

ANNUAL REPORT FOR 2001



**Lengyel Mitigation Site
Craven County
Project No. 8.1170806
TIP No. B-2531WM**



Natural Systems Unit & Roadside Environmental Unit
North Carolina Department of Transportation
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Summary

The following report summarizes the monitoring activities that have occurred in the third year of monitoring for hydrology and vegetation at the Lengyel Mitigation Site. The success criteria for vegetation sampling follow the most recent guidelines from the National Marine Fisheries Service guidelines.

The Lengyel Mitigation Site is a brackish marsh restoration/preservation site divided into two areas. The first area is a reference marsh ecosystem (preservation) that contains surface water gauges LSG-3 and LSG-4, and groundwater gauge LSGW-2. The second area is a restoration site that contains surface water gauges LSG-1 and LSG-2, and groundwater gauge LSGW-1.

The year 2001 represents the third year of hydrologic monitoring for the Lengyel Mitigation Site. Surface water indicated continuous site inundation. Hydrology data collected for groundwater gauges showed continuous saturation for a period exceeding 25% of the growing season.

Vegetation data did not meet the success criteria. The percent frequency of the target species has dropped slightly due to the presence of many other wetland species throughout the site including the *Scirpus* species. The vegetation scale value has increased significantly and is on target to meet success criteria next year.

Additional observations include the siting of ospreys on the nesting pole and the presence of crabs and other aquatic organisms in the constructed tidal swale. NCDOT recommends the continued monitoring of the Lengyel Mitigation Site.

1.1 Introduction

PROJECT DESCRIPTION

The Lengyel Mitigation Site is a 13.198-acre brackish marsh restoration/preservation project located in Craven County, North Carolina. The site is located east of the intersection of US 70 and US 70 Business and provides compensatory mitigation for impacts associated with the construction of the US 17 Neuse River Bridge (TIP No. B-2531) (Figure 1). Mitigation goals for the site include approximately 6.54 acres of brackish marsh restoration, 5.25 acres of brackish marsh preservation, and 0.85 acres of upland buffer. The site was constructed in April of 1998; however, planting activities were not complete until April 1999. The third year of monitoring at the site has just been completed.

PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years. Vegetation success criteria are based on the National Marine Fisheries Service guidelines. Hydrologic success criteria are based on federal guidelines for wetland mitigation. The following report details the results of hydrologic and vegetation monitoring during the 2001 growing season at the Lengyel mitigation site. Included in this report are analyses of both hydrologic and vegetative monitoring results as well as local climate conditions throughout the growing season and site photographs.

PROJECT HISTORY

April 1998	Site Construction Began
April 1998	Site planted (Phase I)
March 1999	Surface Water Gauges Installed
April 1999	Planting Completed (Phase II)
June 1999	Site Construction Finished
October 1999	Vegetation Monitoring (1 yr.)
April-November 1999	Hydrologic Monitoring (1 yr.)
August 2000	Vegetation Monitoring (2 yr.)
October 2000	Two Groundwater Gauges Installed
March-November 2000	Hydrologic Monitoring (2 yr.)
August 2001	Vegetation Monitoring (3 yr.)
March-November 2001	Hydrologic Monitoring (3 yr.)

Figure 1. Site Location Map



DEBIT LEDGER

Table 1. Lengyel Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit
	Acres at Start	Acres Remaining	% Remaining	B-2531
Marsh restoration	7.2	5.64	78.33	1.56
Marsh preservation	4.7	4.7	100.00	
Total	11.9	10.34	86.89	

2.0 Hydrology

2.1 SUCCESS CRITERIA

The hydrologic success criteria established for the Lengyel Mitigation Site includes: 1) site inundation or saturation within 12 inches of the ground surface for 25 percent of the growing season, or should the restoration fail to meet this criteria, 2) statistical comparison between the reference marsh area and the restoration area to determine if hydrology is significantly different. The site specific criteria are more stringent than the current federal guidelines that require a site to be inundated or saturated (within 12" of the surface) by surface or groundwater for a consecutive 5 - 12.5% of the growing season. Areas inundated or saturated less than 5% of the growing season are classified as non-wetlands.

The growing season in Craven County begins on March 18 and ends November 14. The dates correspond to a 50% probability that air temperature will drop to 28° F or lower after March 18 and before November 14.¹ Thus the growing season is 240 days; the established minimum hydrology requires 25% of this season, or 60 days. Local climate must represent average conditions for the area.

2.2 HYDROLOGIC DESCRIPTION

Because the marsh is expected to be inundated because of highwater, wave action, wind-driven tides, and rainfall, surface gauges were installed to record surface water levels. Four surface water gauges were installed at the site on March 31, 1999 (Figure 2). Automatic readings are taken at three-hour intervals daily throughout the growing season. Two additional groundwater gauges were installed on October 2, 2000 to maintain compliance with the CAMA, USACE, and NCDWQ permit conditions. Automatic readings are also taken every three hours. The 2001 data represents the third full growing season for hydrologic monitoring.

2.3 RESULTS OF HYDROLOGIC MONITORING

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within 12 inches of the ground surface was determined for each gauge. This number was converted into percentage of the 240 day growing season (March 18 – November 14). It is this hydrologic data which will determine the hydrologic success of this mitigation site.

All groundwater gauges showed almost continuous saturation. All surface gauges showed continuous site inundation or saturation. Site inundation exceeded 25 percent of the growing season. See Table 2 for Hydrologic Monitoring Results.

¹ Soil Conservation Service, Soil Survey of Craven County, North Carolina, 1989.

