

**US Marine Corps Mitigation Site  
Camp Lejeune  
Onslow County, North Carolina**

*2005 Annual Monitoring Report  
Year 4 of 5*



NCEEP Project Number: .00013  
BLWI Project Number: 050028  
NCDENR contract: D05056S

Original Design Firm: unavailable

Submitted to: NCDENR Ecosystem Enhancement Program  
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Raleigh, NC 27699

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17 February 2006



**BLUE** Land  
Water  
Infrastructure

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## **Appendix A – Vegetative Photos**

1. Vegetative Problem Area Photos
2. Vegetative Monitoring Plot Photos
3. Site Photos

## **Appendix B – Wetland Data**

1. Precipitation Water Level Plots for Each Well

## I. Executive Summary

The US Marine Corps Mitigation Site was designed as a salt marsh to provide compensatory mitigation for the US 17 Bypass of Jacksonville, TIP Project U-2107A, B, BA, C, and D (USACE Action ID No. 199402926). The project is located on the Intracoastal Waterway at Camp Lejeune US Marine Corps Base near Jacksonville, NC. Special conditions of the permit required that “3.5 acres of *Spartina alterniflora* and *Juncus roemerianus* marsh shall be restored as described in the Onslow County Marsh Mitigation Plan dated September 1997.” The site was constructed in 1999 with portions being regarded in 2002. It is in the 4<sup>th</sup> year of monitoring.

The vegetation that survived appears to be doing well. The planted zone of *Juncus roemerianus* had very poor survival and is dominated by open water and invasive species. The *Spartina alterniflora* zone has good growth and is consistent with that of a natural stand. Although the shrub zone had some mortality of the planted species, there appears to be adequate growth and spread in the remaining plants. The shrub zone has met the established success criteria.

Areas of concern/problem areas would be in the lack of survival, growth and spread of the *Juncus roemerianus*. This was a component of the mitigation site that was not met. The area is being encroached by *Phragmites australis* and *Typha sp.*, a recurring one, having been controlled by herbicides in the past years. Probable causes for the lack of survival could be related to improper site grading to the elevations necessary to support plant growth.

There are also several bare areas in the *Spartina alterniflora* zone. The presence of *Salicornia* indicates that salinity could be a factor here, but elevation could also be a factor. *Spartina alterniflora* is encroaching along the perimeter of the bare areas and will probably fill in with time with no additional planting needed.

The surface monitoring wells show that the site is adequately flooded to support the marsh vegetation. One of the two ground water wells malfunctioned. Data retrieved from the one shows that the site met the wetland criteria. No usable data was obtained from the on-site rain gauge.

## II. Project Background

### a. Location and Setting

The project is located on the Intracoastal Waterway at Camp Lejeune US Marine Corps Base near Jacksonville, NC.

Directions from Raleigh: Take I-40 East to Exit 373 – NC24/NC903 East. Follow NC 24 to Jacksonville and take US 17 south. After approximately 12 miles, turn left onto NC 210. Go 4 miles and turn left onto NC 172. Follow NC 172 into Camp Lejeune. Approximately 7 miles past the entry gate turn right onto the dirt road labeled TLZ Albatross. At the first open field, veer right to go across the top of the field. Turn left at the end of the field and follow the road to another open field. Continue to follow the road around to the midpoint of the south side of the field. Turn right onto the final dirt road and follow to the restoration site. The road will end at a locked gate, and the restoration site is on the other side of this gate. (Use Figure 1. the Vicinity Map or additional aerial photography to navigate the network of dirt roads to the restoration area).

### b. Structure and Objectives

The US Marine Corps Mitigation Site was designed as a salt marsh to provide compensatory mitigation for the US 17 Bypass of Jacksonville, TIP Project U-2107A, B, BA, C, and D (USACE Action ID No. 199402926). Special conditions of the permit required that “3.5 acres of *Spartina alterniflora* and *Juncus roemerianus* marsh shall be restored as described in the Onslow County Marsh Mitigation Plan dated September 1997.”

Exhibit Table I. Project Structure Table	
Project Number and Name: 050028 Camp Lejeune Wetland	
Area	Acreage
Shrub area wetland	0.56
Marsh – <i>Juncus roemerianus</i>	0.7
Marsh – <i>Spartina alterniflora</i>	2.23

Exhibit Table II. Project Objectives Table			
Project Number and Name: 050028 Camp Lejeune Wetland			
Area	Objectives	Acreage	Comment
Shrub area wetland	buffer	0.56	
Marsh – <i>Juncus roemerianus</i>	mitigation	0.7	
Marsh – <i>Spartina alterniflora</i>	mitigation	2.23	



Figure 1. Vicinity Map  
 US Marine Corps Mitigation Site  
 (Camp Lejeune)

MCB Camp Lejeune, Onslow County, NC  
 2005 Annual Monitoring - Year 4 of 5  
 EEP Project Number: .00013  
 BLWI Project Number: 050028



**BLUE** Land  
 Water  
 Infrastructure

2000 0 2000 Feet



Scale: 1" = 2000' November 2005

**c. Project History and Background**

Exhibit Table III. Project Activity and Reporting History		
Project Number and Name: 050028 Camp Lejeune Wetland		
Activity or Report	Calendar Year of Completion or Planned Completion	Actual Completion Date
Restoration Plan	unavailable	
Mitigation Plan	1997	9/1997
Construction	1999	3/1999
Temporary S&E mix applied to entire project area	unavailable	unavailable
As-Built Report	unavailable	unavailable
Permanent seed mix applied to wetland areas	unavailable	unavailable
Containerized and B&B plantings for wetland areas	1999	4/1999
Monitoring Gauges Installed	1999	5/1999
Year 1 Hydrologic Monitoring (NCDOT)	1999	11/1999
Year 1 Vegetation Monitoring (NCDOT)	1999	10/1999
Year 2 Hydrologic Monitoring (NCDOT)	2000	11/2000
Year 2 Vegetation Monitoring (NCDOT)	2000	8/2000
Year 3 Hydrologic Monitoring (NCDOT)	2001	11/2001
Year 3 Vegetation Monitoring (NCDOT)	2001	10/2001
Site Regraded	2002	4/2002
Site Replanted	2002	5/2002
Year 1 (restart) Hydrologic Monitoring (NCDOT)	2002	11/2002
Year 1 (restart) Vegetation Monitoring (NCDOT)	2002	8/2002
Supplemental Planting	2003	5/2003
Site Treated for Phragmites	2003	8/2003
Year 2 (restart) Hydrologic Monitoring (NCDOT)	2003	11/2003
Year 2 (restart) Vegetation Monitoring (NCDOT)	2003	8/2003
Site Treated for Phragmites	2004	6/2004
Site Visit with Regulatory Agencies	2004	8/2004
Year 3 (restart) Hydrologic Monitoring (NCDOT)	2004	11/2004
Year 3 (restart) Vegetation Monitoring (NCDOT)	2004	8/2004
Project Handed Over to NCEEP	2004	8/2004
Year 4 (restart) Hydrologic Monitoring (BLWI)	2005	11/2005
Year 4 (restart) Vegetation Monitoring (BLWI)	2005	9/19/2005

Exhibit Table IV. Project Contact Table	
Project Number and Name: 050028 Camp Lejeune Wetland	
<b>Designer</b>	unavailable
<b>Property Contact</b>	<b>MCB Camp Lejeune</b> Environmental Conservation Branch, Environmental Management Division Installations and Environment Department
MCB POC	Martin Korenek (910) 451-3066
<b>Construction Contractor</b>	unavailable
<b>Planting Contractor</b>	unavailable
Seeding Contractor	unavailable
Seed Mix Sources	unavailable
Nursery Stock Suppliers	unavailable
<b>Monitoring Performers</b>	<b>BLUE: Land, Water, Infrastructure, PA</b> 1271 Old US Highway #1 South Southern Pines, NC 28387
Monitoring POC	Larry Hobbs (919) 306-2410



