State of Louisiana
Department of Natural Resources
Coastal Restoration Division and
Coastal Engineering Division

2006 Operations, Maintenance, and Monitoring Report

for

Hopedale Hydrologic Restoration (PO-24)

State Project Number PO-24
Priority Project List 8

August 14, 2007
St. Bernard Parish

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Preface

The 2007 OM&M Report format is a streamlined approach which combines the Operations and Maintenance annual project inspection information with the Monitoring data and analyses on a project-specific basis. This new reporting format for 2007 includes monitoring data collected through December 2006, and annual Maintenance Inspections through June 2007. Monitoring data collected after December 2006 and maintenance inspections conducted between July 2007 and June 2008 will be presented in the 2008 OM&M Report.

I. Introduction

The 3,805 acre Hopedale Hydrologic Restoration (PO-24) project is located southeast of Yscloskey, in St. Bernard Parish, Louisiana, and is bordered by Louisiana Highway 46 (La. Hwy. 46) on the west, the Mississippi River Gulf Outlet (MRGO) spoil deposition area to the north, and Louisiana Highway 624 (La. Hwy. 624) and Bayou La Loutre to the south and east (Figure 1). The area is predominately brackish marsh (3,086 acres) and open water (719 acres) with a small amount of saline marsh, bottomland hardwoods, and bottomland scrub/scrub within the MRGO spoil deposition area. The site was inspected on March 12, 2007, by representatives of Louisiana Department of Natural Resources (LDNR) and the National Marine Fisheries Service (NMFS).

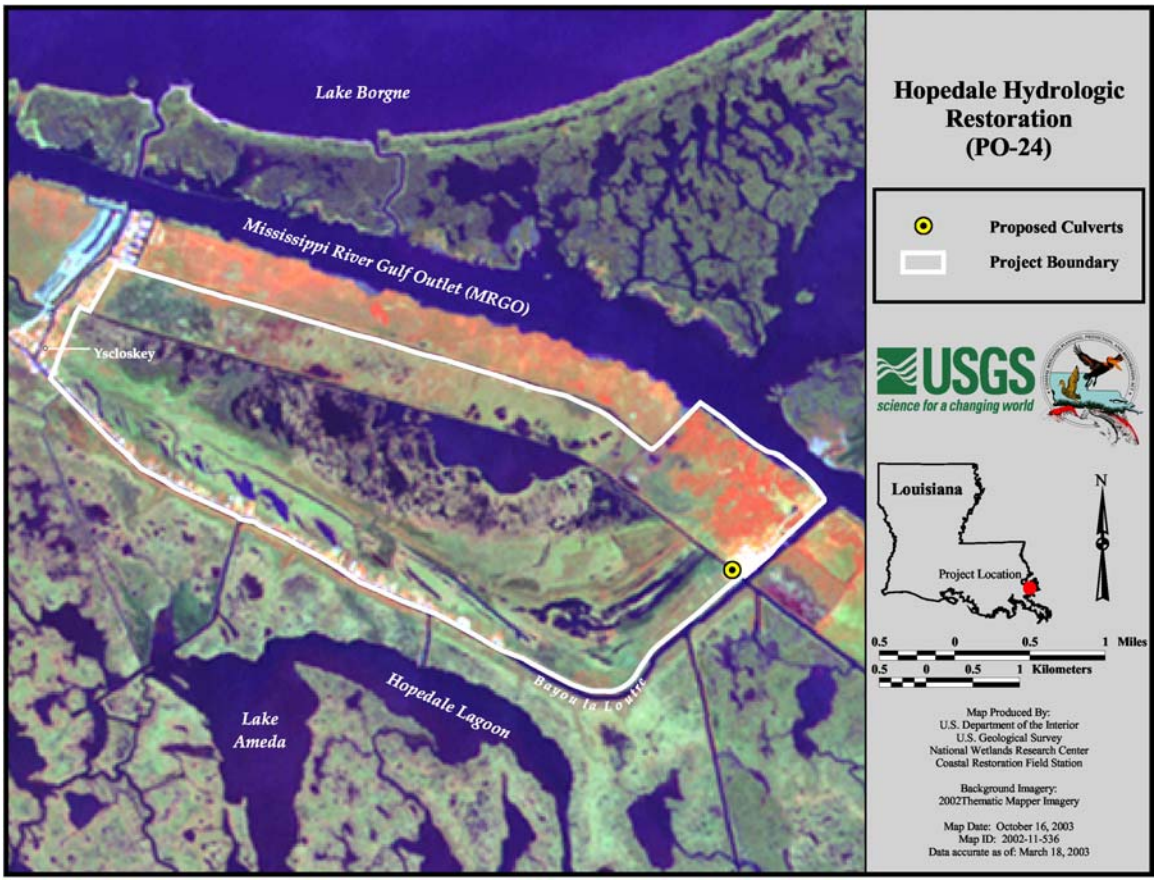

Figure 1. Hopedale Hydrologic Restoration (PO24) project area map with project features.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Hopedale Hydrologic Restoration (PO-24) project is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, LDNR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan April 21, 2005). The annual inspection report also contains a summary of maintenance projects and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Appendix B. A summary of past operation and maintenance projects completed since completion of the project can be found in Section II.

An inspection of the Hopedale Hydrologic Restoration (PO-24) project was held on March 12, 2007, by four representatives of LDNR, George Boddie, Barry Richard, Tom Bernard, and Peter Hopkins, along with Rachel Sweeny, and Cheryl Brodnax representing National Marine Fisheries Service (NMFS). The flow through the project structure was generated from an approximate 1.0 ft. head. Water levels were below the gauges, estimated gauge readings were for the outside gauge +0.5 ft. NAVD-88 and for the inside gauge –0.5 ft. NAVD-88. A Maintenance Inspection Report Check Sheet is included in Appendix C and photographs of that inspection are included in Appendix A of this report.

b. History and Project Description

Wetlands in the Hopedale area have been adversely impacted because of altered hydrology and partial impoundment caused by the construction of La. Hwy. 624 and the MRGO. During construction of La. Hwy. 624, four sets of non-gated culverts were installed under the highway. These culverts connect Bayou La Loutre with wetlands north of the highway and south of the Bayou La Loutre Ridge, and allow water to enter and exit the general project area.

As part of the construction of the MRGO, a spoil containment dike (back dike) was constructed to allow placement of material from the MRGO dredging operation. The dike almost completely impounded the marsh within the Hopedale project area, with the exception of the back dike borrow canal, which directly connected to Bayou La Loutre. A plug and water control structure were originally placed in the borrow canal approximately 400 ft from its intersection with Bayou La Loutre. This structure, which consisted of three iron culverts with flap gates, provided drainage from the area, while limiting tidal increases in minimal storm events. By the mid-1990's the plug had settled and the structure had deteriorated and become inoperable. The present project replaced the original structure with a water control structure fitted with three 82" diameter combination gates (flap/sluice gates) and two, 24"x 84" fisheries access slots (fish gates).

The project involved removal of three existing corrugated metal pipes and rock structure located within Hopedale Canal and replacing with a sheet pile/pipe pile gated structure, along with associated walkways and riprap protection. The site will require construction of temporary closure dams for dewatering the existing canal during construction.

The Hopedale control structure consists of a sheet pile/pipe pile wall, which spans the channel and extends past both banks with an overall length of 137.9'. The top of cap plate elevation is set at + 8' NAVD 88. The structure has three (3) Whipps combination gates and two (2) Whipps fish gates installed with the invert elevation at –7.0' NAVD 88. Associated with the structure is a walkway and guardrails with warning signs on each side of the structure. Canal banks and bottom have an overall length of 115' and are covered with 1' thick 10 lb. riprap and 1.5' thick 55 lb. riprap. The top of 55 lb. riprap along the canal bottom is set at elevation –8 NAVD 88.

Significant Construction Dates:

Description	Date
Bid Opening	**September 4, 2003**
Construction Contract Award	**November 14, 2003**
Pre-construction Conference	**December 2, 2003**
Notice to Proceed	**November 14, 2003**
Mobilization	**January 5, 2004**
Construction Start	**January 10, 2004**
Construction Completion	**November 30, 2004**
Final Acceptance	**January 6, 2005**

c. Summary of Past Operation and Maintenance

There have been none to date.

d. Inspection Results

Water Control Structure

At the time of the inspection, the fish gates were found to be closed and there was no flow through the structure into the interior of the project. The fish gates were opened during the inspection and were left open in accordance with the Operation and Maintenance Plan, thus restoring flow into the project area. The flow through the project structure was generated from an approximated 1.0 ft. of head. Water levels were below the gauges, estimated gauge readings were for the outside gauge +0.5 ft. NAVD-88 and for the inside gauge –0.5 ft. NAVD-88.

