

Project Information Sheet for Wetland Value Assessment South White Lake, Vermilion Parish, LA

Project Name: South White Lake Shoreline Protection (ME-22)

Sponsoring Agency: U.S. Army Corps of Engineers

Environmental Work Group Contact: Sean Mickal, (504) 862-2319

Engineering Work Group Contact: Chris Monnerjhan, (504) 862-2415

Corps Project Manager Point of Contact: Melanie Goodman, (504) 862-1940

DNR Project Manager Point of Contact: Ken Duffy, (225) 342-4106

Project Area: The project is located in Vermilion Parish, along the south shoreline of White Lake, between Will's Point and the western shore of Bear Lake.

Sub Area A (The Kaplan Tract)

These acres come from USGS 1998 DOQQs. The acreage has been brought forward to 2002 using a loss rate of 1.37%. The reason for using this loss rate is explained later.

Total acres 4,717 acres

Fresh Marsh 1,935 acres

Open water 2,782 acres

There is no change in these acres from the last WVA prepared during Phase 0, dated 18 September 2002.

Sub Area D (The Shoreline)

Protection is based on a 15-foot per year loss rate over 20 years; a shoreline length of 61,500 feet; and the dike placed 250 feet offshore at the -1.5 foot (NAVD 88) contour in approximately 2-3 feet of water, stage dependent. Toe of dike is approximately 235 feet off shore (235 x 61,500) = 14,452,500 = 332 acres

Total acres 756 acres

Fresh Marsh 424 acres

Open water 332 acres

Total Project Acreages: Areas A and D only

Total acres 5,473 acres

Fresh Marsh 2,359 acres

Open water 3,114 acres

Net Areas Preserved

Net Areas Preserved		
	Sub Area A	Sub Area D
FWOP TY20	1,150	0
FWP TY20	1,413	424
Net Preserved	263	424

Project Information Sheet for Wetland Value Assessment South White Lake, Vermilion Parish, LA

Total Net Preserved (Sub Area A + Sub Area D) = 687 acres

Total Net Acres Created Sub Area D = 157

Total Net Gain FWP TY20 = 844

Problem:

Sub Area A: This sub area is expected to experience accelerated marsh loss when interior levees are breached as a result of a shoreline levee breach sometime around TY12. The area has subsided due to several years of gravity drainage and portions are below the level of White Lake. This area has been enlarged over the PPL 11 project to take into account the area is hydrologically connected and drained by a single pump in the southeast corner of the boundary area.

Sub Area D: Erosion is believed to be the cause of marsh loss in this Sub Area. USACE land loss maps indicate it is the only cause of loss in a strip about a mile wide along the south shore of White Lake. The old lake rim has eroded away and the more fragile marshes erode more rapidly as evidenced by the severely scalloped shoreline in the Sub Area. The breakwater addresses the erosion problem in Sub Area D. Approximately 157 acres of marsh would be created from beneficial use of material dredged for floatation channel.

Goals:

The project goal is to stop erosion along the South White Lake shoreline between Will's Point and west of Bear Lake, and to build marsh substrate behind the rock breakwaters using dredge material from the project construction floatation channel. A secondary goal is to prevent a breach from occurring between White Lake and the management unit known as the Kaplan Tract.

Project Features:

A segmented breakwater would be constructed at the -1.5-foot NAVD 88 contour in two to three feet of water, stage dependent. The breakwater would be constructed along approximately 61,500 linear feet of shoreline between Will's Point and past the western side of Bear Lake. The breakwater would follow along the shoreline of Bear Lake. The breakwater would have a crown elevation of +3.5 feet NAVD 88, with a 4-foot wide crown and 1V on 1.5H side slopes. The stone section would be placed on geotextile reinforcing fabric. There would be 50-foot wide, rock lined gaps in the breakwater at 1,000-foot intervals. A floatation channel would be necessary to construct the dike. Dredge material removed to construct the floatation channel would be beneficially used to create 157 acres of marsh substrate between the breakwater and the shoreline. The original WVA attributed 60 acres of benefits due to accretion over the 20-year project life. The breakwater design has been revised and is higher than the conceptual plan. Since overtopping of the breakwater is not expected to occur as frequently as the conceptual plan, and the area between the breakwater and the shoreline would be filled with dredge material to create marsh substrate, incremental benefits are no longer being attributed to accretion. However, it is believed that the breakwater would be overtopped periodically, and sufficient accretion would occur over the life of the project to help nourish and sustain the elevation and health of the created marsh.

