

PO-06

Fritchie Marsh Restoration Summary Data and Graphics



Fritchie Marsh Restoration (PO-06)

Project Overview:

The Fritchie Marsh project area contains 6,291-ac (2,546-ha) of intermediate and brackish marsh located southeast of Slidell in St. Tammany Parish (Figure 1). The area is bound by US Hwy 190 to the north, US Hwy 90 to the south and east, and LA Hwy 433 to the west and south.

From 1956 to 1984, 2,260-ac (915-ha) of emergent marsh within the project area have been converted to open water, with the greatest loss occurring in the northern project area. This loss reflects a pattern of marsh deterioration from north to south due to a reduction of freshwater and sediment input into the northern part of the project area. Man-made changes have occurred that may have attributed to this loss such as the construction of the perimeter highways, which isolated the marsh from the West Pearl River Basin and restricted inflow of fresh water, nutrients, and sediment. In addition, the project area receives saltwater input from Lake Pontchartrain through the W-14 canal and Little Lagoon during high tides and strong southerly winds. As a result, the project area has converted from a predominantly fresh marsh in 1956 to a predominantly brackish marsh in 1990.

The objective of this project is to reduce marsh loss through the management of available fresh water. Construction of the project was completed in March 20, 2001 and included the following features (Figure 1):

1. A weir was constructed in the W-14 canal to divert part of the freshwater outflow from Slidell to the interior of the marsh in the northern project area. To increase the flow of fresh water into the interior marsh, 400-ft was dredged along an existing channel which branches southward from the W-14 Canal.
2. One mile (1.6-km) of Salt Bayou was dredged west of US Hwy 90 to allow for increased water exchange from the West Pearl River.
3. A 72" (1.8-m) culvert was constructed next to the existing culvert at US Hwy 90 to allow for increased flow from the West Pearl River into the project area.



Fritchie Marsh Restoration (PO-06)

Project Objective:

The objective of the Fritchie Marsh Restoration Project is to restore more natural hydrologic conditions in the project area resulting in the protection of the existing marsh.

Specific Goals:

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

1. Decrease rate of marsh loss.
2. Increase freshwater flow and promote water exchange into the area from West Pearl River by enlarging the culvert at US Highway 90 and by dredging portions of Salt Bayou.
3. Increase freshwater flow into the northern project area by diverting flow from the W-14 canal.
4. Document species composition and relative abundance of vegetation to evaluate change over time.



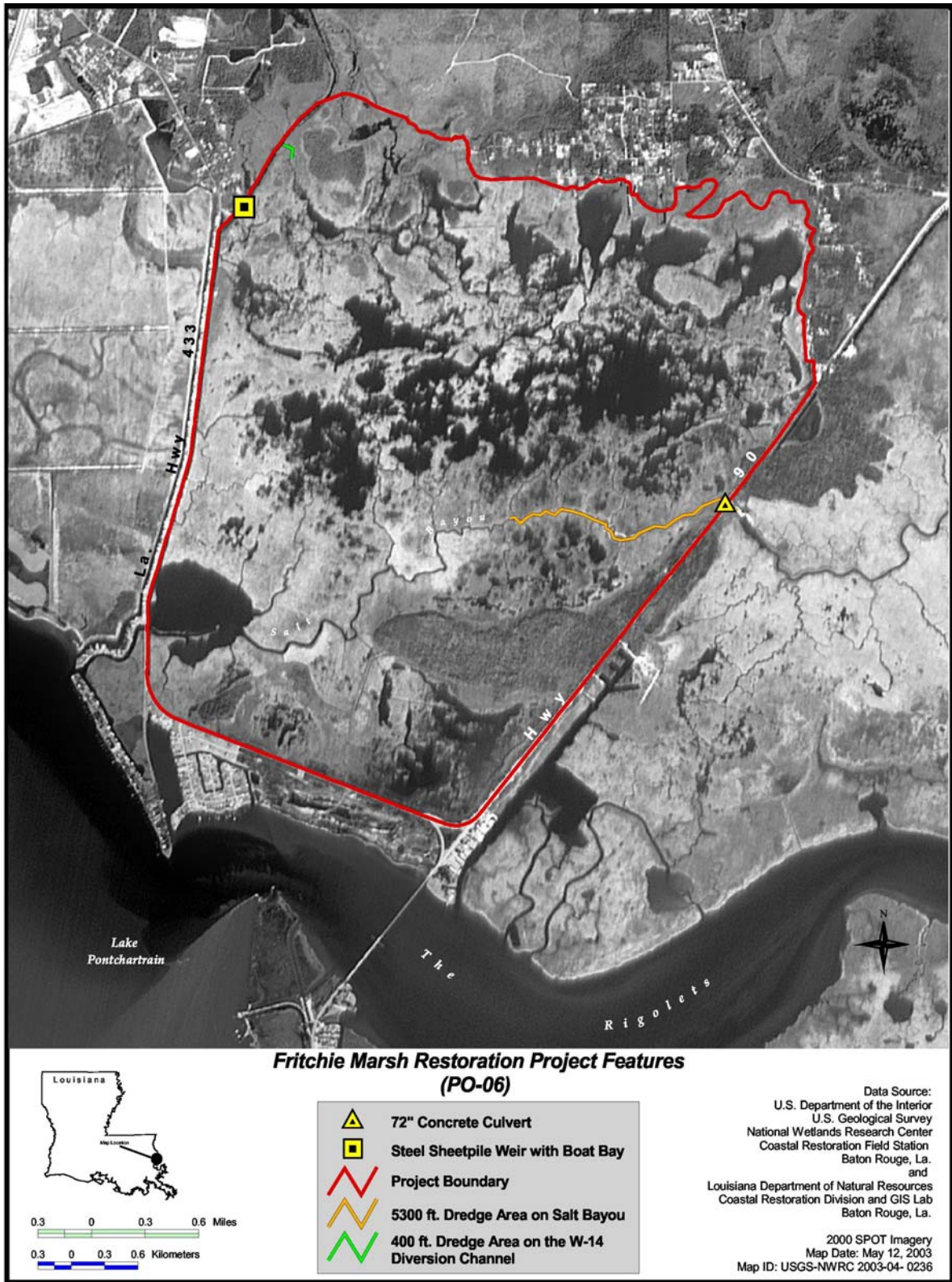


Figure 1. Fritchie Marsh Restoration (PO-06) project boundary and features.



Fritchie Marsh Restoration

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Monitoring Elements:

Habitat Mapping: Color-infrared aerial photography (1:12,000 scale) will be obtained to document vegetated and non-vegetated areas in the project area and reference area. The photography will be geo-rectified, photo-interpreted, mapped, and analyzed with GIS using standard operating procedures documented in Steyer et al. (1995, revised 2000). Photography was obtained in 1996 and 2000 (pre-construction) and will be collected in 2004, 2010, and 2019 (post-construction). It will always be flown at low water conditions.

Salinity: To monitor the effects of increased flow of freshwater into the project area at the Salt Bayou culvert, salinity will be recorded hourly at four permanent stations. Three continuous recorders will be placed in Salt Bayou and one will be placed in the marsh near the diversion of the W-14 canal to monitor hydrologic conditions pre-construction and post-construction. Salinity was be monitored from 1997-2000 (pre-construction) and will be collected from 2001 to 2006 (post-construction). Upon collection of this data set, the Technical Advisory Group (TAG) will assist the CRD Monitoring Manager with evaluation of the data and development of a sampling plan based on an approximate 30% reduction of effort, if technically advisable.

Water Level: To monitor the effects of increased flow of fresh water into the project area at the Salt Bayou culvert and its effects on the marsh, water level was recorded hourly at four permanent stations. Water level was monitored from 1997-2000 (pre-construction) and will be monitored from from 2001 to 2006 (post-construction). Upon collection of this data set, the TAG will assist the CRD Monitoring Manager with evaluation of the data and development of a sampling plan based on an approximate 30% reduction of effort, if technically advisable.



Fritchie Marsh Restoration

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Monitoring Elements (cont.):

Water Flow: To monitor the increased flow of water into the project area at the Salt Bayou culvert and at the diversion at the W-14 canal, water flow was measured near the same locations where continuous recorders were present. Current meters were deployed and cross-sectional channel transects were conducted to characterize the vertical and horizontal flow structure and to calculate the instantaneous volume flux through the channel. The meters were deployed for a one year period prior to construction and for the same time period after construction.

Vegetation: Species composition and relative abundance of vegetation were documented in 1997 and 2000 (pre-construction) and will be documented in 2004, 2007, 2010, 2013, 2016, 2019 (post-construction) along vegetation transects in the project area. The Braun-Blanquet method is used to survey vegetation in 4-m² plots along the transects. Information on herbivory and submerged aquatic vegetation (SAV) occurrence will be recorded during the measuring of the vegetation stations.



Fritchie Marsh Restoration (PO-06)

Habitat Mapping

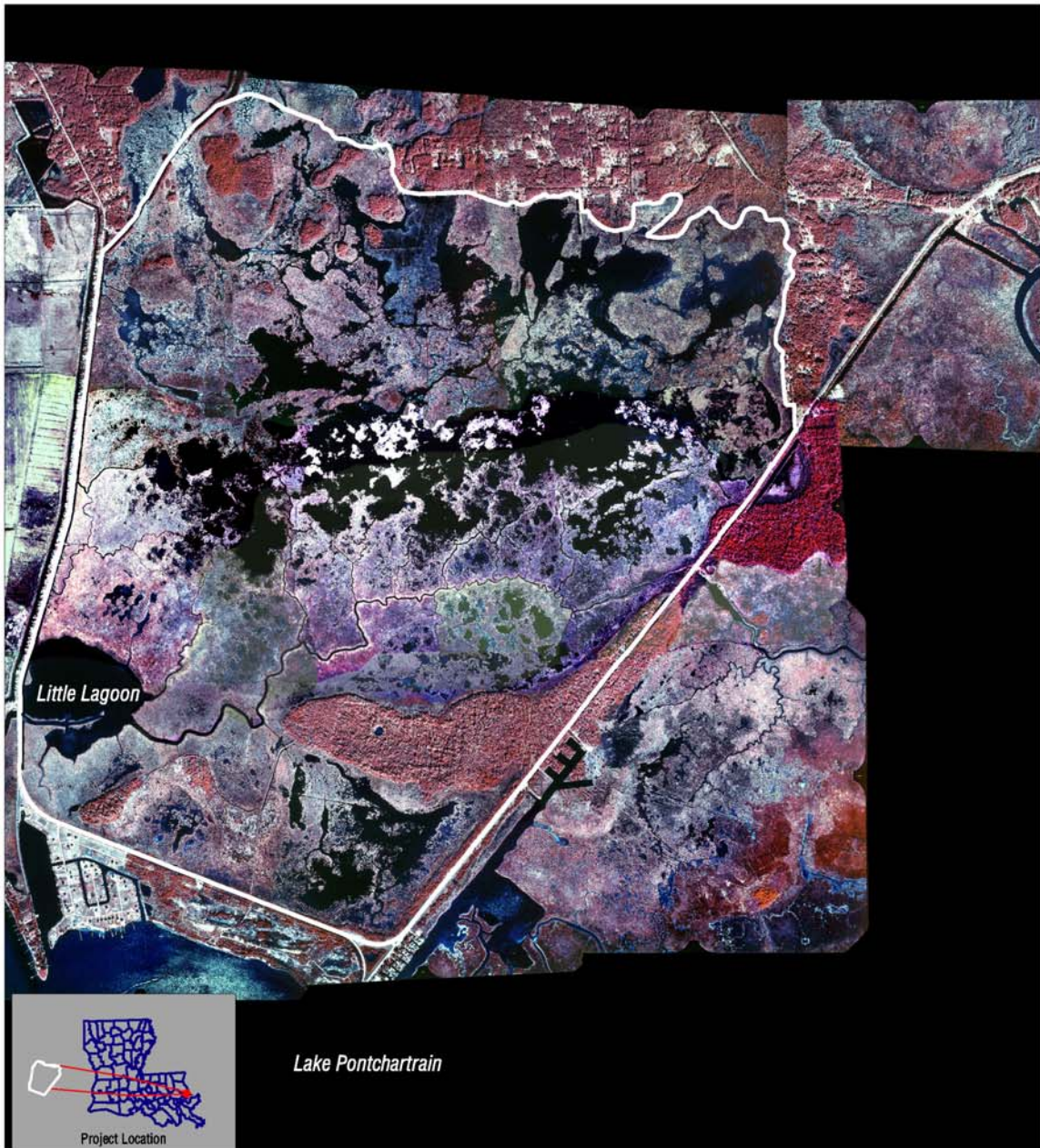
Aerial photography was obtained in 1996 and 2000 (pre-construction), and is currently being analyzed. Photography will be obtained again in 2004, 2010, and 2019 (post-construction).

Figures:

Figure 2. 1996 photomosaic of the Fritchie Marsh Restoration (PO-06) project area.

Figure 3. 1996 photomosaic of the Fritchie Marsh Restoration (PO-06) reference area.





Prepared by:
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U.S. Geological Survey
National Wetlands Research Center
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and
Louisiana Department of Natural Resources
Coastal Restoration Division
New Orleans Field Office



1 0 1 Miles

1 0 1 2 Kilometers

Federal Sponsor:



Map ID: 01-2-032

Figure 2. 1996 photomosaic of the Fritchie Marsh Restoration (PO-06) project area.



Figure 3. 1996 photomosaic of the Fritchie Marsh Restoration (PO-06) reference area.



Fritchie Marsh Restoration (PO-06)

Salinity and Water Level

Hourly salinity and water level data have been collected at the following continuous recorder stations:

Station	Data collection period
PO06-01	2/6/1996 – present
PO06-03*	6/10/1997 – 3/18/1999
PO06-06	6/10/1997 – present
PO06-11	6/10/1997 – present
PO06-60*	3/18/1999 – present

*The continuous recorder at PO06-03 was removed because the water level dropped below the sonde sensor during normal low-water periods. The replacement station, PO06-60 was installed in deeper water closer to the Hwy. 90 culvert.

Discrete staff gauge readings have also been recorded each month since March 1998 at the four continuous recorder stations and at two additional staff gauge locations.

Figures:

Figure 4. Fritchie Marsh Restoration (PO-06) continuous recorder station locations.

Figures 5a-b to 16a-b. Mean daily salinity and water level data by station (english and metric units).

Figure 17a-b. Histogram: Pre-construction vs. Post-construction water level

Figure 18. Histogram: Pre-construction vs. Post-construction salinity

Figure 19. Histogram: Pre-construction vs. Post-construction staff gauge

Figure 20. Histogram: Mean of monthly staff gauge readings



Fritchie Marsh Restoration (PO-06) Continuous Recorder Locations

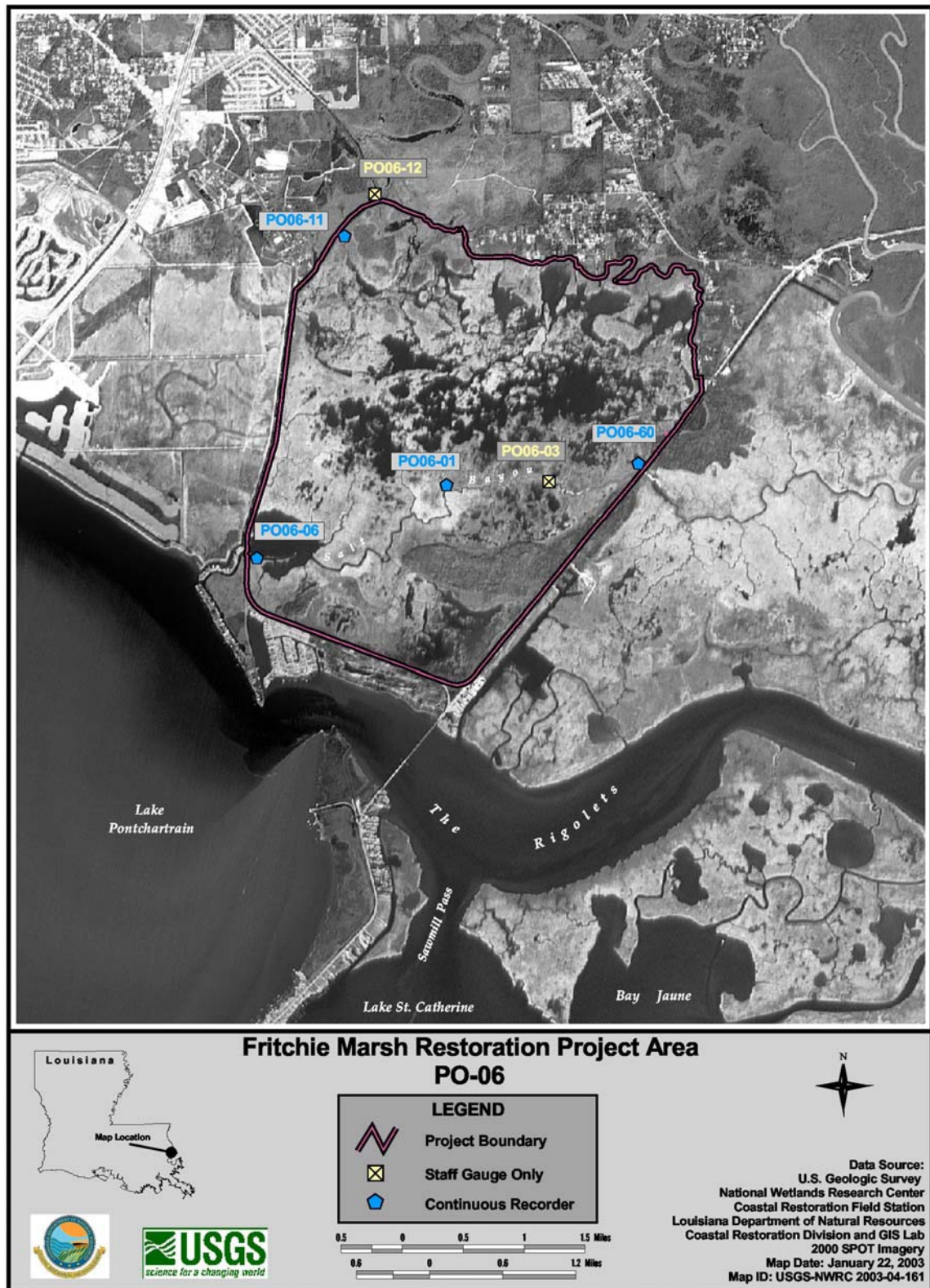


Figure 4. Fritchie Marsh Restoration (PO-06) continuous recorder station locations.