Exhibit Table V. Project Background Table	
Project Number and Name: 050028 Camp Lejeune Wetland	
Project county	Onslow
Drainage area	approximately 62 acres
Drainage impervious cover estimate (%)	0%
Stream order	n/a
Physiographic region	coastal plain
Ecoregion	Carolinian Barrier Islands & Coastal Marshes (63G)
Rosgen classification of as-built	n/a
Cowardin classification	Intertidal persistent emergent wetland, regularly flooded
Dominant soil types	Bohicket silty clay loams, Pactolus fine sands
Reference site ID	unavailable
USGS HUC (project and reference)	03030001
NCDWQ subbasin (project and reference)	03-05-02
NCDWQ classification (project and reference)	SA HQW (Intracoastal Waterway)
Any portion of the project area 303d listed?	No
Any upstream portion 303d listed?	No
Reasons for 303d listing or stressor	n/a
% of project easement fenced	Check with Camp Lejeune to ensure troop movements are not blocking access.

**d. Monitoring Plan View (see Figure 2)**

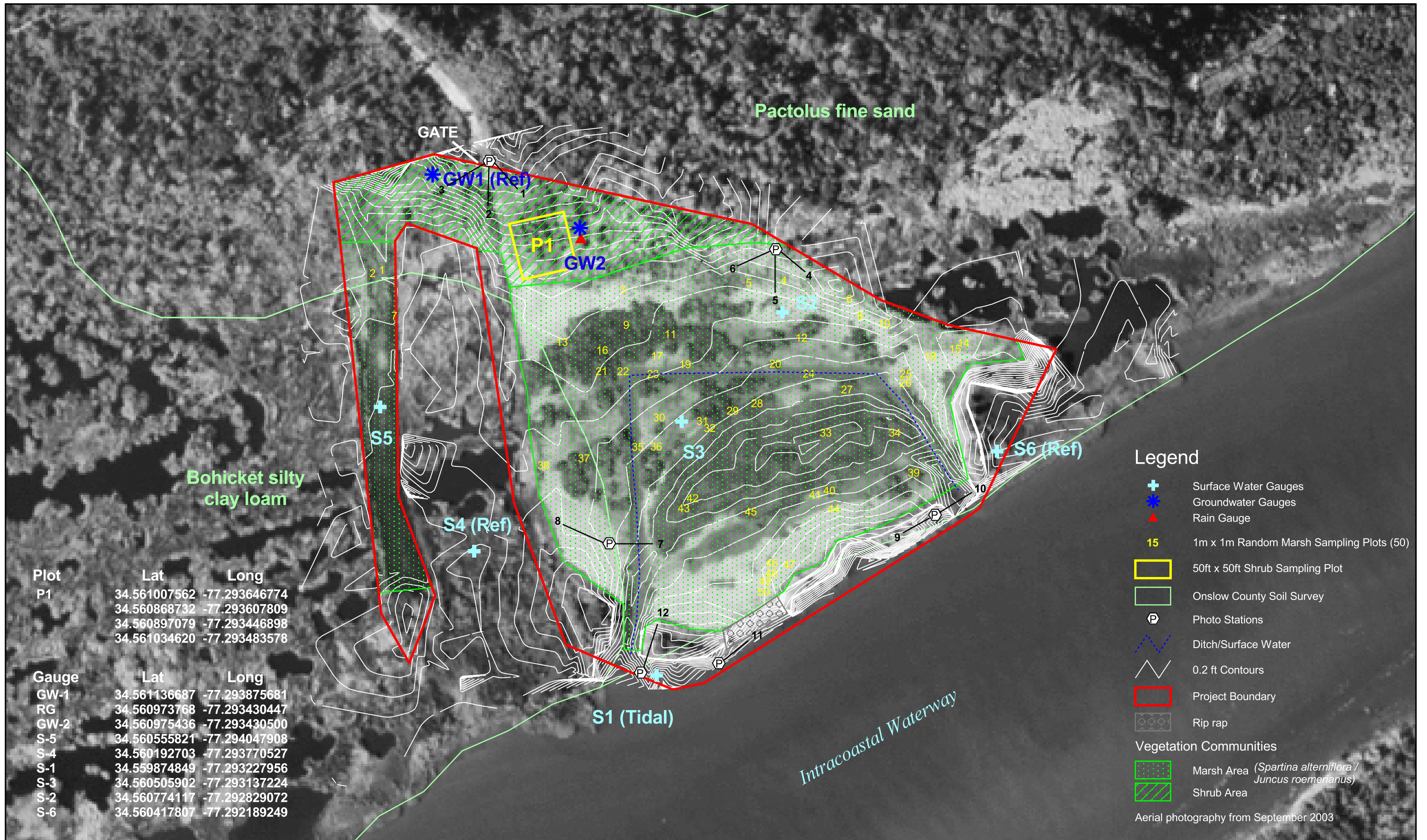


Figure 2. Monitoring Plan View  
 US Marine Corps Mitigation Site (DOT PN: 6.269010T, TIP: U-2107 WM)  
 MCB Camp Lejeune, Onslow County, NC  
 2005 Annual Monitoring - Year 4 of 5



### III. Project Condition and Monitoring Results

#### a. Vegetation Assessment

##### i. Soil Data

Exhibit Table VI. Preliminary Soil Data					
Project Number and Name: 050028 Camp Lejeune Wetland					
Series	Max Depth (in)	% Clay on Surface	K	T	OM %
Bohicket (Bo)	60	30-60	0.28	5	5-25
Pactolus (Pa)	80	2-12	0.1	5	0.5-2