Project Information Sheet for Wetland Value Assessment South White Lake, Vermilion Parish, LA

Monitoring Information:

Cameron Prairie Refuge Protection

A 13,200-foot long rock breakwater was placed on the north bank of the GIWW in January 1994. It was 0-50 feet offshore in 3-4 feet of water. The rocks stopped erosion in the project area and allowed 4.6 feet of horizontal accretion in the first year. This fresh marsh area accreted 1.4 acres per year over 13,200 feet and now completed covers the area between the dike and the shoreline. In the reference area, erosion continued at 4 feet per year.

Freshwater Bayou Wetlands (ME-04) Phase I

A 28,000-foot long rock dike was completed along the western bank of Freshwater Bayou in January 1995. Over the next year 2.3 feet of land accreted behind the rocks while the reference area eroded 6.5 feet.

Boston Canal/Vermilion Bay Sub Area D Protection

Breakwaters were built to a +4 foot elevation in 4-6 feet of water at the mouth of Boston Canal in December 1994. Sediment fences were placed behind the breakwaters. Within less than a year, there was between 1.5 and 4.5 feet of vertical accretion behind the breakwaters.

Blind Lake Shore Protection

In a state only project, a 2,340-foot rock breakwater was built across the mouth of Blind Lake on the south bank of the GIWW in 1989. Giant cutgrass was planted 70 feet from shore. Containerized had 99 % survival at 2.5 months, fresh dug had 82 % survival. In 2.5 years, vertical accretion was .3 feet. By the mid-90s, this entire fresh marsh area had filled and was colonized with giant cutgrass, elephant ear and willow.

Tuttle Cove Gabions

In a state-only project, 1,642 feet of rock –filled gabions were built across the mouth of the Prairie on the western shore of Lake Pontchartrain in 1994. They were 300 feet offshore and 3 feet above mean high water. This intermediate to brackish area prograded an average of 3.5 feet per year while the reference area eroded 6.3 feet per year. There was a 6-foot gap near the south end of the gabions and accretion was greater near this gap. By 1999 the gabions were starting to deteriorate.

V1 Emergent Vegetation

Baseline

Emergent Vegetation - This area has been classified as fresh marsh since O'Neil mapped it. The dominant vegetation has changed from the sawgrass found by O'Neil to mainly *Phragmites communis*, *Zizaniopsis miliacea*, *Scirpus californicus*, and *Sagittaria falcata* as noted by Chabreck in 1997. Numerous other fresh marsh species, such as elephant ear, *Sesbania*, and willow were noted.

Soils and Subsidence - The soil type along the White Lake Sub Area D between Bear Lake and Will's Point is mainly Larose muck. Larose Muck is classified as very poorly drained and very slowly permeable, semi-fluid mineral soils. The subsidence rate in this area is low (from 0 to 1

Project Information Sheet for Wetland Value Assessment South White Lake, Vermilion Parish, LA

foot per century)¹. Lake bottom in the project area was former shoreline and consists of very soft to soft fat clay with lenses and layers of lean clay, silt, and peat with relatively high moisture contents and wood. Approximately 4 to 10 feet of lacustrine deposits are found with the marsh/swamp. Lacustrine deposits consist of very soft to soft fat and lean clays with shell fragments. Pleistocene age deposits underlie marsh/swamp and lacustrine deposits and are found 7-25 feet deep, with the much deeper deposits on the western end of the project site. These Pleistocene deposits consist of stiff to very stiff clays, silts, silty sand, and sands with low water content.²