The slight damage to the main Hopedale Structure from the 2005 hurricanes was still evident as follows:

Structure

The transparent vinyl gate stem protective covers were missing on all five gates, and some of the chain link security fencing on the structure had been dislodged and was lying on the structure floor (Appendix A, Photo #1). The embankment adjacent to the structure was substantially eroded, and some of the upper bank rock protection around the

structure was displaced by the storm surge. It is estimated that 75 cubic yards of earthen material was eroded and 60 tons of class "B" stone was displaced.

The structure; however, is operational in its present condition. A maintenance contract is being designed to address the structure damage. The estimated cost of these repairs is:

- Engineering and Design $5,000
- Construction $80,000
- Construction Oversight $25,000
- LDNR Administration $5,000

Total $115,000

These repair costs are not included in the Three Year Operations and Maintenance Budget because they are to be reimbursed as storm damage. An application to the Federal Emergency Management Agency (FEMA) is being processed.

The mechanical actuator and the hand cranks originally furnished to St. Bernard Parish were lost in the storm. The hand cranks have been replaced and mechanical actuator will also be replaced in the above mentioned maintenance project.

Electronic Alarm Devices

The electronic alarm devices, attached to monitoring stations, alert the parish operators when project water levels indicate a need to operate the gates, see Operation Plan below. Both devices, inside and outside of the project area, are damaged beyond repair. The post-Katrina inspection revealed that the outside station was missing except for the solar panel which showed signs of wind damage. The inside station was flooded and was missing its solar panel. Funding has been requested to replace the devices with similar and more up to date equipment.

e. Maintenance Recommendations

The Hopedale Hydrologic Restoration (PO-24) project is performing and being operated in accordance with the project's design drawings and permit. The structure remains open, but it is fully operational and can be closed in the event of a pending storm. Closer monitoring of the fish gates will be required to ensure that they remain open until they can be secured from unauthorized closure. A design for public bid is being prepared to repair the minor damage associated with Hurricanes Katrina and Rita. It is anticipated that repairs will take place during summer 2007, and the funding source for these repairs will be FEMA.

Follow-up on hurricane damage repairs:

Immediate Repairs

- Repair all the damage mentioned in Section II d "Inspection Results."

Programmed Maintenance

- Continue to check gates on structure for operability.
- Service alarm devices as necessary.

III. Operation Activity

a. Operation Plan

LDNR has had an operations contract with St. Bernard Parish since January 2005 which assigns responsibility for operating the structure to the parish. The current operations plan can be seen in Table 1.

Table 1. Hopedale Hydrologic Restoration project Operation Plan.

SCENARIO	S-1 CONFIGURATION
Normal operations Bayou La Loutre below + 3.0' NAVD 88.	Combination flap/sluice gates closed (i.e., flapping). Fish access slots open.
Bayou La Loutre water levels (i.e., exterior) ≥ 3.0' NAVD 88 for four consecutive hours or when Bayou La Loutre ≥ 3.5' NAVD 88. Resume normal operations when Bayou La Loutre water levels are below +2.0' NAVD 88 for 12 consecutive hours.	Close fish access slots. Combination may be opened and resume normal (i.e., flapping) once water in Bayou La Loutre falls to +2.0' NAVD 88.
Perimeter overtopping Resume normal operation once interior gauge is ≤ 2.0' NAVD 88.	Open combination flap/sluice gates when Bayou La Loutre water levels are lower than interior water levels for 12 consecutive hours.
Interior water elevation below 0.44' NAVD 88 (Mean Low Water) for 48 consecutive hours. Resume normal operation once interior gauge is ≥ 0.75' NAVD 88 (Average Marsh Elevation).	Close one of the two fish slots.

b. Actual Operations

No operation of the gates was performed by St. Bernard Parish from the time of Hurricane Katrina to March 2007, when the operating handles that were lost in the hurricane were replaced.

IV. Monitoring Activity

a. Monitoring Goals

The objective of the Hopedale Hydrologic Restoration project is three-fold: (1) to maintain and enhance existing marshes in the project area by reducing the tidal influx of higher salinity water (2) to reduce marsh inundation intensity and duration, and (3) to maintain organism exchange.

The following goals will contribute to the evaluation of the above objective:

1. Maintain 99% of the pre-construction acres of vegetated wetlands over the life of the project.
2. Reduce the number and duration of flooding events.
3. Maintain or improve fisheries ingress and egress.

b. Monitoring Elements

Aerial Photography

To determine ratios of land to open water and land loss rates in the project area, color-infrared aerial photography (1:12,000 scale with ground controls) is being obtained. The photography is being georectified, mapped, and analyzed using techniques described in Steyer et al. (1995). The photography was obtained in 2000 (pre-construction), and will be obtained in 2012 and 2022 (post-construction).

Salinity

To monitor salinities, three continuous recorder stations are located within the project area and two are located outside the project area, in Bayou LaLoutre (Figure 2). Salinity data has been collected hourly from June 1, 2000, to present, and will be collected through 2010 at all five stations. Only two stations (PO24-02 and PO24-05) will remain active after 2010, and will continue to collect data until 2023.

Water Level

The same five recorders used to collect salinity data are also used to record the water level. All five stations are surveyed to the North American Vertical Datum (NAVD 88) to allow the level data to be converted to a known elevation. However, only the three stations within the project area are directly adjacent to marsh and can be associated with an average marsh elevation. The average marsh elevation enables assessment of frequency, depth, and duration of project area marsh inundation.

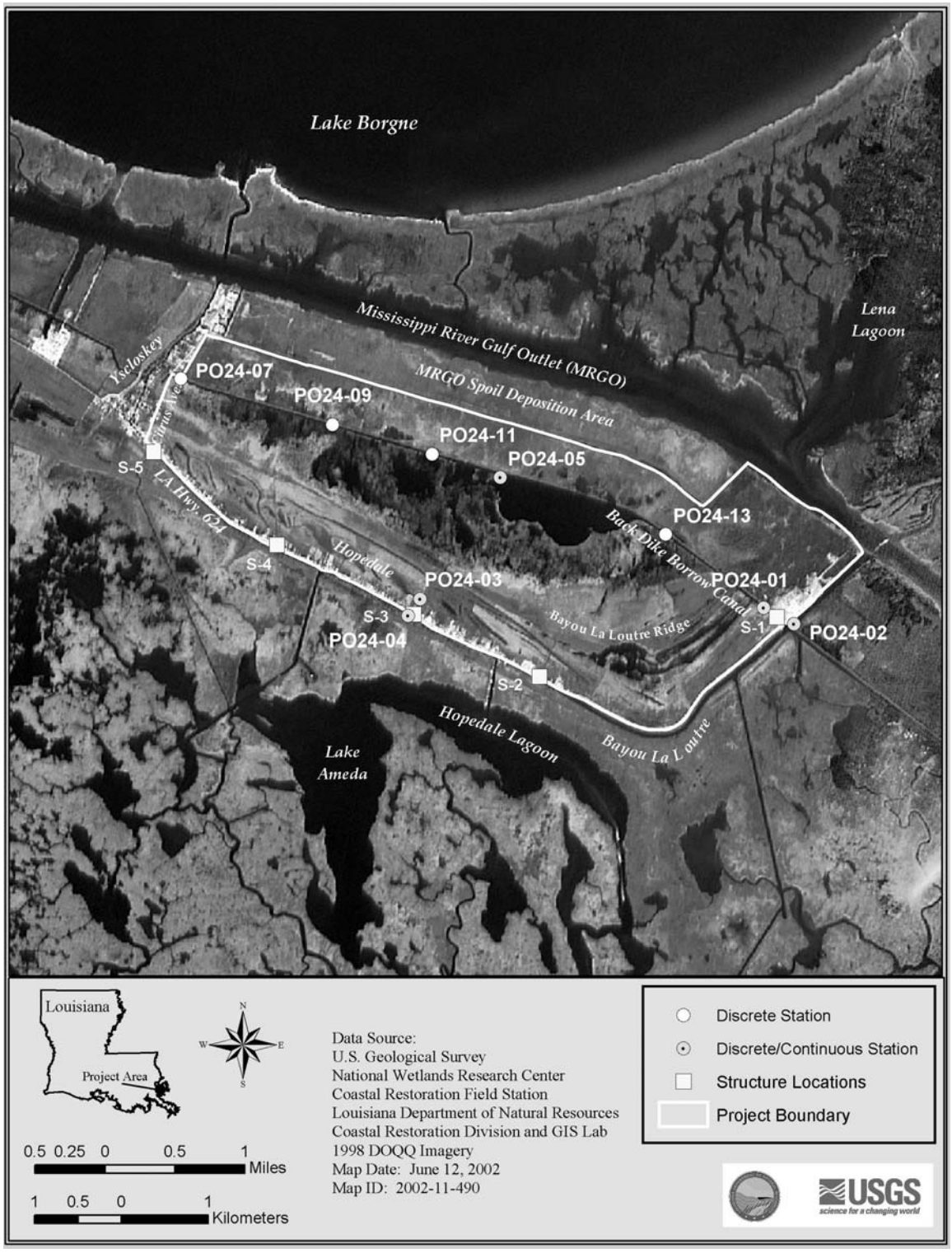

Figure 2. Location of continuous salinity and water level recorders in the Hopedale Hydrologic Restoration (PO24) project.

c. Preliminary Monitoring Results and Discussion

Aerial Photography

Aerial photography obtained in 2000 (pre-construction) has been analyzed and is presented in Figure 3. Once photography is obtained in 2013 and analyzed, change rates may be determined.