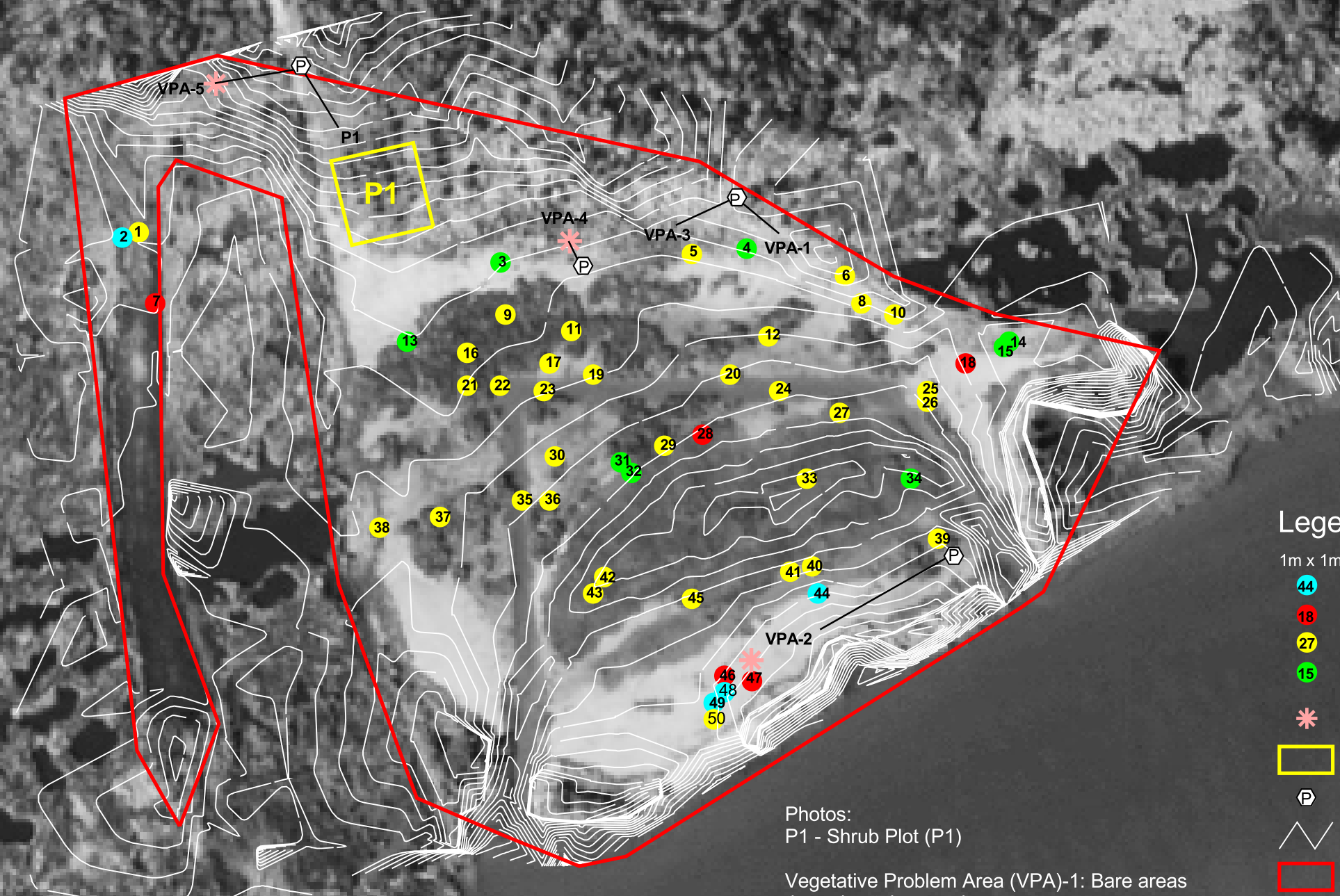
##### ii. Vegetative Problem Areas

The greatest problem with the vegetation growth is the lack of *Juncus roemerianus*. This was a component of the mitigation site that was not met. There is minimum survival in the planted zone and the area is being encroached by *Phragmites australis* and *Typha sp.* Probable causes for the lack of survival could be related to site grading for proper elevations.

There are also several bare areas in the *Spartina alterniflora* zone. The presence of *Salicornia* indicates that salinity could be a factor here. *Spartina alterniflora* is encroaching along the perimeter of the bare areas and will probably fill in with time with no additional planting needed.

Exhibit Table VII. Vegetative Problem Areas			
Project Number and Name: 050028 Camp Lejeune Wetland			
Feature/Issue	Area	Probable Cause	Photo #
Bare Areas	Small areas throughout	Elevations or salinity	VPA1
	Large area along shoreline	Elevations or salinity	VPA2
Marginal <i>Juncus</i> Establishment	Throughout area planted in <i>Juncus</i>	Elevations not appropriate for <i>Juncus roemerianus</i>	VPA3
Invasive Populations	Small area (20'x30') just east of rain gage	<i>Phragmites</i> : persisting after treatment	VPA4
	See VPA Plan View	<i>Typha</i> area; also some <i>Phragmites</i> to the west	VPA5

##### iii. Problem Area Plan View (see Figure 3)



**Legend**

- 1m x 1m Random Marsh Sampling Plots (50)
- 44 Open water or bare ground
  - 18 Scale factors: 0.5 - 2
  - 27 Scale factors: 3 - 4
  - 15 Scale factor: 5 (best)
  - ✱ Problem Areas
  - 50ft x 50ft Shrub Sampling Plot
  - P Photo Stations
  - 0.2 ft Contours
  - Project Boundary
  - Rip rap
- Vegetation Communities**
- Marsh Area (*Spartina alterniflora* / *Juncus roemerianus*)
  - Shrub Area

Aerial photography from September 2003

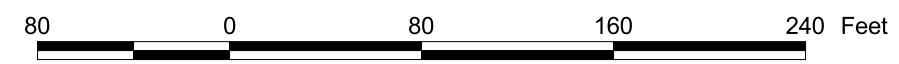
Photos:  
P1 - Shrub Plot (P1)

Vegetative Problem Area (VPA)-1: Bare areas throughout the marsh  
 VPA-2: Large bare area near shore  
 VPA-3: *Juncus* has not established across the site as per the planting plan  
 VPA-4: Small area of phragmites persisting after treatment  
 VPA-5: Small area of typha, larger stand of phragmites beyond typha to the west

Plot	Lat	Long
P1	34.561007562	-77.293646774
	34.560868732	-77.293607809
	34.560897079	-77.293446898
	34.561034620	-77.293483578



Figure 3. Vegetative Problem Area Plan View  
 US Marine Corps Mitigation Site (DOT PN: 6.269010T, TIP: U-2107 WM)  
 MCB Camp Lejeune, Onslow County, NC  
 2005 Annual Monitoring - Year 4 of 5



Scale: 1" = 80'

EEP Project Number: .00013  
 BLWI Project Number: 050028



#### iv. Success Criteria (Shrub Area)

The shrub area will be deemed successful when a minimum mean density of 320 shrubs per acre of approved target species survives for at least three years.

#### v. Success Criteria (Marsh Area)

The marsh area success criteria were developed in accordance with NOAA-NMFS Guidelines. Monitoring plots found to be located within the open water channel were not evaluated, and did not count in the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met:

1. At year 5, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.
2. A minimum of 70% of the plots shall contain the target (planted) species.

#### vi. Stem Counts (Shrub Area)

According to past monitoring reports, of the 3.5 acres that comprise the site approximately 0.56 acres involved shrub planting. Three types of shrubs were planted: wax myrtle (*Morella cerifera*), false willow (*Baccharis halimifolia*), and marsh elder (*Iva frutescens*).

To determine shrub density one 50' x 50' plot was installed following planting. The total number of shrubs planted within the plot was counted to determine planting density. A total of 51 shrubs within the plot yielded 680 shrubs per acre planting density. The survival monitoring number was then compared to the planting density to obtain survival density. (Density = monitoring count / planted shrubs x 680).

Project Number and Name: 050028 Camp Lejeune Wetland						
Plot #	Wax Myrtle	False Willow	Marsh Elder	Total (Year 4)	Total Planted	Density (Shrubs/Acre)
1	23	14	2	39	51	520

Even though the survival density is well above the success criteria of 320 shrubs per acre, and has been for more than 3 years, it appears to be slowly decreasing each year. Wax myrtle and false willow appeared to naturally propagate while a significant number of marsh elder (9) died since last year's monitoring visit. The shrub area is anticipated to continue to meet the success criteria beyond the monitoring period.

Exhibit Table IX. Vegetation Trends (Shrub Area)				
Project Number and Name: 050028 Camp Lejeune Wetland				
<i>Shrub Area</i>				
Monitoring Year	Firm	Shrubs	Shrubs/acre	Success
2002	NCDOT	48	640	Y
2003	NCDOT	48	640	Y
2004	NCDOT	42	560	Y
2005	BLWI	39	520	Y

**vii. Stem Counts (Marsh Area)**

According to the previous monitoring reports, approximately 0.7 acres of black needle rush (*Juncus roemerianus*) and 2.23 acres of smooth cordgrass (*Spartina alterniflora*) were planted in the marsh grass area.