Sub Area A

The southwestern portion of this area has opened significantly since the late 1980s when land management strategies in this area changed. The USACE data ends at 1990 therefore, 1998 DOQQs from LDNR were coupled with the USACE data to calculate a loss rate from 1990 to 1998. The DNR acreages were adjusted accordingly to calculate the loss rate. Erosion rates calculated by comparing 1978-79 aerial photography with 1997-98 aerial photographs showed erosion rates averaging 47.62 acres per year or roughly 0.91% per year. A comparison was then done using the 1998 DOQQ compared to the 1993 Land/Water classification. This later comparison showed an erosion rate during this 5 year time period of 8.30% per year. This erosion rate exemplifies the land loss potential when agricultural land is abandoned and allowed to convert back to fresh water marsh after decades of active farming. A weighted average using USGS data from 1956 to 1998 showed an average loss per year of 1.37%. This average was used as the base loss rate. It was determined that a levee breach would occur in TY12. A 25% increase in erosion rate was factored into the PPL 11 candidate project. However, given the calculated land loss from 1993 to 1998 and recent survey data, which suggests that much of Sub Area A is below mean Catfish Lake level, the potential for inundation could be even more severe. As a result, a 50% increase in loss rate (to 2.06%) was applied after year 12.

	Sub Area A
COE % Loss 55-74 per year	0.02
COE % Loss 74-90 per year	0.71
COE % Loss 83-90 per year	1.57
USGS % Loss 56-78 per year	0.05
USGS % Loss 78-98 per year	0.91
USGS Apparent % Loss 93-98 per year	8.30
Weighted Averages	
COE % Loss 55-90 per year	0.34
USGS % Loss 56-90 per year	0.35
USGS % Loss 56-98 per year	1.37

¹ USDA Natural Resources Conservation Service. 1996. Soil Survey of Vermilion Parish, Louisiana

² CEMVN. 2004. CWPPRA South White Lake Shoreline Protection Project (#ME-22), Vermilion Parish, LA, Preliminary Design Report.

**Project Information Sheet for Wetland Value Assessment
South White Lake, Vermilion Parish, LA**

Sub Area A	Land	%	Water	%	Total	%
1993	4072.92	85.02166	717.53	14.97834	4790.45	100
1998	2058.54	43.53603	2669.82	56.46397	4728.36	100
1998 rec	2085.572	43.53603	2704.878	56.46397	4790.45	100
Loss/Gain 1993-1998	1987.348	acres				
% Loss 1993-1998	41.48563					
Acres Lost Per Year	397.4697					
% Lost Per Year	8.297126					
Erosion Rate 93-98	8.30%					

Sub Area D

This area uses the estimated Sub Area D erosion rate instead of land loss from Britsch's maps. Erosion rates were calculated by comparing 1978-79 color IRs and the 1997-98 infragreens. Sub Area D erosion rates averaged approximately 15 feet per year.

Future without project

Sub Area A

With an erosion rate of 15 feet per year on the south shore of White Lake, it was estimated that after TY12 the levee would break in several places bordering Sub Area A. For the first 11 years a loss rate of 1.37% was used. It is doubtful that the landowner would repair the levee. Since a large portion of the leveed area is below the water level in White Lake, a portion of the area would be flooded. It is projected that a rapid loss of marsh would occur following inundation from White Lake. This loss of marsh is expected to occur in TY12 as a 20% loss of the TY11 marsh acreage. Following this instantaneous marsh loss, the land loss rate would be 50% higher than the rate used for TY1 – TY11. A 50% increase in the 1.37% rate is 2.06% per year.

Future with project

The project protects the shoreline and so no breach occurs, therefore the loss rate of 1.37% per year remains constant through TY20.

<u>Future without project</u>			<u>Future with project</u>		
TY0	41%	1,935/4,717	TY0	41%	1,935/4,717
TY1	40%	1,909/4,717	TY1	40%	1,909/4,717
TY11	35%	1,663/4,717			
TY12	28%	1,330/4,717*			
TY20	24%	1,150/4,717**	TY20	30%	1,413/4,717

*Levee breach occurs causing a 20% loss of TY11 acreage

**Loss rate of 2.06% is applied to TY12 acreage

Sub Area D

Future without project

When the average erosion rate of 15 feet per year was applied to the 61,500 feet of Sub Area D over 20 years, a total of 424 acres would be lost without the project. This averages to 21 acres per year.

**Project Information Sheet for Wetland Value Assessment
South White Lake, Vermilion Parish, LA**

Future with project

The breakwater is assumed to stop erosion along the Sub Area D. The dredged material from the flotation canal would be beneficially used to create approximately 157 acres of marsh.