Fritchie Marsh Restoration (PO-06)

Station PO06-01 (1/1/97 - 12/31/98)

Salinity and Water Level Data

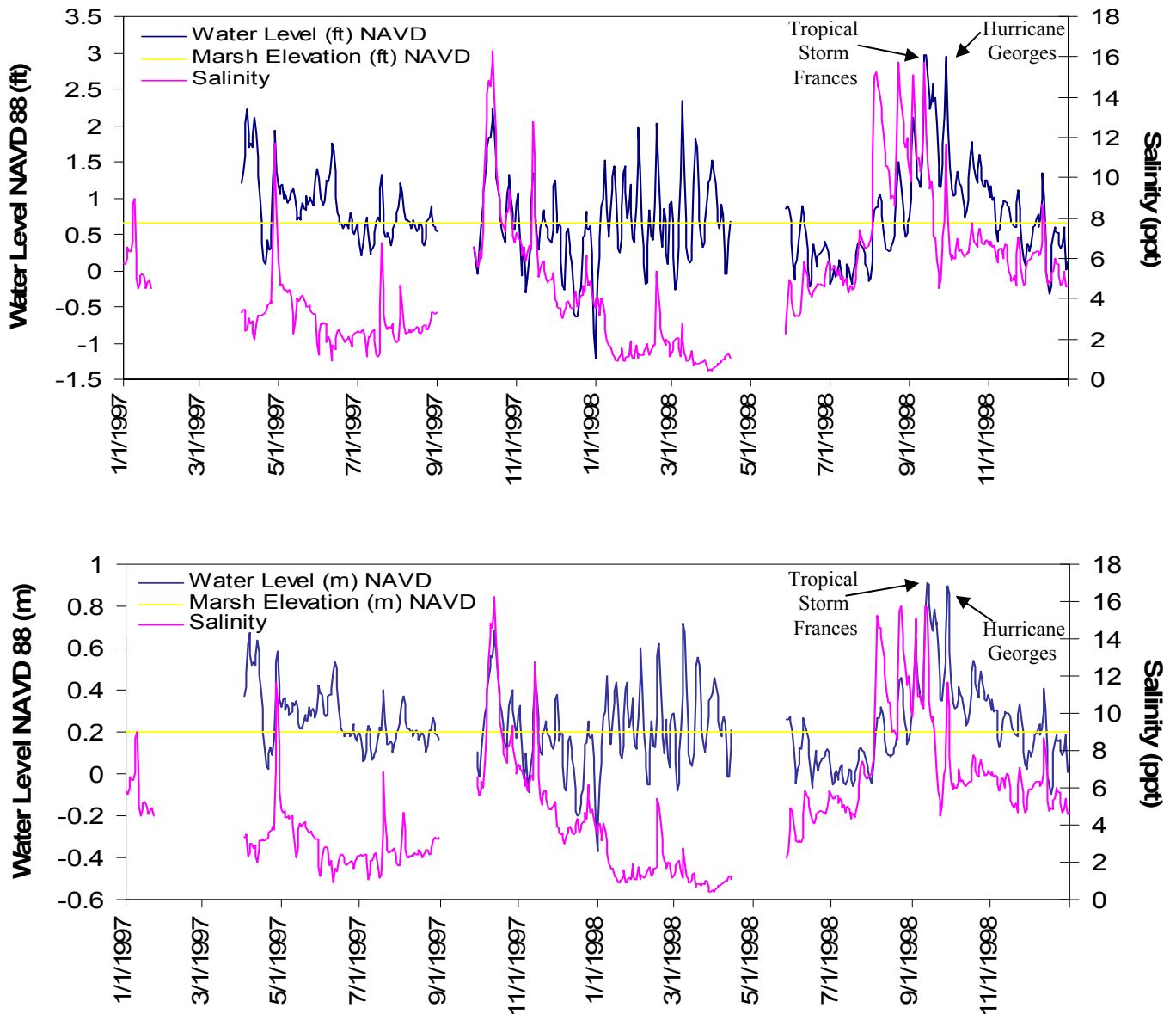


Figure 5a-b. Daily mean salinity and water level at Station PO06-01 in the Fritchie Marsh (PO-06) project area during 1997 and 1998. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-01 (1/1/99 - 12/31/00)
Salinity and Water Level Data

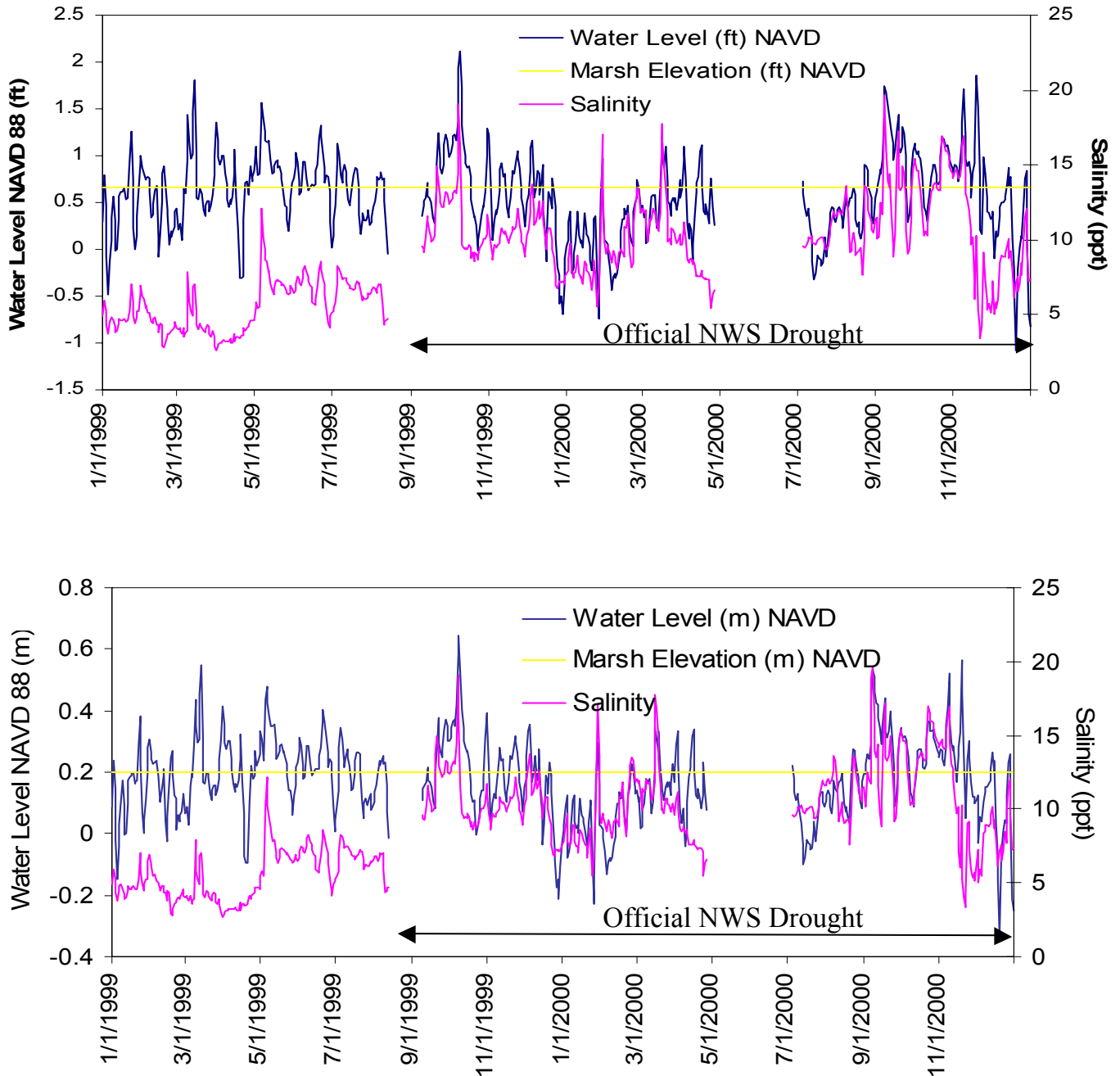


Figure 6a-b. Daily mean salinity and water level at Station PO06-01 in the Fritchie Marsh (PO-06) project area during 1999 and 2000. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-01 (1/1/01 - 12/31/02)

Salinity and Water Level Data

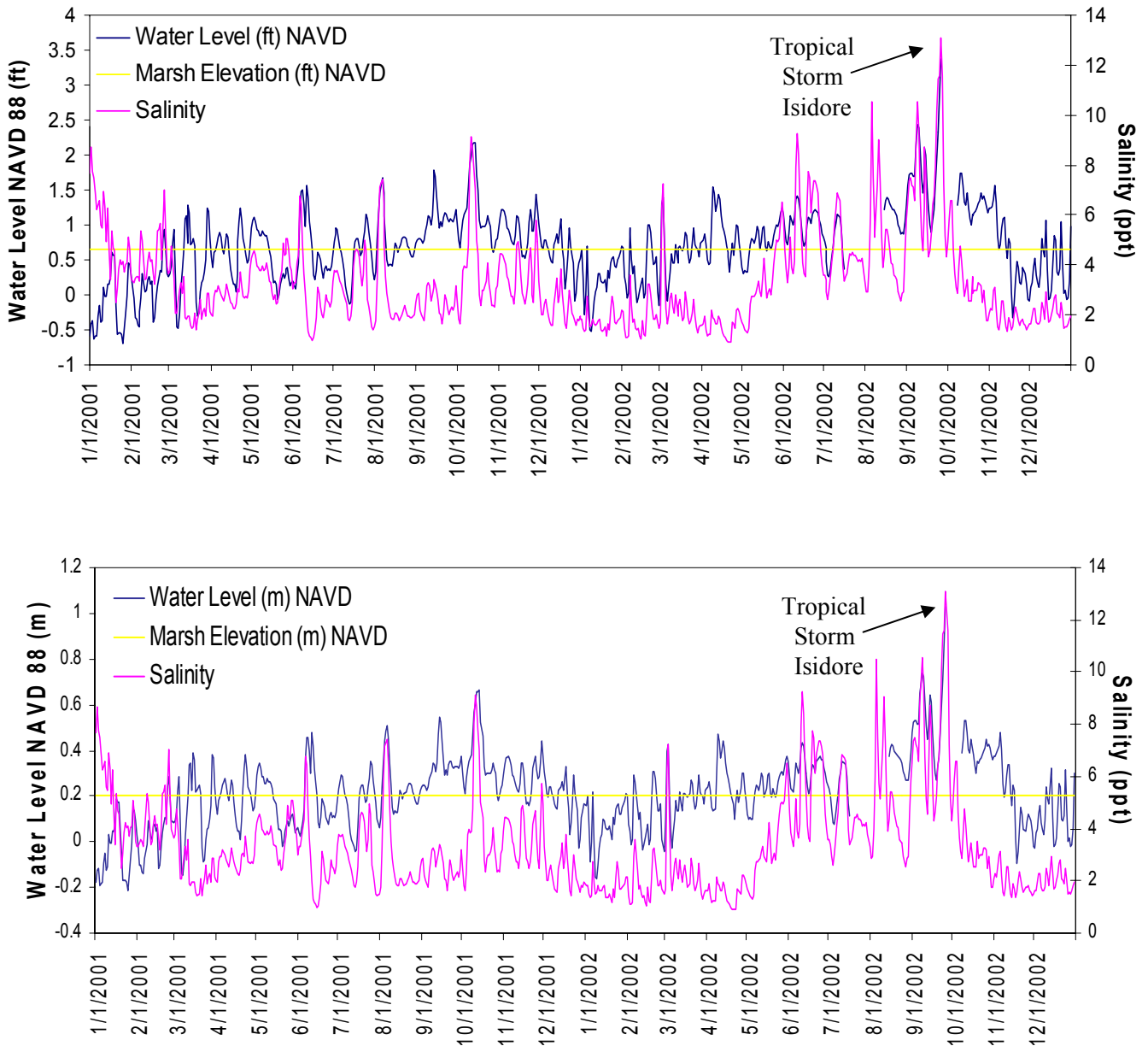


Figure 7a-b. Daily mean salinity and water level at Station PO06-01 in the Fritchie Marsh (PO-06) project area during 2001 and 2002. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-03 (6/10/97 - 12/31/98)

Salinity and Water Level Data

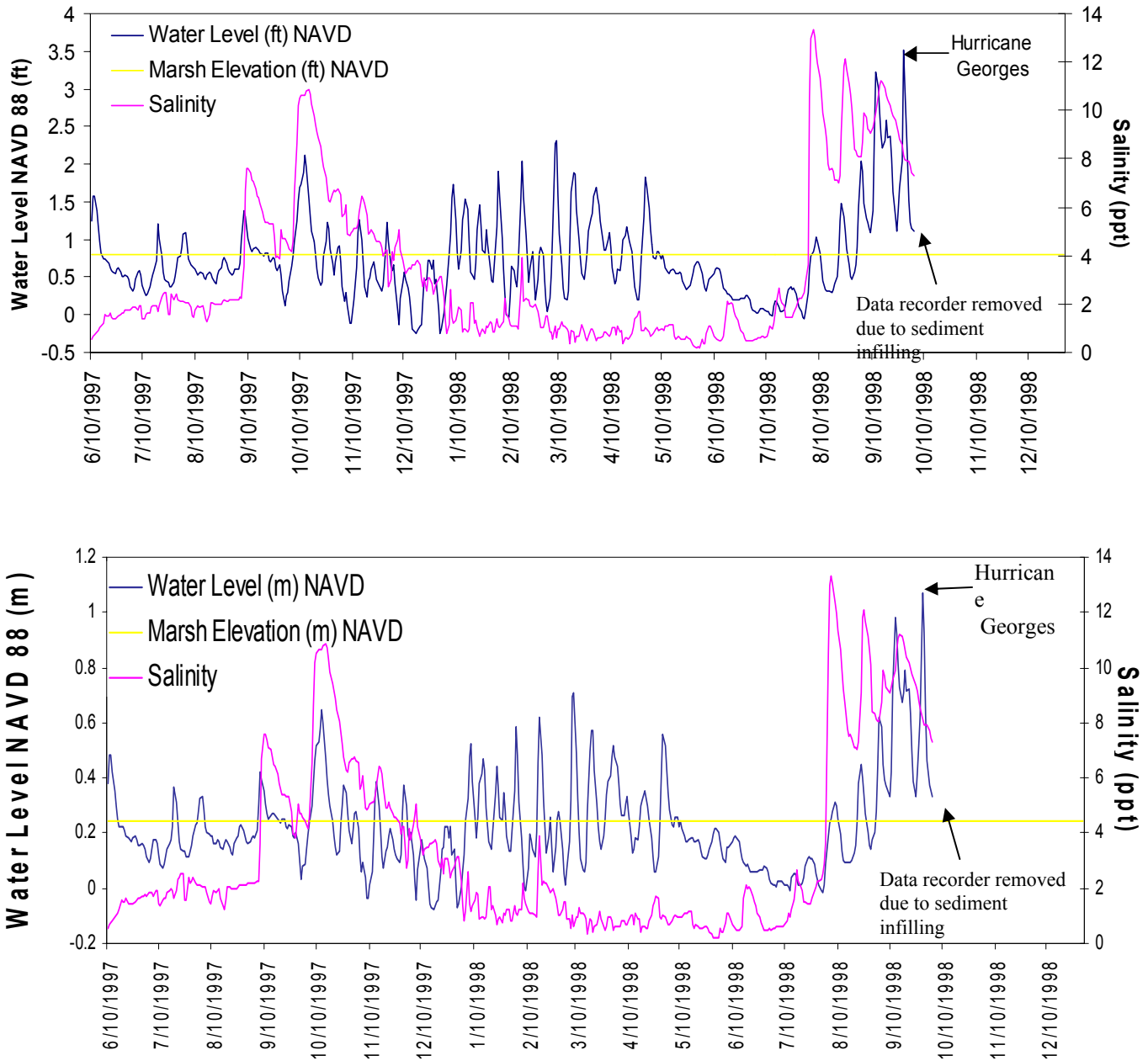


Figure 8a-b. Daily mean salinity and water level at Station PO06-03 in the Fritchie Marsh (PO-06) project area during 1997 and 1998. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-06 (6/10/97 - 12/31/98) Salinity and Water Level Data

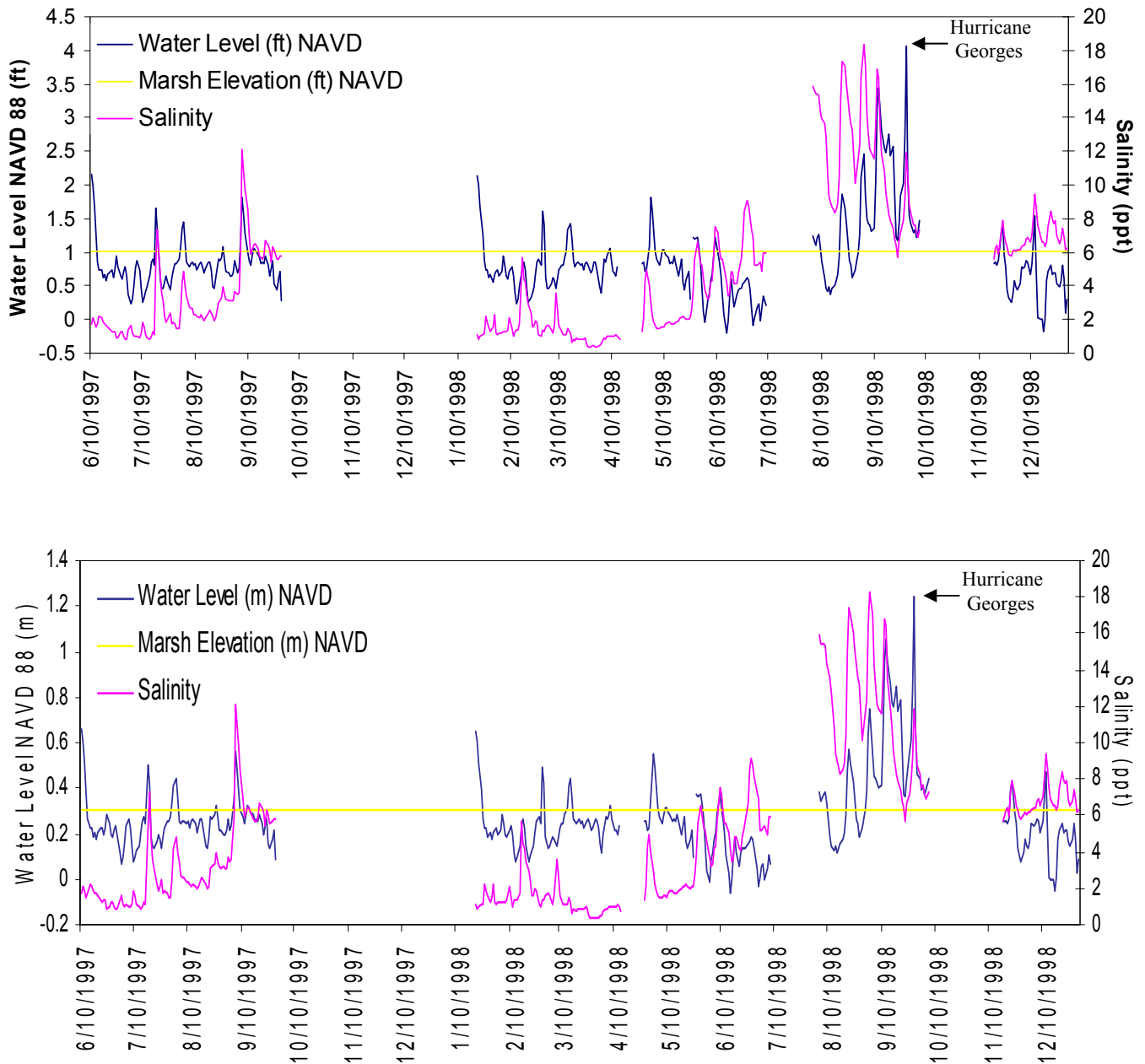


Figure 9a-b. Daily mean salinity and water level at Station PO06-06 in the Fritchie Marsh (PO-06) project area during 1997 and 1998. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-06 (1/1/99 - 12/31/00) Salinity and Water Level Data