Figure 2. Lengyel Site Gauge Location Map

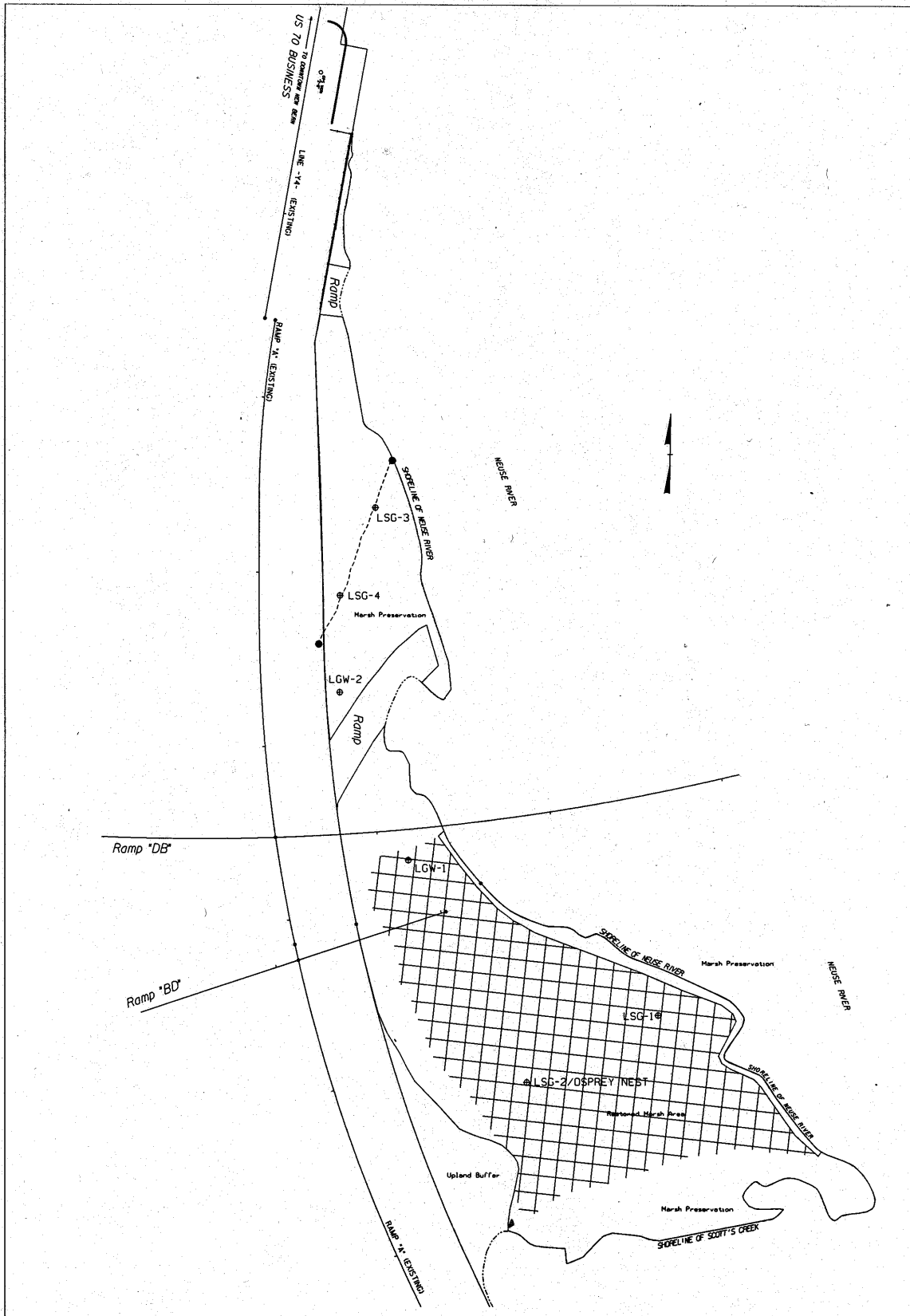


Table 2. Hydrologic Monitoring Results

Monitoring Gauge	< 5.0%	5.0 – 12.5%	12.5 - 25.0%	> 25.0%	Actual %	Success Dates
LSGW1				✓	39.6	Aug 12 – Nov 14
LSGW2				✓	31.7	Aug 12 – Oct 26
LSG1				✓	100.0	Mar-18 – Nov 14
LSG2				✓	100.0	Mar-18 – Nov 14
LSG3				✓	100.0	Mar-18 – Nov 14
LSG4				✓	100.0	Mar-18 – Nov 14

* Shaded gauges are reference gauges.

Appendix A contains charts of the water depth for each surface and groundwater gauge during 2001. These monitoring gauge graphs are designed to show the reaction of groundwater to specific rainfall events. If the gauge shows above 12” for greater than 5% of the growing season, the maximum number of consecutive days is noted on each graph. Daily precipitation events, shown on each monitoring gauge graph, represent data from the New Bern rain gauge.

2.3.2 Climatic Data

Figure 4 is a comparison of the 2001 monthly rainfall to the historical precipitation (collected between 1931 and 2000) for New Bern, North Carolina. This comparison gives an indication of how 2001 relates to historical data in terms of climate conditions. All off site data was provided by the NC State Climate Office. Data for November and December 2001 was unavailable at the time this report was published.

This graph is used to indicate the general precipitation conditions for the surrounding area. The data obtained indicates lower than normal precipitation for January, February, April, September, and October and above average precipitation for March in the year 2001. May, June, July, and August experienced normal rainfall. The sum precipitation measured from November 1, 2000 through October 31, 2001 was 43.3 inches, which is below the normal 30 year (1961-1990) average rainfall for the New Bern area of 53 inches. Overall, the site maintained excellent hydrologic results while experiencing normal to below normal rainfall in 2001.

2.4 CONCLUSIONS

The year 2001 represents the third year of hydrologic monitoring for the Lengyel Mitigation Site. Surface water indicated continuous site inundation. Hydrology data collected for groundwater gauges showed continuous saturation for a period exceeding 25% of the growing season. NCDOT will continue to monitor the site.