<u>Future without project</u>			<u>Future with project *</u>		
TY0	56%	424 acres	TY0	56%	424 acres/756
TY1	52%	403 acres	TY1	58%	440 acres (424 + 16 created)/756
			TY5	77%	581 acres (424 + 157 created)/756
TY20	0%	0 acres	TY20	77%	581 acres (424 + 157 created)/756

*For future with project, 157 acres of marsh substrate created by beneficial disposal of material dredged for flotation channel would produce 10% or 16 acres of emergent vegetation in TY1 and 100% or 157 acres of emergent vegetation at TY5.

V2 Submerged Aquatic Vegetation

Sub Area A

Baseline

TY0 20% - DNR habitat data

<u>Future without project</u>		<u>Future with project</u>	
TY1	20%	TY1	20%
TY11	20%		
TY12	17%*		
TY20	15%	TY20	20%**

*After the levee breaks through, the SAV coverage would likely decrease. The group decided not to decrease the coverage very much since SAV does occur in Bear Lake, demonstrating that the turbid water from White Lake would not eliminate SAV.

**The SAV would remain at 20% since the breakwater would prevent the levee break.

Sub Area D

Baseline

TY0 1% Almost no SAV exists along the shoreline of White Lake, except along the edge of Bear Lake.

<u>Future without project</u>		<u>Future with project</u>	
TY1	1%	TY1	5%
		TY5	60%**
TY20	1%*	TY20	60%

*As erosion continues, the SAV coverage would likely remain at 1% as the area continues to erode and deepen.

**The breakwater and created marsh would protect the approximately 50-foot wide area of open water remaining between the shoreline. The entire open water area is expected to become shallow (less than 1.5 feet deep) and SAV coverage would substantially increase.

**Project Information Sheet for Wetland Value Assessment
South White Lake, Vermilion Parish, LA**

V3 Marsh Edge/Interspersion

Sub Area A

Baseline

TY0 Class 1 - 10%
Class 2 - 40%
Class 3 - 20%
Class 4 - 30%

Future without project

TY1 Same as existing

Future with project

TY1 Same as existing

TY11 Class 1 - 5%
Class 2 - 40%
Class 3 - 20%
Class 4 - 35%

N/A

TY12 Class 2 - 15%
Class 3 - 30%
Class 4 - 55%

N/A

TY20 Class 2 - 10%
Class 3 - 30%
Class 4 - 60%

Class 2 - 40%
Class 3 - 20%
Class 4 - 40%

Sub Area D

Baseline

The marsh is solid, but its proximity to open water makes about 50% a Class 4.

TY0 Class 1 - 50%
Class 4 - 50%

Future without project

TY1 Class 1 - 50%
Class 4 - 50%

Future with project

TY1 Class 1 - 100%*

TY5 Class 1 - 100%

TY20 Class 5 - 100%

TY20 Class 1 - 100%

*The created marsh would increase the actual acreage and percent of Class 1, comparing FWP to FWOP.

**Project Information Sheet for Wetland Value Assessment
South White Lake, Vermilion Parish, LA**

V4 Shallow Open Water

Sub Area A

Baseline

TY0 80% 2,226/2,782 acres - According to Mr. Randy Moertle

Future without project

TY1 80%

TY11 81%

TY12 75%

TY20 75%

Future with project

TY1 80%

TY20 83%

Assume all marsh lost becomes SOW

Sub Area D

Baseline

According to transect data furnished by NRCS, shallow water \leq 1.5-foot deep extends to about 30 feet offshore in this area of White Lake. Thus, about 42 acres of the 332 acres of open water are shallow.

TY0 13% 42/332

Future without project

Sub Area D erosion would continue and the percentage of water in the project area would increase. The strip of shallow water would stay the same size.

TY1 12% 42/353

TY20 6% 42/756

Future with project

Sub Area D erosion would be stopped and marsh would be created in 157 acres of the open water area leaving 175 acres of open water. Most of the remaining 50-foot wide, open water area between the created marsh and the existing shoreline would remain or become shallow (\leq 1.5 feet). The water depth in and near the areas that would be occupied by the fish gaps is expected to remain $>$ 1.5 feet (approximately 12 acres [41.9 ft x 200 ft (area of water bottom between gap and created marsh) x 61 (number of gaps)]).