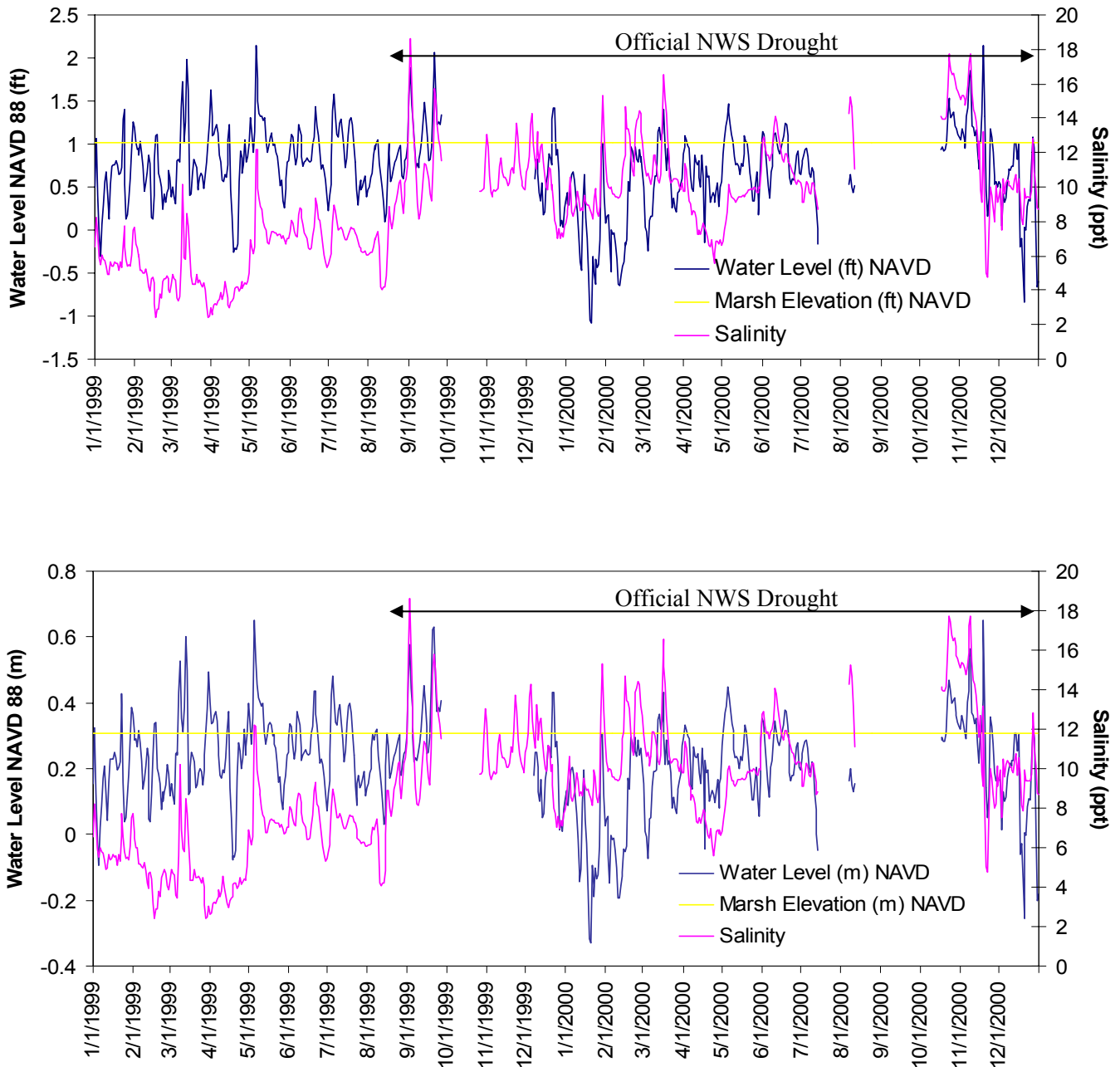


Figure 10a-b. Daily mean salinity and water level at Station PO06-06 in the Fritchie Marsh (PO-06) project area during 1999 and 2000. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-06 (1/1/01 - 12/31/02)

Salinity and Water Level Data

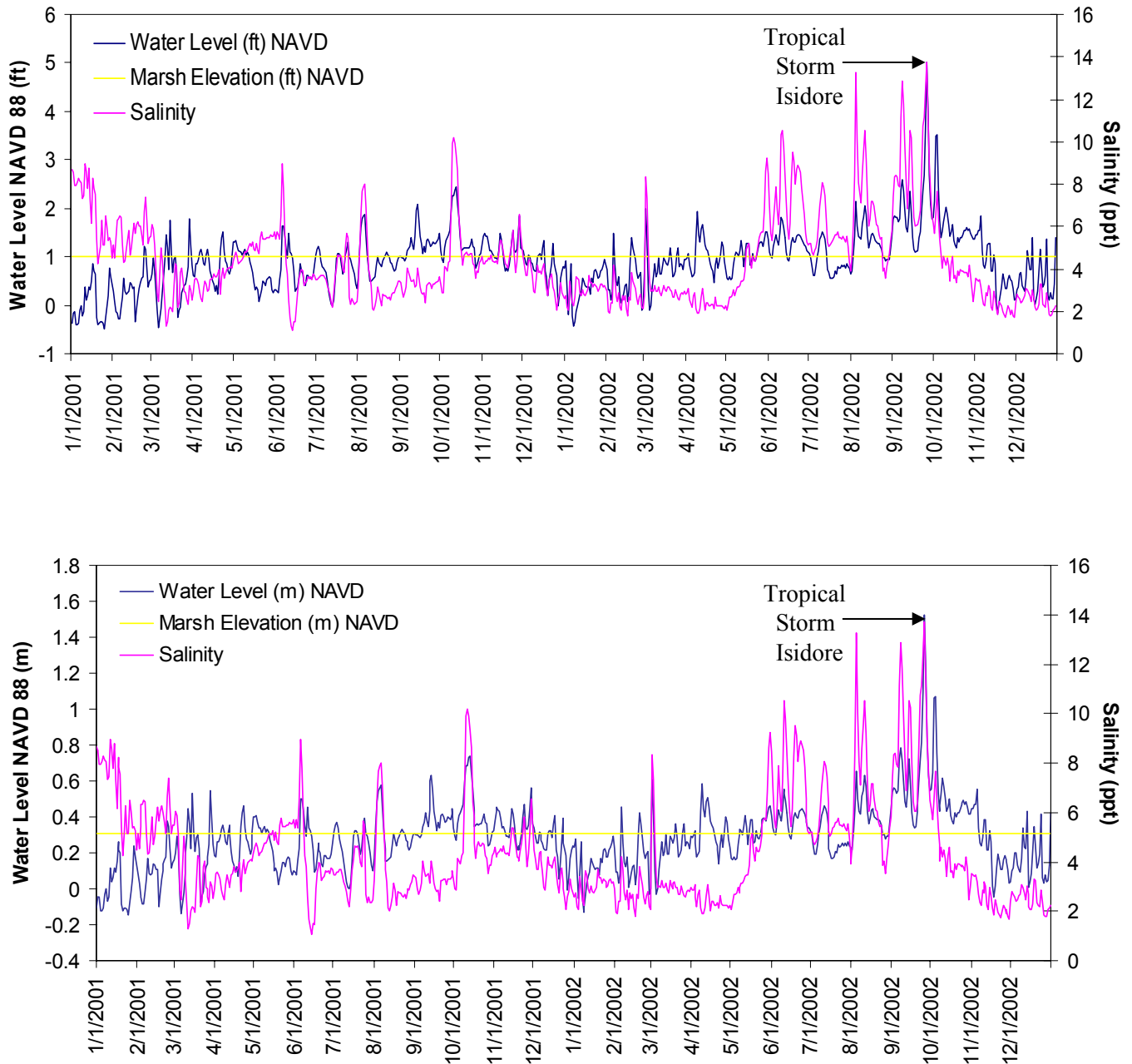


Figure 11a-b. Daily mean salinity and water level at Station PO06-06 in the Fritchie Marsh (PO-06) project area during 2001 and 2002. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-11 (6/10/97 - 12/31/98) Salinity and Water Level Data

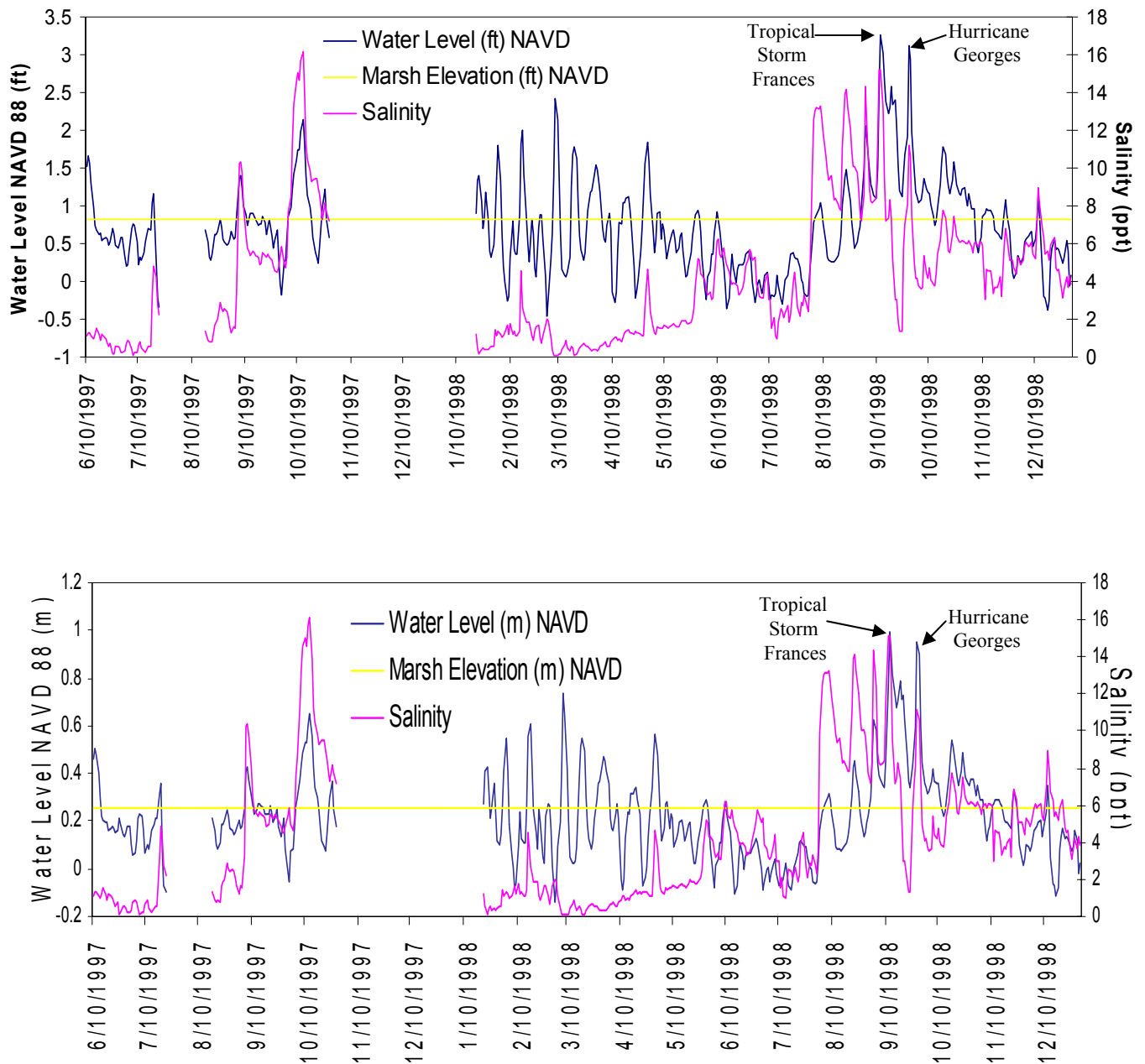


Figure 12a-b. Daily mean salinity and water level at Station PO06-11 in the Fritchie Marsh (PO-06) project area during 1997 and 1998. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-11 (1/1/99 - 12/31/00) Salinity and Water Level Data

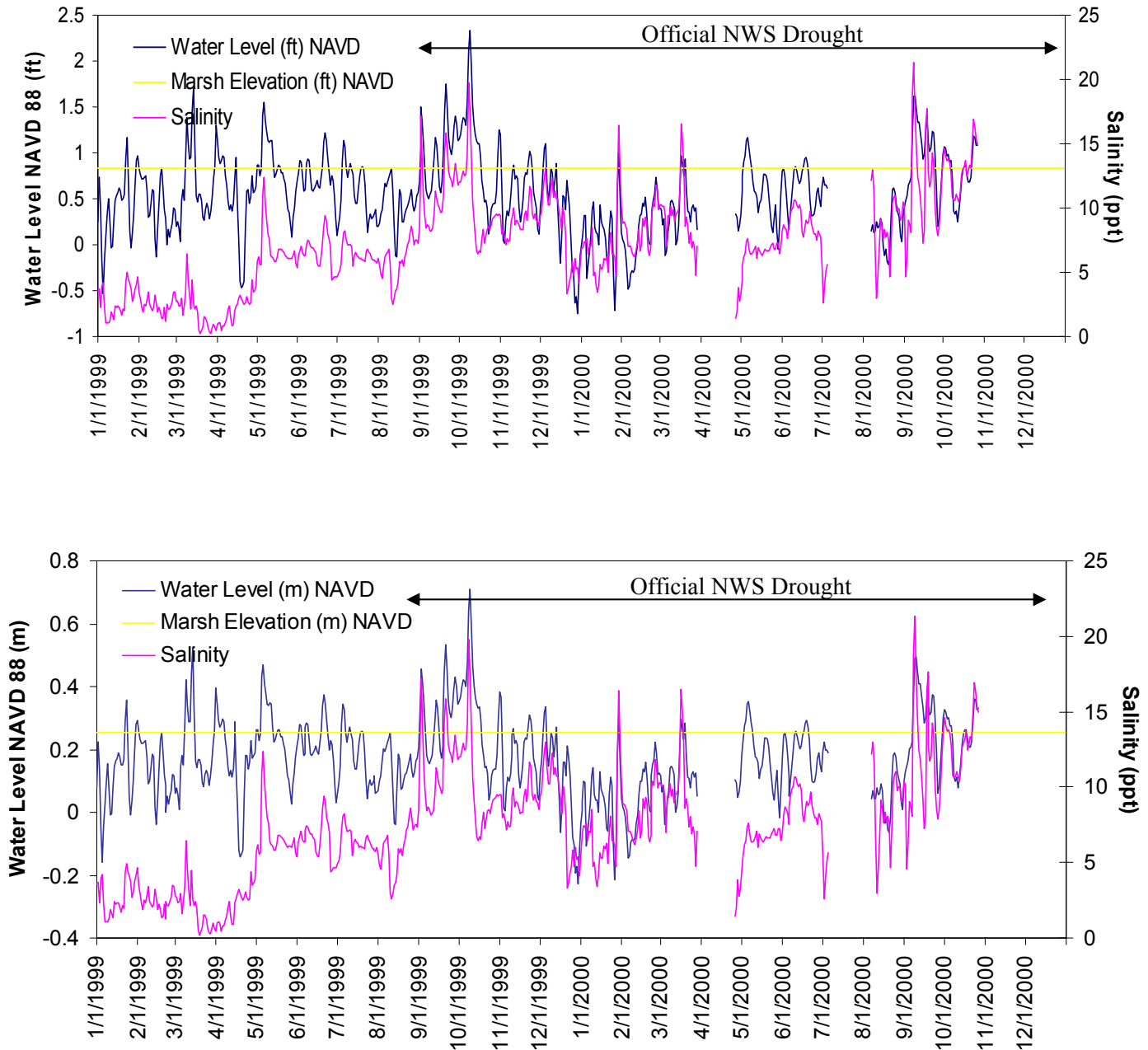


Figure 13a-b. Daily mean salinity and water level at Station PO06-11 in the Fritchie Marsh (PO-06) project area during 1999 and 2000. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-11 (1/1/01 - 12/31/02) Salinity and Water Level Data