Salinity

The Back Dike Borrow canal, which connects Bayou LaLoutre to the project area, was completely blocked to allow for structure placement, thus stopping water exchange. Data collected during the construction period (10 January 2004 – 30 November 2004) were removed from the data sets for analysis, but are presented in the time series of weekly means (Figures 4 and 5). Hourly readings were averaged to obtain the mean weekly salinity readings. Mean weekly observations were used to reduce the effects of diurnal tides and meteorological events in the data. Tidal cycles often span more than one day; consequently, analyzing data on a daily basis does not account for the tidal cycle.

The initial deployment of the Hopedale Hydrologic Restoration (PO-24) project continuous recorders occurred in the middle of a drought, which affected southeast Louisiana from August 1999 to December 2000. All stations had elevated salinity levels during the beginning of data collection in response to this drought (Figures 4 and 5). Visual observation of weekly means seems to show that project and reference stations track one another very closely, even after completion of construction. Figure 6 further illustrates the similarities when data were summarized into quarterly means to determine if there was a seasonal difference between the project and reference areas. The close proximity of the project to the MRGO results in salinity incursions during tropical events, or even periods of sustained strong east winds, which can be identified by spikes in Figures 4 and 5. Unfortunately, during the strongest storm to affect the area over the period of data collection, Hurricane Katrina, all stations were flooded or destroyed, resulting in a loss of most data for this event (Table 2). However, the spikes from these meteorological events were short-lived compared to the increase in salinity associated with the drought at the beginning of data collection.

Table 2. Data gap, by data type, caused by the destruction of monitoring stations during Hurricane Katrina. All sondes flooded, but data was retrieved from two of them.

Station	Salinity Data Missing	Water Level Data Missing
PO24-01	8/16/05 – 11/29/05	8/16/05 – 11/29/05
PO24-02	8/16/05 – 11/29/05	8/16/05 – 11/29/05
PO24-03	8/16/05 – 11/29/05	8/16/05 – 11/29/05
PO24-04	10/25/05 – 11/29/05	8/29/05 – 11/29/05
PO24-05	10/25/05 – 11/29/05	10/25/05 – 11/29/05

Figure 7 shows that the mean weekly salinity concentrations at each continuous recorder station within the project area have decreased, albeit slightly, between the pre- and post-construction period; however, only station PO24-01 has shown a significant (p = 0.0038) decrease. The two reference stations also showed small changes between the pre- and post-construction period, with PO24-02 increasing and PO24-04 decreasing, slightly. Although station 01 showed a significant change in salinity, the biological response may not reflect the significance since the classifications for both periods are within the mesohaline category (5 – 18 ppt).

Mean weekly salinity measurements were also analyzed using a 2X2 factorial analysis of variance (ANOVA) in which an interaction between the main effects *period* (pre- or post-construction) and *location* (project or reference) is tested for statistical significance. This is an application of the BACI paired series design discussed in Stewart-Oaten et al. (1986), Underwood (1994), and Smith (2002). The statistical model depends on simultaneity of measurements among the various stations. Therefore, only weeks in which there were data available to calculate a mean for all five stations could be used in this analysis. This analysis was run using Proc GLM in SAS© Version 9 with *period* and *location* as fixed effects (SAS Institute Inc. 2003).

Evidence of an impact comes in the form of a statistically significant interaction between the main effects, *period* and *location*. A test on the *period*location* interaction showed a statistically significant impact (p <0.0001). This shows up as lines out of parallel in Figure 8. The high degree of statistical significance resulted from the large sample size, not from the size of the effect, which was modest. On average, the salinity within the project area decreased by less than one half of a part per thousand from what would be expected if the project had no impact.

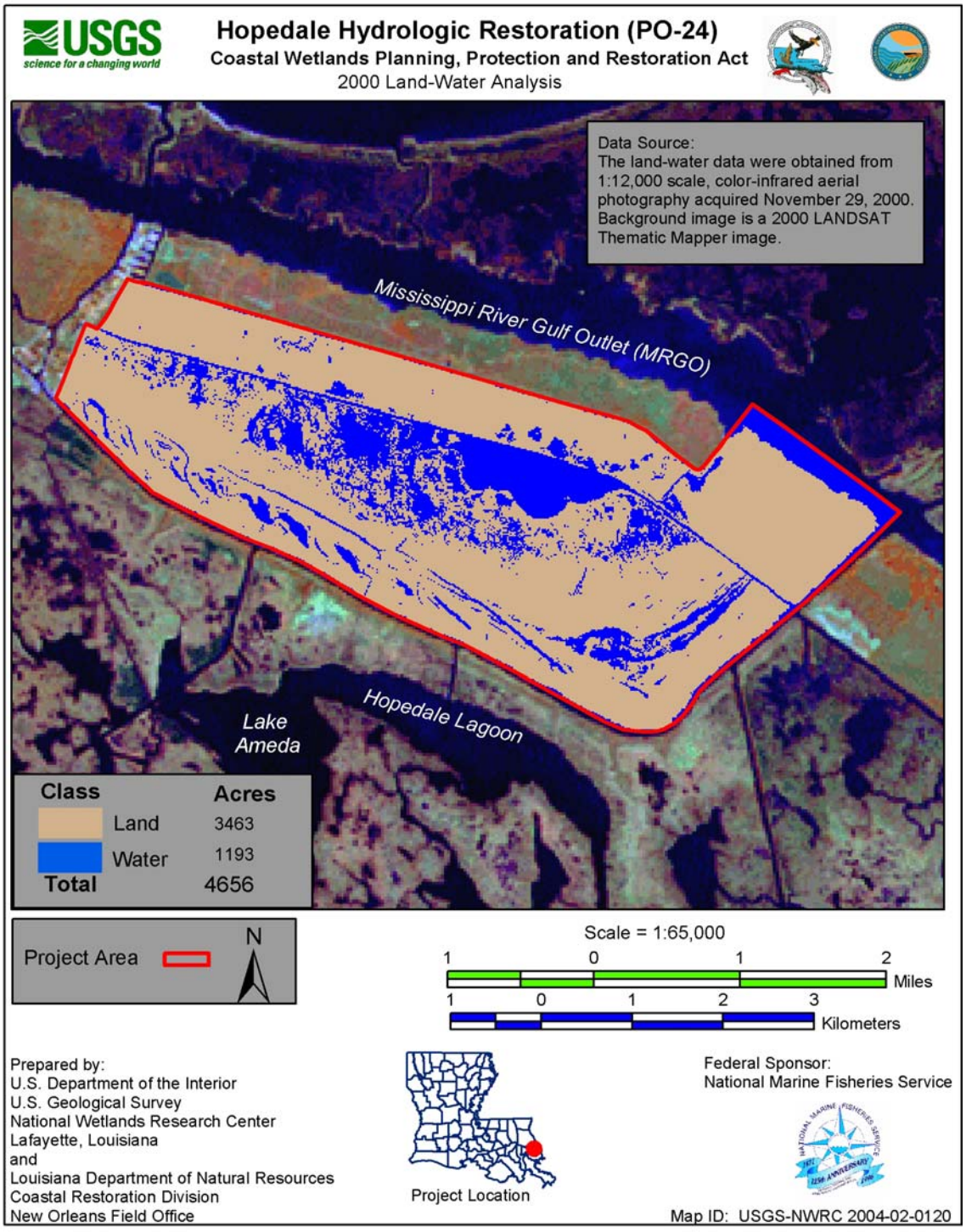

Figure 3. Land-water analysis from 2000 aerial photography for the Hopedale Hydrologic Restoration (PO-24) project.