TY1 24% 42/175

TY5 93% 163/175

TY20 93% 163/175

By TY3 all remaining open water between the existing shoreline and the newly created marsh, which would average approximately 50 feet wide, would be shallow.

V5 Salinity

Sub Area A

Baseline

TY0 0 ppt

Future without project

TY1 0 ppt

Future with project

TY1 0 ppt

**Project Information Sheet for Wetland Value Assessment
South White Lake, Vermilion Parish, LA**

TY11 0 ppt
 TY12 1 ppt *
 TY20 1 ppt

TY20 0 ppt

* Levee break increases salinity to 1 ppt, same as Catfish Lake.

Sub Area D

Average high salinity at Catfish Point north was about 3.5 ppt during the growing seasons from 1995-98 (HICP, July 2000 draft). As the Mermentau River water moves into Grand Lake, salinity would become diluted. The mean high salinity in White Lake would probably be about 1 ppt. The project would do nothing to change salinity.

Baseline

TY0 1 ppt

<u>Future without project</u>	<u>Future with project</u>
All TYs 1 ppt	All TYs 1 ppt

V6 Fish Access

Sub Area A

Baseline

TY0 0.0001 The value for fresh marsh without fish access.

<u>Future without project</u>	<u>Future with project</u>
TY1 0.0001	TY1 0.0001
TY11 0.0001	
TY12 0.1*	
TY20 0.1	TY20 0.0001

*Levee breaks increasing to 0.1, the same as White Lake.

Sub Area D

Baseline

TY0 0.1 The rating for the Catfish Point Control Structure.

<u>Future without project</u>	<u>Future with project</u>
TY1 0.1	TY1 0.1 Access would remain 0.1 due to the fish dips.
	TY3 0.1
	TY5 0.1
TY20 0.1	TY20 0.1

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **Grand/White Lakes Landbridge Protection**
Option A - Rock Breakwaters
 Condition: Future Without Project

Project Area:
 Fresh..... 1,530
 Intermediate..

Variable		TY 0		TY 1		TY 15	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	29	0.36	29	0.36	17	0.25
V2	% Aquatic	3	0.13	3	0.13	3	0.13
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%	0.20	%	0.20	%	0.20
		100		100		100	
V4	%OW <= 1.5ft	4	0.15	4	0.15	4	0.15
V5	Salinity (ppt) fresh intermediate	1	1.00	1	1.00	1	1.00
V6	Access Value fresh intermediate	0.10	0.37	0.10	0.37	0.10	0.37
Emergent Marsh HSI =		0.42		EM HSI =	0.42	EM HSI =	0.34
Open Water HSI =		0.23		OW HSI =	0.23	OW HSI =	0.23

0 0 0
 0 0 0
 0 0 0
 0.2 0.2 0.2

1.00 1.00 1.00

0.37 0.37 0.37

Project: **Grand/White Lakes Landbridge Protection**
 FWOP

Variable		TY 20					
		Value	SI	Value	SI	Value	SI
V1	% Emergent	14	0.23				
V2	% Aquatic	1	0.11				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%	0.20	%		%	
		100					
V4	%OW <= 1.5ft	2	0.12				
V5	Salinity (ppt) fresh intermediate	1	1.00				
V6	Access Value fresh intermediate	0.10	0.37				
EM HSI =		0.32		EM HSI =		EM HSI =	
OW HSI =		0.21		OW HSI =		OW HSI =	

0 0 0
 0 0 0
 0 0 0
 0.2 0 0

1.00

0.37

Project: **Grand/White Lakes Landbridge Protection**
 FWOP

Variable							
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%		%		%	
V4	%OW <= 1.5ft						
V5	Salinity (ppt) fresh intermediate						
V6	Access Value fresh intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

0 0 0
 0 0 0
 0 0 0
 0 0 0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **Grand/White Lakes Landbridge Protection**
Option A - Rock Breakwaters

Project Area:
 Fresh..... 1,530
 Intermediate..