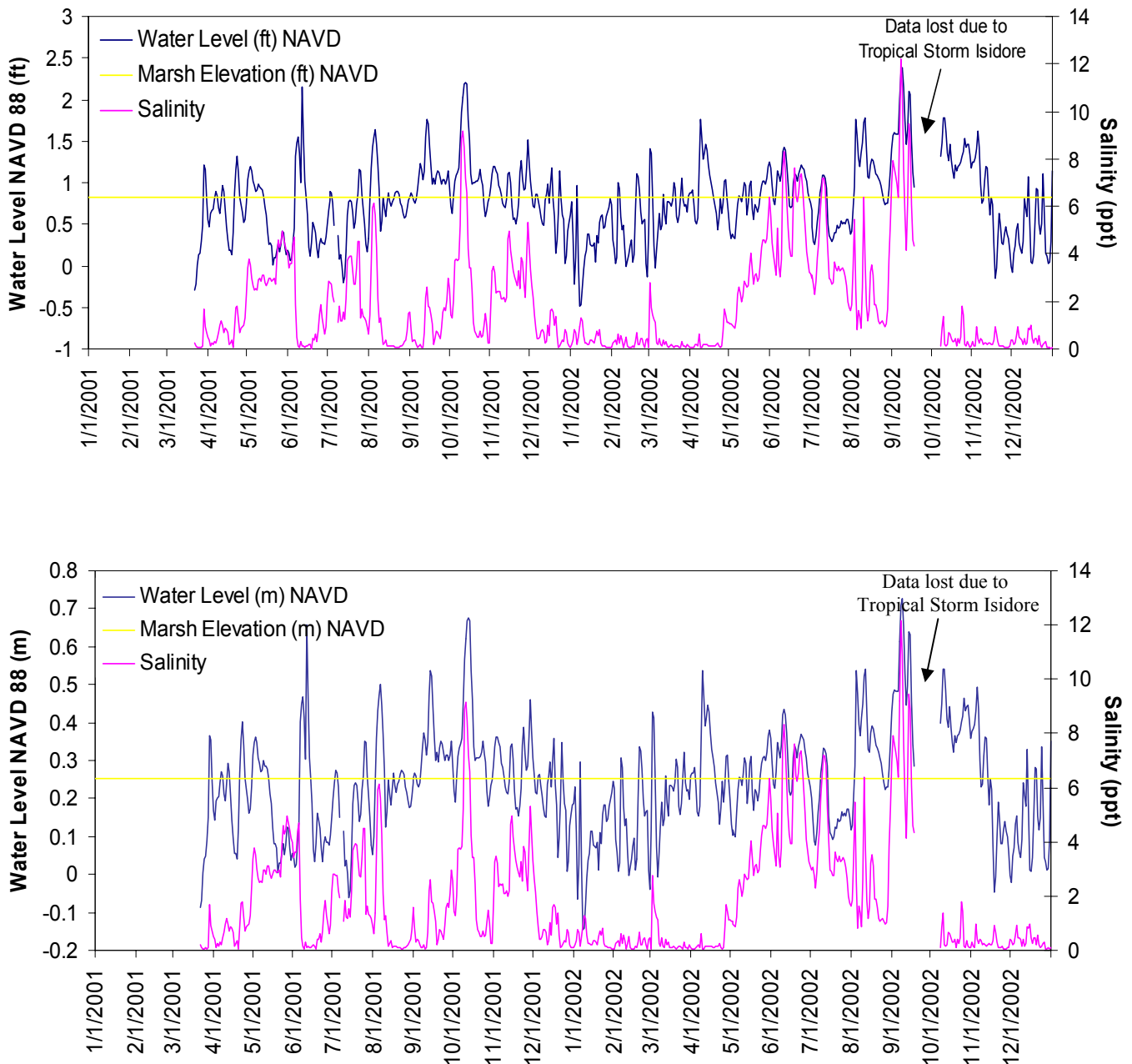


Figure 14a-b. Daily mean salinity and water level at Station PO06-11 in the Fritchie Marsh (PO-06) project area during 2001 and 2002. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-60 (3/18/99 - 12/31/00) Salinity and Water Level Data

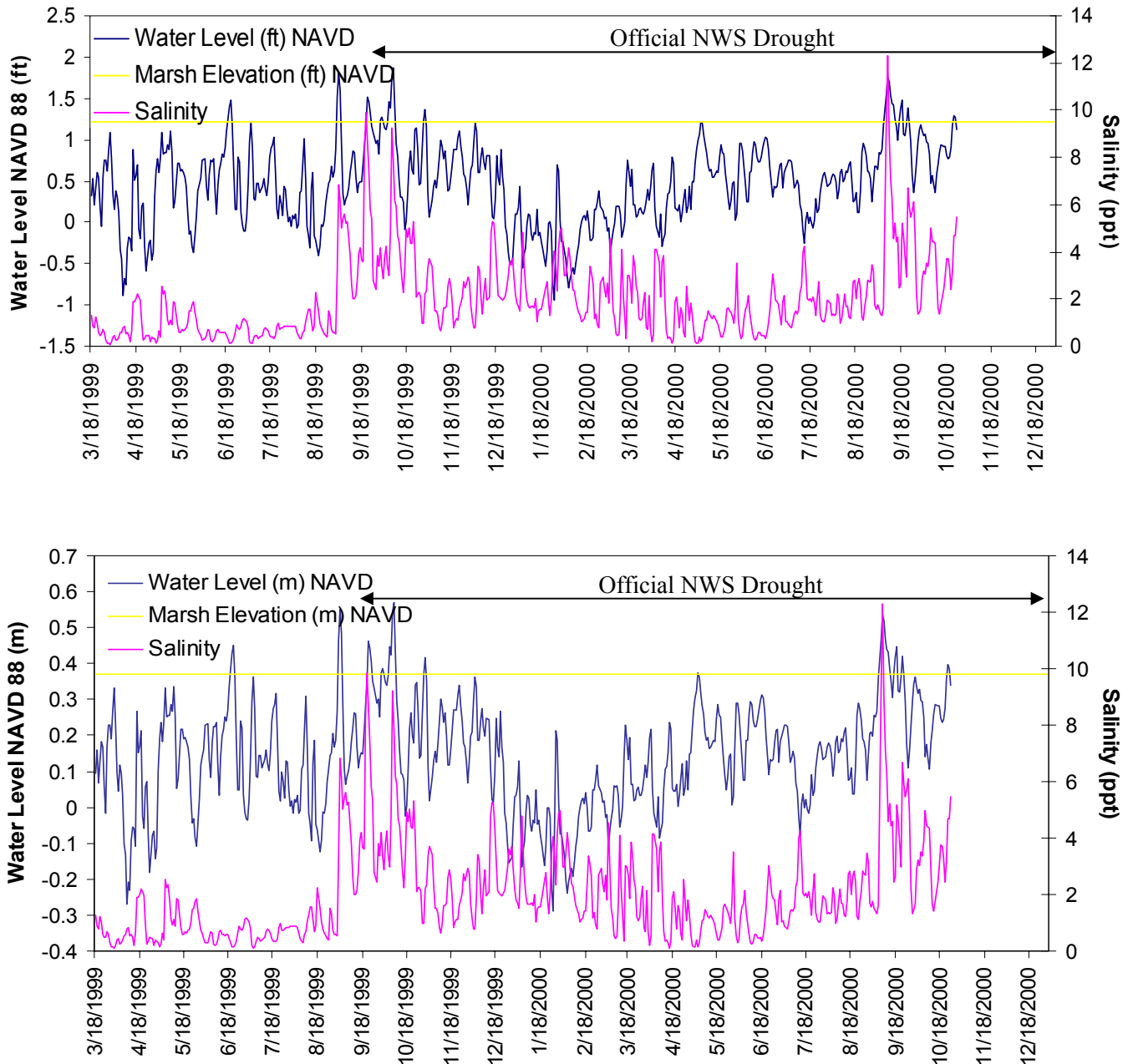


Figure 15a-b. Daily mean salinity and water level at Station PO06-60 in the Fritchie Marsh (PO-06) project area during 1999 and 2000. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Station PO06-60 (1/1/01 - 12/31/02) Salinity and Water Level Data

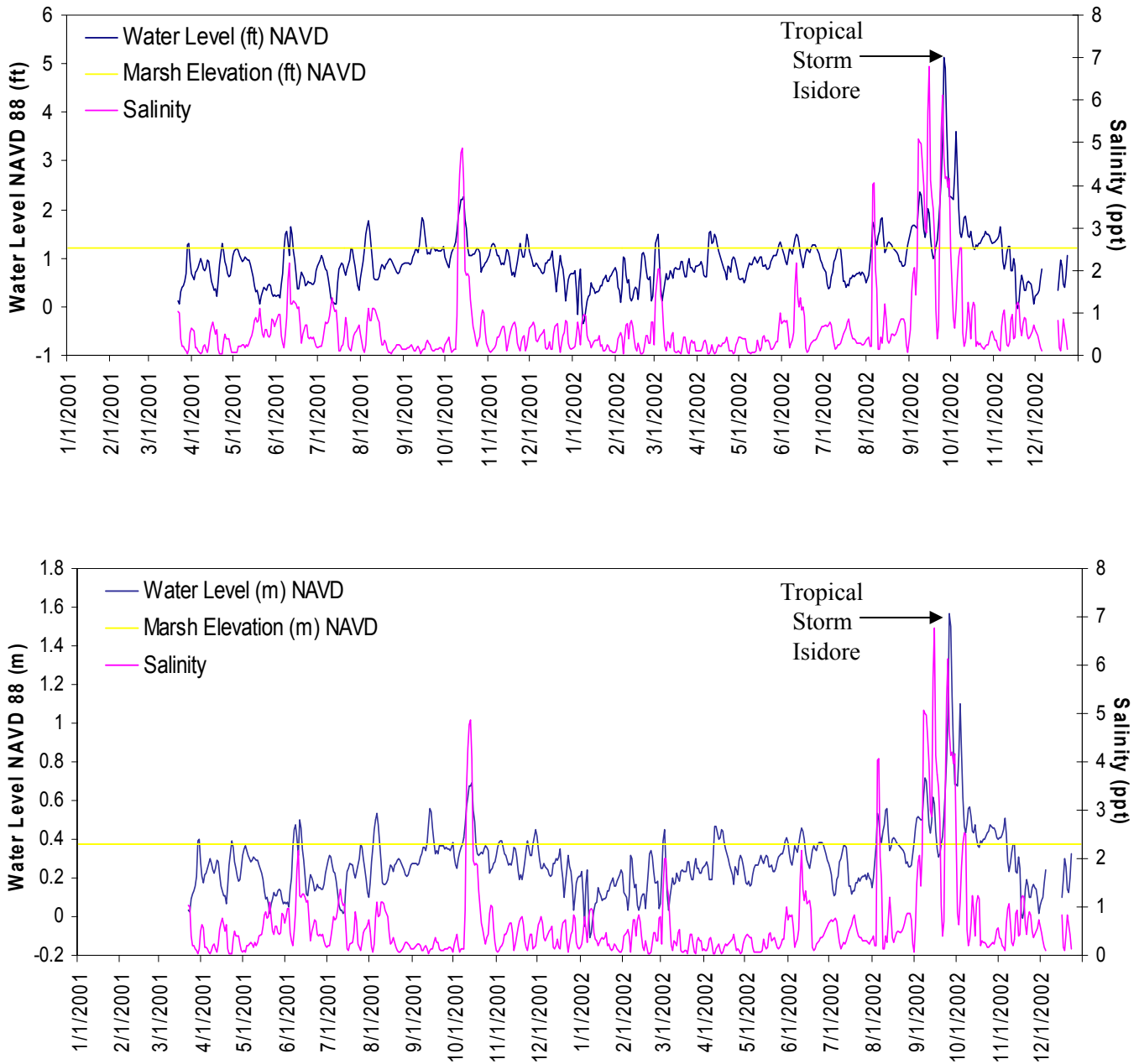


Figure 16a-b. Daily mean salinity and water level at Station PO06-60 in the Fritchie Marsh (PO-06) project area during 2001 and 2002. Daily means are calculated from hourly YSI datasonde readings. A water level reading above the marsh elevation line signifies that the marsh is flooded.



Fritchie Marsh Restoration (PO-06)

Pre-construction vs. Post-construction Water Level - NAVD 88

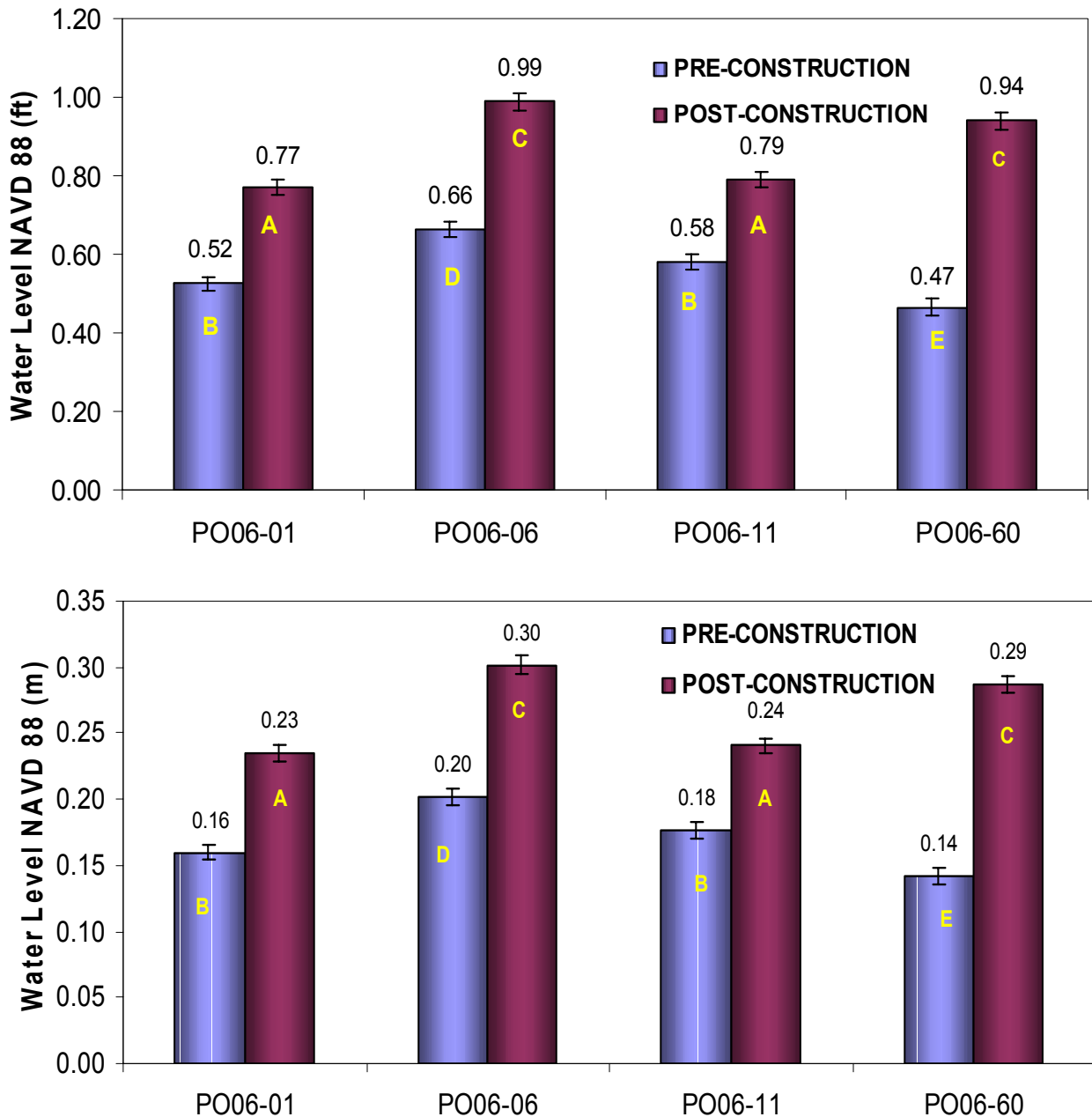


Figure 17a-b. Mean daily water level at four YSI continuous recorder stations located in the Fritchie Marsh (PO-06) project area during pre-construction (3/1/99 - 2/28/01) and post-construction (3/1/01-12/31/02) periods. Bars with the same letter indicate that means are not significantly different ($p>0.05$) based on least square means comparisons. Pre-construction water levels may have been affected by drought conditions which persisted from August 1999 to December 2000.



Fritchie Marsh Restoration (PO-06)

Pre-construction vs. Post-construction Salinity

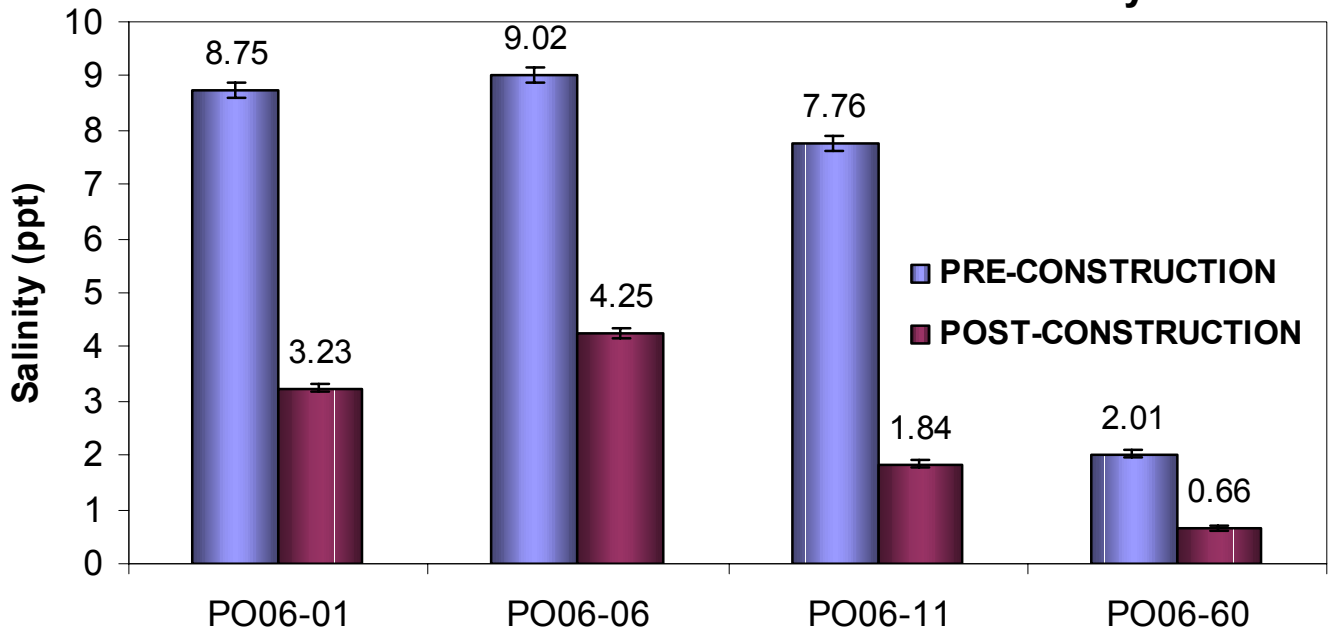


Figure 18. Mean daily salinity at four YSI continuous recorder stations located in the Fritchie Marsh (PO-06) project area during pre-construction (3/1/99 - 2/28/01) and post-construction (3/1/01-12/31/02) periods. Least square means comparisons between the four stations are significantly different within and between the pre- and post-construction periods ($p < 0.0001$), except between stations PO06-01 and PO06-06, which are marginally non-significant ($p = 0.0517$) during the pre-construction period, and between stations PO06-11 (post-construction) and PO06-60 (pre-construction) ($p = 0.2180$). It is important to note that pre-construction salinities may have been amplified due to drought conditions which persisted from August 1999 to December 2000.