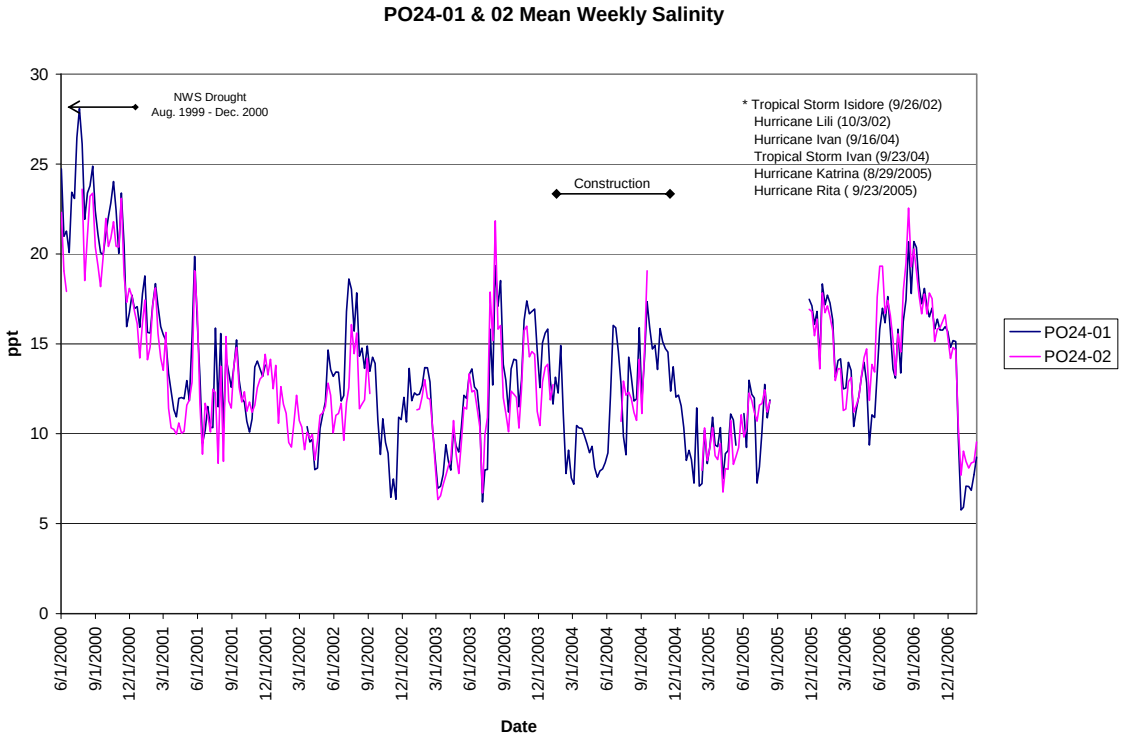

Figure 4. Mean weekly salinity for project station PO24-01 and reference station PO24-02 for the Hopedale Hydrologic Restoration project.

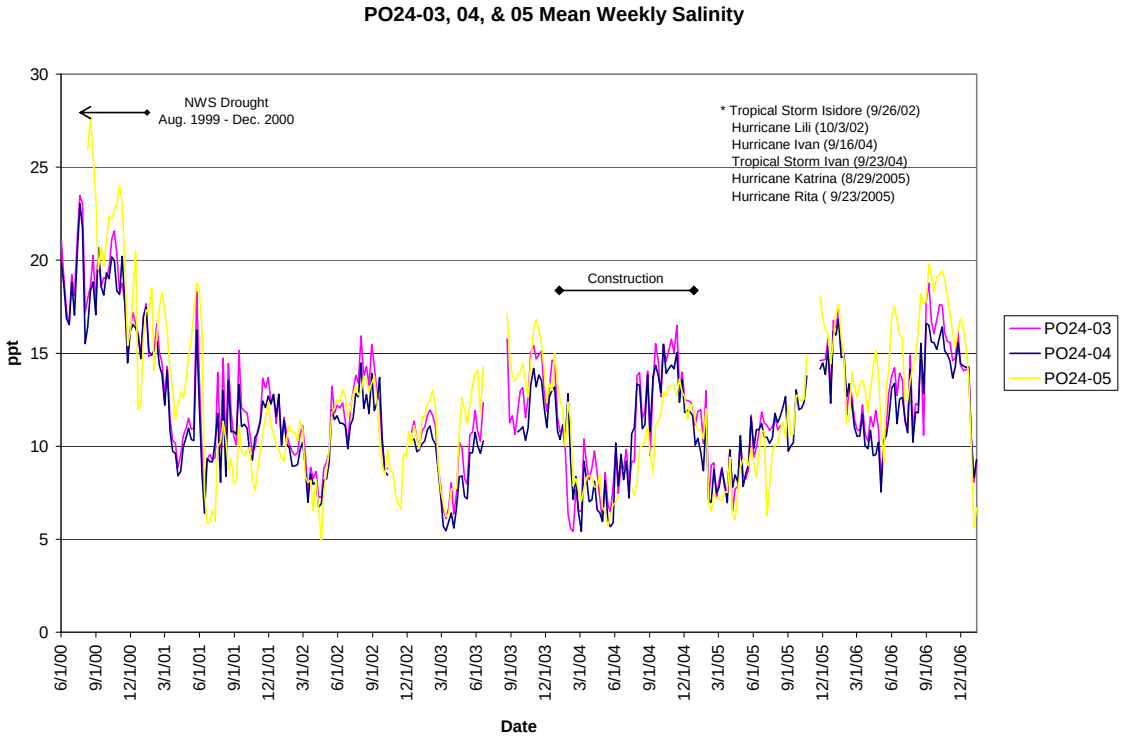

Figure 5. Mean weekly salinity for project stations PO24-03 and 05 and reference station PO24-04 for the Hopedale Hydrologic Restoration project.

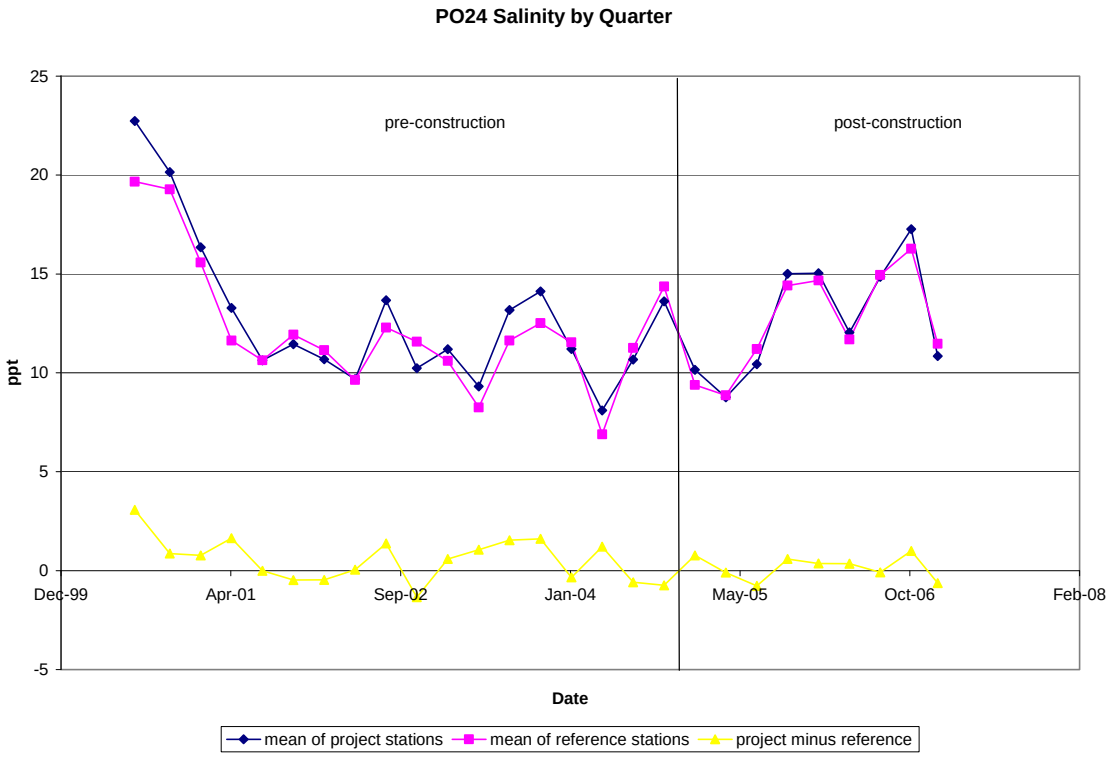

Figure 6. Mean quarterly salinity for the project and reference area of the Hopedale Hydrologic Restoration project.

