ANNUAL REPORT FOR 2004

County Mitigation Site

New Hanover County

Project No. 8.2250109

TIP No. U-92 A/B

Prepared By:
Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following report summarizes the monitoring activities that have occurred in 2004 at the County Mitigation Site. The 2004-year represents the first year of hydrology and vegetation monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the site is deemed successful. The site was constructed to serve as mitigation for impacts associated with the construction of U92-A/B (Smith Creek Parkway).

A tidal gauge was installed at the Bridge Maintenance site in July 2000 and was used as a reference for Smith Creek, Waste Treatment, and County Sites. Tidal data was collected from July 2000 to July 2004. These sites were graded to elevations based on this tidal data.

In December 2003, four surface water gauges were installed to monitor hydrology on the site. One other gauge, which is located at the adjacent Bridge Maintenance Mitigation Site, is used as the reference for the County Mitigation Site. The reference gauge monitors the tidal regime for comparison with the elevation data on the County Mitigation Site, to confirm the site's flooding period. Since the site is a tide-driven system, groundwater and rain gauges were not installed.

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges indicated that inundation levels were similar to the reference gauge.

Vegetation monitoring of the baldcypress area revealed an average tree density of 108 trees per acre. This average is above the minimum success criteria of 50 trees per acre. For the marsh grass area, the target species and scale values were 82% and 3.6, respectively.

During the July 2004 onsite agency meeting, it was agreed that NCDOT could propose to remove the four surface water gauges at the County Site if there was successful tidal data during the 2004-monitoring season. Based on the hydrology and vegetation success for the 2004-monitoring year, NCDOT proposes to remove the gauges and discontinue monitoring.

1.0 INTRODUCTION

1.1 Project Description

The County Mitigation Site is located in New Hanover County, adjacent to the Bridge Maintenance Mitigation Site and the U-92B project in Wilmington (Figure 1). Totaling 1.9 acres in size, the site provides tidal swamp forest creation mitigation for a portion of the wetland impacts associated with U-92A/B. The Bridge Maintenance Site is utilized to provide reference data for restoration monitoring.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five years or until the site is deemed successful. The following report describes the results of both hydrologic and vegetation monitoring for the 2004-year (the first year of monitoring).

1.3 Project History

February 2004	Baldcypress Planted
April 2004	Marsh Grass Planted
March-November 2004	Hydrology Monitoring (1 yr.)
August 2004	Vegetation Monitoring (1 yr.)