Figure 3. Lengyel Site Hydrologic Monitoring Results

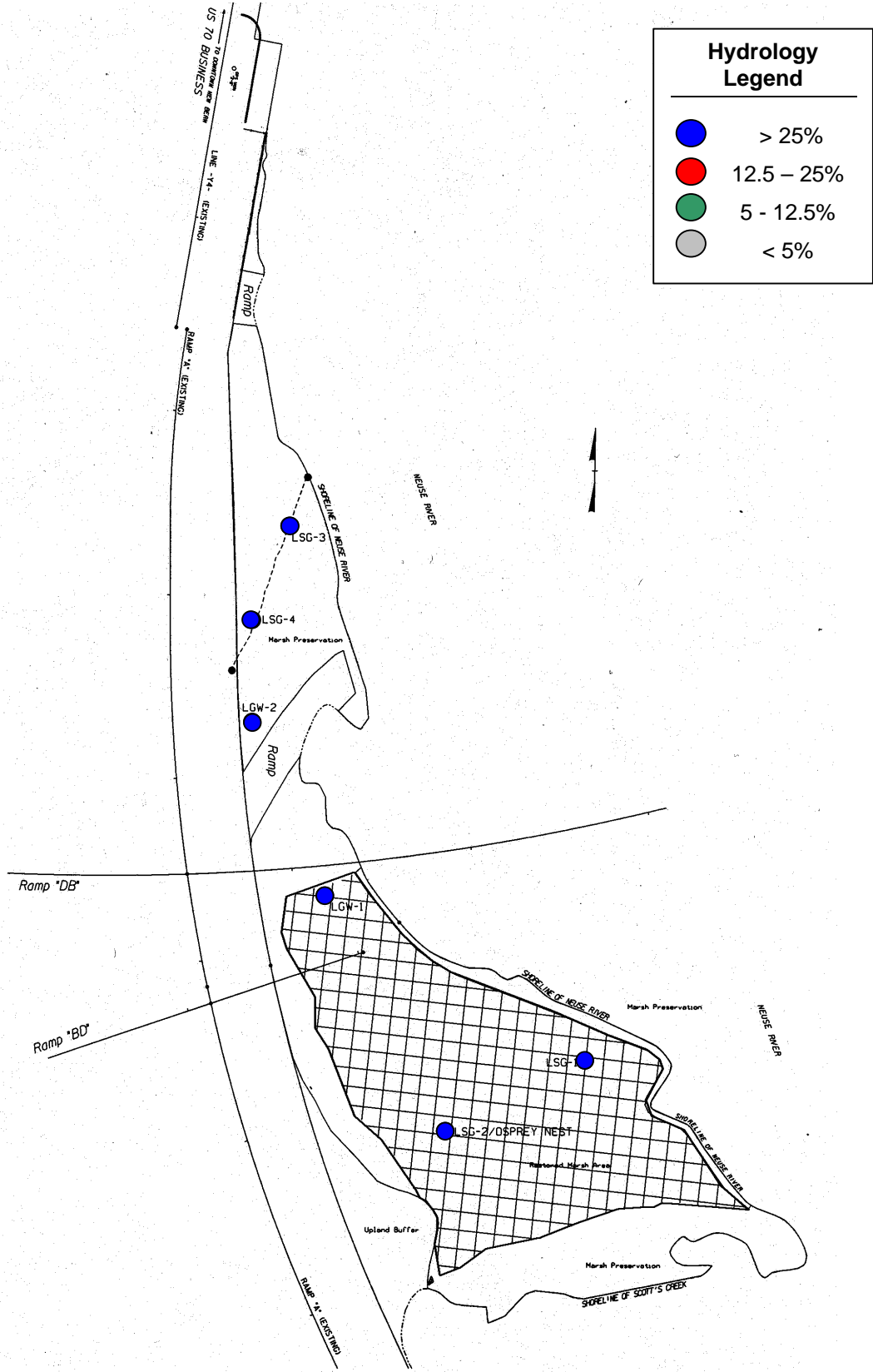
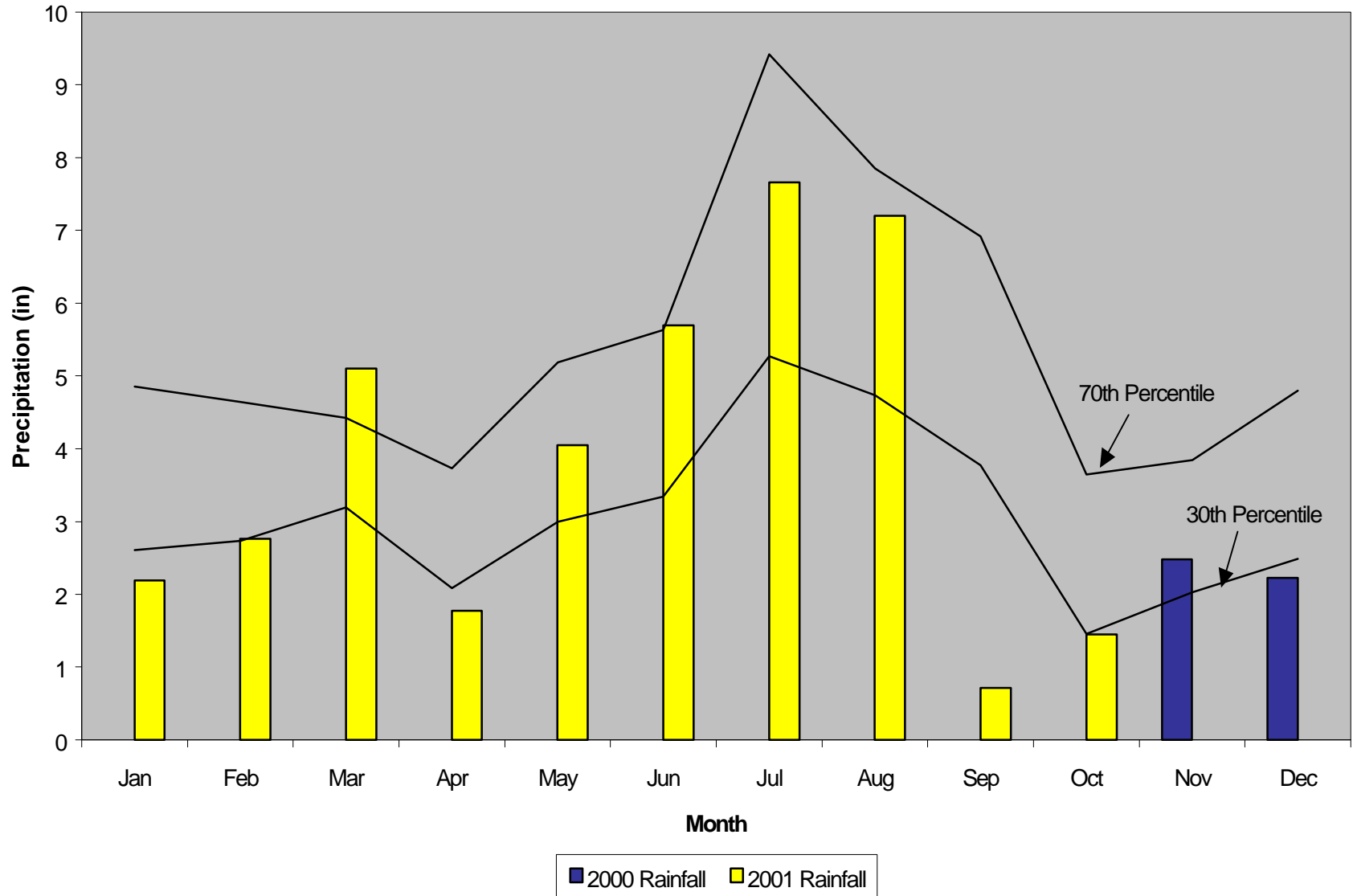


Figure 4. Lengyel Site 30-70 Percentile Graph, New Bern, NC



3.0 Vegetation: Lengyel Mitigation Site (Year 3 Monitoring)

3.1 SUCCESS CRITERIA

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

At year five, 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.

A minimum of 70% of the plots shall contain the target (planted) species.