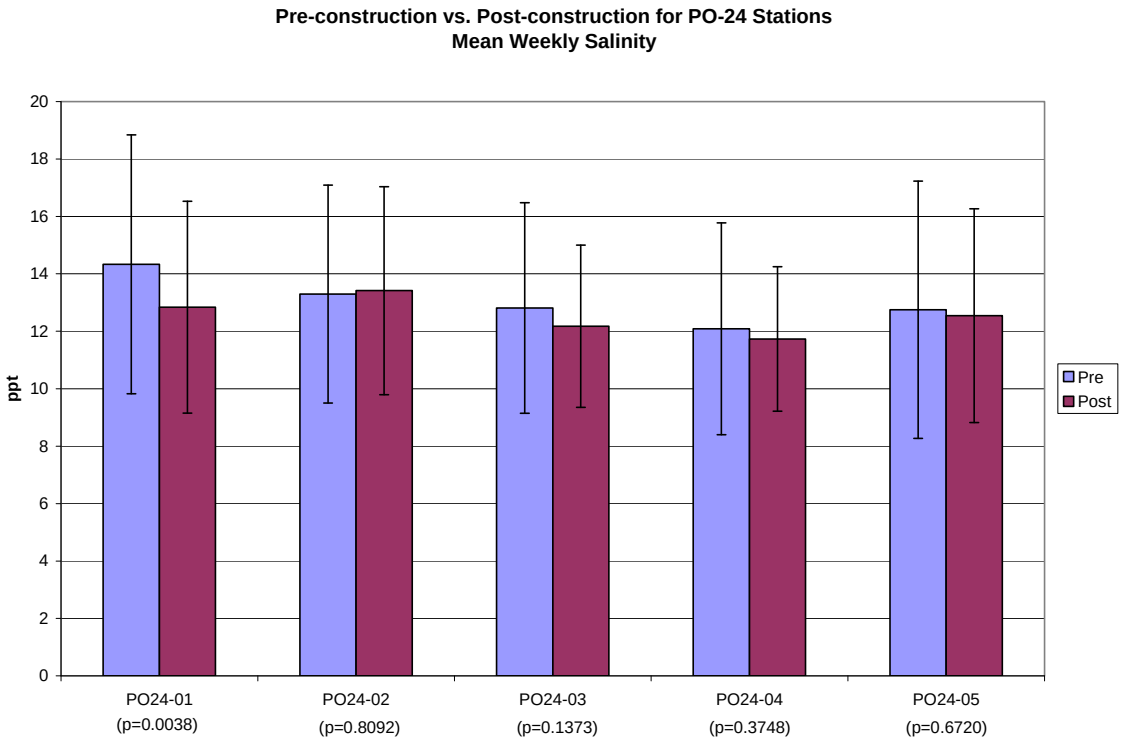

Figure 7. Average of mean weekly salinity for the pre- and post-construction periods of the Hopedale Hydrologic Restoration project. Statistics computed using ANOVA.

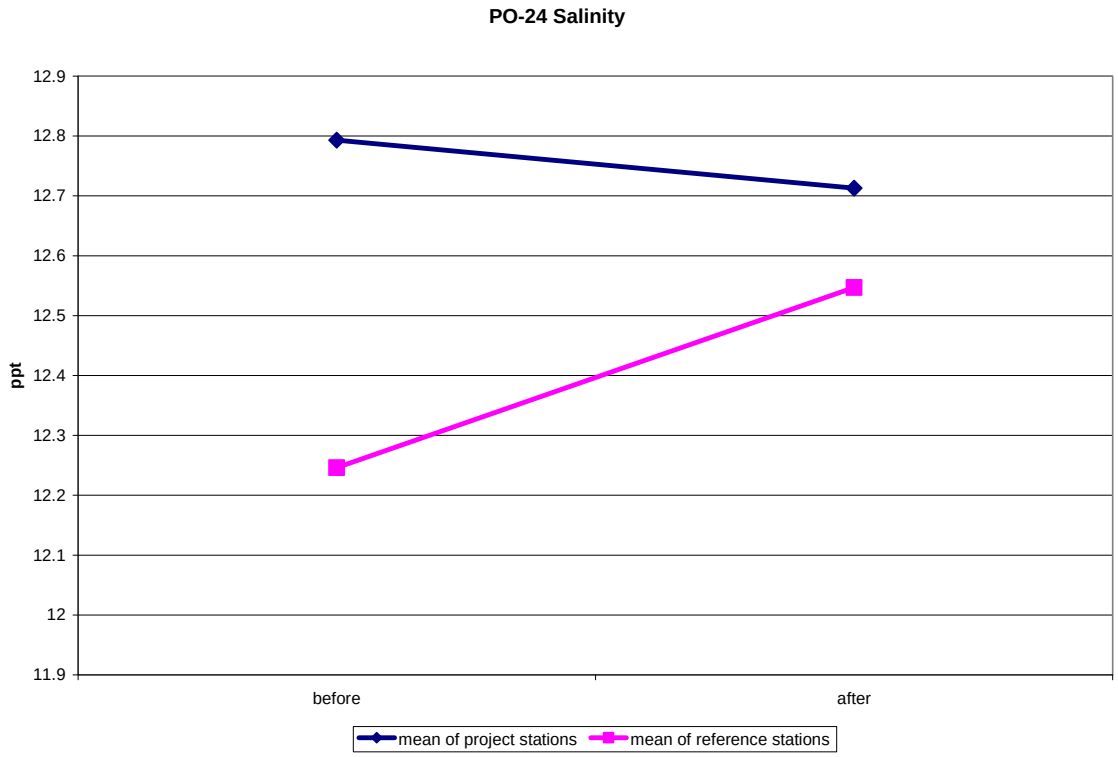

Figure 8. Mean salinity for the pre- and post-construction periods of the project and reference area of the Hopedale Hydrologic Restoration project.

Water Level

The Back Dike Borrow canal, which connects Bayou LaLoutre to the project area, was completely blocked to allow for structure placement, thus stopping water exchange. Data collected during the construction period (10 January 2004 – 30 November 2004) were removed from the data sets for analysis, but are presented in the time series of weekly means (Figures 9 and 10). Hourly readings were averaged to obtain the mean weekly water level readings. Mean weekly observations were used to reduce the effects of diurnal tides and meteorological events in the data. Tidal cycles often span more than one day; consequently, analyzing data on a daily basis does not account for the tidal cycle.

Visual observation of mean weekly water level shows project stations maintaining lower water elevations than reference stations after the construction period (Figures 9 and 10). This trend is also apparent when the data is presented in quarterly means by area (Figure 11). Figure 12 shows that all three project stations had a significant decrease in mean water levels after completion of the project structure. Stations PO24-01 and PO24-05 showed the largest decreases in water level, 0.49 ft and 0.40 ft NAVD 88, respectively. Station PO24-03 showed a change of 0.13 ft NAVD 88 between the pre- and post-construction period, which is expected considering its location within the project area.

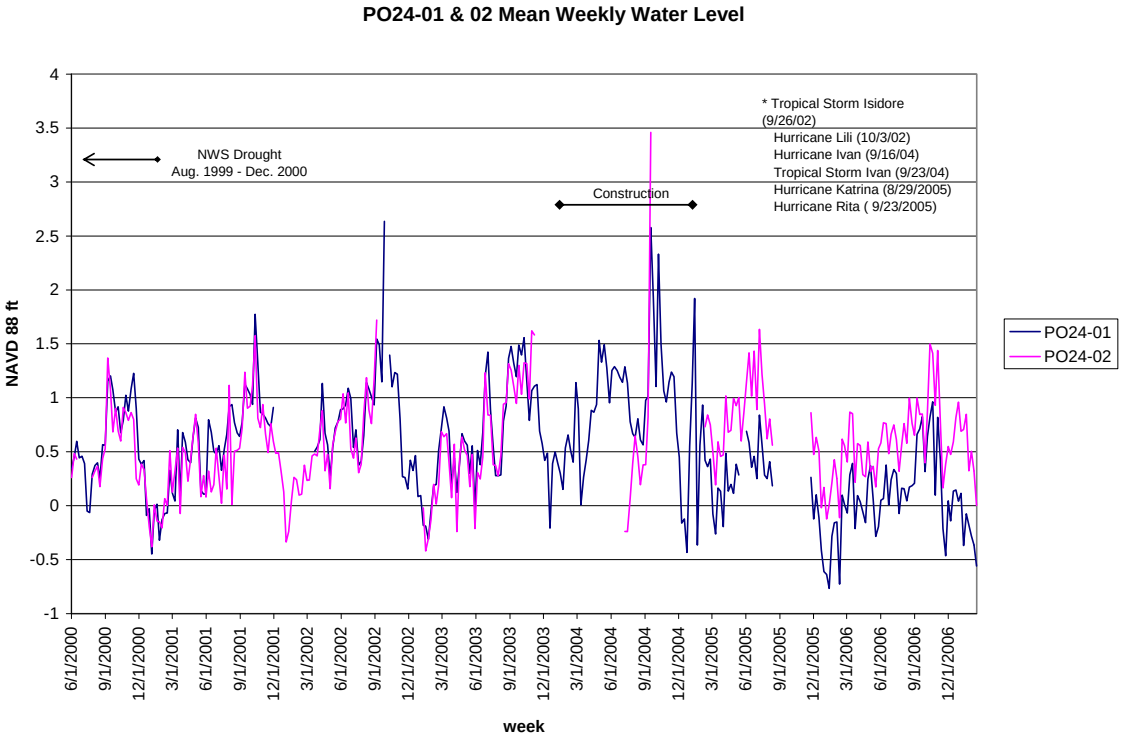

Figure 9. Mean weekly water level for project station PO24-01 and reference station PO24-02 for the Hopedale Hydrologic Restoration project.