Marsh vegetation was assessed using NOAA-NMFS methodology. The assessment involved sampling 50 random 1m x 1m plots and determining a scale factor based on number of stems and percent coverage. Only one plot fell into an area (open water) excluded from sampling.

Using the same methodology from the previous monitoring reports, the average scale factor for 49 plots was 3.35. Unless all plots receive a scale factor of 5 it is unlikely that using this method will ever produce an overall scale factor of 5, and therefore the marsh will never reach success. A practical approach would be to average the actual percent cover for the plots and apply the scale factor to that final average percent. When that number achieves 75% then the marsh would be deemed successful. Using the average percent coverage the marsh has a scale factor of 4.0.

Unless the bare spots are resolved it is unlikely that the marsh will reach its scale factor success criteria by next year (Year 5) regardless of which calculation method is used.

No guidance was provided as to how many stems or what percent cover of the target species were needed to count the plot into the frequency tabulation. Upon review of previous monitoring reports, a decision was made to count the plot toward the frequency total if the plot contained any of the two target species.

The percentage of plots containing the target species is 89.8%, well above the success criteria of 70%. However, as discussed in the Vegetative Problems section of this report, *Juncus* is only present in about 15% of its total planted area.

Exhibit Table X. Stem Counts (Marsh Area)						
Project Number and Name: 050028 Camp Lejeune Wetland						
Plot	Scale Factor	% Cover	<i>Juncus roemerianus</i>	<i>Spartina alterniflora</i>	Frequency	Notes
1	3	30				<i>Salicornia, Aster, Phragmites, Scirpus, Distichlis</i>
2						open water
3	5	95	X		1	<i>Baccharis</i> , pennywort, upland grass
4	5	95	X		1	<i>Spartina patens, Distichlis</i>
5	4	60	X		1	<i>Salicornia, Iva frutescens</i>
6	3	45		X	1	<i>Distichlis, Salicornia</i>
7	2	5		X	1	<i>Distichlis</i>
8	4	60		X	1	<i>Limonium, Salicornia</i>
9	4	60		X	1	
10	3	50		X	1	<i>Distichlis, Salicornia</i>
11	3	35		X	1	
12	3	45		X	1	
13	5	80		X	1	
14	5	95		X	1	<i>Distichlis, Salicornia, Aster, Borrchia, Spartina patens</i>
15	5	85		X	1	<i>Distichlis, Spartina patens, Salicornia</i>
16	4	65		X	1	
17	3	35		X	1	
18	2	20				<i>Distichlis, Salicornia</i>
19	3	40		X	1	
20	3	35		X	1	
21	4	50		X	1	
22	3	45		X	1	
23	4	55		X	1	
24	3	40		X	1	
25	3	40		X	1	
26	3	40		X	1	
27	3	35		X	1	<i>Salicornia</i>
28	2	15		X	1	<i>Salicornia, Limonium</i>
29	4	55		X	1	
30	4	65		X	1	
31	5	85		X	1	
32	5	80		X	1	<i>Salicornia</i>
33	4	60		X	1	
34	5	75		X	1	
35	4	60		X	1	
36	4	60		X	1	

Exhibit Table X. Stem Counts (Marsh Area) continued

37	3	45		X	1	
38	4	65		X	1	
39	4	70		X	1	
40	4	70		X	1	
41	4	60		X	1	
42	4	75		X	1	
43	4	55		X	1	
44	0	0				bare ground
45	4	65		X	1	
46	2	25		X	1	<i>Salicornia</i>
47	2	50		X	1	<i>Salicornia, Spartina patens</i>
48	0	0				bare ground
49	0	0				bare ground
50	3	30		X	1	<i>Salicornia, Distichlis</i>

Total Number of Plots Counted	49
Scale Factor Average	3.35
Percent Cover Average	50.51
Ave Scale Factor based on % Cover	4.0
Percent Frequency of Target Species	89.80

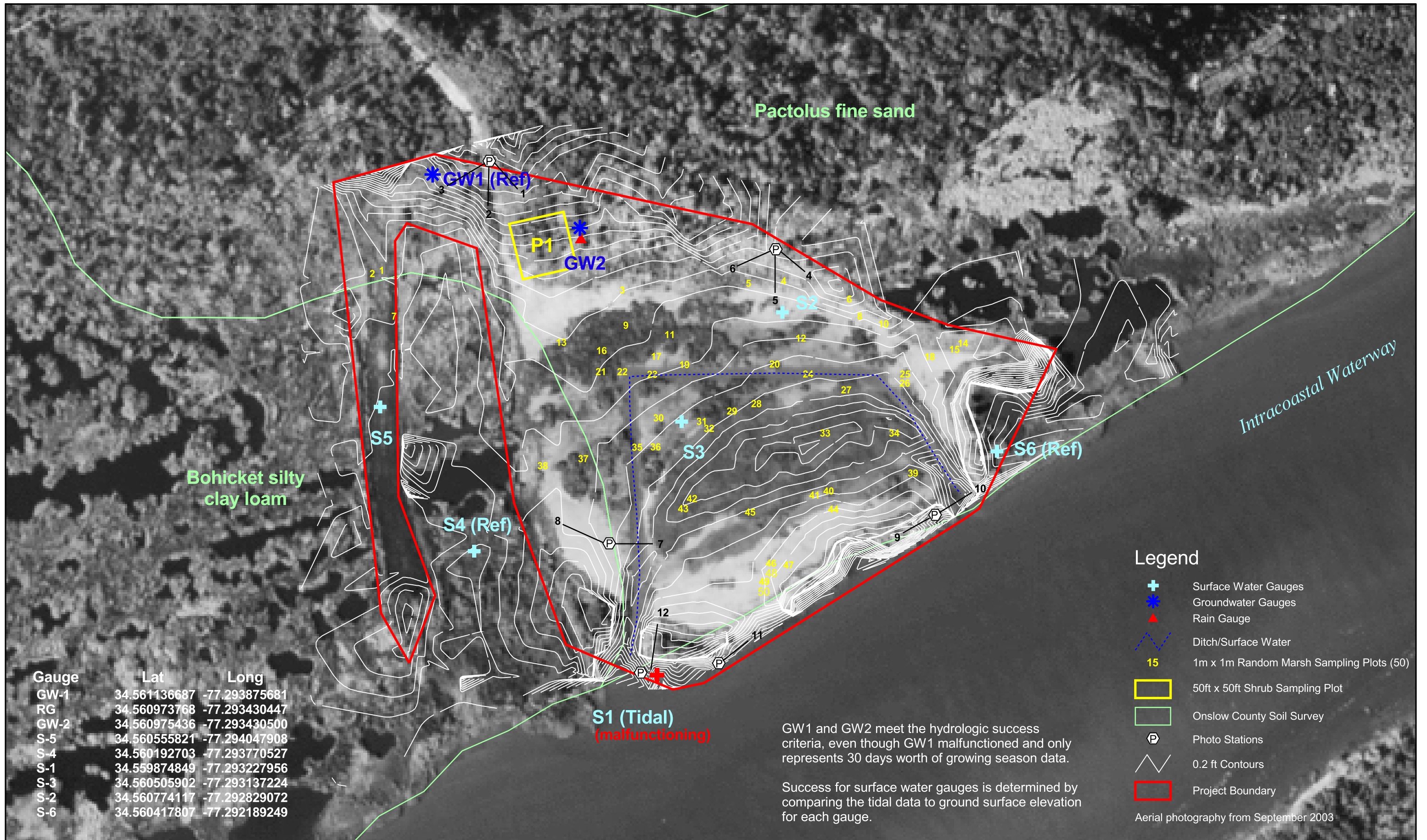
Exhibit Table XI. Vegetation Trends (Marsh Area)					
Project Number and Name: 050028 Camp Lejeune Wetland					
<i>Marsh Area</i>					
Monitoring Year	Firm	Ave Scale	Success	% Plots w/ Target Species	Success
2002	NCDOT	3.16	N	67.3	N
2003	NCDOT	3.45	N	68.4	N
2004	NCDOT	4.12	N	76.2	Y
2005	BLWI	3.35*	N	89.8	Y

\*This number is the average of scale factors for all plots - used for comparison with previous data. Using the average percent cover yields a scale factor of 4.0.