3.2 DESCRIPTION OF PLANTED AREAS

The following plant communities were planted in the Marsh Grass Area:

Marsh Planting: (approximately 2.46 hectares)

Spartina cynosuroides, Big Cordgrass

3.3 RESULTS OF VEGETATION MONITORING

Table 3. Vegetation Monitoring Statistics, by zone and plot

ZONE	Plot #	Scale Factor	<i>Spartina cynosuroides</i>	<i>Scirpus</i> sp.	<i>Juncus</i> sp.	Frequency (Big Cordgrass only)	Notes
	1	5.0	✓	✓		✓	<i>Aster</i> sp., <i>Baccharis</i> sp., Smartweed
	2	5.0		✓			<i>Ptilimnium</i> sp., Goldenrod
	3	5.0	✓	✓		✓	<i>Baccharis</i> sp., Wax myrtle, <i>Verbena bonariensis</i>
	4	4.0	✓			✓	
	5	5.0	✓			✓	<i>Ptilimnium</i> sp., Goldenrod
	6	4.0	✓	✓	✓	✓	<i>Aster</i> sp., Smartweed
	7	5.0	✓	✓	✓	✓	<i>Aster</i> sp., Smartweed
	8	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., <i>Baccharis</i> sp.
	9	5.0	✓	✓		✓	<i>Ptilimnium</i> sp.
	10	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., Duck potato
	11						open water
	12	5.0					<i>Ptilimnium</i> sp., Duck potato
	13	5.0	✓			✓	Black willow, <i>Baccharis</i> sp., <i>Carex</i> sp., Goldenrod, <i>Ptilimnium</i> sp.
	14	5.0					<i>Cyperus</i> sp., <i>Ptilimnium</i> sp., <i>Pluchea</i> sp.
	15	5.0		✓			<i>Ptilimnium</i> sp., <i>Baccharis</i> sp.
	16	5.0	✓		✓	✓	Blue stem, <i>Baccharis</i> sp., Goldenrod, <i>Aster</i> sp.
	17	5.0	✓			✓	Goldenrod, <i>Ptilimnium</i> sp., <i>Cyperus</i> sp.
	18	4.0	✓	✓		✓	<i>Pluchea</i> sp., <i>Ptilimnium</i> sp.
	19	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., Smartweed
	20						open water
	21	5.0	✓			✓	<i>Ptilimnium</i> sp., Goldenrod
	22	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., <i>Baccharis</i> sp.
	23	5.0	✓	✓	✓	✓	<i>Baccharis</i> sp., Lance-leaved <i>Sagittaria</i> , Black willow
	24	5.0					<i>Juncus</i> sp., <i>Scirpus robustus</i> , Panic grass
	25	5.0					<i>Juncus</i> sp., <i>Scirpus robustus</i>
	26	4.0	✓			✓	<i>Pluchea</i> sp., 1' water
	27	5.0			✓		Goldenrod, Smartweed, Pennywort
	28	4.0	✓			✓	Black willow, L.L. <i>Sagittaria</i> , Goldenrod, <i>Aster</i> sp.
	29	5.0	✓			✓	
	30	5.0	✓	✓		✓	<i>Baccharis</i> sp., L.L. <i>Sagittaria</i> , Goldenrod, <i>Aster</i> sp., B.W.
	31	5.0	✓			✓	<i>Ptilimnium</i> sp., <i>Pluchea</i> sp.
	32	5.0					<i>Baccharis</i> sp., Blue stem Wax myrtle, <i>Juncus</i> sp., Smartweed
	33	5.0	✓			✓	<i>Cyperus</i> sp.
	34	4.0	✓	✓		✓	L.L. <i>Sagittaria</i> , Smartweed, 8" water
	35	5.0	✓	✓		✓	<i>Aster</i> sp.
	36	3.0	✓			✓	<i>Aster</i> sp., <i>Pluchea</i> sp., 8" water
	37	5.0	✓	✓		✓	<i>Ptilimnium</i> sp.
	38	5.0		✓			<i>Aster</i> sp., <i>Juncus</i> sp., L.L. <i>Sagittaria</i>
	39	5.0	✓	✓	✓	✓	<i>Aster</i> sp., L.L. <i>Sagittaria</i>
	40	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., <i>Baccharis</i> sp.
	41						open water
	42	5.0		✓	✓		<i>Pluchea</i> sp.
	43	4.0	✓			✓	Switch grass
	44	5.0					Goldenrod, Smartweed, Fennel
	45	5.0	✓		✓	✓	<i>Ptilimnium</i> sp.

ZONE	Plot #	Scale Factor	<i>Spartina cynosuroides</i>	<i>Scirpus</i> sp.	<i>Juncus</i> sp.	Frequency (Big Cordgrass only)	Notes
	46	5.0	✓	✓		✓	Goldenrod, <i>Juncus</i> sp., <i>Ptilimnium</i> sp.
	47	5.0	✓	✓		✓	<i>Ptilimnium</i> sp.
	48	5.0		✓			<i>Ptilimnium</i> sp.
	49	5.0		✓			<i>Cyperus</i> sp., <i>Ptilimnium</i> sp., <i>Pluchea</i> sp., <i>Baccharis</i> sp., <i>Juncus</i> sp.
	50	4.0			✓		<i>Pluchea</i> sp., <i>Ptilimnium</i> sp., 1' water
	51	5.0	✓	✓		✓	Wax myrtle, <i>Ptilimnium</i> sp.
	52	5.0	✓		✓	✓	Lespedeza, <i>Aster</i> sp., Baldcypress, Blue stem, <i>Juncus effusus</i>
	53	5.0	✓			✓	Woolgrass, Smartweed
	54	5.0	✓	✓	✓	✓	<i>Ptilimnium</i> sp.
	55	5.0	✓	✓	✓	✓	<i>Aster</i> sp., Goldenrod
	56	5.0		✓			L.L. Sagittaria, <i>Ptilimnium</i> sp.
	57	5.0		✓	✓		<i>Ptilimnium</i> sp.
	58	5.0	✓	✓	✓	✓	<i>Rotala</i> sp., <i>Aster</i> sp., Smartweed
	59	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., Smartweed
	60	5.0		✓			L.L. Sagittaria, <i>Ptilimnium</i> sp., <i>Juncus</i> sp., Goldenrod
	61	5.0	✓	✓		✓	<i>Ptilimnium</i> sp.
	62	5.0	✓	✓		✓	<i>Ptilimnium</i> sp.
	63	4.0	✓			✓	Goldenrod, Ragweed, <i>Ptilimnium</i> sp.
	64	5.0	✓	✓		✓	<i>Aster</i> sp., Black willow, Pennwort
	65	5.0		✓			<i>Aster</i> sp., <i>Juncus effusus</i>
	66						open water
	67	5.0		✓			<i>Ptilimnium</i> sp.
	68	5.0	✓	✓		✓	<i>Aster</i> sp.
	69						open water
	70	5.0	✓			✓	Goldenrod, <i>Baccharis</i> sp.
	71						open water
	72	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., Goldenrod
	73	5.0	✓	✓		✓	<i>Aster</i> sp., Smartweed
	74	5.0	✓	✓		✓	<i>Aster</i> sp., Smartweed
	75	5.0	✓			✓	<i>Juncus</i> sp.
	76	4.0		✓			<i>Pluchea</i> sp.
	77	5.0	✓			✓	<i>Ptilimnium</i> sp.
	78	5.0	✓	✓	✓	✓	<i>Baccharis</i> sp., Goldenrod, Wax myrtle
	79						open water
	80	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., L.L. Sagittaria
	81	5.0	✓	✓		✓	<i>Cyperus</i> sp.
	82	5.0		✓			<i>Juncus effusus</i> , <i>Ptilimnium</i> sp.
	83						open water
	84	5.0		✓			<i>Ptilimnium</i> sp.
	85	5.0	✓			✓	<i>Aster</i> sp., <i>Ptilimnium</i> sp., Goldenrod, L.L. Sagittaria
	86	5.0	✓	✓		✓	Black willow, Panic grass, <i>Verbena bonariensis</i>
	87	5.0	✓			✓	<i>Aster</i> sp., L.L. Sagittaria, Wax myrtle, <i>Bidens</i> sp.
	88	5.0		✓	✓		<i>Ptilimnium</i> sp.
	89	5.0		✓			<i>Juncus effusus</i> , <i>Baccharis</i> sp., <i>Ptilimnium</i> sp.
	90	5.0	✓	✓		✓	<i>Ptilimnium</i> sp., <i>Aster</i> sp., Smartweed