Fritchie Marsh Restoration (PO-06)

Pre-construction vs. Post-construction Mean Monthly Staff Gauge Readings

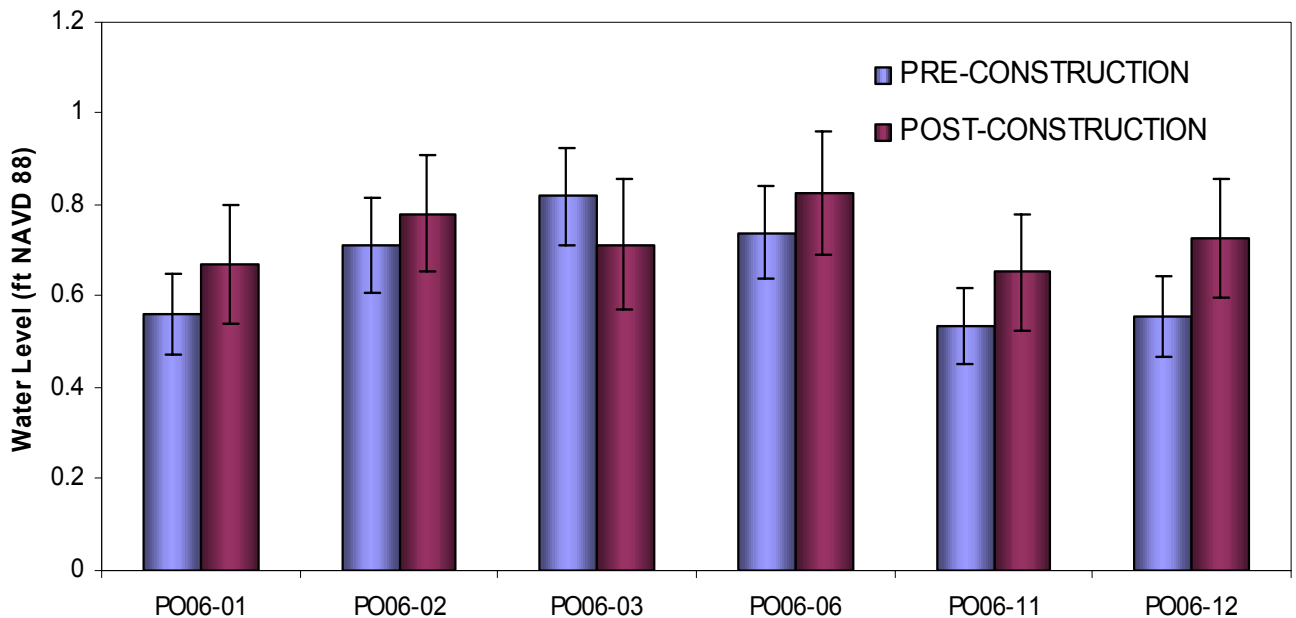


Figure 19. Mean of monthly staff gauge readings at the six staff gauges located in the Fritchie Marsh (PO-06) project area during pre-construction (3/98-2/01) and post-construction (3/01-1/03) periods. There is no significant difference among mean staff gauge readings at the six stations within or between the pre- and post-construction periods ($p < 0.5902$).



Fritchie Marsh Restoration (PO-06)

Mean of Monthly Staff Gauge Readings March 1998 - January 2003

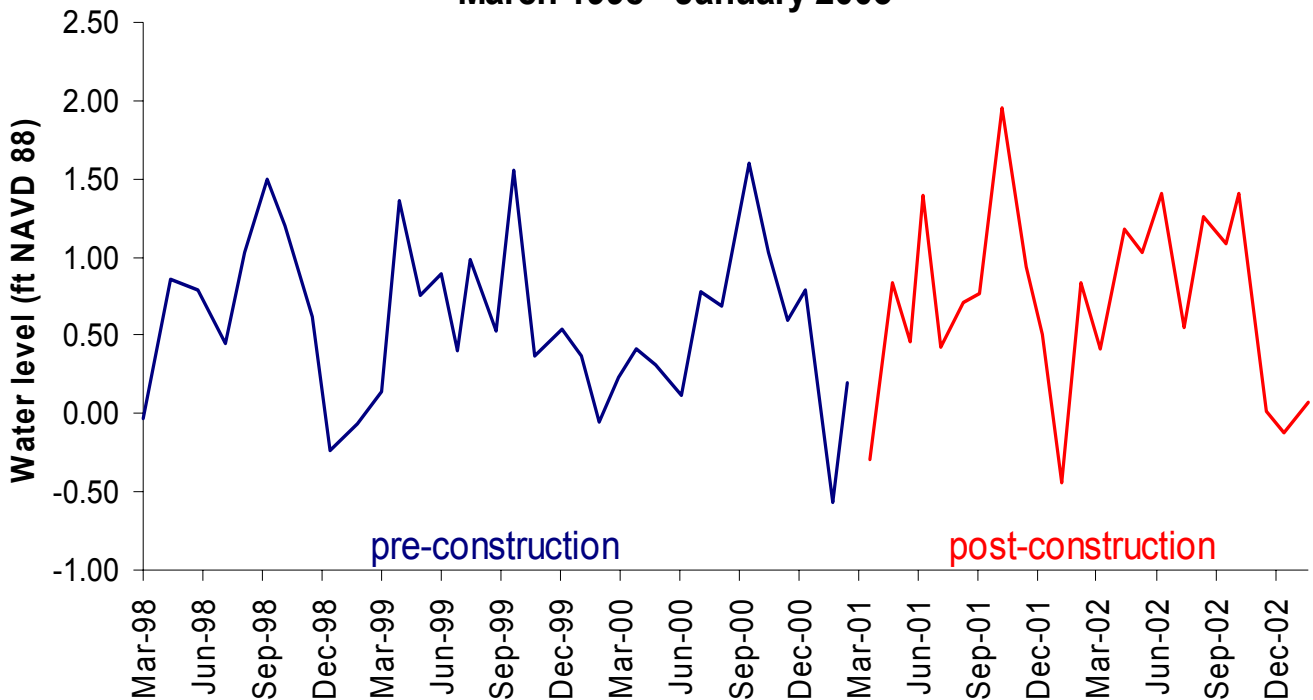


Figure 20. Mean of monthly readings of six staff gauges located in the Fritchie Marsh Restoration (PO-06) Project area from March 1998 to January 2003.



Fritchie Marsh Restoration (PO-06)

Water Flow

Hourly current meter data were collected at five stations from October 1998 to January 2000 (pre-construction) and from December 2001 to December 2002 (post-construction). Flow volume estimates at each station were made using recorded current data, channel cross sections, and water level data from the associated continuous recorder station.

Water Flow Station	Associated Water Level Station
PO06-51	PO06-60
PO06-52	PO06-01
PO06-53	PO06-06
PO06-54	PO06-11
PO06-55	PO06-11

Figures and Tables:

Figure 21. Fritchie Marsh Restoration (PO-06) water flow monitoring locations.

Figures 22a-b to 26a-b. Mean daily flow volume (m^3/s) at the five water flow monitoring stations of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods.

Figures 27a-b to 31a-b. Mean daily flow volume (ft^3/s) at the five water flow monitoring stations of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods.

Table 1. Mean flow volume (ft^3/s) into (+) and out of (-) the Fritchie Marsh Restoration (PO-06) project area at the five water flow monitoring stations during the pre-construction and post-construction monitoring periods.



Fritchie Marsh Restoration (PO-06) Water Flow Monitoring Locations

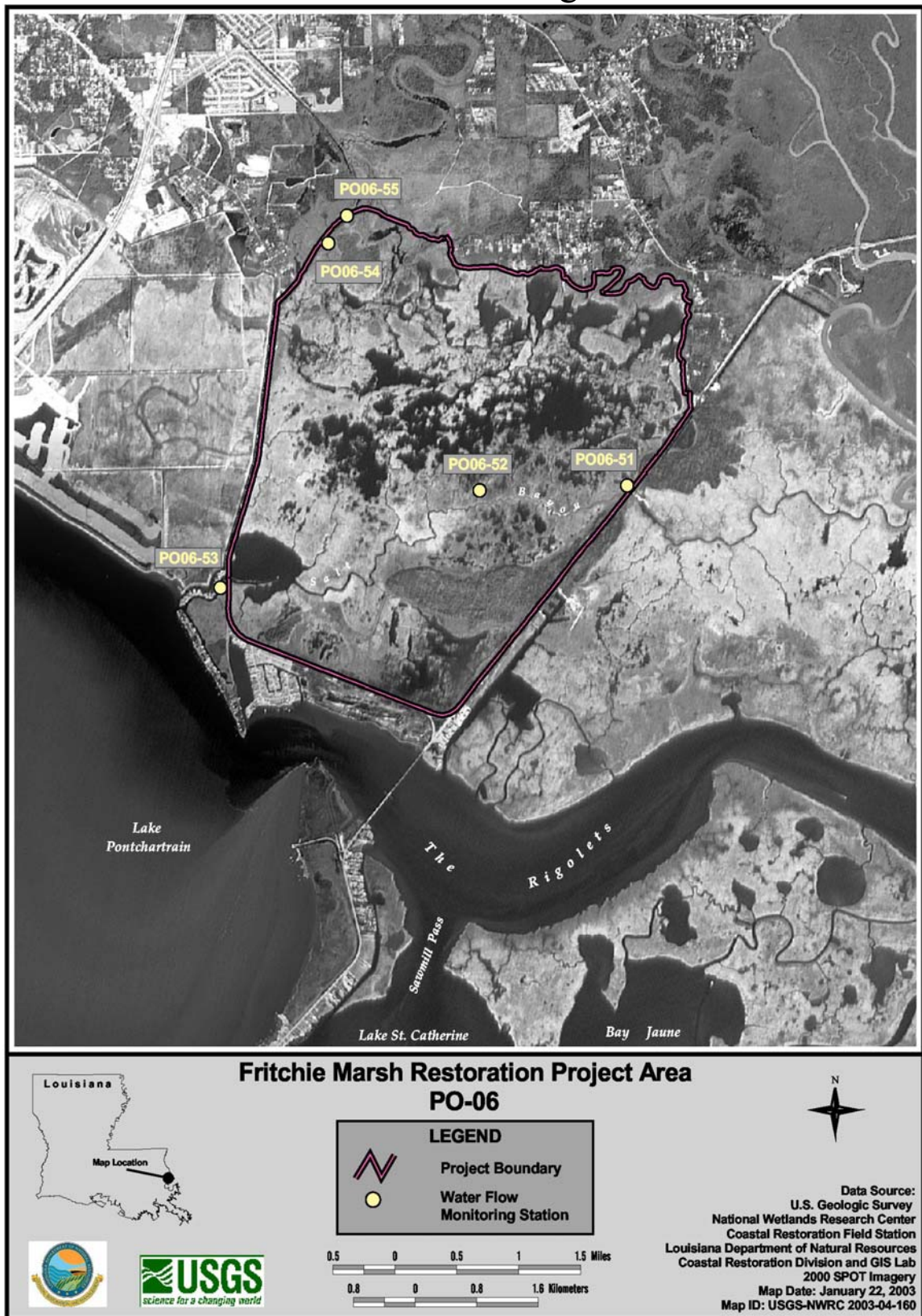


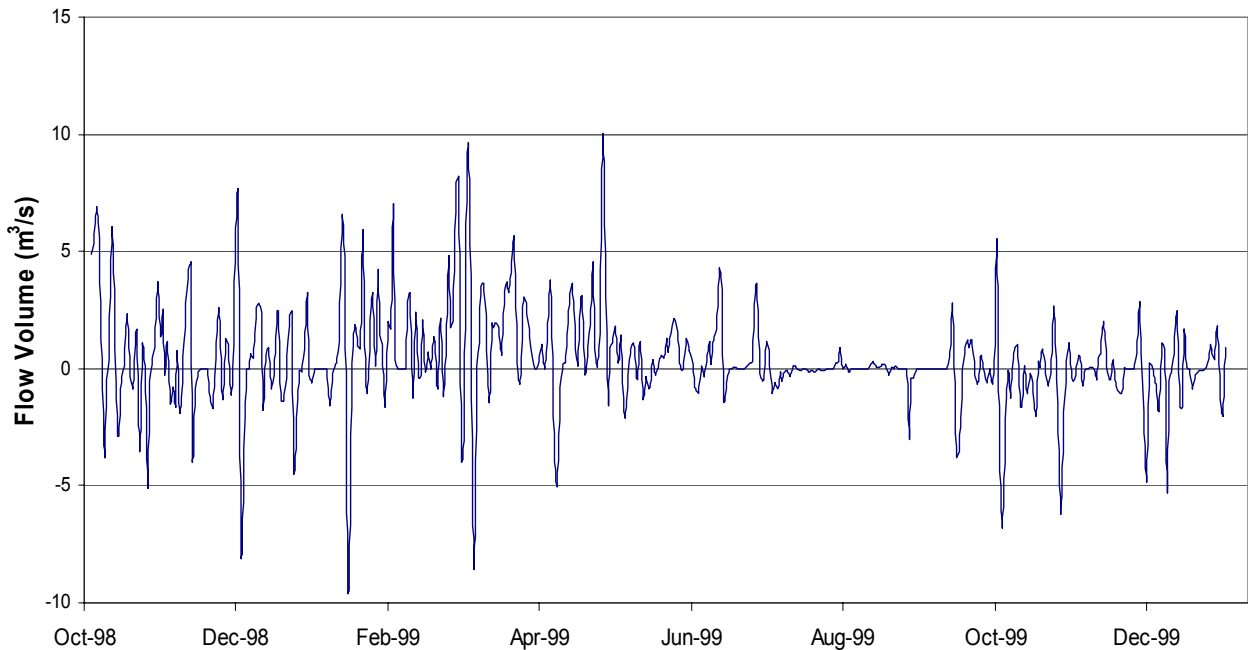
Figure 21. Fritchie Marsh Restoration (PO-06) water flow monitoring locations.



Fritchie Marsh Restoration (PO-06)

Flow Volume (m³/s) – Station PO06-51

Pre-construction



Post-construction

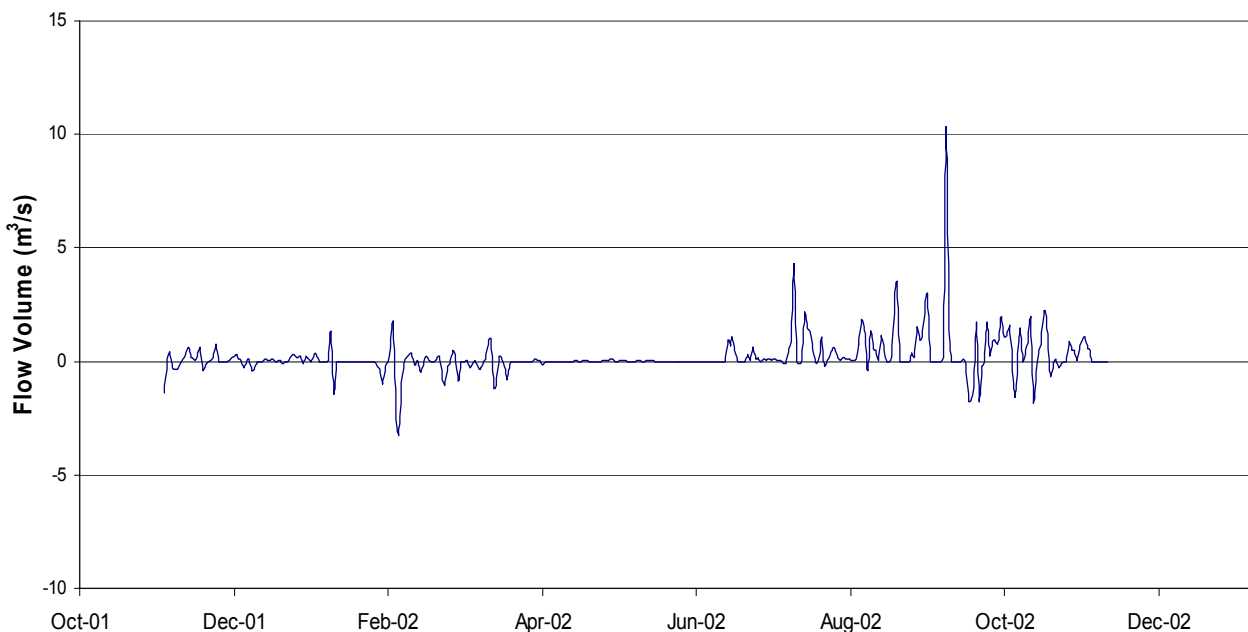


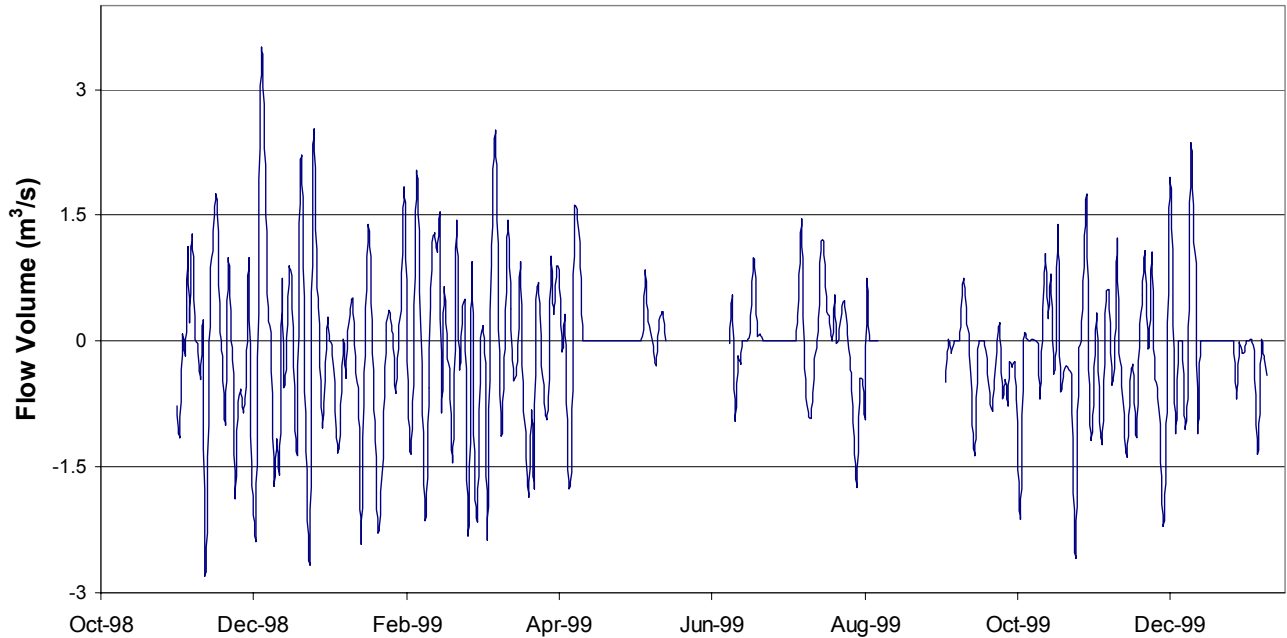
Figure 22a-b. Mean daily flow volume (m³/s) at Station PO06-51 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area at the Hwy 90 culvert.