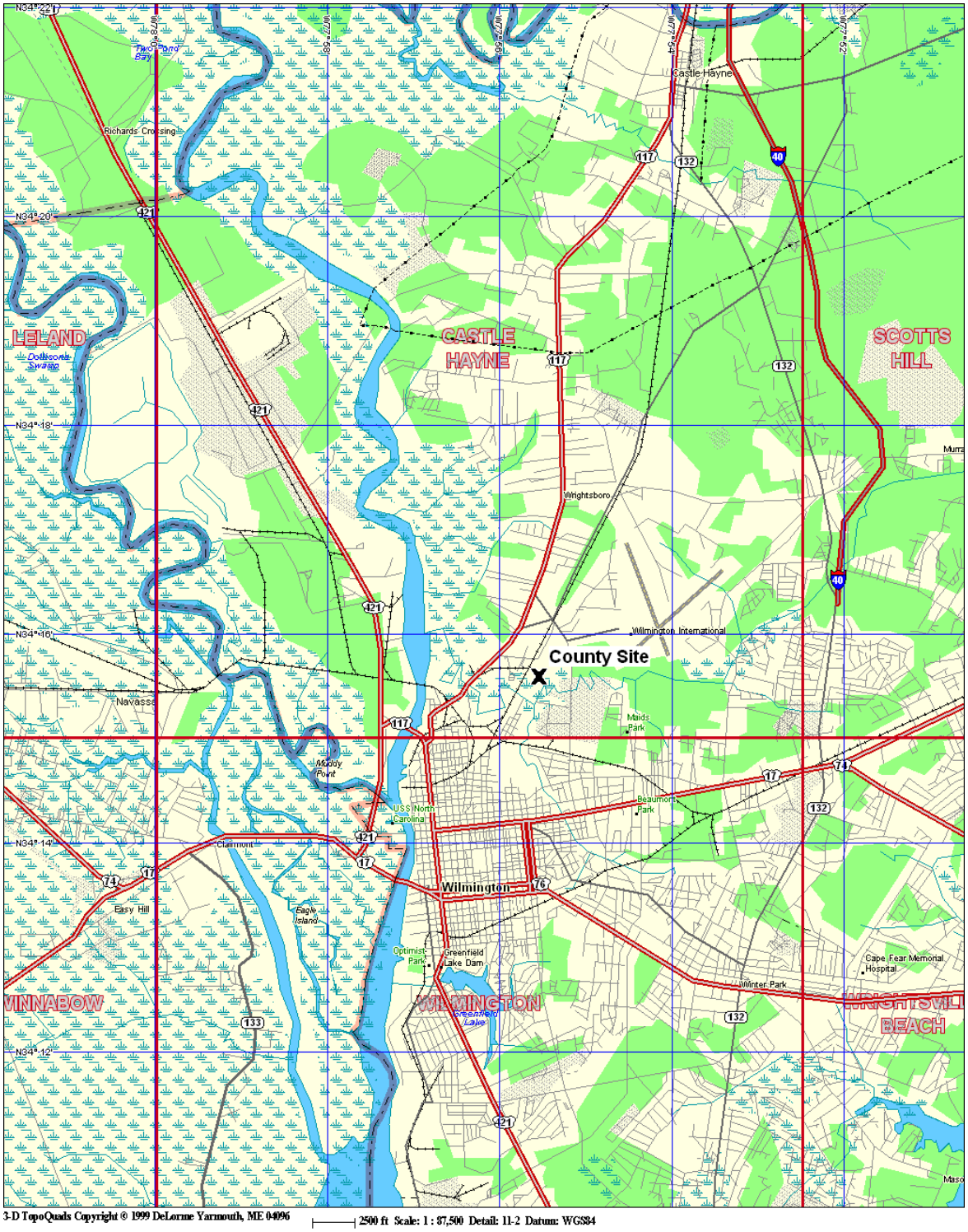


Figure 1: Site Location Map

2.0 HYDROLOGY

2.1 Success Criteria

Groundwater monitoring is not required at this site because it is a tidal system. Instead, data from an offsite tide gauge located at the adjacent Bridge Maintenance Site (collected 02-27-04 through 07-14-04) was used as a baseline to estimate the percentage of time that the site should remain flooded, at specific elevations. A target elevation of 2.5 feet above mean sea level was selected for the County Mitigation Site. Using the baseline data and the proposed elevation, the County Site will be considered hydrologically successful if it is inundated for 25.6% of the growing season, from February 27 to November 26 (271 days).

2.2 Hydrologic Description

Four 40-inch surface gauges, set to record hourly readings, were installed in December 2003 (Figure 2). The elevation of the calibration point on each surface water gauge was located using survey equipment and varied across the site for each gauge.

Appendix A contains a plot of the water depth for each surface gauge. Monitoring results are shown for the 2004-growing season. The actual average elevation across the site is 2.5'. It was calculated from the as-built drawings provided by Division Construction personnel.