3.4 CONCLUSIONS

- Percent Frequency of Target Species (Big Cordgrass) **68.4%**

Frequency of 70% required.

- Vegetative Cover Scale Value **4.9**

Scale Value of 5 required for year 5.

Of the 4.8 hectares (11.9 acres) of this site, approximately 2.46 hectares (6.1 acres) involved marsh planting. The percent frequency of target species does not meet the success criteria. The cover scale value is on target for the third year of monitoring. Many other wetland species are increasing their presence throughout the site including *Scirpus* species.

The open water channel within the site was measured with GPS equipment and is shown on the attached map.

No phragmites was observed on site. NCDOT will continue to monitor this site.

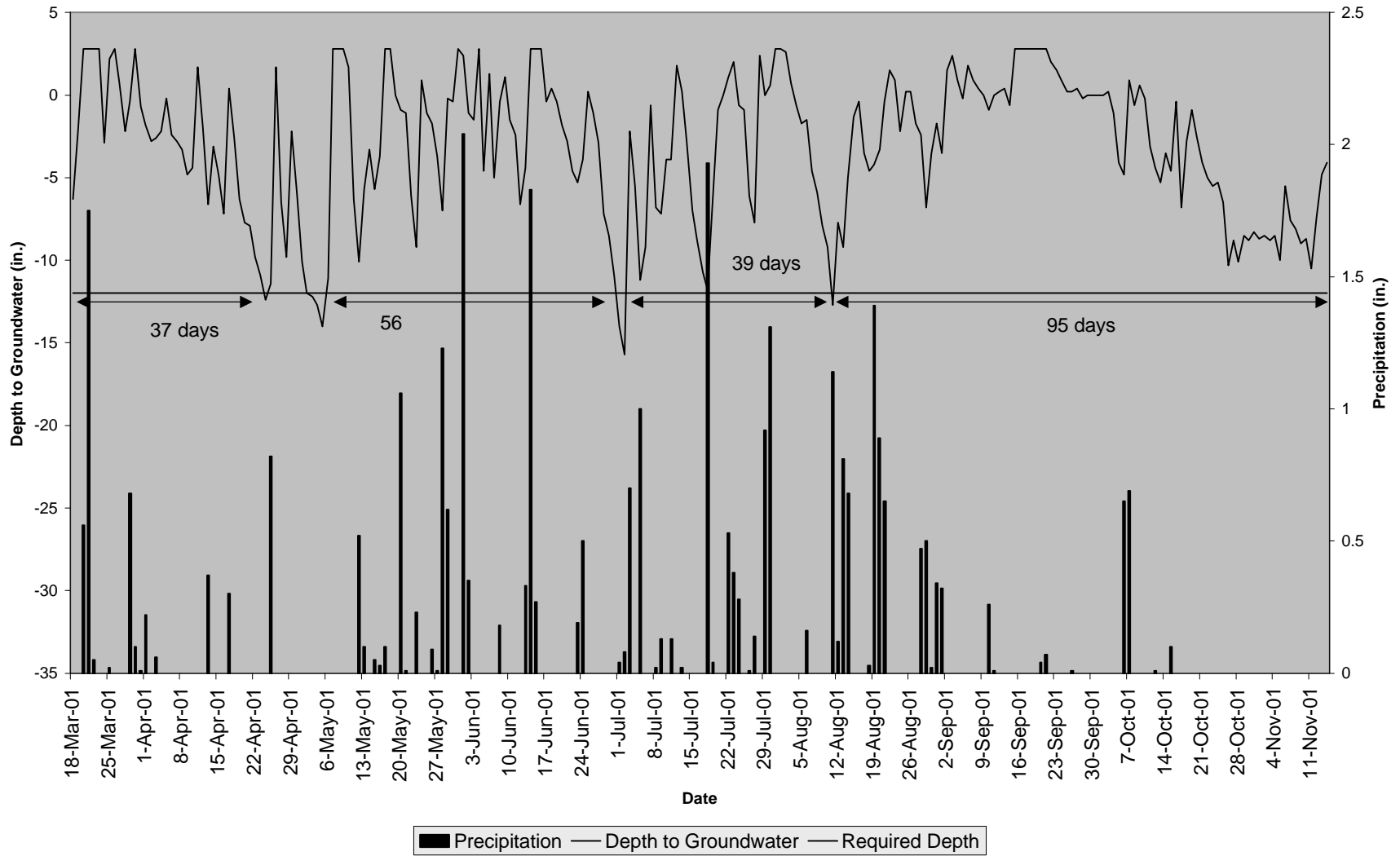
4.0 Overall Conclusions/Recommendations

- Hydrology has met the success criteria for the third year.
- Even though the percent frequency of target species did not meet the success criteria, the site is establishing wetland vegetation. The vegetation cover scale value has significantly increased and is on target to meet the success criteria in 2002.
- Monitoring should continue for both hydrology and vegetation.