Condition: Future With Project

Variable		TY 0		TY 1		TY 10				
		Value	SI	Value	SI	Value	SI			
V1	% Emergent	29	0.36	30	0.37	30	0.37			
V2	% Aquatic	3	0.13	3	0.13	5	0.15			
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.20	% 100	0.20	% 100	0.20	0	0	0
								0	0	0
								0	0	0
								0.2	0.2	0.2
V4	%OW <= 1.5ft	4	0.15	5	0.16	3	0.13			
V5	Salinity (ppt) fresh intermediate	1	1.00	1	1.00	1	1.00	1.00	1.00	1.00
V6	Access Value fresh intermediate	0.10	0.37	0.10	0.37	0.10	0.37	0.37	0.37	0.37
Emergent Marsh HSI =			0.42	EM HSI =			0.42	EM HSI =		0.42
Open Water HSI =			0.23	OW HSI =			0.23	OW HSI =		0.24

Project: **Grand/White Lakes Landbridge Protection**
 FWP

Variable		TY 20		Value	SI	Value	SI	Value	SI	
		Value	SI							
V1	% Emergent	28	0.35							
V2	% Aquatic	3	0.13							
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.20	%		%		%		0
										0
										0
										0
										0.2
V4	%OW <= 1.5ft	3	0.13							
V5	Salinity (ppt) fresh intermediate	1	1.00							1.00
V6	Access Value fresh intermediate	0.10	0.37							0.37
EM HSI =			0.41	EM HSI =				EM HSI =		
OW HSI =			0.23	OW HSI =				OW HSI =		

Project: **Grand/White Lakes Landbridge Protection**
 FWP

Variable							
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%		%		%	
V4	%OW <= 1.5ft						
V5	Salinity (ppt) fresh intermediate						
V6	Access Value fresh intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

0 0 0
 0 0 0
 0 0 0
 0 0 0

AAHU CALCULATION - EMERGENT MARSH

Project: Grand/White Lakes Landbridge Protection
Option A - Rock Breakwaters

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	451	0.42	187.28	
1	441	0.42	183.13	185.21
15	267	0.34	91.58	1893.61
20	216	0.32	70.02	403.19
			AAHUs =	124.10

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	451	0.42	187.28	
1	460	0.42	193.71	190.49
10	458	0.42	192.87	1739.61
20	429	0.41	175.63	1841.93
			AAHUs	188.60

NET CHANGE IN AAHUs DUE TO PROJECT				
A. Future With Project Emergent Marsh AAHUs	=			188.60
B. Future Without Project Emergent Marsh AAHUs	=			124.10
Net Change (FWP - FWOP) =				64.50

AAHU CALCULATION - OPEN WATER

Project: Grand/White Lakes Landbridge Protection
Option A - Rock Breakwaters

Future Without Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	1079	0.23	246.75	
1	1089	0.23	249.03	247.89
15	1263	0.23	288.82	3764.99
20	1314	0.21	279.93	1422.55
			AAHUs =	271.77

Future With Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	1079	0.23	246.75	
1	1070	0.23	245.58	246.16
10	1072	0.24	258.71	2269.27
20	1101	0.23	250.86	2548.50
			AAHUs	253.20

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	253.20
B. Future Without Project Open Water AAHUs =	271.77
Net Change (FWP - FWOP) =	-18.57

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	64.50
B. Open Water Habitat Net AAHUs =	-18.57
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	37.70

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **Grand/White Lakes Landbridge Protection**
Option B - A-Jacks
 Condition: Future Without Project

Project Area:
 Fresh..... 1,530
 Intermediate..

Variable		TY 0		TY 1		TY 15				
		Value	SI	Value	SI	Value	SI			
V1	% Emergent	29	0.36	29	0.36	17	0.25			
V2	% Aquatic	3	0.13	3	0.13	3	0.13			
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.20	% 100	0.20	% 100	0.20	0	0	0
V4	%OW <= 1.5ft	4	0.15	4	0.15	4	0.15			
V5	Salinity (ppt) fresh intermediate	1	1.00	1	1.00	1	1.00	1.00	1.00	1.00
V6	Access Value fresh intermediate	0.10	0.37	0.10	0.37	0.10	0.37	0.37	0.37	0.37
Emergent Marsh HSI =			0.42	EM HSI =	0.42	EM HSI =	0.34			
Open Water HSI =			0.23	OW HSI =	0.23	OW HSI =	0.23			

