bayou Cypress
Bayou de Fleur
Bayou Dupre Cut
Oil And Gas Field
LEVEE
BOUNDARY
Timber
BARATARIA
WATERWAY
Heliport
R 24 E
R 25 E
R 23 E
36
23
39
45
28.8
21.9
11.9
21.3
10.1
22.3
34.7

Header listing for GIS file: BA-3CB890_SP.gis
Date statistics printed: 27-Jun-1994
Date statistics created: 27-Jun-1994

This file has 566 rows, and 431 columns

This image is geo-referenced to a State Plane coordinate system
The upper left corner has coordinate: 2391764, 387406.3

The cell size is (X, Y): 82, 82
The number of acres per cell is: 0.1543618
Upper left corner data file coordinate (X,Y) is: 14882, 3492

Number of classes in this variable is: 20
This file contains 8-bit data
The VARIABLE name is CZONE 1988/90 merge habitat data - 78 match

VALUE	POINTS	Acres	%	DESCRIPTION
0	65256.	10073.033	0.00 %	OUT
1	86169.	13301.202	48.22 %	WATER
2	387.	59.738	0.22 %	AB FLOATING
3	1876.	289.583	1.05 %	AB SUBMERGED
4	18.	2.779	0.01 %	FRESH MARSH
5	36903.	5696.414	20.65 %	INTERMEDIATE MARSH
6	46999.	7254.850	26.30 %	BRACKISH MARSH
7	0.	0.000	0.00 %	SALINE MARSH
8	0.	0.000	0.00 %	ESTUARINE MARSH
9	789.	121.791	0.44 %	CYPRESS FOREST
10	65.	10.034	0.04 %	BOTTOMLAND FOREST
11	6.	0.926	0.00 %	UPLAND FOREST
12	0.	0.000	0.00 %	DEAD FOREST
13	126.	19.450	0.07 %	BOTTOMLAND SHRUB/SCRUB
14	4724.	729.205	2.64 %	UPLAND SHRUB/SCRUB
15	0.	0.000	0.00 %	SHORE/FLAT
16	595.	91.845	0.33 %	AG/PASTURE
17	3.	0.463	0.00 %	UPLAND BARREN
18	18.	2.779	0.01 %	DEVELOPED
19	12.	1.852	0.01 %	OTHER LAND
Totals:	178690.	27582.910		

Totals and Percentages are Based on Non-zero points

13,450 water total

5699 ac Int Marsh
2048 ac Int water

7254 brack marsh
11,602 brack water

Total area = 26603 ac

Coastal Wetland Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Area I

Project: Naomi (BA-3C)

Date: 6/28/94

Wetland Type: Intermediate

Land Loss Rate: 1.17%/year (pre-Naomi loss)

Marsh Acreage: 5,699

Water Acreage: 2043

Total Acreage: 7,742 AC

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water <= 1.5'	V5 Salinity	V6 Fish Access
	TY0	5,699 74%	80%	75 = 1 15 = 2 10 = 3	80%	1‰	1
FWOP (loss - 0.292%) (Siphon reduces loss by 75%)	1 (-17 AC/yr)	5682 73%	↓	↓	80%	↓	↓
	20 (-333)	5366 AC 69%	80%	85 = 1 15 = 2	85%		
FWP (loss - 0.0731) (Reduced loss by 93%)	1 (-4 AC)	5695 AC 74%	81%	75 = 1 15 = 2 10 = 3	80%		
	20 (-83)	5616 72%	85%	90 = 1 10 = 2	90%	↓	↓

a II = 848.5 AC (50%)
21.2/yr / 3433 ~~2584~~ AC = ~~0.8%/yr~~ 3.35%/yr

Total losses used =
a I = 1.17%
a II = 0.967%
a III = 3.53%
These rates are based on 1983 marsh area.
(over)

Remarks: Marsh loss — Original rate for entire area = 1.008%/yr. This contained ~10,000 acres of upland & those not in proj. area. Total loss ~~for~~ from 1983-1990 = 1,697 AC = 242.4 AC/yr. Loss allocated to three areas as follows: Area I = 509.1 AC/7 yrs = 72.7 AC/yr / ~~5,844~~ 6208 (1983) = ~~1.27%~~/yr 1.17%; Area 2 = 339.4 (20%) (20% of loss = 339.4) = 48.5/yr / ~~5015 AC~~ ~~4670 AC~~ 5009 AC = ~~1.03%~~ 0.967%/yr; Area III =