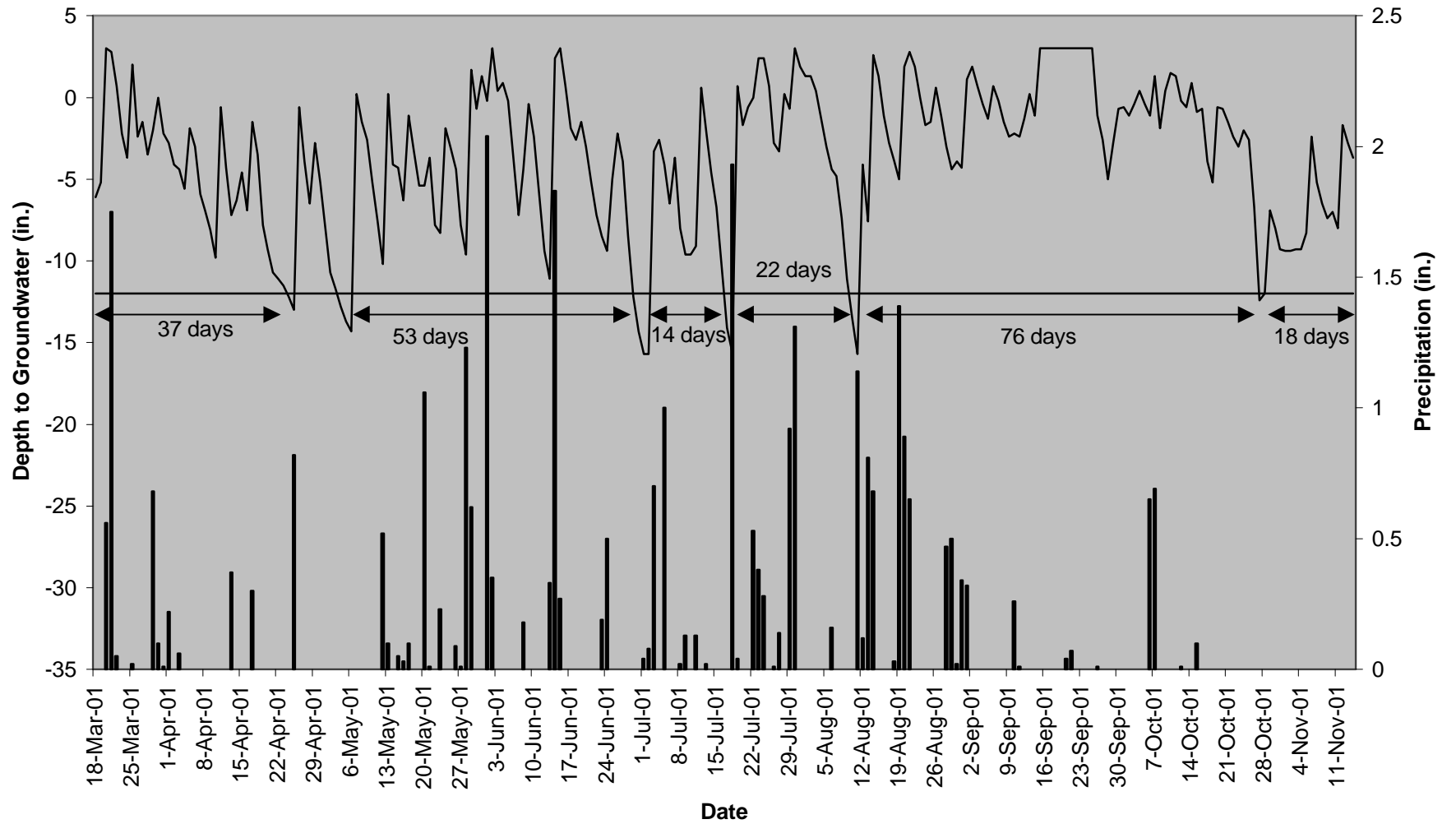
APPENDIX A

SURFACE AND GROUND WATER HYDROLOGY PLOTS

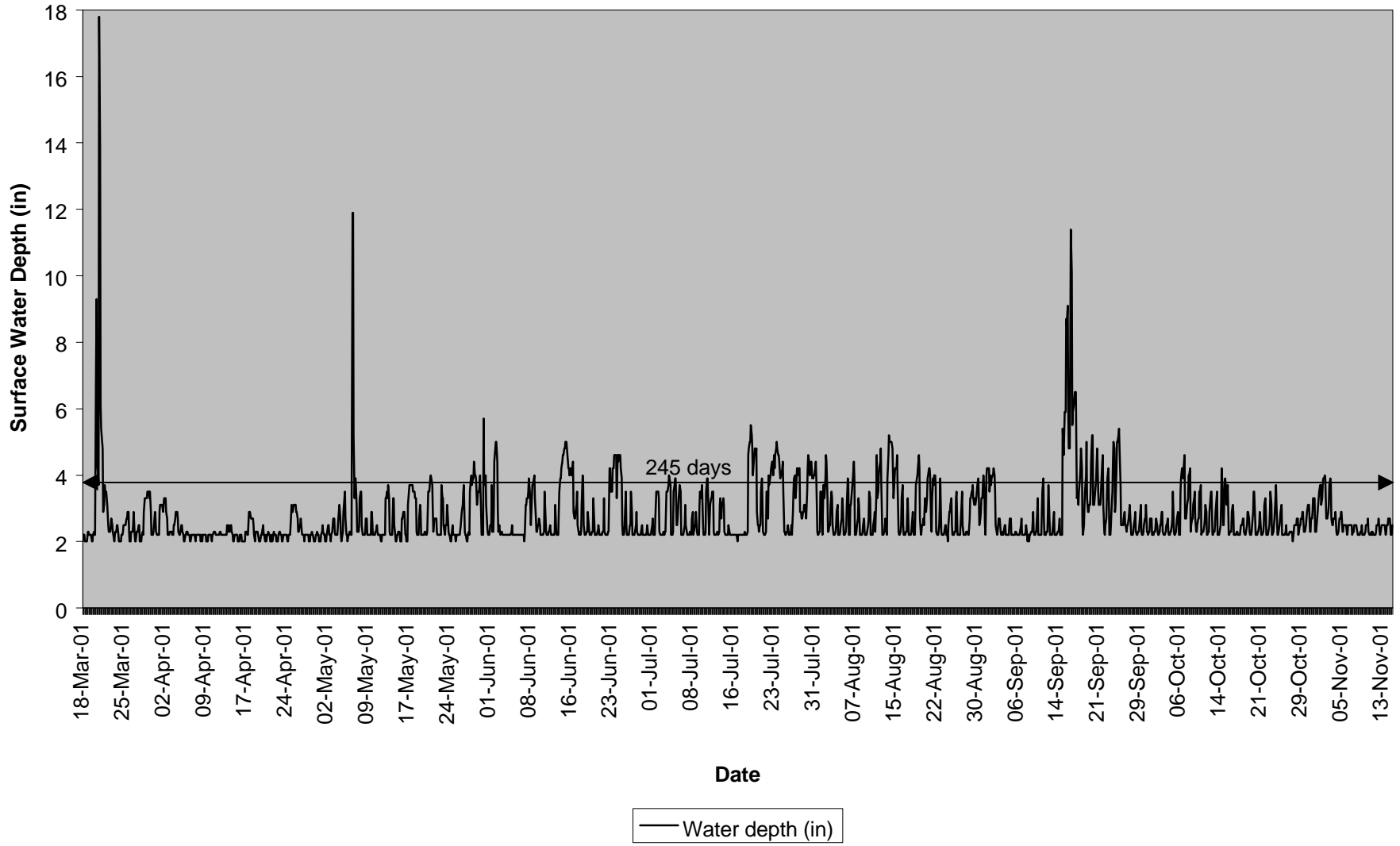