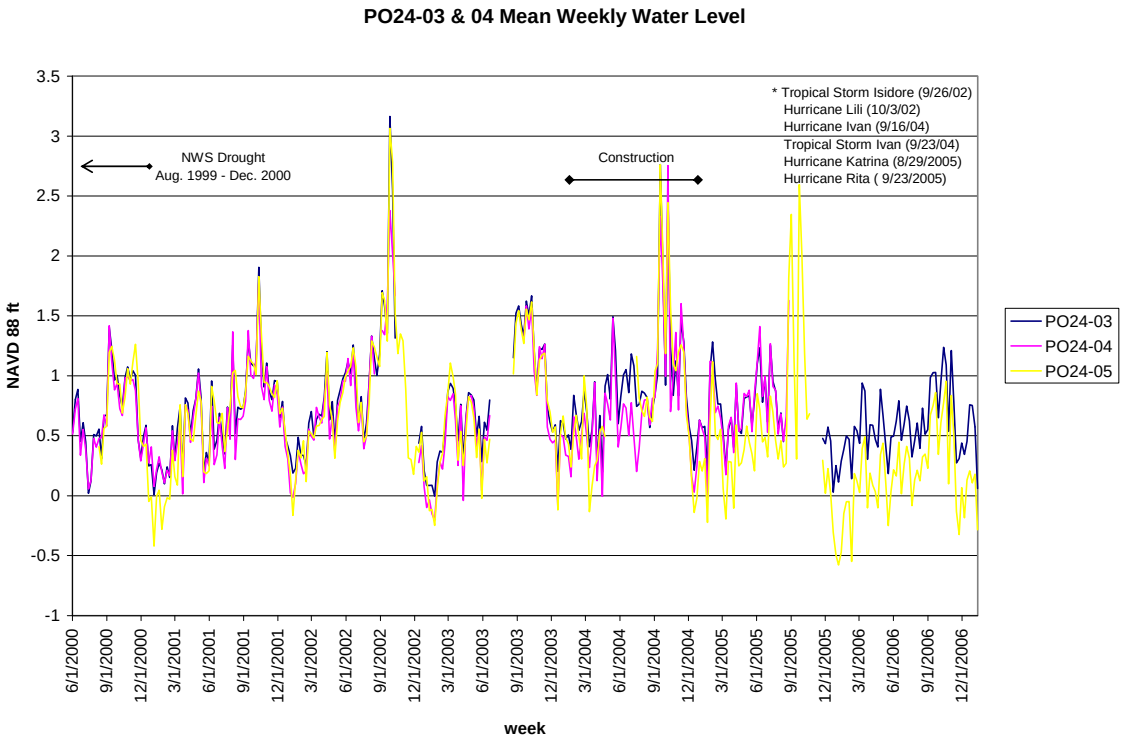

Figure 10. Mean weekly water level for project stations PO24-03 and 05 and reference station PO24-04 for the Hopedale Hydrologic Restoration project.

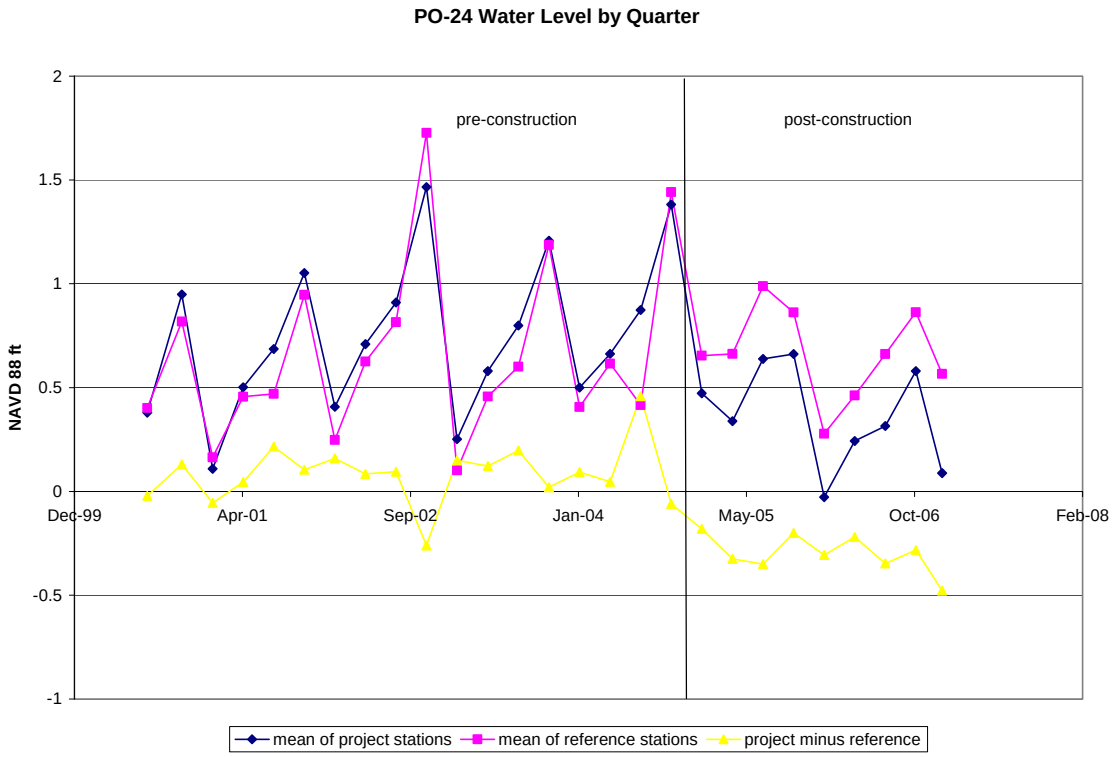

Figure 11. Mean quarterly water level for the project and reference area of the Hopedale Hydrologic Restoration project.

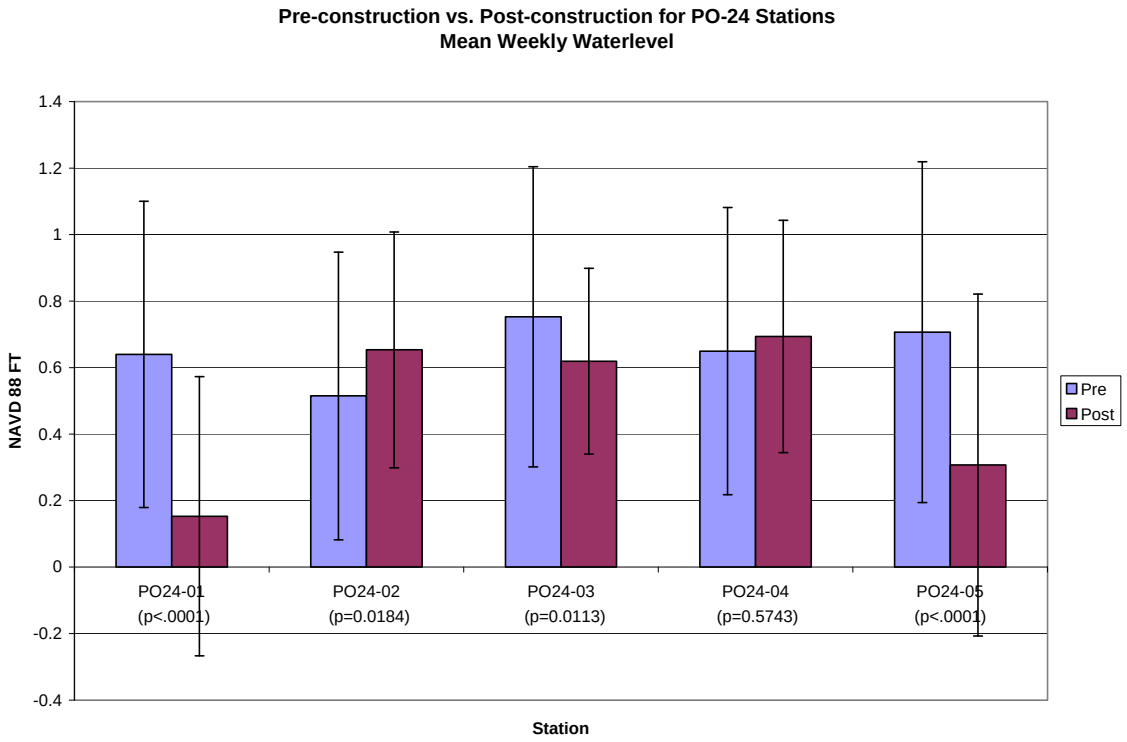

Figure 12. Average of mean weekly water level for the pre- and post-construction periods of the Hopedale Hydrologic Restoration project. Statistics computed using ANOVA.