**viii. Vegetation Plot Photos (see Appendix A)**

Only photos taken for the vegetation plots were in the shrub area. This is the only permanent plot established for sampling. Representative marsh vegetation photos are in Appendix A, Site Photos.





Gauge	Lat	Long
GW-1	34.561136687	-77.293875681
RG	34.560973768	-77.293430447
GW-2	34.560975436	-77.293430500
S-5	34.560555821	-77.294047908
S-4	34.560192703	-77.293770527
S-1	34.559874849	-77.293227956
S-3	34.560505902	-77.293137224
S-2	34.560774117	-77.292829072
S-6	34.560417807	-77.292189249

**Legend**

- + Surface Water Gauges
- \* Groundwater Gauges
- ▲ Rain Gauge
- ~ Ditch/Surface Water
- 15 1m x 1m Random Marsh Sampling Plots (50)
- 50ft x 50ft Shrub Sampling Plot
- Onslow County Soil Survey
- P Photo Stations
- / 0.2 ft Contours
- Project Boundary

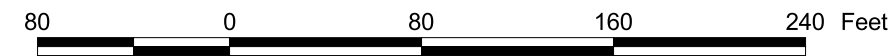
GW1 and GW2 meet the hydrologic success criteria, even though GW1 malfunctioned and only represents 30 days worth of growing season data.

Success for surface water gauges is determined by comparing the tidal data to ground surface elevation for each gauge.

Aerial photography from September 2003



Figure 4. Wetland Problem Area Plan View  
 US Marine Corps Mitigation Site (DOT PN: 6.269010T, TIP: U-2107 WM)  
 MCB Camp Lejeune, Onslow County, NC  
 2005 Annual Monitoring - Year 4 of 5



Scale: 1" = 80'  
 November 2005

EEP Project Number: .00013  
 BLWI Project Number: 050028



## **b. Wetland Assessment and Recommendations**

Overall, the marsh (*Spartina alterniflora* zone only) seems to be growing well. There is spread of *S. alterniflora* into some of the areas previously reported as being bare. There are still bare areas and this could be due to improper elevations for plant survival and growth. It is recommended that some spot recordings of existing elevation in the good growth and bare areas be taken for comparison and evaluation. The site should be evaluated in terms of mitigation/permit requirements. The surviving *Juncus* marsh is small and may be inadequate for the permit requirements. Remedial action may be necessary for this zone.

### **i. Wetland Problem Areas Plan View Exhibit (see Figure 4)**

### **ii. Wetland Criteria Attainment**

There are a total of nine monitoring gauges on the site, two are ground water wells (RDS WL-40), six are surface water wells (Infinity) and one is a rain gauge (Infinity). When the process of downloading the wells started, many of the wells were found to be in need of either repair or replacement. The rain gauge was askew and had to be stabilized. Initially, the groundwater wells would not download. One of the wells (GW-1) was replaced and another (GW-2) was substituted with another well, an RDS WL-40 obtained from EEP. Limited data was obtained from GW-1. Data retrieved from GW-2 showed that the site did meet the wetland success criteria during the growing season. It is recommended that both of these wells be replaced. The surface water gauges showed that the site is adequately and regularly flooded to support marsh vegetation. Two of the wells, SG-4 and SG-5, show that water fluctuates, but remains standing/flooded for most of the time. No conclusive rainfall was available from the site due to improper equipment. This has been fixed, but only two months of data was retrievable. Rainfall data from Wilmington, N.C. indicate two high rainfall events in September and October from hurricane Ophelia and tropical storms. The site should maintain wetland success in the future without any action from the NC Ecosystem Enhancement Program.

## **IV. Methodology Section**

Marsh vegetation was assessed using NOAA-NMFS methodology. The assessment involved sampling 50 random 1m x 1m plots and determining a scale factor based on number of stems and percent coverage.

Data collection of the shrub zone consisted of counting and recording the survival of the planted species within the plot.

## **V. References**

NCDOT. "Annual Report for 2004, US Marine Corps Mitigation Site, Onslow County, Project No. 6269010T, TIP No. U2107 WM." Office of Natural Environment & Roadside Environmental Unit, December 2004.

NCDOT. "Annual Report for 2003, US Marine Corps Mitigation Site, Onslow County, Project No. 6269010T, TIP No. U2107 WM." Office of Natural Environment & Roadside Environmental Unit, December 2003.

NCDOT. "Annual Report for 2002, US Marine Corps Mitigation Site, Onslow County, Project No. 6269010T, TIP No. U2107 WM." Office of Natural Environment & Roadside Environmental Unit, December 2002.

NCDOT. "Annual Report for 2001, US Marine Corps Mitigation Site, Onslow County, Project No. 6269010T, TIP No. U2107 WM." Office of Natural Environment & Roadside Environmental Unit, December 2001.

NCDOT. "Annual Report for 2000, US Marine Corps Mitigation Site, Onslow County, Project No. 6269010T, TIP No. U2107 WM." Office of Natural Environment & Roadside Environmental Unit, December 2000.

NOAA, USCOE. "Using Random Sampling with Geographical Information Systems (GIS), Geographical Positioning Systems (GPS) and the Braun-Blanquet Method to Estimate Frequency (Survival) and Percent Cover." NOAA National Marine Fisheries Service, US Army Corps of Engineers, March 1999.

# **APPENDIX A**

## **Vegetative Photos**

## Vegetative Problem Area Photos

VPA-1 Small bare areas, throughout the *S.alterniflora*.



VPA-2 Large area along the shoreline.



VPA-3 Marginal *Juncus* establishment.



VPA-4 *Phragmites*.



VPA-5 *Typha sp.*



## Vegetation Monitoring Plot Photos

Plot 1 the shrub zone.