Lengyel LSGW-1



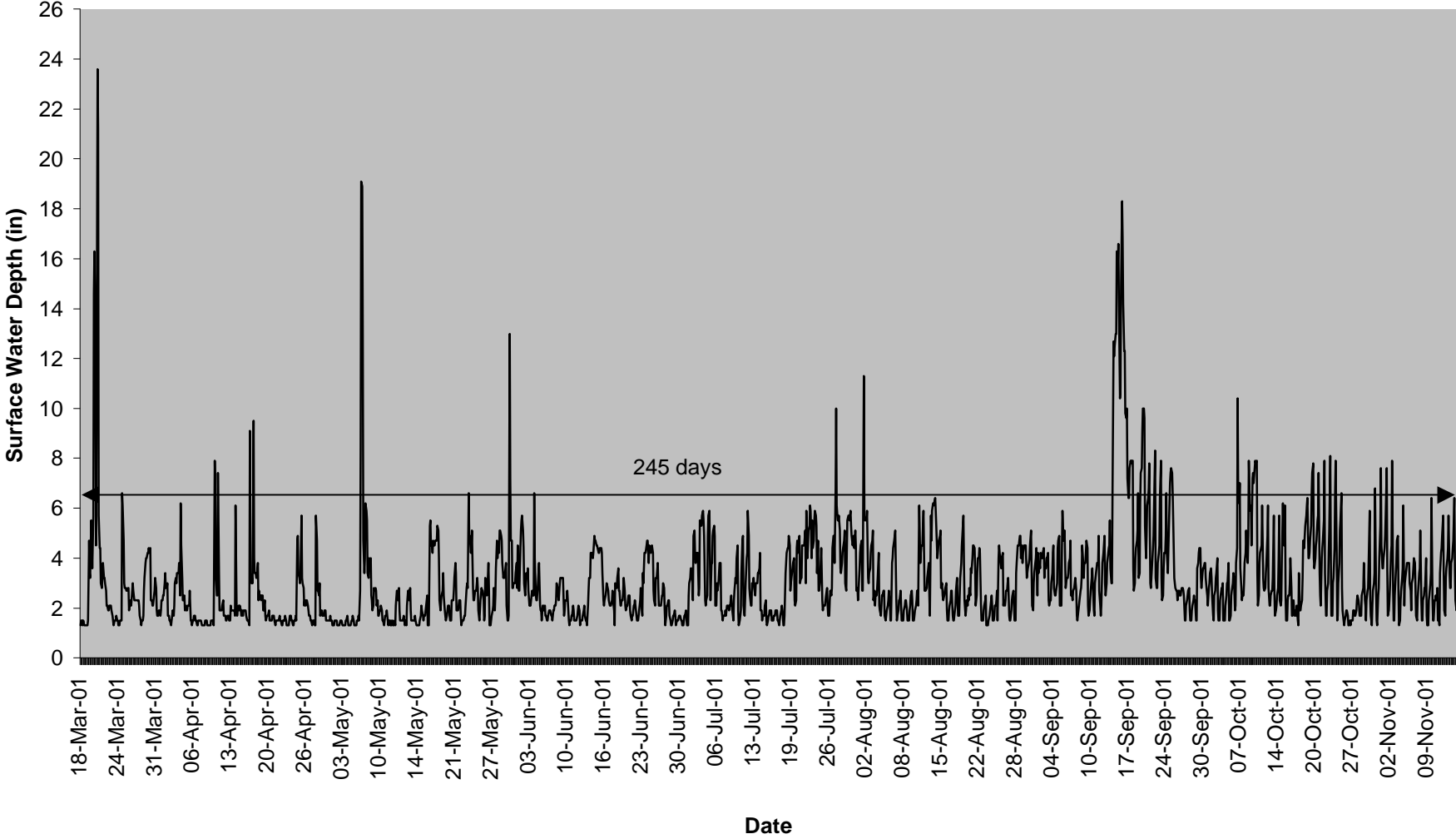
Lengyel LSGW-2



Surface Water Gauge (LSG-1)