Fritchie Marsh Restoration (PO-06)

Flow Volume (m³/s) – Station PO06-52

Pre-construction



Post-construction

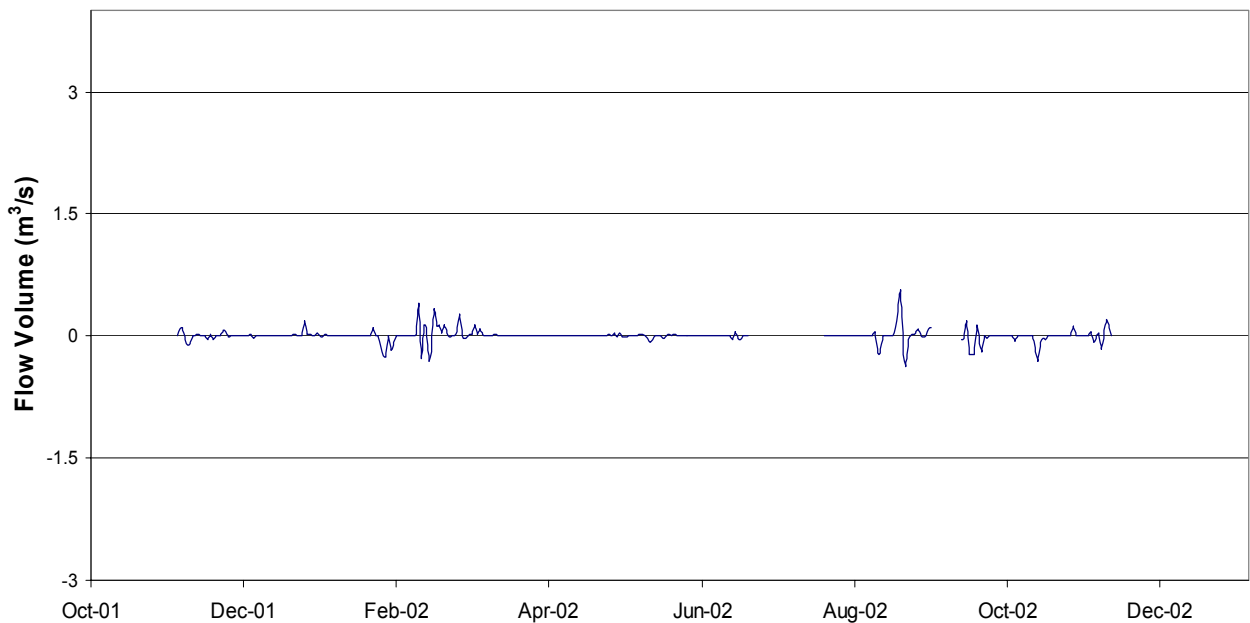


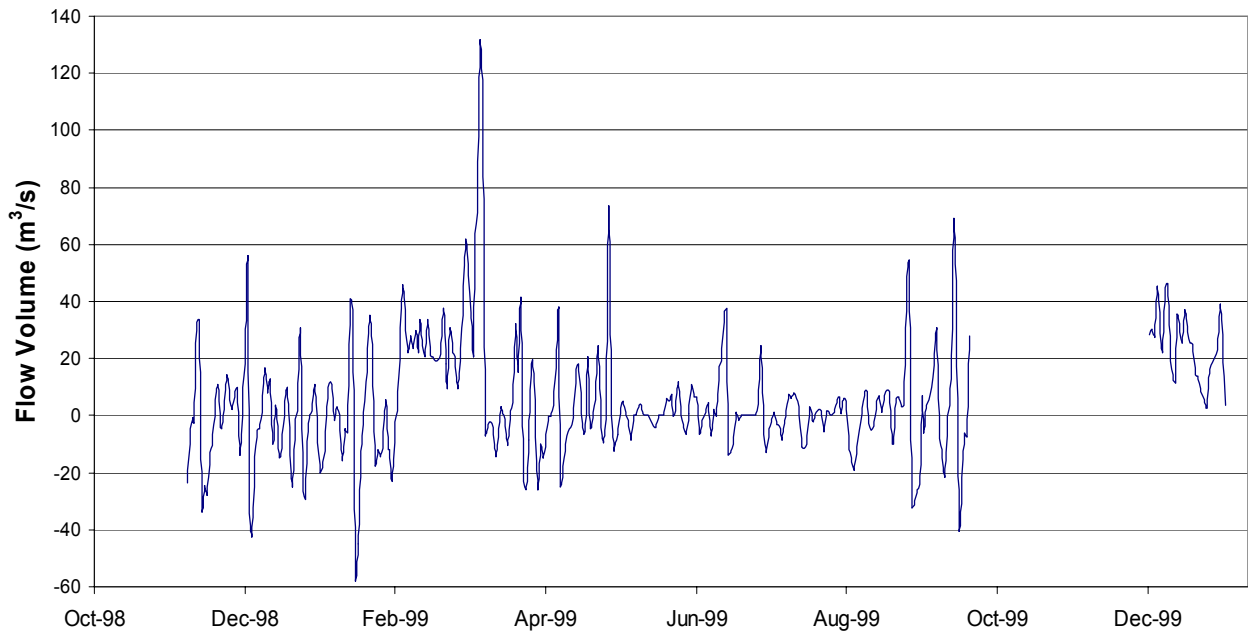
Figure 23a-b. Mean daily flow volume (m³/s) at Station PO06-52 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the marsh from Salt Bayou.



Fritchie Marsh Restoration (PO-06)

Flow Volume (m³/s) – Station PO06-53

Pre-construction



Post-construction

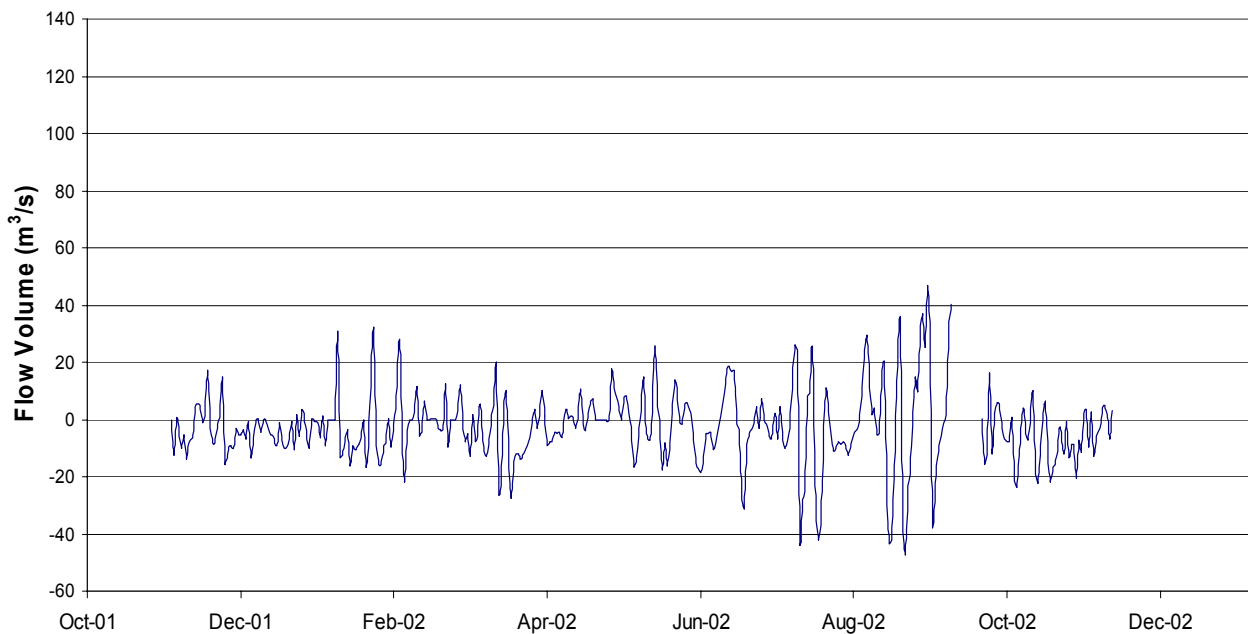


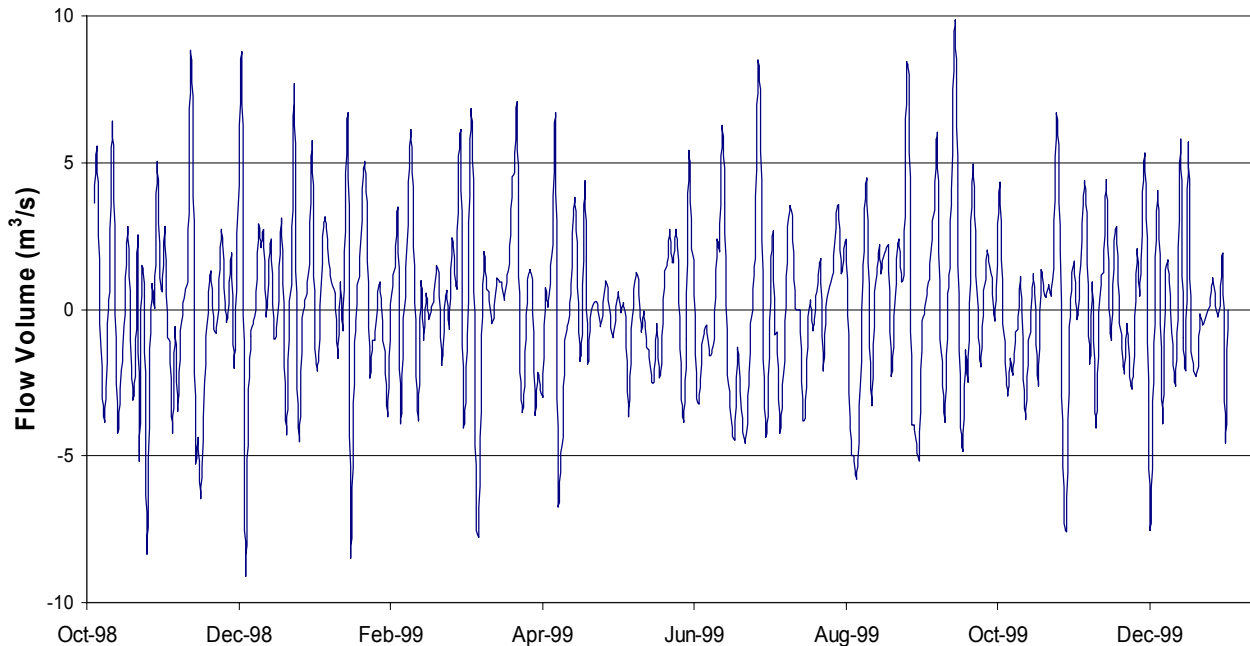
Figure 24a-b. Mean daily flow volume (m³/s) at Station PO06-53 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area from Lake Pontchartrain.



Fritchie Marsh Restoration (PO-06)

Flow Volume (m³/s) – Station PO06-54

Pre-construction



Post-construction

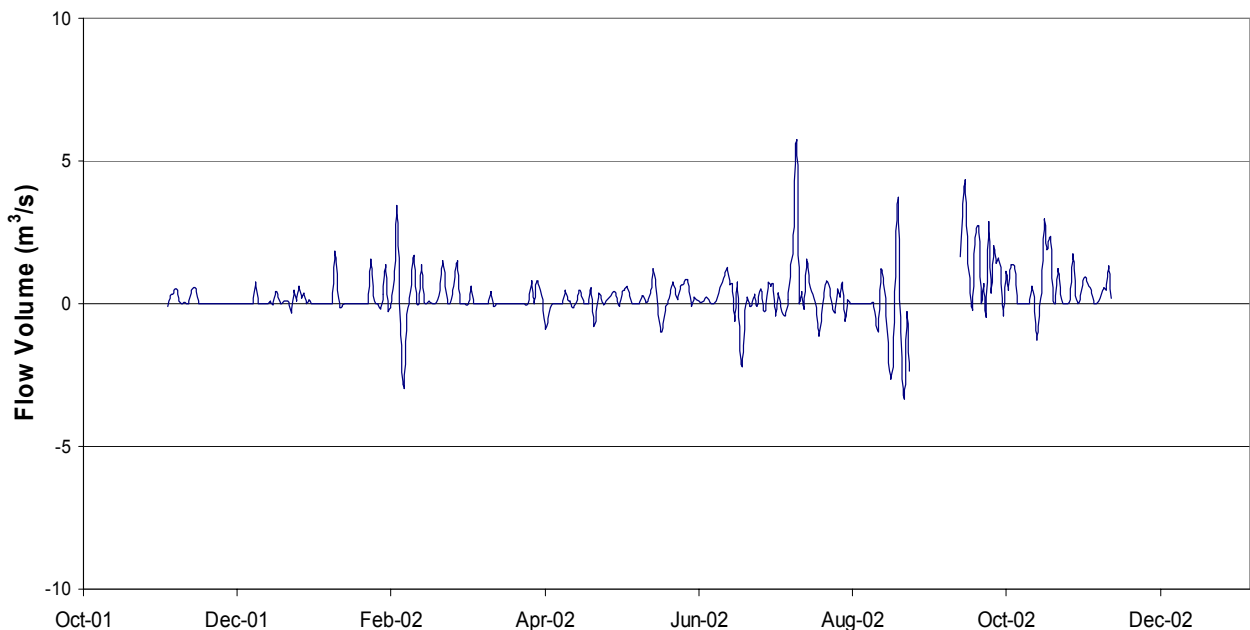


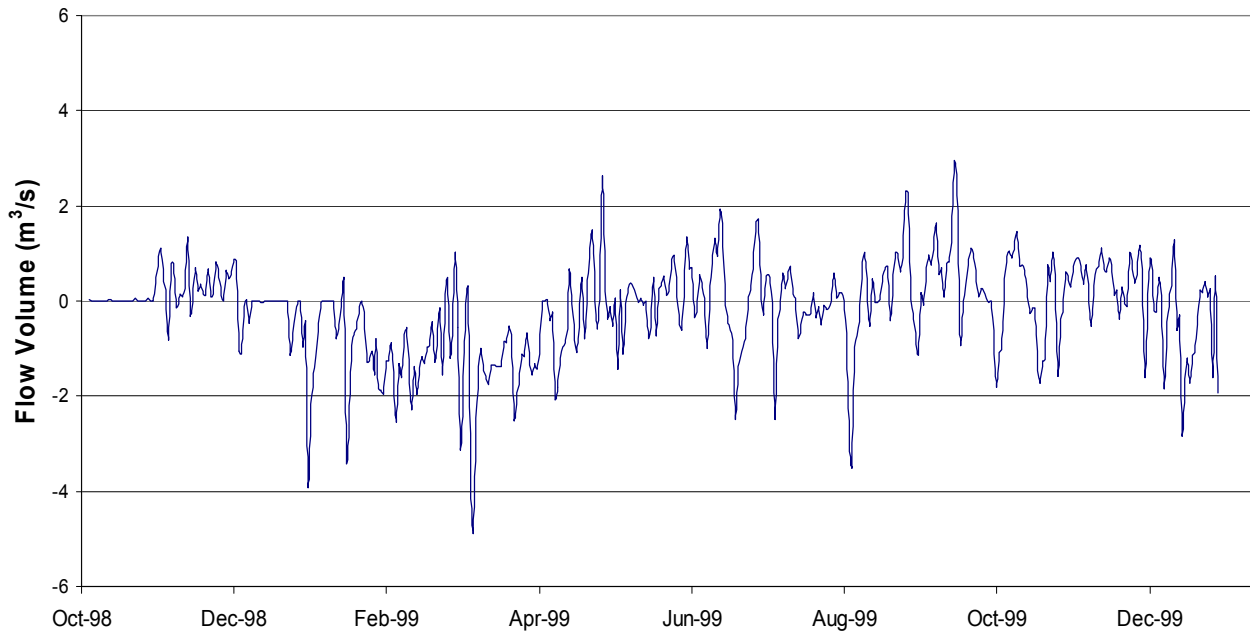
Figure 25a-b. Mean daily flow volume (m³/s) at Station PO06-54 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area from the W-14 Canal.



Fritchie Marsh Restoration (PO-06)

Flow Volume (m³/s) – Station PO06-55

Pre-construction



Post-construction

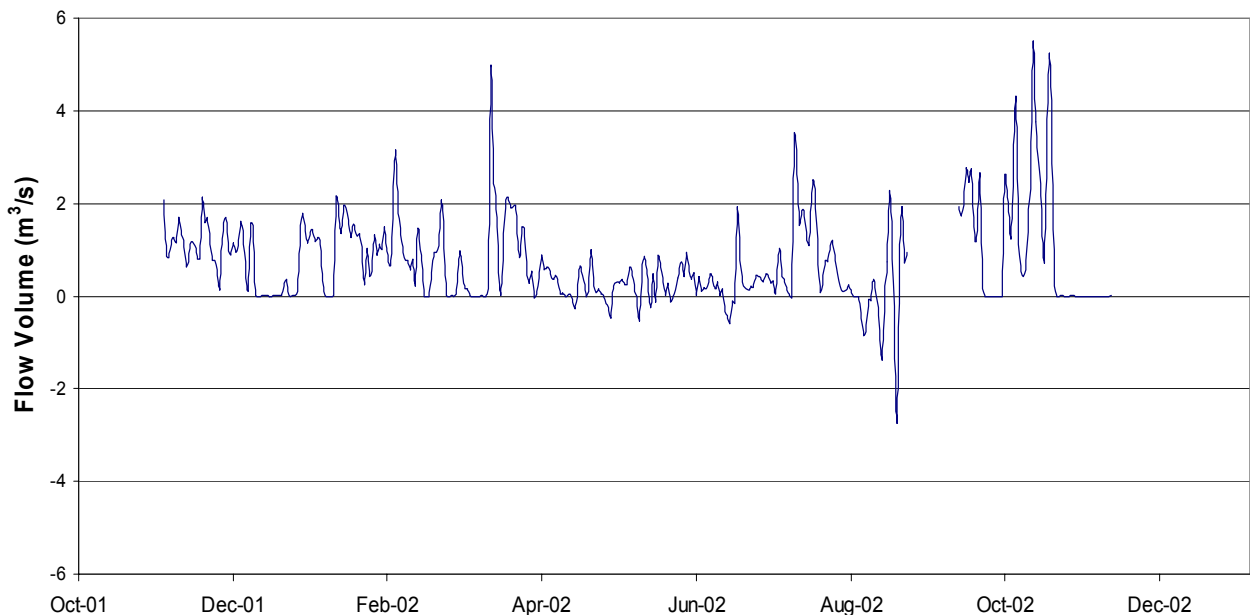


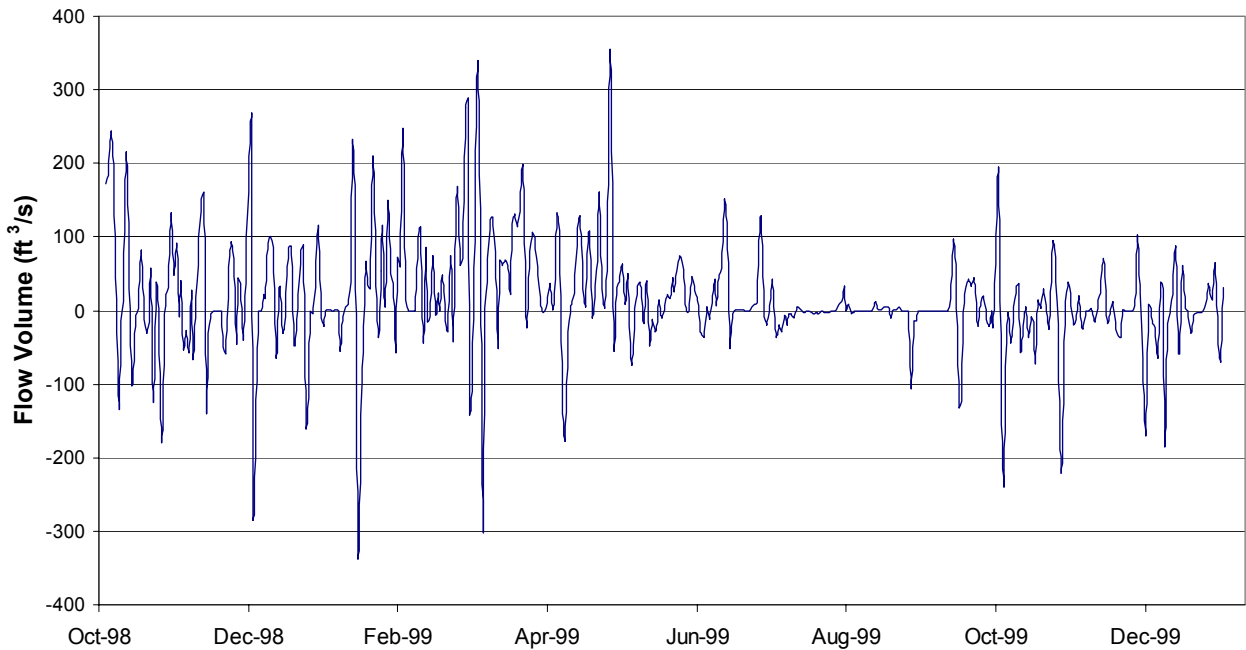
Figure 26a-b. Mean daily flow volume (m³/s) at Station PO06-55 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow through the W-14 Canal from Slidell.