Coastal Wetland Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NAOmi (BA-30) Area II

Date: 6/28/94

Wetland Type: Brackish

Land Loss Rate: 0.967%/yr (pre-NAOmi)

Marsh Acreage: 4,670 ac

Water Acreage: 5,941

Total Acreage: 10,611 AC

Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water <= 1.5'	V5 Salinity	V6 Fish Access
TY0	4670 AC 44%	50%	35 - 1 15 - 3 50 - 4	25%	3 ppt	1
loss = 0.725%/yr FWOP -34 1	4636 AC 44%	50%				
-677 AC 20	3993 AC 38%	60%	30% - 1 20% - 3 50% - 4			
loss = 0.543%/yr FWP -25.4 AC 1	4645 44%	55%	35 - 1 15 - 3 50 - 4	25%		
-508 AC 20	4162 39%	75%	31 - 1 19 - 3 50 - 4	30%		

Remarks: Marsh loss = -339.4 AC / 7 yrs = 48.5 AC/yr for 4670 AC = 1.03%/yr; But we used 0.967%/yr.
FWOP - loss decreased 25% due Sabine (To 0.725%/yr)
FWP - 25% reduction of Baseline loss rates (25% red. of 0.725% = 0.5437%/yr

Coastal Wetlands Planning Protection and Restoration Act
Wetland Value Assessment Worksheet

Area III

Project: NAomi (BA-3c)

Date: 6/28/94

Wetland Type: Brackish

Marsh acreage: 2584 Ac

Water acreage: 5661 Ac

Total acreage: 8245 Ac

Land Loss Rate: 3.53% (121.21 Ac / 3432.5 Ac (in 1983))

Target Year	V1 % Marsh	V2 % SAV	V3 Marsh edge	V4 Water ≤ 1.5'	V5 Salinity	V6 Fish access
TY0	2,584 31%	50%	10 = 1 10 = 2 30 = 3 50 = 4	30%	4‰	1
-86.5Ac 1 (Diff = -3.35%/yr) FWOP	2497 30%			29%		
-1,731Ac 20	853Ac 10%		20 = 3 80 = 4	10%		
-76Ac 1 (Diff = -2.93%/yr) FWP	2508 Ac 30%	51%	Same as Base	29%	3‰	
-1514 20	1070Ac 13%	55%	25 = 3 75 = 4	15%		

Remarks: FWOP - reduce water by 5% due Sediment (= 3.35%/yr)

FWP - reduce Baseline rate of 3.35%/yr by 15% or 2.93%/yr

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

MULTIPLE AREA BENEFITS SUMMARY SHEET

Project: Naomi Siphon Outfall Management
(BA–3c)

The WVA analysis for project BA–3c includes 3 areas: Area 1, an intermediate marsh occupying the northern portion of the overall project area; Area 2, a brackish marsh in the central part of the project area; and Area 3, a brackish marsh in the southern portion of the project area. Total WVA benefits (AAHU's) for this project are obtained by adding the benefits calculated for each area, as summarized below:

Area	AAHU's
1	113.82
2	142.66
3	122.43

TOTAL BENEFITS = 379 AAHU'S

30–Oct–95

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project..... Naomi Siphon Outfall Management (BA-3c)
Area 1
Condition: Future Without Project

Marsh type acres:
Fresh.....
Intermediate.. 7747

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	74	0.77	73	0.76	69	0.72
V2	% Aquatic	80	0.82	80	0.82	80	0.82
V3	Interspersion	%		%		%	
	Class 1	75	0.88	75	0.88	85	0.94
	Class 2	15		15		15	
	Class 3	10		10			
	Class 4						
	Class 5						
V4	%OW <= 1.5ft	80	1.00	80	1.00	85	1.00
V5	Salinity (ppt)						
	fresh		1.00		1.00		1.00
	intermediate	1		1		1	
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.84	HSI =	0.83	HSI =	0.82

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project..... Naomi Siphon Outfall Management (BA-3c)
Area 1
Condition: Future With Project