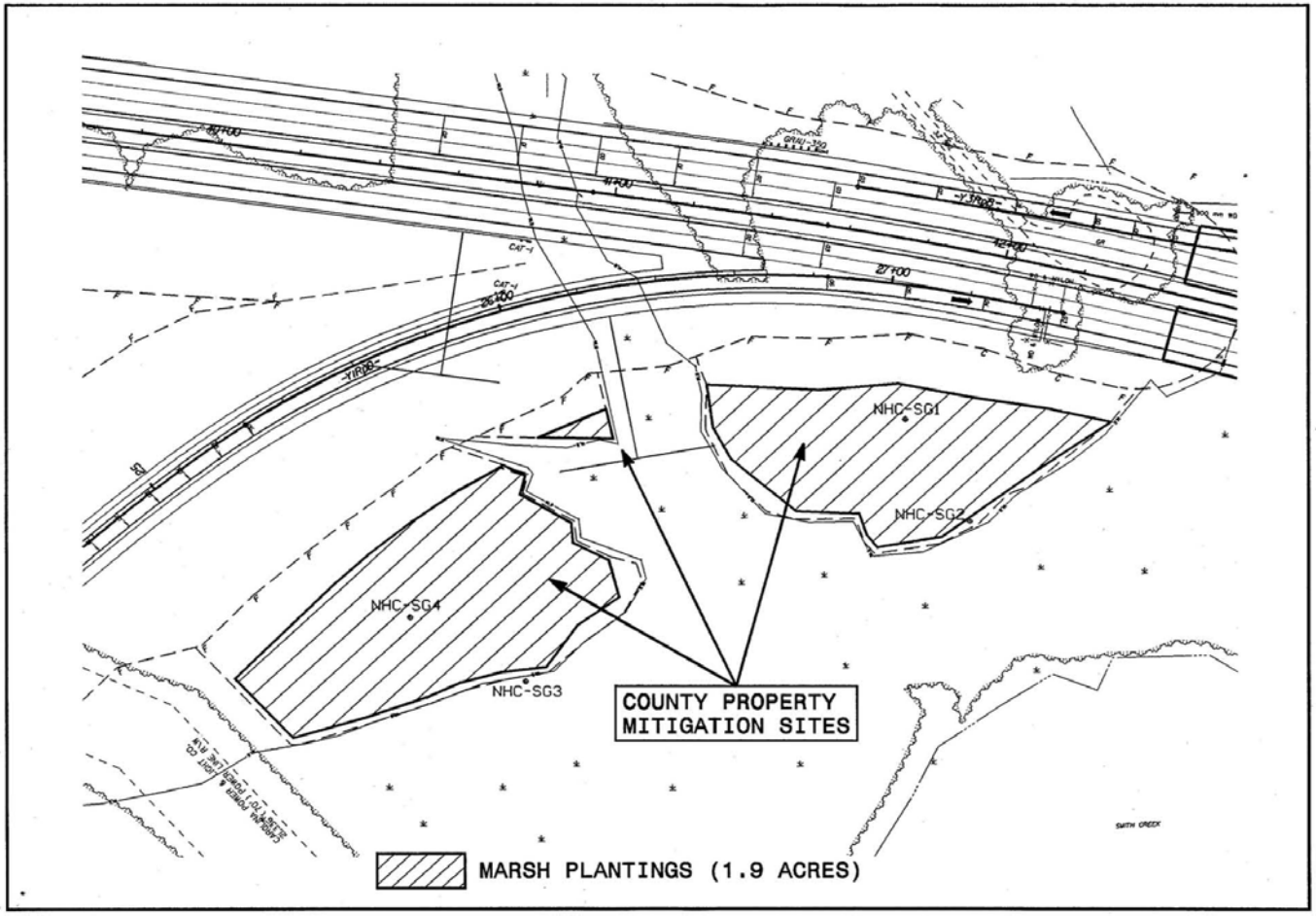


Figure 2. Gauge Location Map

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

Appendix A includes graphs of the data recorded at each surface water gauge. Since the site is a tide-driven system, groundwater and rain gauges were not installed.