**Site photos (associated with established photo points)**

**W-1**



**W-2**



**W-3**



**W-4**



**W-5**



**W-6**



**W-7**



**W-8**



**W-9**



**W-10**



**W-11**

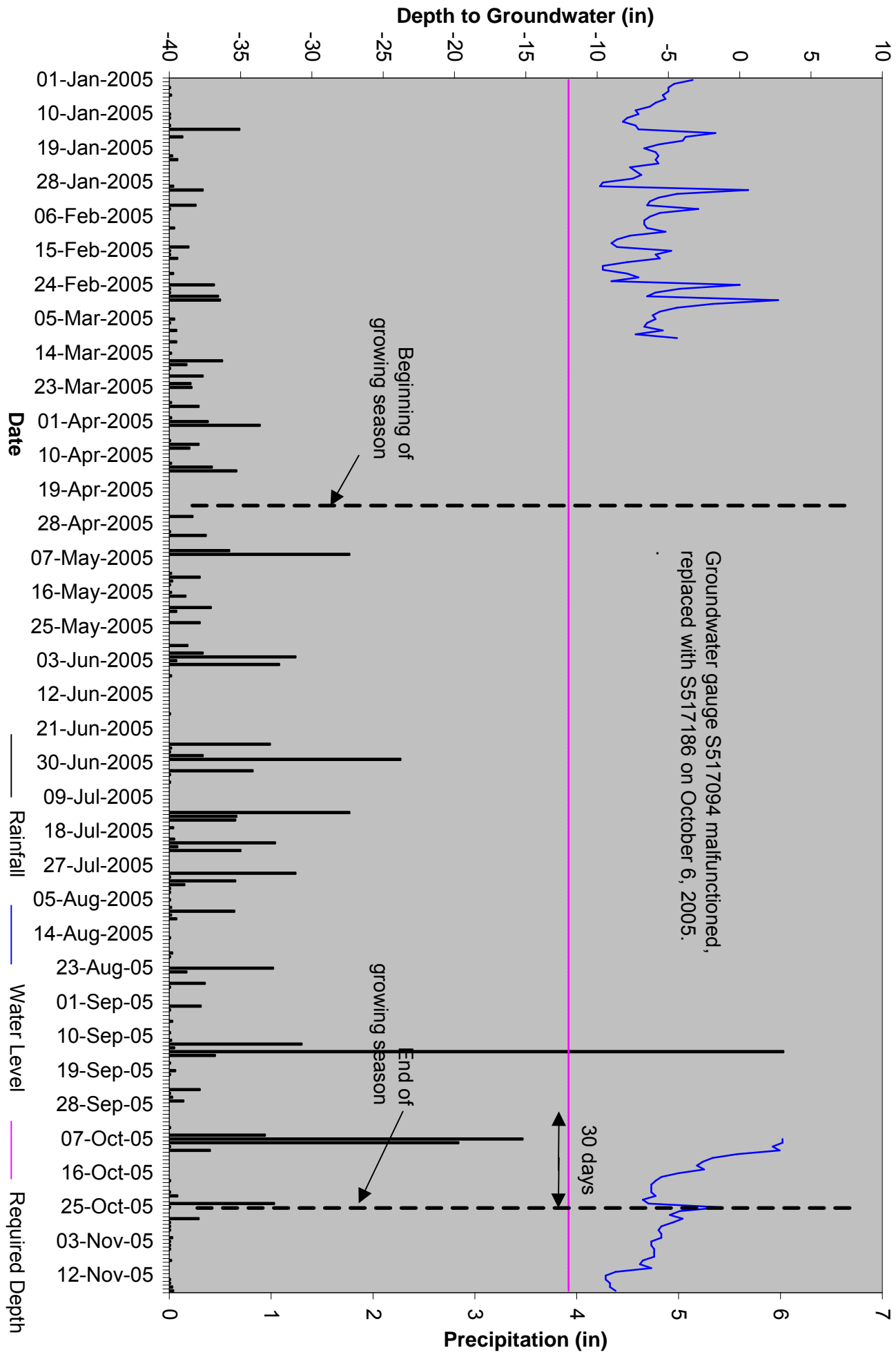


**W-12**



## **APPENDIX B**

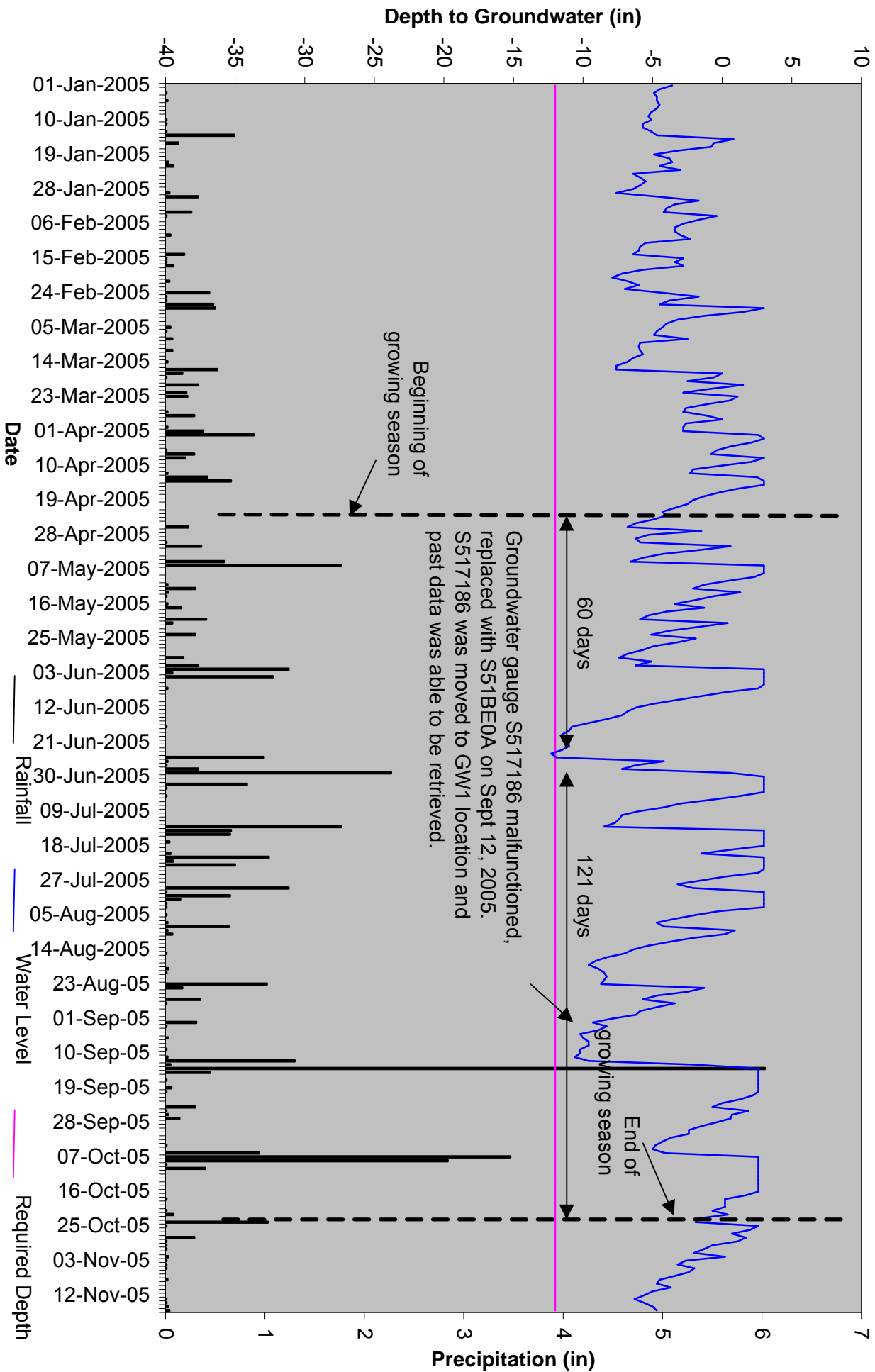