Project: **Grand/White Lakes Landbridge Protection**
 FWOP

Variable		TY 20								
		Value	SI	Value	SI	Value	SI			
V1	% Emergent	14	0.23							
V2	% Aquatic	1	0.11							
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.20	% 		% 		0	0	0
V4	%OW <= 1.5ft	2	0.12							
V5	Salinity (ppt) fresh intermediate	1	1.00					1.00		
V6	Access Value fresh intermediate	0.10	0.37					0.37		
EM HSI =			0.32	EM HSI =		EM HSI =				
OW HSI =			0.21	OW HSI =		OW HSI =				

Project: Grand/White Lakes Landbridge Protection
 FWOP

Variable							
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%		%		%	
V4	%OW <= 1.5ft						
V5	Salinity (ppt) fresh intermediate						
V6	Access Value fresh intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

0 0 0
 0 0 0
 0 0 0
 0 0 0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **Grand/White Lakes Landbridge Protection**
Option B - A-Jacks
 Condition: Future With Project

Project Area:
 Fresh..... 1,530
 Intermediate..

Variable		TY 0		TY 1		TY 10					
		Value	SI	Value	SI	Value	SI				
V1	% Emergent	29	0.36	30	0.37	28	0.35				
V2	% Aquatic	3	0.13	3	0.13	5	0.15				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%	0.20	%	0.20	%	0.20	0	0	0	
		100		100		100		0.2	0.2	0.2	
V4	%OW <= 1.5ft	4	0.15	5	0.16	5	0.16				
V5	Salinity (ppt) fresh intermediate	1	1.00	1	1.00	1	1.00	1.00	1.00	1.00	
V6	Access Value fresh intermediate	0.10	0.37	0.10	0.37	0.10	0.37	0.37	0.37	0.37	
Emergent Marsh HSI =			0.42	EM HSI =			0.42	EM HSI =			0.41
Open Water HSI =			0.23	OW HSI =			0.23	OW HSI =			0.24

Project: **Grand/White Lakes Landbridge Protection**
 FWP

Variable		TY 20									
		Value	SI	Value	SI	Value	SI				
V1	% Emergent	26	0.33								
V2	% Aquatic	4	0.14								
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%	0.20	%		%		0	0	0	
		100						0.2	0	0	
V4	%OW <= 1.5ft	6	0.17								
V5	Salinity (ppt) fresh intermediate	1	1.00					1.00			
V6	Access Value fresh intermediate	0.10	0.37					0.37			
EM HSI =			0.40	EM HSI =				EM HSI =			
OW HSI =			0.24	OW HSI =				OW HSI =			

Project: Grand/White Lakes Landbridge Protection
FWP

Variable							
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%		%		%	
V4	%OW <= 1.5ft						
V5	Salinity (ppt) fresh intermediate						
V6	Access Value fresh intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

0 0 0
0 0 0
0 0 0
0 0 0

AAHU CALCULATION - EMERGENT MARSH

Project: Grand/White Lakes Landbridge Protection
Option B - A-Jacks

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	451	0.42	187.28	
1	441	0.42	183.13	185.21
15	267	0.34	91.58	1893.61
20	216	0.32	70.02	403.19
			AAHUs =	124.10

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	451	0.42	187.28	
1	459	0.42	193.29	190.28
10	435	0.41	178.09	1670.78
20	396	0.40	157.44	1676.88
			AAHUs	176.90

NET CHANGE IN AAHUs DUE TO PROJECT				
A. Future With Project Emergent Marsh AAHUs	=			176.90
B. Future Without Project Emergent Marsh AAHUs	=			124.10
Net Change (FWP - FWOP) =				52.80

AAHU CALCULATION - OPEN WATER

Project: Grand/White Lakes Landbridge Protection
Option B - A-Jacks

Future Without Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	1079	0.23	246.75	
1	1089	0.23	249.03	247.89
15	1263	0.23	288.82	3764.99
20	1314	0.21	279.93	1422.55
			AAHUs =	271.77

Future With Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	1079	0.23	246.75	
1	1071	0.23	245.81	246.28
10	1095	0.24	266.09	2303.04
20	1134	0.24	268.92	2675.43
			AAHUs	261.24

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	261.24
B. Future Without Project Open Water AAHUs =	271.77
Net Change (FWP - FWOP) =	-10.53

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	52.80
B. Open Water Habitat Net AAHUs =	-10.53
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	32.37