Fritchie Marsh Restoration (PO-06)

Flow Volume (ft³/s) – Station PO06-51

Pre-construction



Post-construction

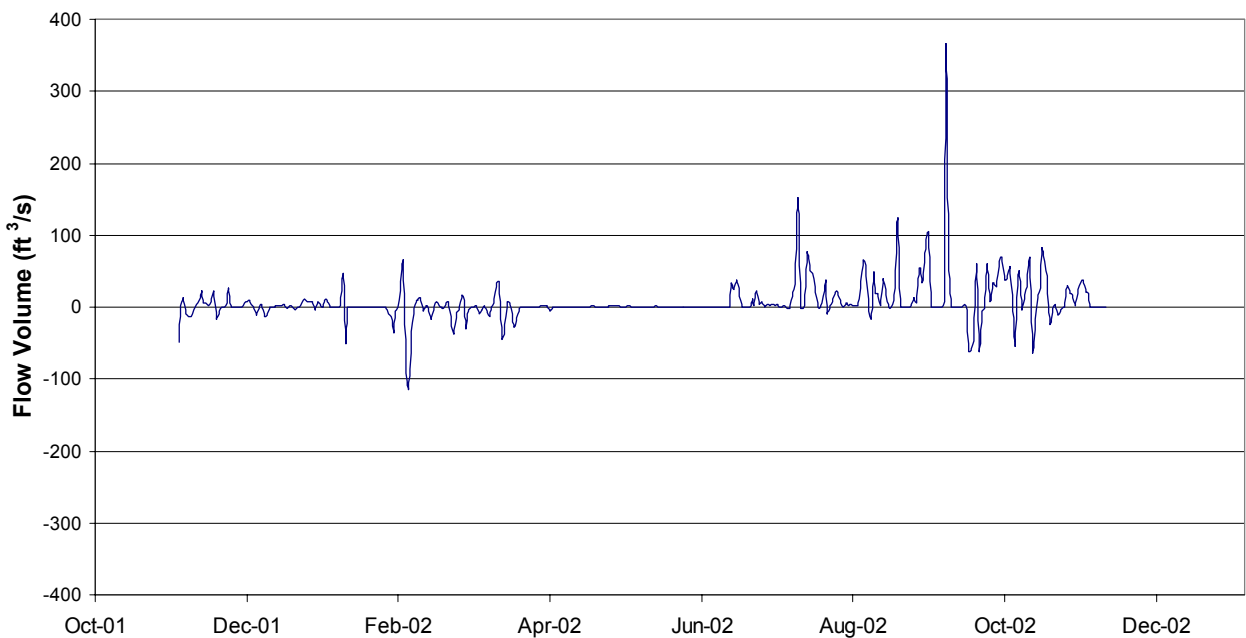


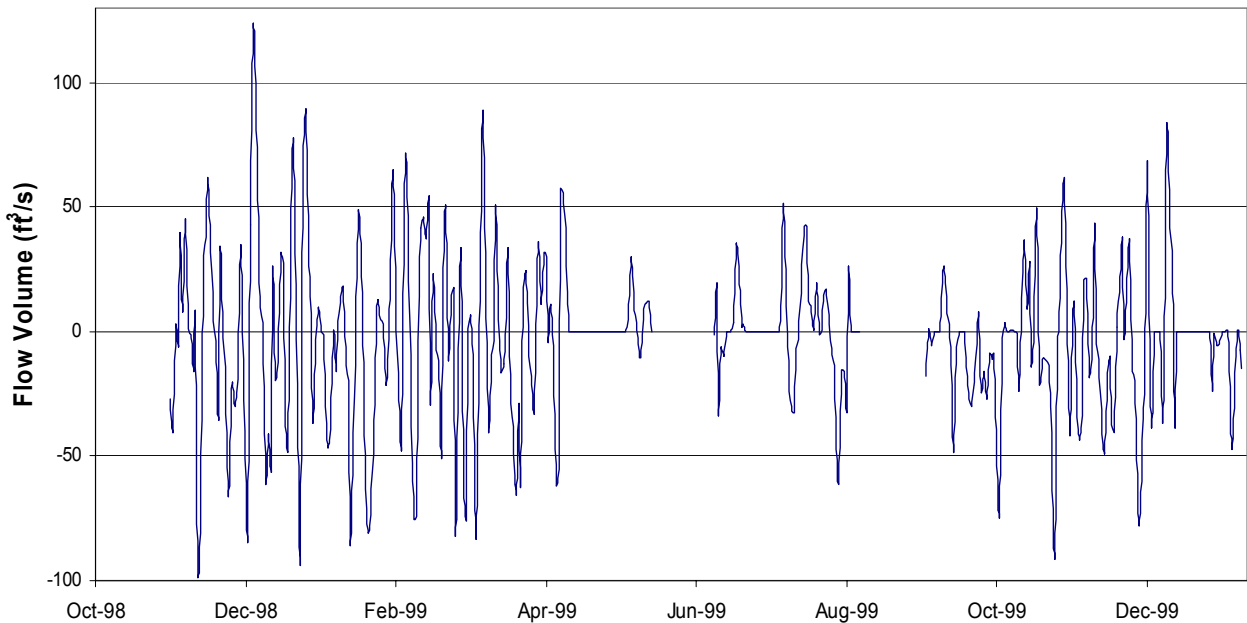
Figure 27a-b. Mean daily flow volume (ft³/s) at Station PO06-51 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area at the Hwy 90 culvert.



Fritchie Marsh Restoration (PO-06)

Flow Volume (ft³/s) – Station PO06-52

Pre-construction



Post-construction

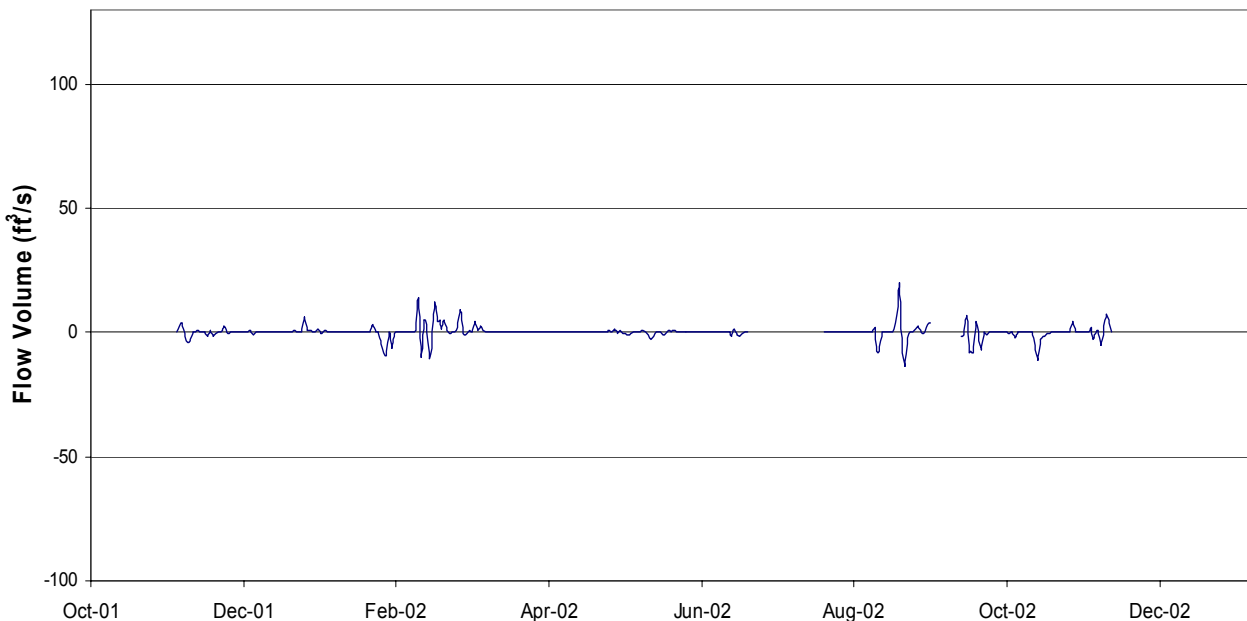


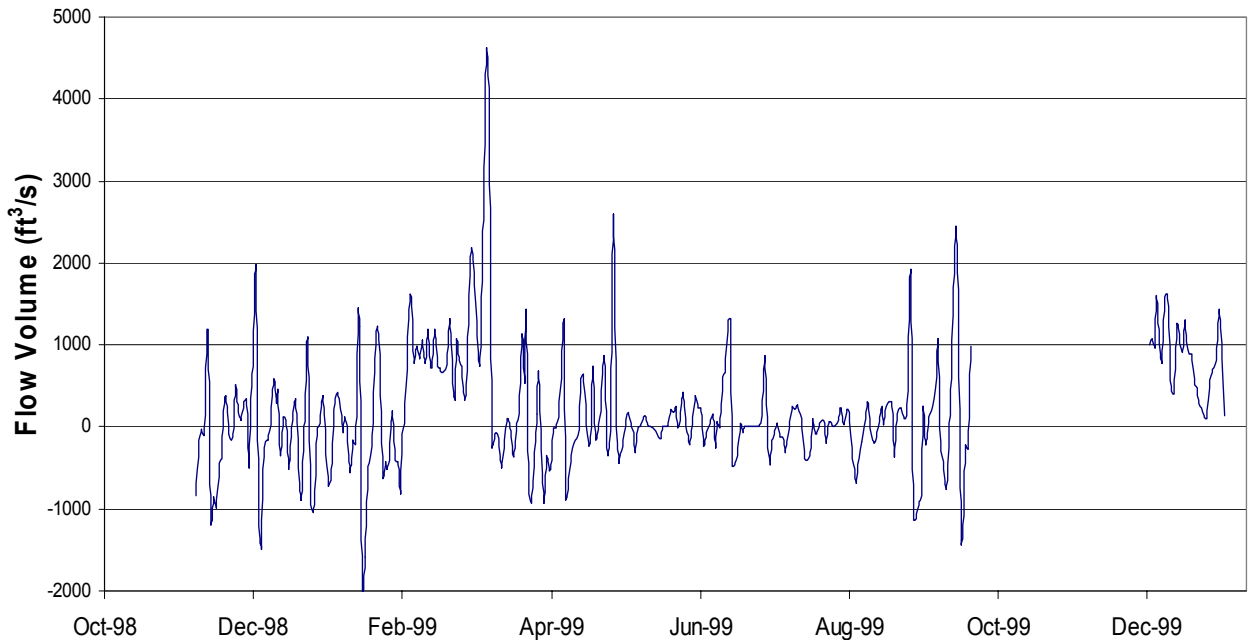
Figure 28a-b. Mean daily flow volume (ft³/s) at Station PO06-52 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the marsh from Salt Bayou.



Fritchie Marsh Restoration (PO-06)

Flow Volume (ft³/s) – Station PO06-53

Pre-construction



Post-construction

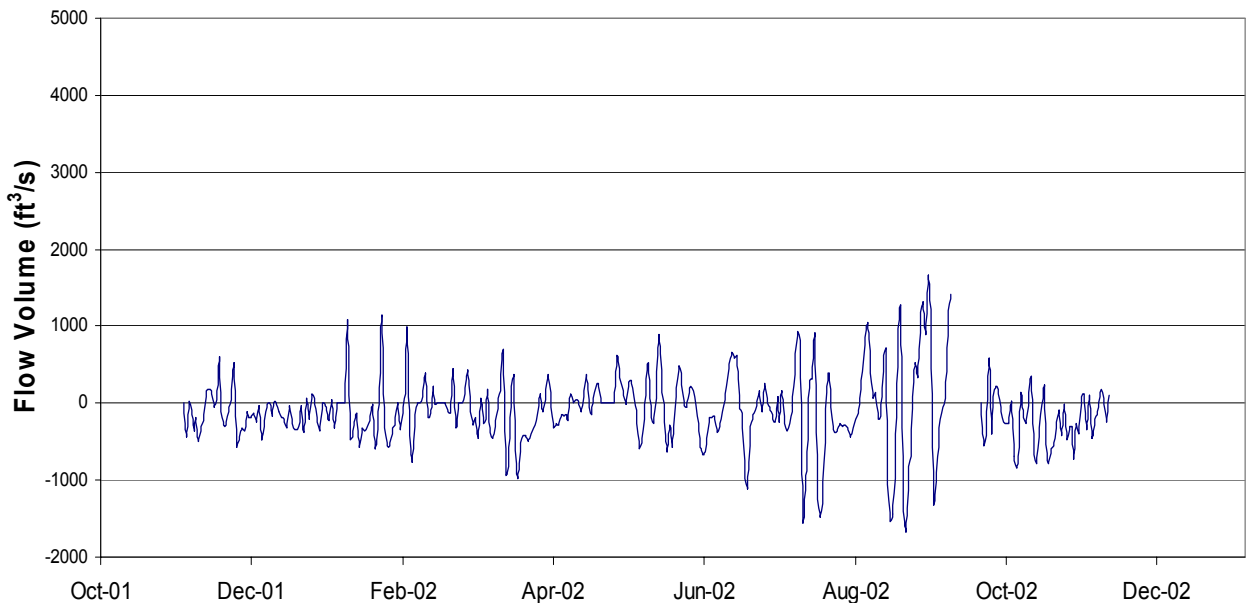


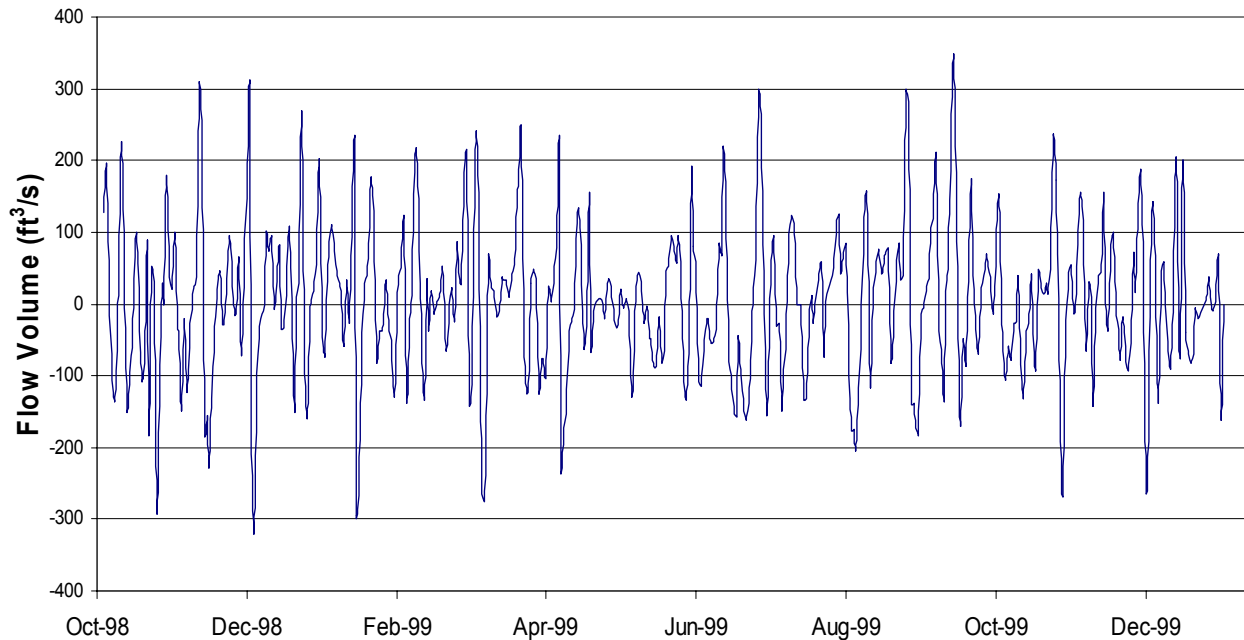
Figure 29a-b. Mean daily flow volume (ft³/s) at Station PO06-53 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area from Lake Pontchartrain.