2.3.2 Climatic Data

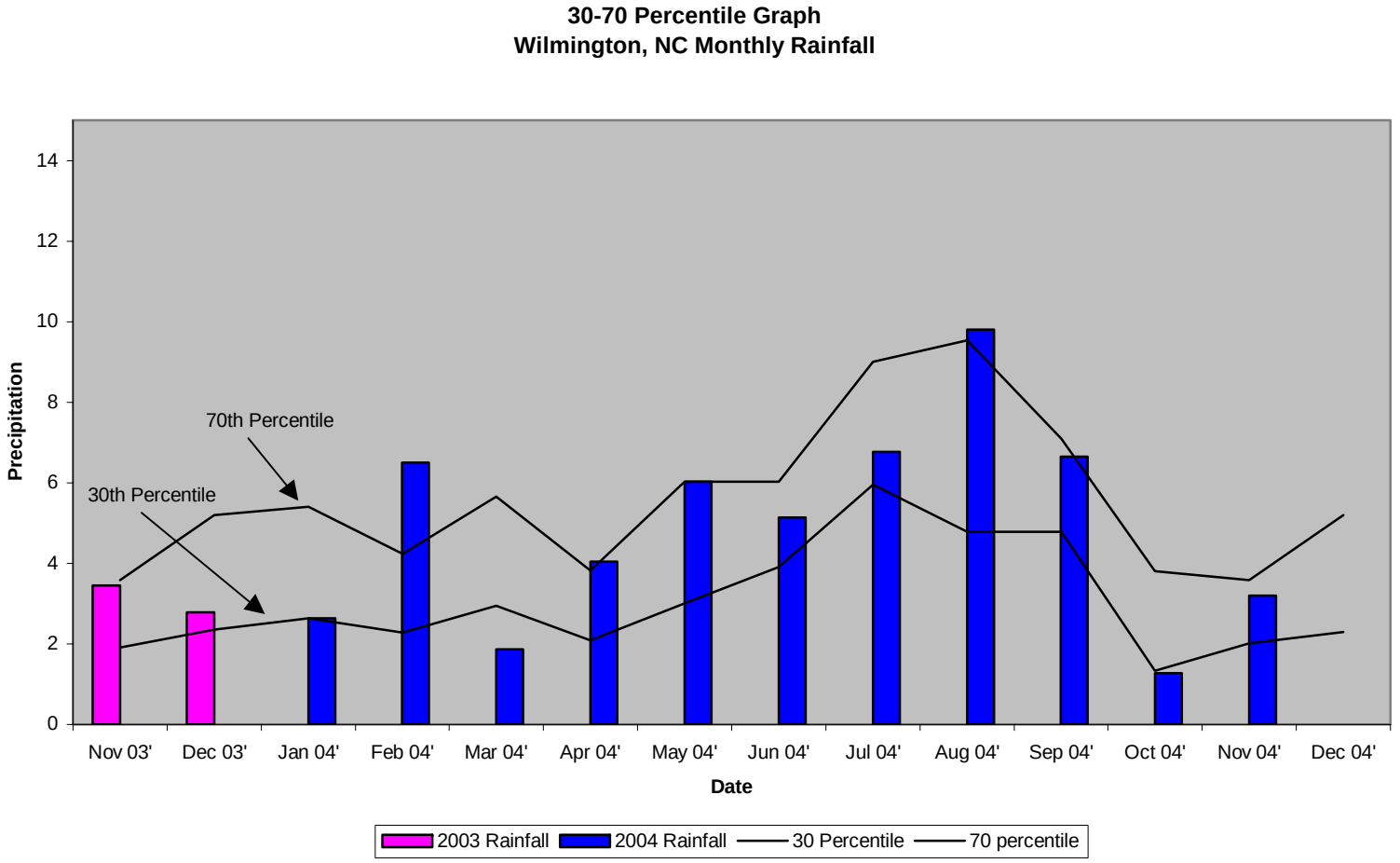
Figure 3 examines the local climate in comparison with historical data in order to determine whether 2004 was "average" in terms of climate conditions. The two lines represent the 30th and 70th percentiles of monthly precipitation for Wilmington, NC. The bars are monthly rainfall totals for 2003 and 2004. The historical data was collected from the State Climate Office of North Carolina.

For the 2004-year, February and August experienced above average rainfall. The months of March and October recorded below average rainfall for the site. November (03'), December (03'), January, April, May, June, July, September, and November experienced average rainfall. Overall, 2004 was an average rainfall year at the County Mitigation Site.

2.4 Conclusions

The 2004-year represents the first year of hydrologic monitoring for the County Mitigation Site. The four surface water gauges were compared to the reference gauge located at the Bridge Maintenance Site. Three of the four surface gauges at the County Site indicated that the site was inundated for 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

FIGURE 3: 2004 30-70 Percentile Graph



3.0 VEGETATION: U-92 COUNTY SITE (YEAR 1 MONITORING)

3.1A Success Criteria (Baldcypress Area)

One 100' x 100' plot and one 50' x 50' plot have been set and will be counted as part of the vegetation monitoring for the site.