Station 03 is located in a small unnamed bayou on the south side of the Bayou LaLoutre ridge, near the south central boundary of the project area. The connection of this small bayou with Bayou LaLoutre is through three 36" non-gated culverts which run under La. Hwy. 624. These open culverts allow water to flow in and out of the project area freely, as opposed to the structure near station 01, which only allows water out. Reference stations PO24-02 and 04 showed increases in mean water level after the completion of construction. However, only station 02 was significant. Station 04 has had elevation problems since being destroyed by Hurricane Katrina, not allowing data to be converted to NAVD 88 in order to compute mean weekly averages. This lack of data likely affected the post-construction mean.

Mean weekly water level measurements were also analyzed using a 2X2 factorial analysis of variance (ANOVA) in which an interaction between the main effects (*period* and *location*) is tested for statistical significance. Evidence of an impact comes in the form of a statistically significant interaction between the main effects, *period* and *location*. A test on the *period*location* interaction showed a statistically significant impact (p <0.0001). This shows up as lines out of parallel in Figure 13. On average, the water level within the project area was 0.30 ft lower than what would be expected if the project had no impact.

One of the stated goals of the project was to reduce the number and duration of flooding events, in part to protect vegetation from the stresses of frequent and extreme inundation. Figure 14 shows the frequency and depth of flooding at the project stations for the pre- and post-construction periods as determined by the mean weekly water levels. All stations showed a reduction in the number of events at each depth category during the post-construction period, with the exception of PO24-05 for the >1 ft category. Station 05 was the only station to make it through Hurricanes Katrina and Rita. The extreme water levels associated with these storms are the reason for the increased occurrence of >1ft flood events during the post-construction period. Duration of flooding was also reduced after the completion of construction at all stations (Table 3). Station 03 showed the least amount of change, which can be expected due to reasons stated above.

Table 3. Average weeks flooded per month for the project stations of the Hopedale Hydrologic Restoration project during the pre- and post-construction period.

Station	Pre-Construction	Post-Construction
PO24-01	1.296	0.296
PO24-03	1.204	0.846
PO24-05	1.519	0.556

The purest estimate of the variability of a measurement is the second central moment of its distribution, also known as the variance. Because hourly and daily periods are considered too brief to apply much stress to marsh vegetation (Visser 2007), a variance estimate of a weekly mean water level gives a more meaningful statistic. The pre-construction water level variance was compared to the post-construction variance using the folded F-test feature of Proc Ttest in SAS© Version 9. The results are summarized in Table 4 as standard deviations.

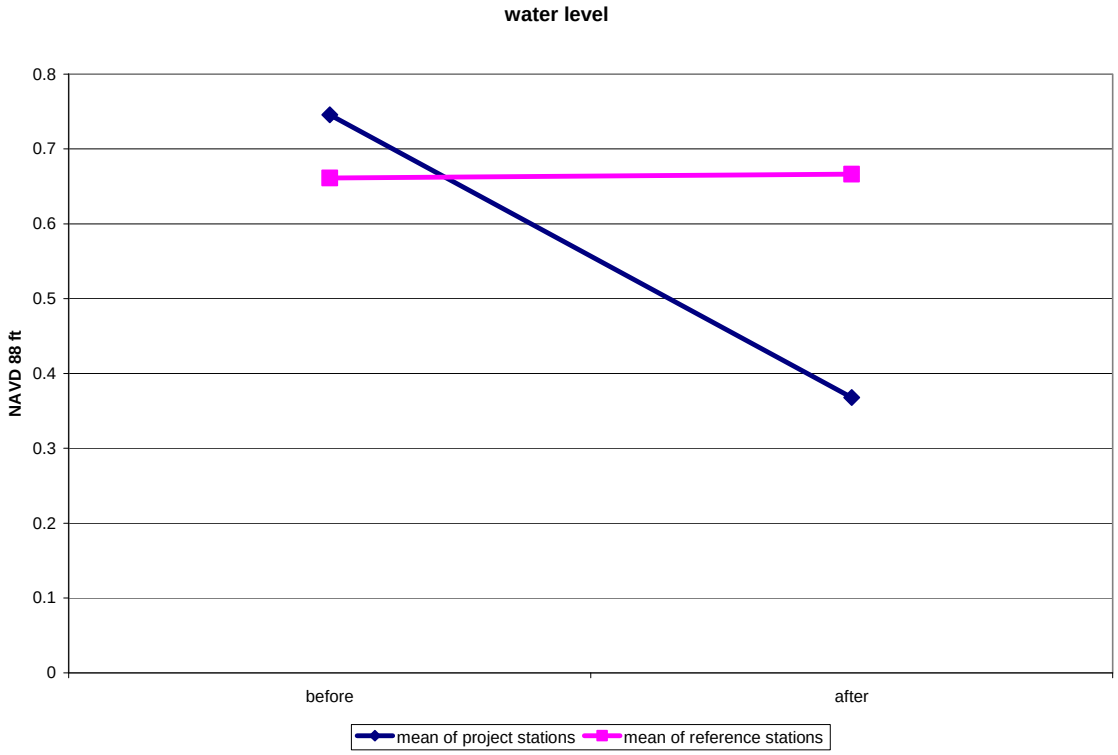

Figure 13. Mean water level for the pre- and post-construction periods of the project and reference area of the Hopedale Hydrologic Restoration project.

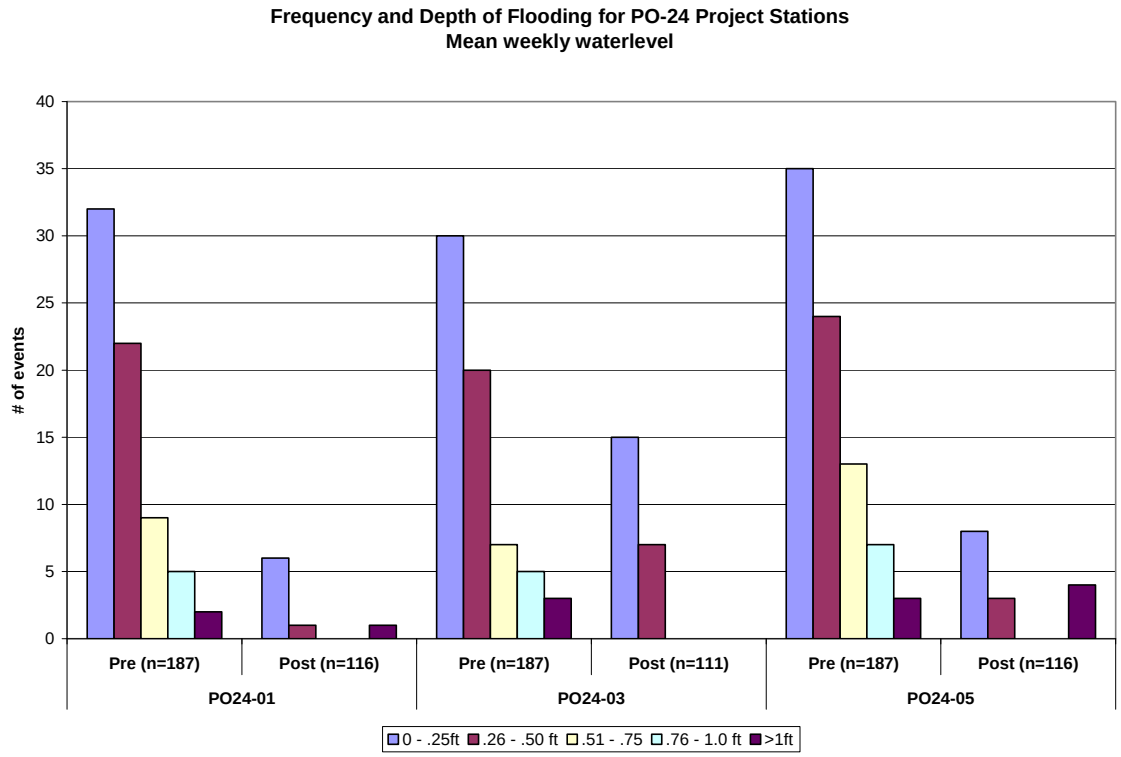

Figure 14. Frequency and depth of flooding for project stations in the Hopedale Hydrologic Restoration project.