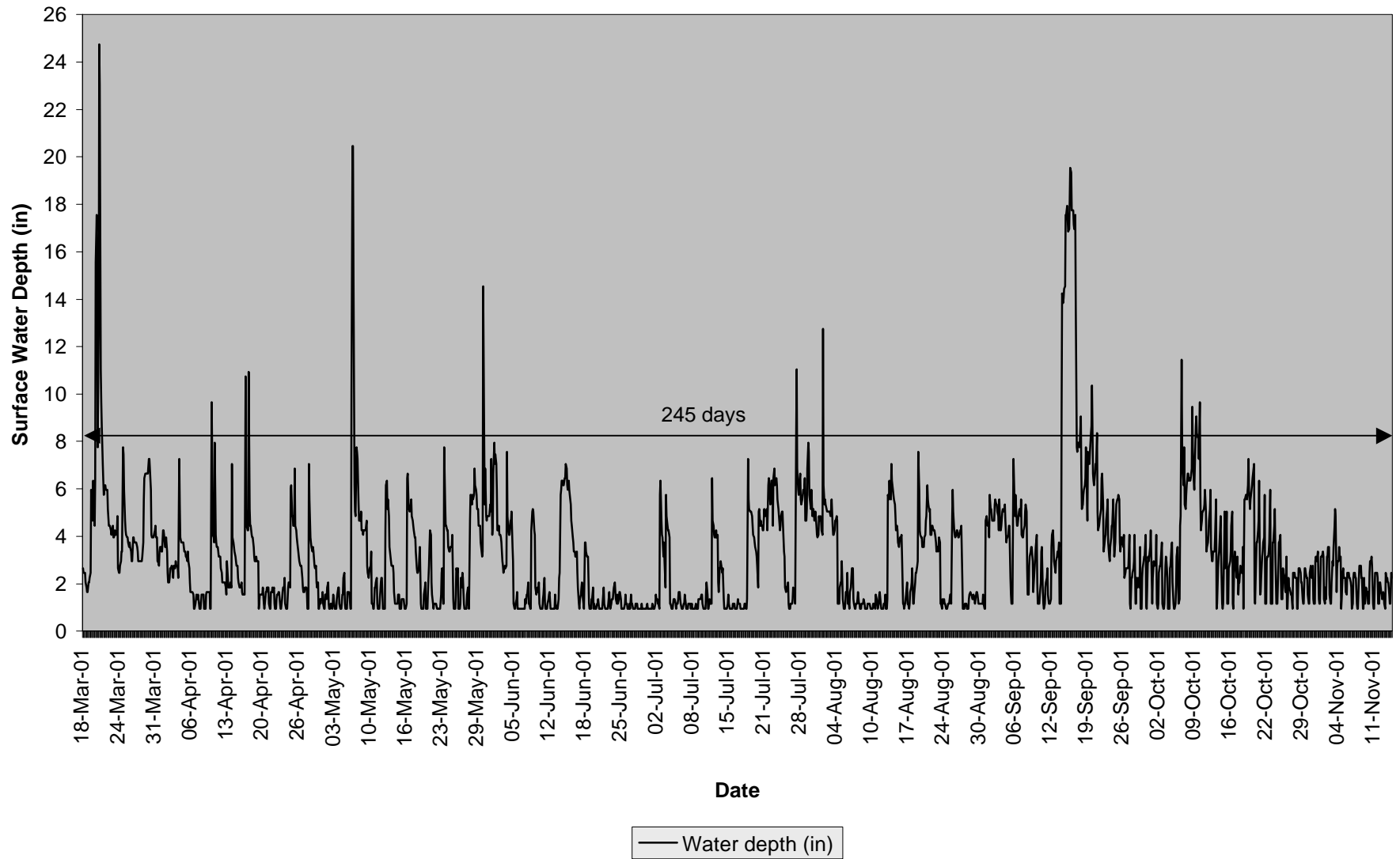


Surface Water Gauge (LSG-2)

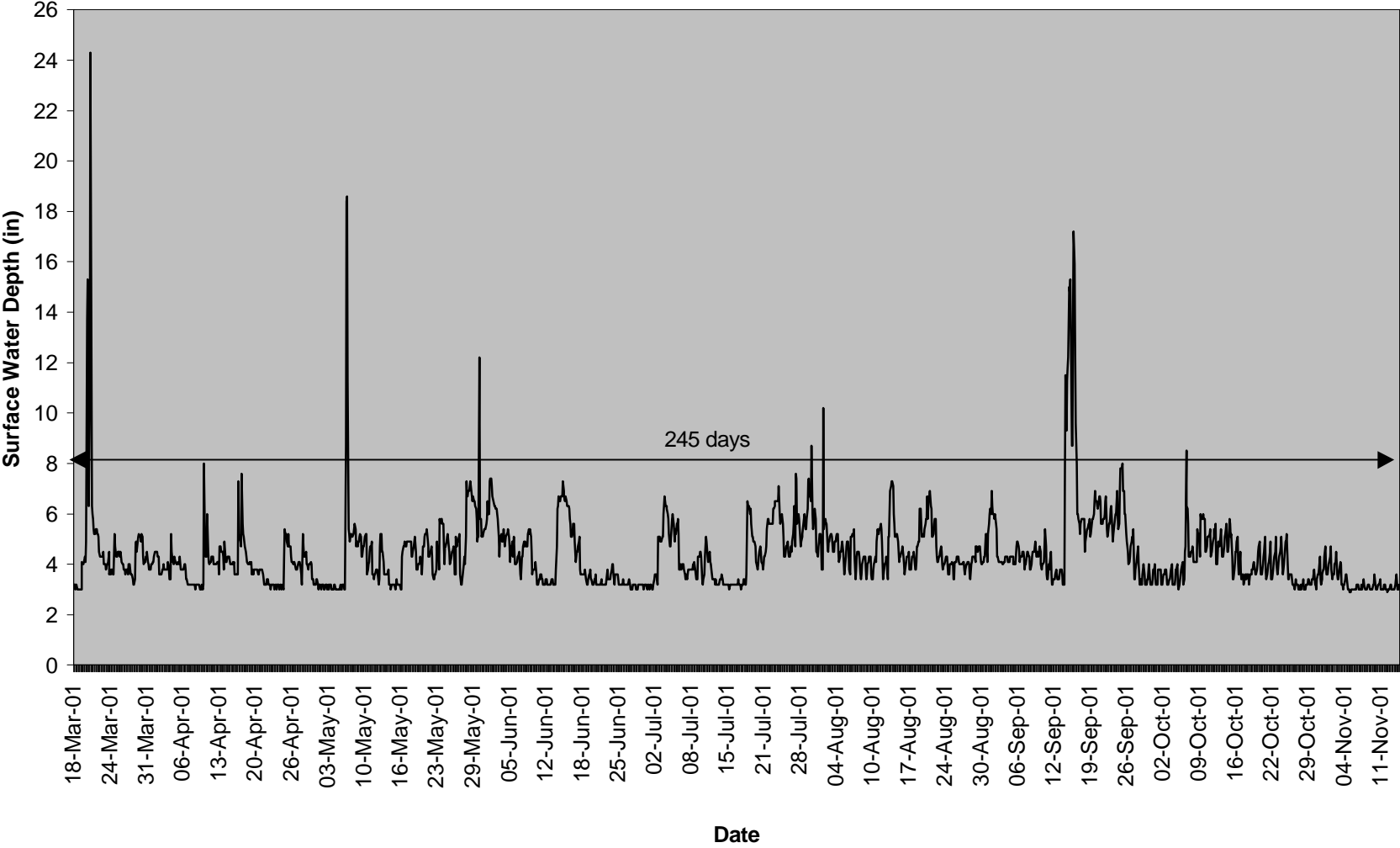


— Surface Water depth

Surface Water Gauge (LSG-3)



Surface Water Gauge (LSG-4)



— Water depth (in)

APPENDIX B

SITE PHOTOS

LENGYEL



Photo 1



Photo 2



Photo 3



Photo 4





Photo 5



Photo 6

2001 Monitoring

Lengyel Mitigation Site Photo and Plot locations

  CONTAINS: S.W. REV.	PROJECT REFERENCE NO.	SHEET NO.
	S.W. SHEET NO.	REV.
ROADWAY DESIGN ENGINEER	HYDRAULIC ENGINEER	