Fritchie Marsh Restoration (PO-06)

Flow Volume (ft³/s) – Station PO06-54

Pre-construction



Post-construction

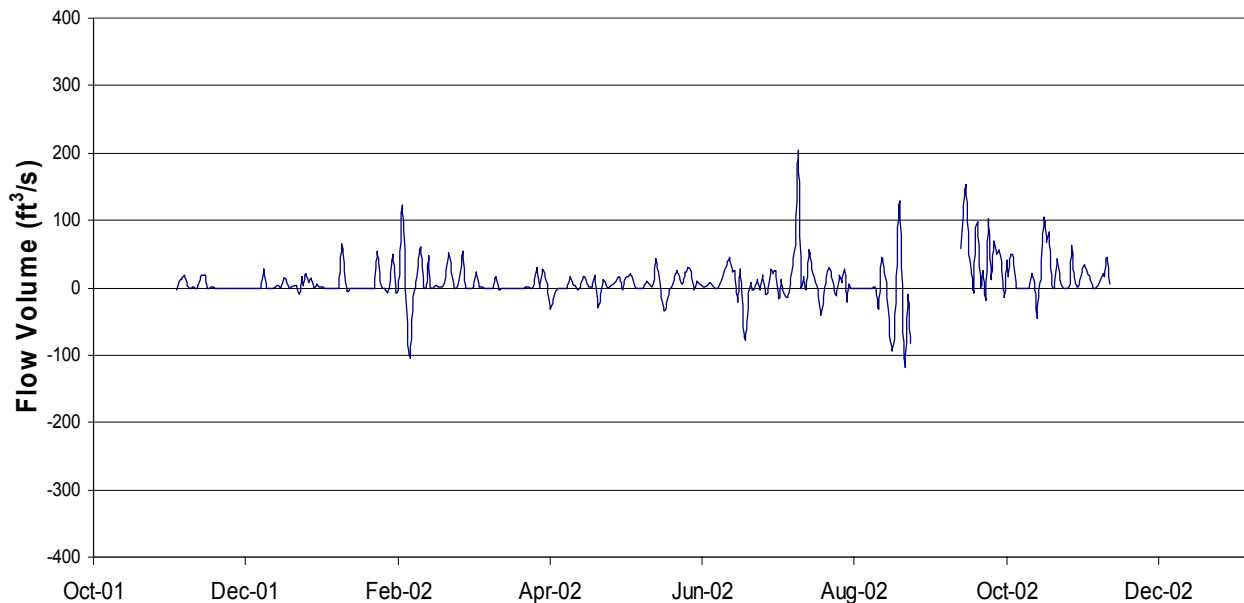


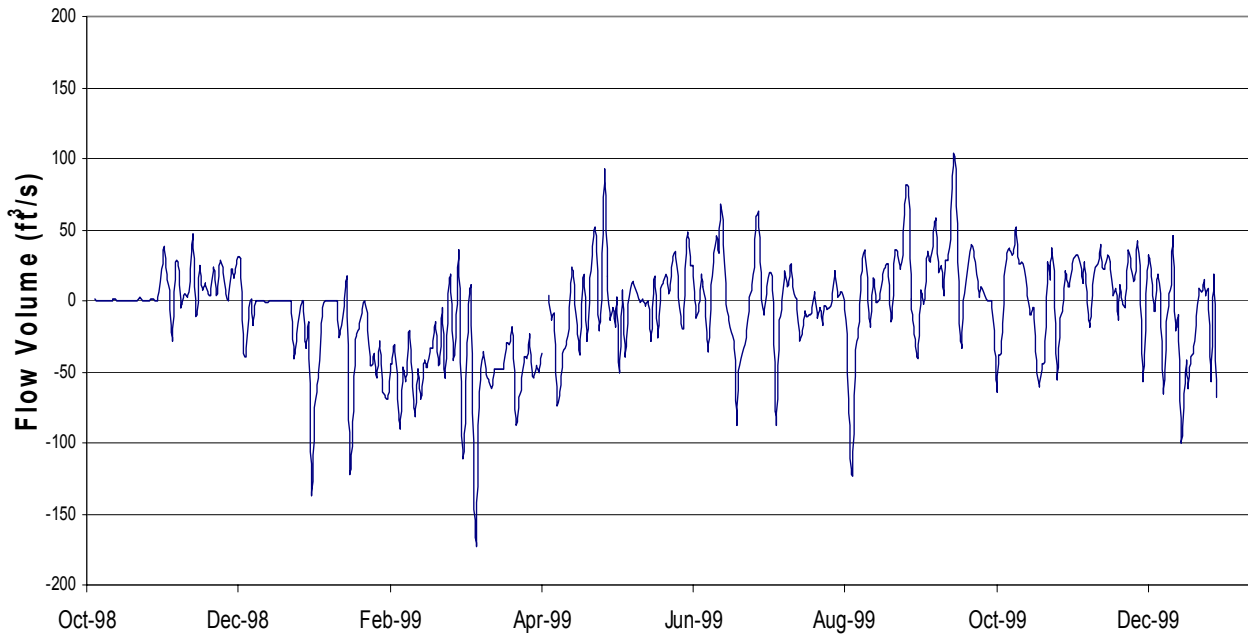
Figure 30a-b. Mean daily flow volume (ft³/s) at Station PO06-54 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow into the project area from the W-14 Canal.



Fritchie Marsh Restoration (PO-06)

Flow Volume (ft³/s) – Station PO06-55

Pre-construction



Post-construction

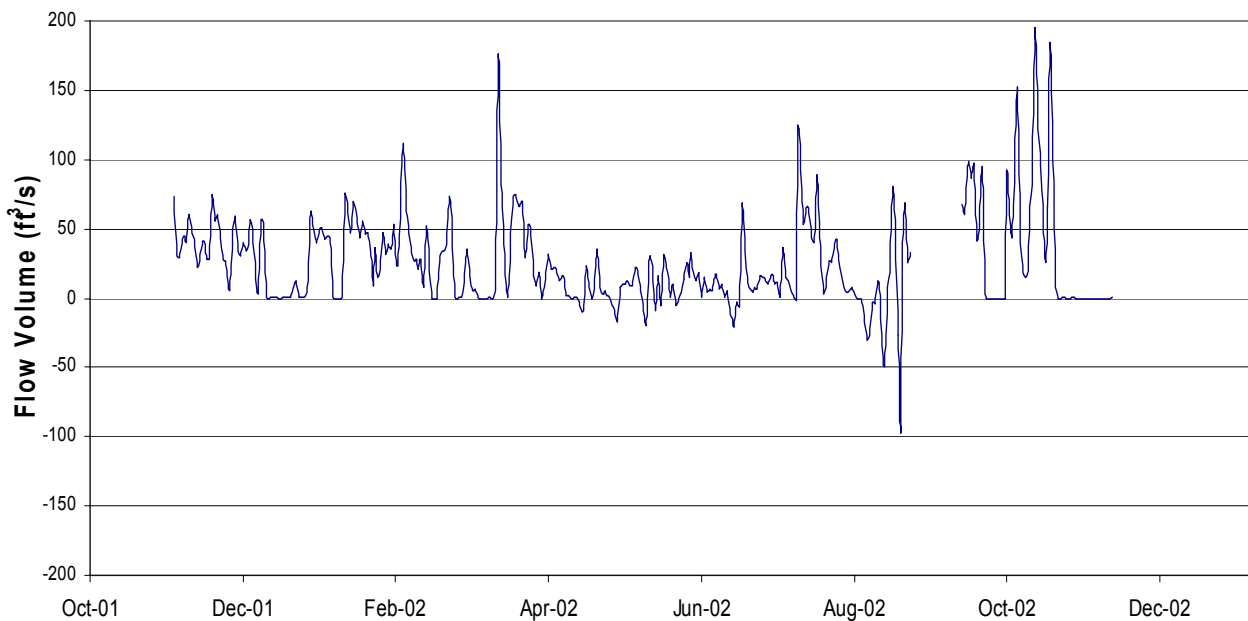


Figure 31a-b. Mean daily flow volume (ft³/s) at Station PO06-55 of the Fritchie Marsh Restoration project (PO-06) during pre-construction and post-construction periods. Positive flow volume indicates flow through the W-14 Canal from Slidell.



Fritchie Marsh Restoration (PO-06)

Water Flow

Table 1. Mean flow volume (ft³/s) into (+) and out of (-) the Fritchie Marsh Restoration (PO-06) project area at the five water flow monitoring stations during the pre-construction and post-construction monitoring periods. Input from Slidell (PO06-55) and through the Hwy 90 culvert (PO06-51) is primarily fresh, while input from Lake Pontchartrain (PO06-53) is generally intermediate to brackish.

Station	Construction Period	Mean flow volume (ft ³ /s) into project area (+)	S.E.	Mean flow volume (ft ³ /s) out of project area (-)	S.E.
PO06-51	PRE	132.33	1.46	-128.77	1.83
	POST	47.92	1.42	-40.72	1.26
PO06-52	PRE	53.64	0.62	-62.76	0.68
	POST	8.22	0.32	-9.20	0.31
PO06-53	PRE	997.79	14.25	-714.79	10.18
	POST	819.28	13.14	-728.54	8.86
PO06-54	PRE	160.63	1.38	-142.35	1.17
	POST	60.46	1.18	-51.31	1.35
PO06-55	PRE	50.82	0.53	-61.79	0.69
	POST	55.48	0.67	-36.36	1.27



Fritchie Marsh Restoration (PO-06)

Vegetation

Vegetation surveys were conducted in September 1997 (N=25 plots), September 1999 (N=4 plots) and August 2000 (N=29 plots) during the pre-construction period. Preliminary statistical analyses will be conducted following the first post-construction vegetation survey in 2004.

Figures and Tables:

Table 2. Scientific and common names of plant species observed during the 1997, 1999, and 2000 vegetation surveys of the PO-06 project area.

Table 3. The percentage of the total number of vegetation plots where each species occurred and the mean percent cover of species within plots where they occurred during the 1997 (N=25 plots), 1999 (N=4 plots), and 2000 (N=29 plots) vegetation sampling of the PO-06 project area. Sampling was conducted within 4-m² plots using the Braun-Blanquet method.

Figure 32. Mean % cover of selected species across all 4-m² plots within the PO-06 project area during September 1997 (N=25 plots) and August 2000 (N=29 plots). Vegetation was sampled using the Braun-Blanquet method.



Fritchie Marsh Restoration (PO-06)

Vegetation

Table 2. Scientific and common names of plant species observed during the 1997, 1999, and 2000 vegetation surveys of the PO-06 project area.

Scientific Name	Common Name
<i>Amaranthus australis</i>	southern amaranth
<i>Ammannia coccinea</i>	valley redstem
<i>Baccharis halimifolia</i>	eastern baccharis
<i>Bacopa monnieri</i>	herb of grace
<i>Cyperus filicinus</i>	fern flatsedge
<i>Cyperus odoratus</i>	fragrant flatsedge
<i>Distichlis spicata</i>	inland saltgrass
<i>Echinochloa walteri</i>	coast cockspur grass
<i>Eclipta prostrata</i>	false daisy
<i>Eleocharis cellulosa</i>	Gulf Coast spikerush
<i>Eleocharis olivacea</i>	bright green spikerush
<i>Eleocharis parvula</i>	dwarf spikerush
<i>Ipomoea sagittata</i>	saltmarsh morning-glory
<i>Iva frutescens</i>	Jesuit's bark
<i>Juncus roemerianus</i>	needlegrass rush
<i>Kosteletzkya virginica</i>	Virginia saltmarsh mallow
<i>Ludwigia leptocarpa</i>	anglestem primrose-willow
<i>Lythrum lineare</i>	wand lythrum
<i>Panicum repens</i>	torpedo grass
<i>Phragmites australis</i>	common reed
<i>Pluchea camphorata</i>	camphor pluchea
<i>Polygonum hydropiperoides</i>	swamp smartweed
<i>Sagittaria lancifolia</i>	bulltongue arrowhead
<i>Schoenoplectus pungens</i>	common threesquare
<i>Spartina alterniflora</i>	smooth cordgrass
<i>Spartina patens</i>	saltmeadow cordgrass
<i>Symphyotrichum subulatum</i>	eastern annual saltmarsh aster
<i>Symphyotrichum tenuifolium</i>	perrenial saltmarsh aster
<i>Vigna luteola</i>	hairypod cowpea



Fritchie Marsh Restoration (PO-06)

Vegetation

Table 3. The percentage of the total number of vegetation plots where each species occurred and the mean percent cover of species within plots where they occurred during the 1997 (N=25 plots), 1999 (N=4 plots), and 2000 (N=29 plots) vegetation sampling of the PO-06 project area. Sampling was conducted within 4-m² plots using the Braun-Blanquet method.

Scientific Name	Occurrence of Total Plots (%)			Mean % Cover in Plots where Species Occurred		
	1997	1999	2000	1997	1999	2000
<i>Spartina patens</i>	100	100	100	93	78	65
<i>Schoenoplectus pungens</i>	44	25	21	48	10	13
<i>Eleocharis cellulosa</i>	8			45		
<i>Juncus roemerianus</i>	24	25	21	33	10	10
<i>Vigna luteola</i>	52	25	17	30	1	3
<i>Phragmites australis</i>	4			25		
<i>Sagittaria lancifolia</i>	4			25		
<i>Symphyotrichum subulatum</i>	36	25		23	5	
<i>Cyperus sp.</i>	4		3	20		5
<i>Iva frutescens</i>	4		10	20		5
<i>Cyperus filicinus</i>	16			15		
<i>Distichlis spicata</i>			48			15
<i>Ipomoea sagittata</i>	24	25	24	12	5	1
<i>Pluchea camphorata</i>	12	25	7	11	10	3
<i>Lythrum lineare</i>	44	25	31	10	2	8
<i>Baccharis halimifolia</i>	4		14	10		4
<i>Symphyotrichum tenuifolium</i>			45			11
<i>Panicum repens</i>	8	25		9	2	
<i>Ammannia coccinea</i>	16			8		
<i>Amaranthus australis</i>	20	50	17	7	6	1
<i>Cyperus odoratus</i>	40			7		
<i>Bacopa monnieri</i>	4		21	5		1
<i>Eleocharis olivacea</i>	4			5		
<i>Polygonum hydropiperoides</i>	4			4		
<i>Echinochloa walteri</i>	8			3		
<i>Eleocharis parvula</i>			3			3
<i>Spartina alterniflora</i>		25			3	
<i>Kosteletzkya virginica</i>	8			1		
<i>Ludwigia leptocarpa</i>	4			1		
<i>Eclipta prostrata</i>	8			1		
Unknown			3			0.3



Fritchie Marsh Restoration (PO-06)

Vegetation

1997 and 2000 Mean % Cover of Selected Species

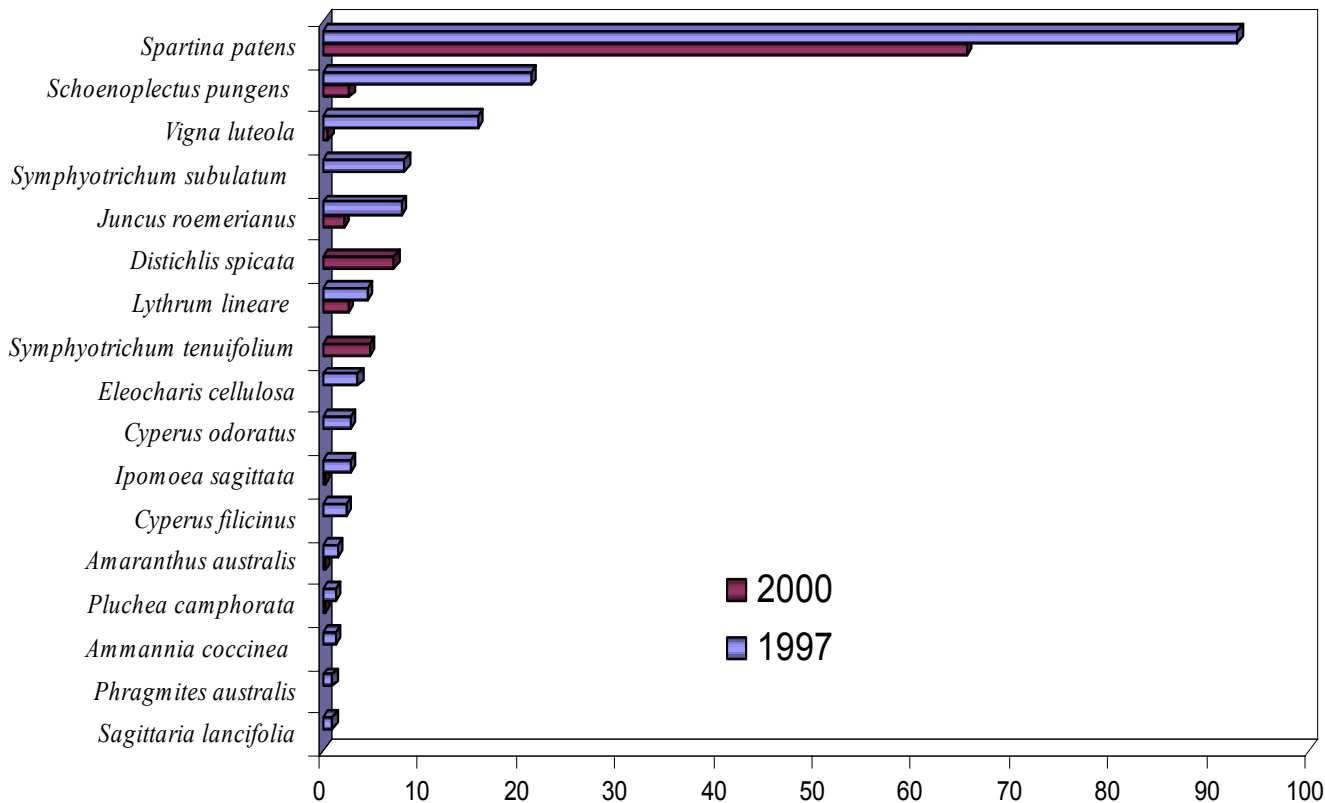


Figure 32. Mean % cover of selected species across all 4-m² plots within the PO-06 project area during September 1997 (N=25 plots) and August 2000 (N=29 plots). Vegetation was sampled using the Braun-Blanquet method.



Fritchie Marsh Restoration (PO-06)

Preliminary Findings

Habitat Mapping: Preliminary conclusions based on aerial photography will be made after 2003 photography is acquired.

Salinity: Salinity was significantly lower ($p < 0.0001$) at all continuous recorder stations during the post-construction period (through the end of 2002). However, pre-construction salinities may have been amplified due to drought conditions.

Water Level: Water level was significantly higher ($p < 0.05$) at all continuous recorder stations during the post-construction period (through the end of 2002). However, pre-construction water levels may have been affected by drought conditions.

Water Flow: Pre-construction and post-construction water level data are currently being analyzed. Statistical tests will be conducted to explain the effects of flow volume on salinity at each of the monitoring stations during the pre-construction and post-construction periods.

Vegetation: Statistical analyses will be conducted following the first post-construction survey in 2004.