Marsh type acres:
Fresh.....
Intermediate.. 7747

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	74	0.77	74	0.77	72	0.75
V2	% Aquatic	80	0.82	81	0.83	85	0.87
V3	Interspersion	%		%		%	
	Class 1	75	0.88	75	0.88	90	0.96
	Class 2	15		15		10	
	Class 3	10		10			
	Class 4						
	Class 5						
V4	%OW <= 1.5ft	80	1.00	80	1.00	90	1.00
V5	Salinity (ppt)						
	fresh		1.00		1.00		1.00
	intermediate	1		1		1	
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.84	HSI =	0.84	HSI =	0.84

AAHU CALCULATION

Project: Naomi Siphon Outfall Management (BA–3c)
Area 1

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	7747	0.84	6484.26	
1	7747	0.83	6447.94	6466.10
20	7747	0.82	6335.54	121443.05
			AAHU's =	6395.46

Future With Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	7747	0.84	6484.26	
1	7747	0.84	6497.74	6491.00
20	7747	0.84	6522.74	123694.56
			AAHU's	6509.28

NET CHANGE IN AAHU'S DUE TO PROJECT	
A. Future With Project AAHU's =	6509.28
B. Future Without Project AAHU's =	6395.46
Net Change (FWP – FWOP) =	**113.82**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project.....Naomi Siphon Outfall Management (BA-3c) Area 2 Marsh type acres..... 10611

Condition: Future Without Project

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	44	0.50	44	0.50	38	0.44
V2	% Aquatic	50	0.65	50	0.65	60	0.72
V3	Interspersion	%		%		%	
	Class 1	35	0.51	35	0.51	30	0.48
	Class 2						
	Class 3	15		15		20	
	Class 4	50		50		50	
	Class 5						
V4	%OW <= 1.5ft	25	0.42	25	0.42	25	0.42
V5	Salinity (ppt)	3	1.00	3	1.00	3	1.00
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.61	HSI =	0.61	HSI =	0.59

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project.....Naomi Siphon Outfall Management (BA-3c) Area 2 Marsh type acres..... 10611

Condition: Future With Project

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	44	0.50	44	0.50	39	0.45
V2	% Aquatic	50	0.65	55	0.69	75	0.83
V3	Interspersion	%		%		%	
	Class 1	35	0.51	35	0.51	31	0.49
	Class 2						
	Class 3	15		15		19	
	Class 4	50		50		50	
	Class 5						
V4	%OW <= 1.5ft	25	0.42	25	0.42	30	0.49
V5	Salinity (ppt)	3	1.00	3	1.00	3	1.00
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.61	HSI =	0.62	HSI =	0.61

AAHU CALCULATION

Project: Naomi Siphon Outfall Management (BA–3c)
Area 2

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	10611	0.61	6489.61	
1	10611	0.61	6489.61	6489.61
20	10611	0.59	6229.71	120833.55
			AAHU's =	6366.16

Future With Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	10611	0.61	6489.61	
1	10611	0.62	6542.04	6515.82
20	10611	0.61	6474.86	123660.52
			AAHU's	6508.82

NET CHANGE IN AAHU'S DUE TO PROJECT	
A. Future With Project AAHU's =	6508.82
B. Future Without Project AAHU's =	6366.16
Net Change (FWP – FWOP) =	**142.66**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project.....Naomi Siphon Outfall Management (BA-3c) Area 3 Marsh type acres..... 8245

Condition: Future Without Project

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	31	0.38	30	0.37	10	0.19
V2	% Aquatic	50	0.65	50	0.65	50	0.65
V3	Interspersion	%		%		%	
	Class 1	10	0.38	10	0.38		0.24
	Class 2	10		10			
	Class 3	30		30		20	
	Class 4	50		50		80	
	Class 5						
V4	%OW <= 1.5ft	30	0.49	29	0.47	10	0.23
V5	Salinity (ppt)	4	1.00	4	1.00	4	1.00
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.54	HSI =	0.53	HSI =	0.37

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project.....Naomi Siphon Outfall Management (BA-3c) Area 3 Marsh type acres..... 8245

Condition: Future With Project

Variable		TY 0		TY 1		TY 20	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	31	0.38	30	0.37	13	0.22
V2	% Aquatic	50	0.65	51	0.66	55	0.69
V3	Interspersion	%		%		%	
	Class 1	10	0.38	10	0.38		0.25
	Class 2	10		10			
	Class 3	30		30		25	
	Class 4	50		50		75	
	Class 5						
V4	%OW <= 1.5ft	30	0.49	29	0.47	15	0.29
V5	Salinity (ppt)	4	1.00	3	1.00	3	1.00
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.54	HSI =	0.53	HSI =	0.40