Table 4. Standard deviation of weekly mean water level, decimal feet NAVD 88, for the Hopedale Hydrologic Restoration project during the pre- and post-construction periods.

Station	Project/Reference	Std Dev Pre-	Std Dev Post-	*p-Value*
1	project	0.461	0.422	0.339
2	reference	0.434	0.357	0.042
3	project	0.452	0.281	<0.0001
4	reference	0.433	0.354	0.147
5	project	0.464	0.457	0.920

Variance decreased at all stations. No statistically significant change occurred at project stations 1 and 5. Project station 3 exhibited a statistically significant decrease from $s^2 = (0.452 \text{ ft})^2$ to $s^2 = (0.281 \text{ ft})^2$. The high degree of statistical significance ($p < 0.0001$) resulted as much from the large sample size as from the size of the effect. Reference station 2 exhibited a marginally significant ($p < 0.0415$) decrease in variance from $s^2 = (0.434 \text{ ft})^2$ to $s^2 = (0.357 \text{ ft})^2$. Reference station 4 showed no significant change.

V. Conclusions

a. Project Effectiveness

Reduction in salinity was not a specific goal of this project. Mean weekly salinities at all stations remained unchanged after the project was completed, with the exception of PO24-01, where salinity dropped by approximately one part per thousand (ppt). Although this change was statistically significant, the biological significance is minor as the average weekly post-construction salinity is still 12.8 ppt. With the project's close proximity to the MRGO, it is highly unlikely salinities will ever decrease in the area.

Reduction in water level, which was a specific goal of the project, occurred between the pre- and post- construction period at all project stations. However, both reference stations have shown an increase in water level during the post-construction period. Although there is a large amount of data missing for station PO24-04 due to elevation issues, and its mean weekly average for the post-construction period may be underestimated. However, when all data were combined by sampling unit, project or reference, for the BACI analysis, it showed the water level decreased by almost a half-foot after project completion. Therefore, it appears the project had a positive effect on water level with the inclusion of the water control structure. This decrease in water level will likely reduce stress to the marsh vegetation.

Although there are more data for the pre-construction period than the post-, the frequency and depth of flooding have decreased between the two periods for all project stations. The duration of flooding has also decreased during the post-construction period. Whether this is related to a project effect or the shorter data stream for the post-construction period cannot be determined at this time. However, with the significant decrease in water level along with the shorter duration of flooding events, it is highly probable that the reduction of flooding is project-related.

Although we do not measure the usage of the structure by fishes, it is assumed that the fish slots allow access as they are kept in the open position. Once post-construction aerial photography is acquired, land to water ratios will be analyzed to reveal if pre-construction acres have been retained as intended.

b. Recommended Improvements

There are no recommended improvements to this project.

c. Lessons Learned

Bayou LaLoutre is a high traffic area. The continuous recorders located within the bayou were constantly being struck by marine vessels, causing lots of gaps in the data. Station

2 was eventually moved to the bridge over the back dike canal at its intersection to Bayou LaLoutre and has not been hit since. Station 4 has no such permanent structure to which it could be attached, and is still plagued with collisions. A more stable structure should be considered in the future.

VI. Literature Cited

SAS Institute Inc. 2003. SAS Version 9, Cary, NC: SAS Institute Inc., 2002-2003.

Smith, E. P:. 2002. "BACI Design," Encyclopedia of Environmetrics, Volume 1, pp. 141-148. El-Shaarawi and W. W. Piegorsch, eds, John Wiley & Sons, Ltd., Chichester. (text and *errata* available as pdf at this address: http://www.stat.vt.edu/facstaff/epsmith.html)

Stewart-Oaten, A., W. W. Murdoch, and K. R. Parker. 1986. Environmental impact assessment: Pseudoreplication in time? Ecology 67: 929-940.

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E Swenson. 1995. Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring plan. Open-File Series 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.

Underwood, A. J.. 1994. On beyond BACI: Sampling designs that might reliably detect environmental disturbances. Ecological Applications 4(1): 3-15.

Visser, J. M. 2007. Analysis of the hydrologic data from CWPPRA hydrologic restoration projects' draft report for the Louisiana Department of Natural Resources.

Appendix A

Photographs

Photo #1 – Water Control Structure. Standing on the East bank looking south. Note the damage to the railing and fencing.

Photo #2 – Fish Gate Operator. The stem protective cover is missing and needs to be replaced on both fish gates and all three flap/sluice gates. A locking mechanism should be installed to prevent unauthorized operation of the gates.

Photo #3 – Ramp and Entry. Standing on the East bank looking north. Note the damage to the railing and fencing and the scour around the end of the sheet pile wall.

Appendix B

Three Year Budget Projection

Hopedale Hydrologic Restoration / PO-24 / PPL 8

Three-Year Operations & Maintenance Budgets 07/01/2007 - 06/30/2010

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Project	O & M	Federal Sponsor	Prepared By
Barry Richard	*Barry Richard*	*NMFS*	*Peter Hopkins*

	2007/2008	2008/2009	2009/2010
Maintenance Inspection	$3,596.00	$3,689.00	$0.0
General Maintenance	$0.0	$0.0	$14,995.00
Structure Operation	$7,786.00	$7,989.00	$8,196.00
Administration	$0.0	$0.0	$0.0
Maintenance/Rehabilitation			

07/08 Description:

E&D	$0.0
Construction	$0.0
Construction Oversight	$0.0
Sub Total - Maint. And Rehab.	$ -

08/09 Description

E&D		$0.0
Construction		$0.0
Construction Oversight		$0.0
	Sub Total - Maint. And Rehab.	$ -

09/10 Description:

E&D			$0.0
Construction			$0.0
Construction Oversight			$0.0
		Sub Total - Maint. And Rehab.	$ -

	2007/2008	2008/2009	2009/2010
Total O&M Budgets	**$ 11,382.00**	**$ 11,678.00**	**$ 23,191.00**

O &M Budget (3 yr	**$ 46,251.00**
Unexpended O & M Budget	**$ 401,907.01**
Remaining O & M Budget (Projected)	**$ 355,656.01**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2007/2008

Hopedale Hydrologic Restoration / PO-24 / PPL 8

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$3,596.00	**$3,596.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations	LUMP	1	$7,786.00	**$7,786.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**
ADMINISTRATION				
LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$11,382.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2008/2009

Hopedale Hydrologic Restoration / PO-24 / PPL 8

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$3,689.00	**$3,689.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations	LUMP	1	$7,989.00	**$7,989.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**
ADMINISTRATION				
LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:				
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$11,678.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 2009/2010

Hopedale Hydrologic Restoration / PO-24 / PPL 8

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$0.00	**$0.00**
General Structure Maintenance (Radio Equip.)	LUMP	1	$14,995.00	**$14,995.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations	LUMP	1	$8,196.00	**$8,196.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**
ADMINISTRATION				
LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:				
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navagation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$23,191.00**

Appendix C

Field Inspection Form

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: **Hopedale Hydrologic Restoration Project (PO-24)** Date of Inspection: 3/12/2007 Time: 8:30 am

Structure No. _____ Inspector(s): Richard, Boddie, Bernard, Hopkins, Sweeny, Brodnax

Structure Description: _____ Water Level Inside: -0.5 ft NAVD Outside: +0.5 ft NAVD

Water levels were estimated, water was below gages

Type of Inspection: Scheduled Weather Conditions: Cloudy Skies, Windy

Item	Condition	Pysical Damage	Corrosion	Photo #	Observations and Remarks
Swing Gates 84" D	Good	None	None		Gate Screw Coverings which indicate gate height are missing.
Fish Gates 24" x 84"	Good	None	None		Gate Screw Coverings which indicate gate height are missing.
Handrails Grating Hardware etc.	Poor	Extensive	None	1	Some fencing collapsed or damaged. Some handrails bent or damaged.
Galv. Pile Caps	Good	None	None		
Signage /Supports	Good	None	None		
Riprap	Good	None	None		
Silt/Fill	Good	None	None		