### **Wetland Graphs**



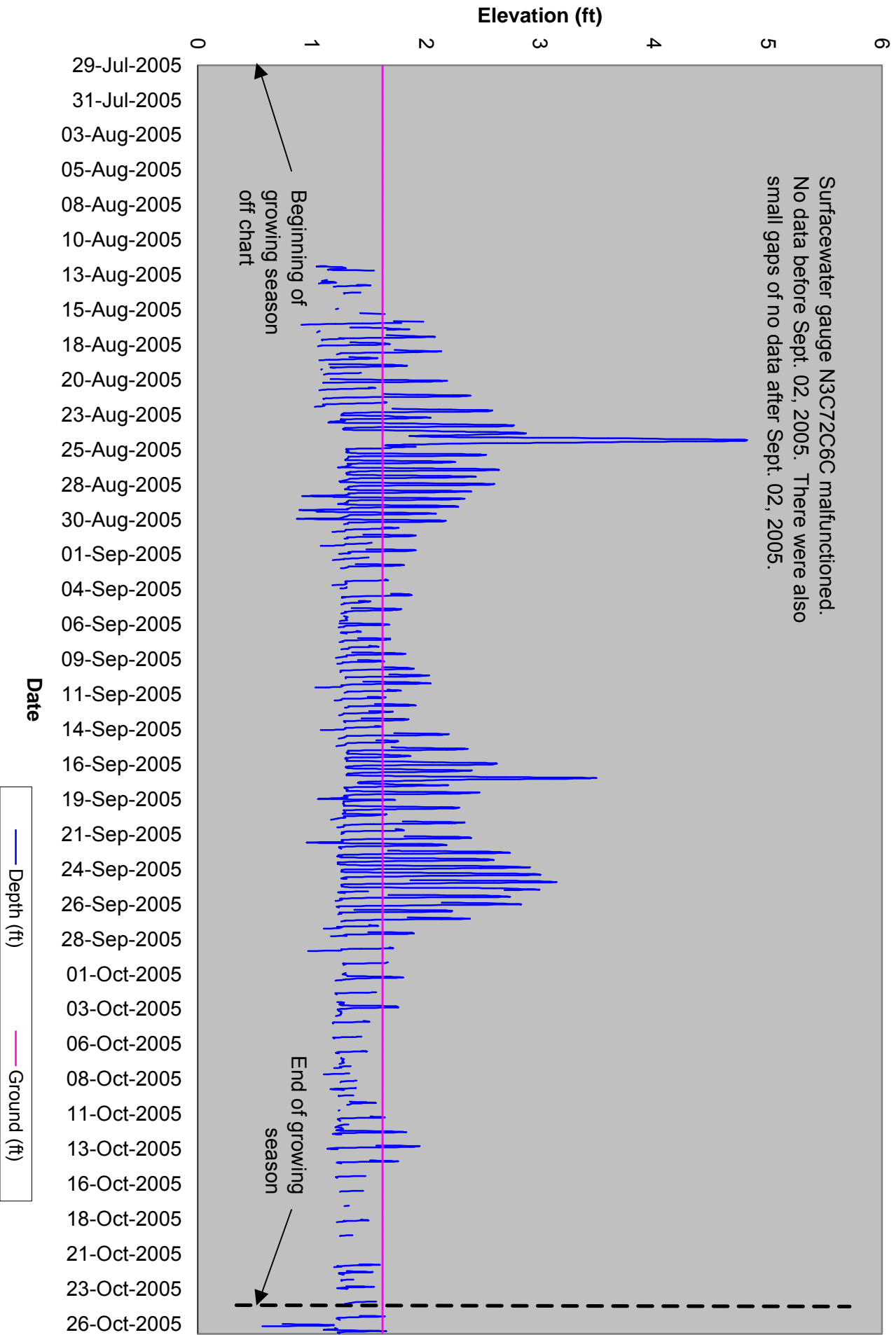
**Figure 5**  
**Camp Lejeune - GW1 (Reference)**  
**40" Groundwater (S517094 / S517186)**



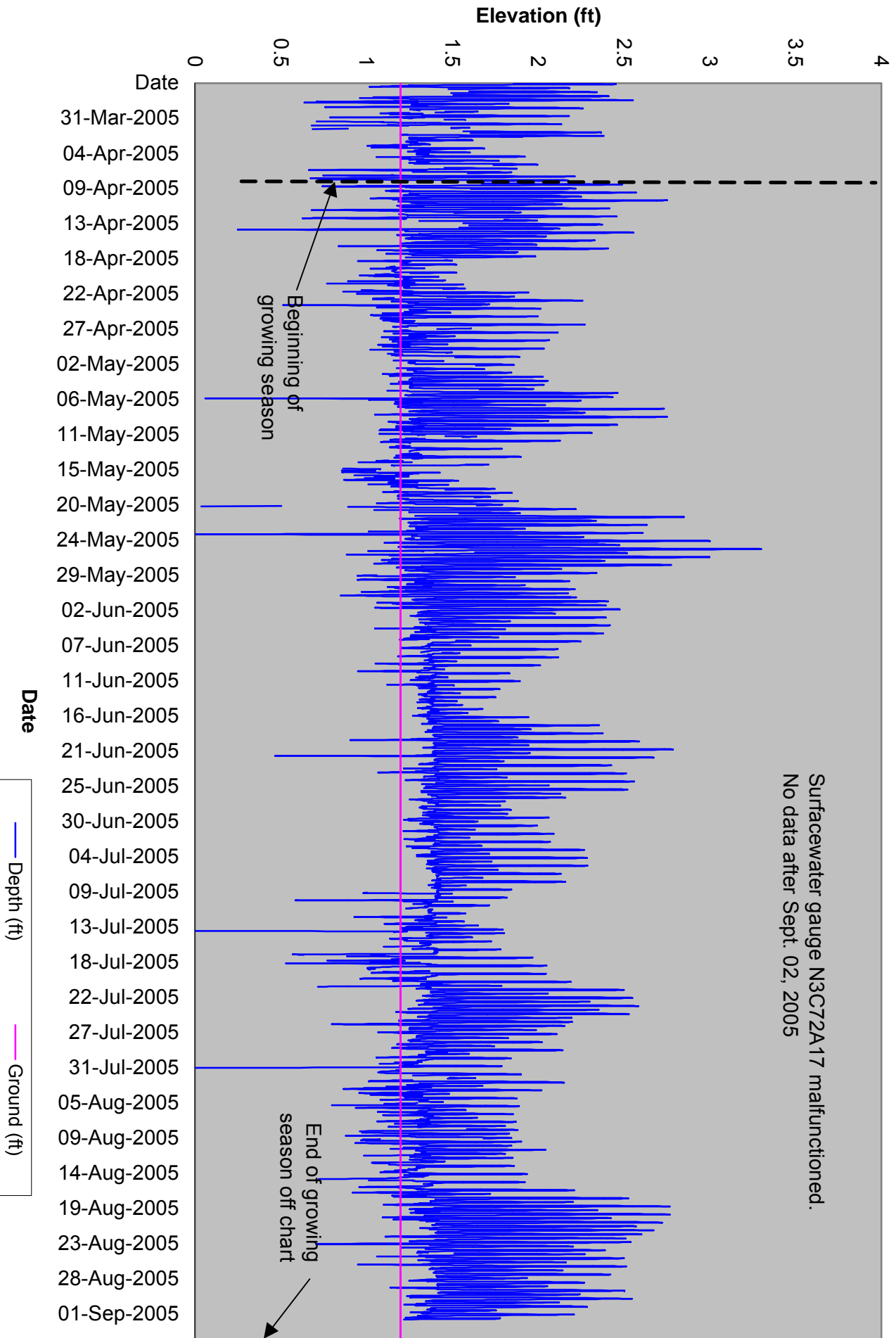
**Figure 6**  
**Camp Lejeune - GW2**  
**40" Groundwater (S517186 / S51BE0A)**