AAHU CALCULATION

Project: Naomi Siphon Outfall Management (BA–3c)
Area 3

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	8245	0.54	4426.62	
1	8245	0.53	4371.70	4399.16
20	8245	0.37	3069.04	70687.05
			AAHU's =	3754.31

Future With Project			Total	Cummulative
TY	Acres	x HSI	HU's	HU's
0	8245	0.54	4426.62	
1	8245	0.53	4378.65	4402.63
20	8245	0.40	3319.48	73132.26
			AAHU's	3876.74

NET CHANGE IN AAHU'S DUE TO PROJECT	
A. Future With Project AAHU's =	3876.74
B. Future Without Project AAHU's =	3754.31
Net Change (FWP – FWOP) =	**122.43**

Coastal Wetland Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: Naomi Siphon outfall Mgt. - BA-3c
Area 1

Date: 6/28/94

Marsh Acreage: 5,699ac

Wetland Type: Intermediate

Water Acreage: 2,048ac

Land Loss Rate: 1.17%/yr, reduced FWOP to 0.293%/yr

Total Acreage: 7,747ac

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water <= 1.5'	V5 Salinity	V6 Fish Access
	TY0	5,699ac 74%	80%	Class 1 - 75% Class 2 - 15% Class 3 - 10%	80%	1 ppt	1.0
FWOP	1	5682ac 73%	80%	↓	↓	↓	↓
	20	5366ac 69%	80%	1 - 85% 2 - 15%	85%	↓	↓
FWP	1	5,695ac 74%	81%	1 - 75% 2 - 15% 3 - 10%	80%	1 ppt	1.0
	20	5616ac 72%	85%	1 - 90% 2 - 10%	90%	↓	↓

Loss rate reduced FWP by 75% to 0.073%/yr.

Remarks:

Coastal Wetland Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: Naomi Siphon outfall Mgt. - BA-3c
Area 2

Date: 6/28/94

Marsh Acreage: 4670 ac

Wetland Type: Brackish

Water Acreage: 5941 ac

Land Loss Rate: 0.725%/yr.

Total Acreage: 10,611 ac

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water <= 1.5'	V5 Salinity	V6 Fish Access
	TY0	4670ac 44%	50%	class 1 - 35% class 3 - 15% class 4 - 50%	25%	3 ppt	1.0
FWOP	1	4636ac 44%	↓	↓	↓	↓	↓
	20	3993ac 38%	60%	1 - 30% 3 - 20% 4 - 50%	↓	↓	↓
FWP	1	4645ac 44%	55%	1 - 35% 3 - 15% 4 - 50%	25%	3 ppt	1.0
	20	4163ac 39%	75%	1 - 31% 3 - 19% 4 - 50%	30%	↓	↓

Remarks: Historic loss rate was 0.967%/yr. For baseline & FWOP, we estimated that the siphon alone had reduced that rate by 25%, to 0.725%/yr. For FWP, we estimated the outfall mgt. project would further reduce loss rates another 25% to 0.543%/yr.

Coastal Wetland Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: Naomi Siphon Outfall Mgt. BA-3c Area III

Date: 6/28/94

Wetland Type: Brackish

Land Loss Rate: 3.353%/yr.

Marsh Acreage: 2,584ac

Water Acreage: 5,661 ac

Total Acreage: 8,245ac

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water <= 1.5'	V5 Salinity	V6 Fish Access
	TY0	2584ac 31%	50%	Class 1- 10% Class 2- 10% Class 3- 30% Class 4- 50%	30%	4ppt	1.0
FWOP	1	2497ac 30%	↓	↓	29%	↓	↓
	20	851ac 10%	↓	3 - 20% 4 - 80%	10%	↓	↓
FWP	1	2508ac 30%	51%	1 - 10% 2 - 10% 3 - 30% 4 - 50%	29%	3ppt	1.0
	20	1064ac 13%	55%	3 - 25% 4 - 75%	15%	3ppt	↓

Remarks: Historic (pre-siphon) loss rate = 3.53%/yr. For baseline and FWOP scenario, estimated siphon alone reduces that rate 5% to 3.353%/yr.

For FWP, estimate baseline loss rate reduced by 13% to 2.91%/yr