The site will be considered a success for the baldcypress if there are 50 five-year old trees per acre after the end of the fifth growing season. Changes in the hydrology of Smith Creek have caused the decline in natural baldcypress populations, and it is uncertain if the planted baldcypress trees will survive. If the baldcypress survivorship declines below the success criteria, then the NCDOT will consult with the Corps of Engineers to determine appropriate action.

Establishment of cypress trees over the restoration area of the County Site is proposed, however there is evidence that they may not survive because of increases in salinity, tidal amplitude, and sea level (Hackney and Yelverton, 1990). Consequently, if cypress mortality occurs and the area develops into an emergent marsh community, the vegetation success criteria will be based on emergent marsh vegetation.

3.1B Success Criteria (Marsh Grass Area)

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 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 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.

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

3.2A&B Description of Planted Areas

The following plant communities were planted throughout the County Site:

Spartina cynosuroides, Big Cordgrass
Cladium jamaicense, Sawgrass
Taxodium distichum, Baldcypress

3.3A Results of Vegetation Monitoring (Baldcypress Area)

Plot #	Baldcypress (1 Year)	Total (at planting)	Density (trees/acre)
1 (100' x 100')	31	31	108
2 (50' x 50')	10	10	108
AVG. DENSITY			108

3.3B Results of Vegetation Monitoring (Marsh Grass Area)

ZONE	Plot #	Scale Factor	*Spartina cynosuroides*	*Cladium jamaicense*	Frequency	Notes
1	1	4.0				
	2	5.0	1		1	
	3	4.0				
	4	4.0	1		1	
	5	5.0				
	6	5.0	1	1	1	
	7	4.0	1		1	
	8	3.0	1		1	
	9	3.0	1		1	
	10	4.0	1		1	
	11	4.0	1		1	
	12	5.0	1	1	1	
	13	4.0	1		1	
	14	5.0				
	15	3.0	1		1	
	16	3.0	1		1	
	17					Out of Bounds
	18	4.0	1	1	1	
	19	4.0	1	1	1	
	20	3.0	1		1	
	21	1.0	1		1	
	22	2.0	1		1	
	23	4.0				
	24	3.0	1	1	1	
	25	4.0	1	1	1	
	26	2.0	1		1	
	27					Open Water
	28	3.0		1	1	
	29	4.0	1		1	
	30	2.0	1		1	
Freqency (Percentage of Plots with Desired Species)					**82%**	
Sum Scale Value					**101**	
Total Number of Plots Counted					**28**	
Vegetative Cover (Scale Value)					**3.6**	

Site Notes: The following species were also noted in the monitoring plots. The percentage of plots that the species were found in follows in parentheses (i.e. 16% of the plots contain *Juncus* sp.). *Juncus* sp. (16), *Polygonum* sp. (13), *Carex* sp. (5), *Sagittaria* sp. (7), woolgrass (4), *Scirpus* sp. (2), fennel (4), cattail (15) and *Echinochloa walteri* (2).

3.4A Conclusions (Baldcypress Area)

Baldcypress trees were planted on 20' centers throughout the approximately 1.6-acre site. One 100' x 100' plot and one 50' x 50' plot were established in the planting area. The vegetation monitoring of the planted area revealed an average density of 108 baldcypress trees per acre.

3.4B Conclusions (Marsh Grass Area)

- Percent Frequency of Target Species (Big & Smooth Cordgrass, Sawgrass)
  82% Frequency of 70% required.

- Vegetative Cover Scale Value
  3.6 Scale Value of 5 required for year 5.

Approximately 1.6 acres of this site involved marsh grass plantings. There were thirty random plots established throughout the planting area. These plots were located with GPS. Based upon the percent frequency and the scale value, the marsh grass area is on track for the first year of monitoring.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges indicated that inundation levels were similar to the reference gauge.