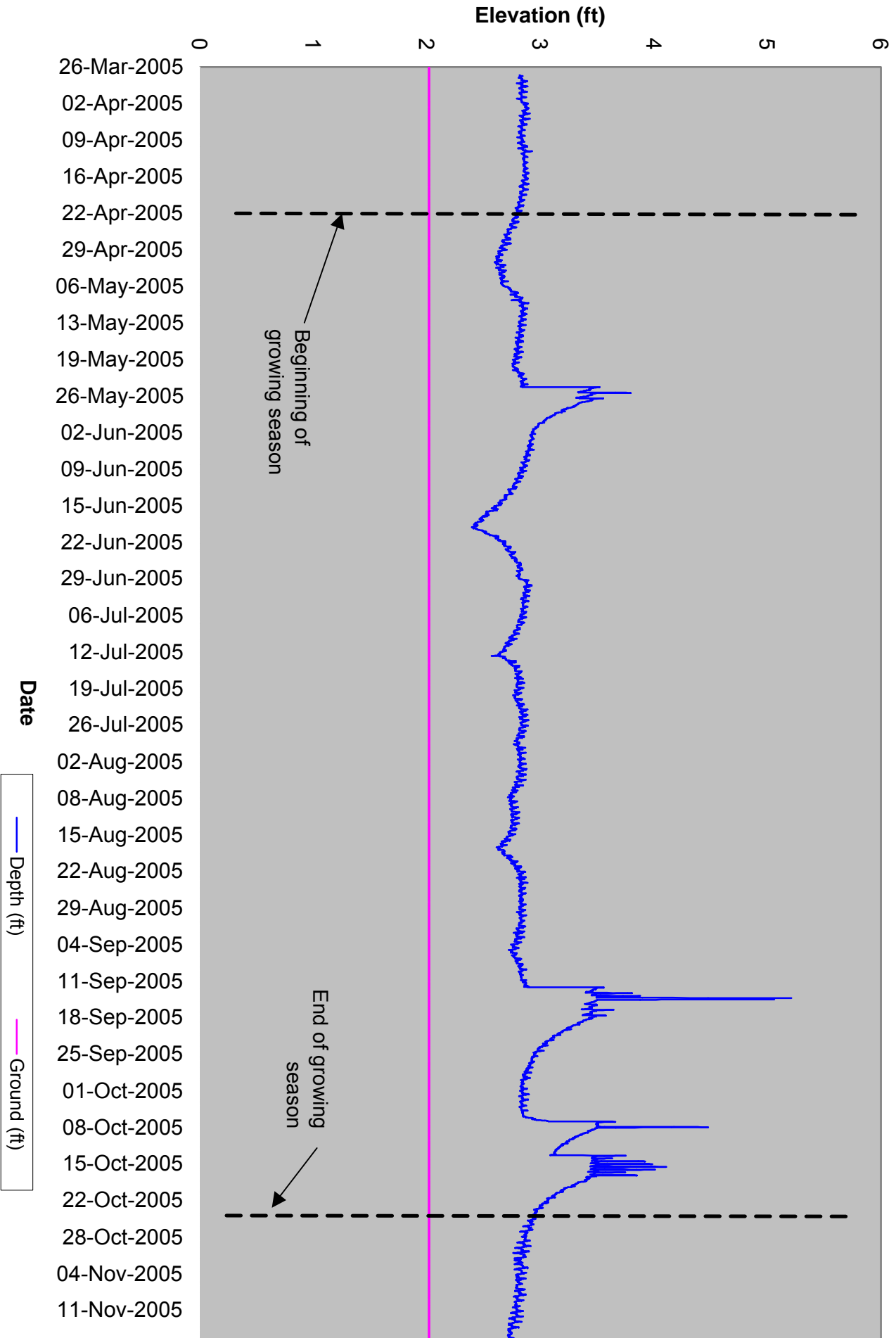
**Figure 7**  
**Camp Lejeune SG-2**  
**Infinity - (N3C72C6C)**

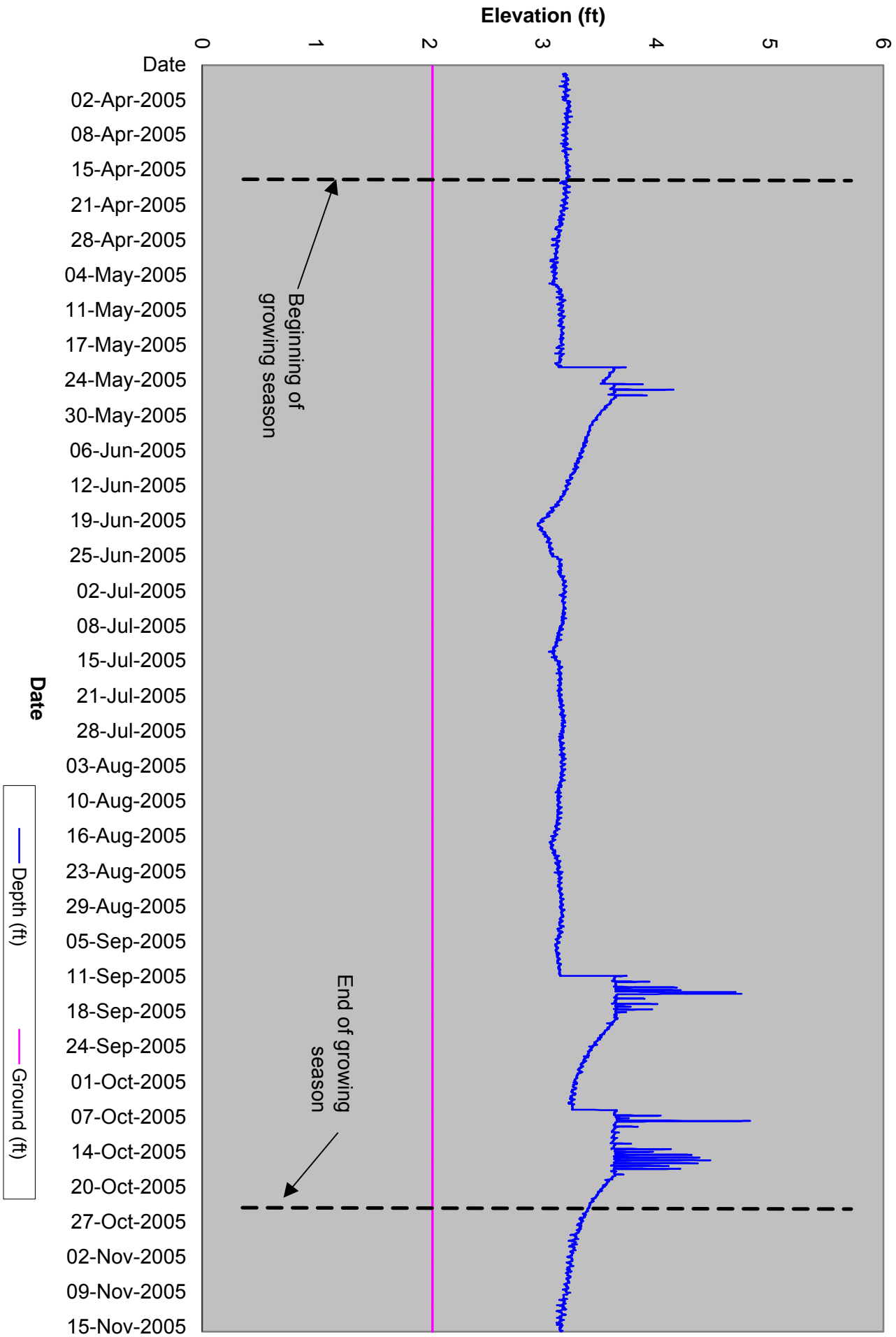


**Figure 8**  
**Camp Lejeune SG-3**  
**Infinity - (N3C72A17)**



**Figure 9**  
Camp Lejeune SG-4  
Infinity - (N3C72D25)





**Figure 10**  
**Camp Lejeune SG-5**  
**Infinity - (N3C691A9)**

Figure 11  
Camp Lejeune SG-6 (ref)  
Infinity - (N3C6920E)