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APPENDIX A

GAUGE GRAPHS

APPENDIX B

SITE PHOTOS

&

PLOT AND PHOTO LOCATIONS MAP

County Site

Photo 1

Photo 2

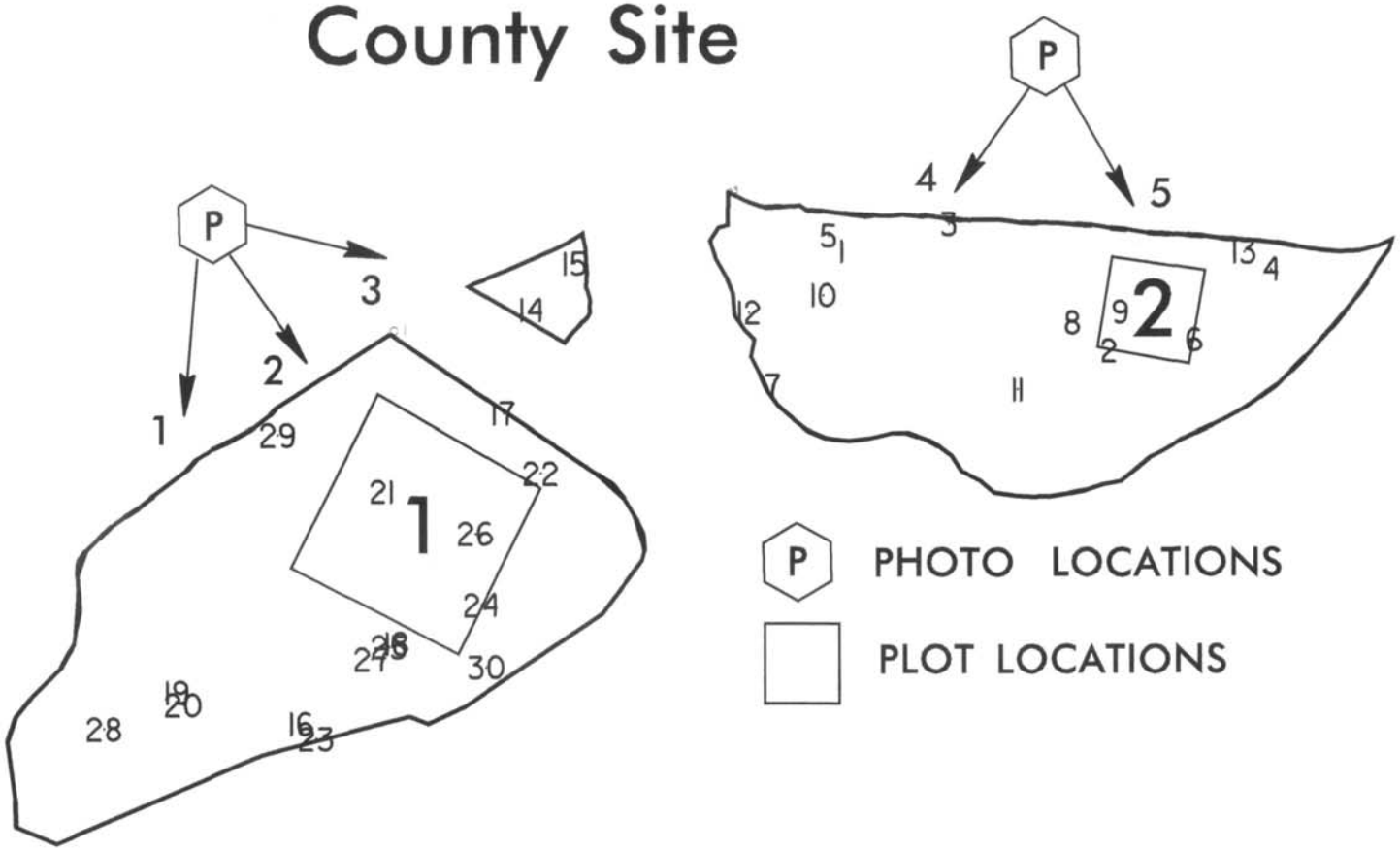
Photo 3

Photo 4

Photo 5

2004

County Site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