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NUTRIENT RETENTION OF HARVESTED AQUATIC VEGETATION

FROM

LAKES SALLIE AND MELISSA

FOR

THE PELICAN RIVER WATERSHED DISTRICT

Instrumental Research, Inc.

July, 1985

PURPOSE

Define the nutrient content of the harvested aquatic vegetation from Lake Sallie and Lake Melissa under four environmental conditions over a period of time.

RESULTS

1. The vegetation left on the dry sand and open to the elements retained the highest percentage of phosphorus and nitrogen over the 27 day test period.
2. Within the typical time frame for the cleanup of water born vegetation (3 to 5 days) there was no appreciable loss of nutrients from the plant material.
3. A greater loss of hydrocarbons was evidenced in the beginning of the experiment than nitrogen and phosphorus from the plant material.
4. The vegetation immersed in water over the experimental period had the highest loss of phosphorus and nitrogen and steadily lost hydrocarbon content as well.

CONCLUSIONS

1. The greatest efficiency of vegetation removal and nutrient removal per pound of handled vegetation comes from removing the water born materials from the shoreline.
2. To effect the greatest removal of nutrients from a shore cleaning, the vegetation should be removed from the water as quickly as possible and allowed to dry above the waterline.
3. The cost of using the Bobcat to clean the beaches is about 5 times as efficient as the floating harvester for removing recyclable nutrients from the lake.
4. Based on this data and the 1984 harvest records, the Lake Sallie harvest removed 62% of the retained phosphorus and 120% of the retained nitrogen for that year.

MATERIALS & METHODS

A mixture of aquatic vegetation was collected from both Lake Sallie and Lake Melissa on May 23, 1985. The vegetation contained approximately equal quantities of *Potamogeton crispus* (curley leafed pondweed), *Ceratophyllum demersum* (coontail), and *Chara vulgaris* (stonewort, muskgrass).

The collected materials were transported to the study area in five gallon containers. Prior to distribution, the materials were mixed together to make the samples as homogenous as possible and still maintain the integrity of the individual stems.

A sample of the plant material was taken for analysis when the experiment was set up on May 28, 1985.

The percent dry weight of the samples were done on approximately 500 gm of collected wet weight material for each experimental situation.

Total kjeldahl nitrogen analysis was done on one gram of the wet collected sample. The analytical method used was the Macro-Kjeldahl Method 420 A in Standard Methods for the Examination of Water and Wastewater, 16 Edition.

Total phosphorus analysis was performed on material from the dried sample which was ground with a mortar and pestal to a mixed powder. The analysis was done on the powdered material using the Sulfuric Acid-Nitric Acid Digestion 414 C II and the Ascorbic Acid Detection Method 424 F for total phosphorus as listed in Standard Methods.

The samples were set out in the open to receive the effects of sun, wind, and rain throughout the test period which ran from May 28, 1985 to June 24, 1985 for a total of 27 days.

Set # 1.

The mixture of vegetation was put on a dry, well drained base, about six inches deep. Samples for analysis were cut plugs which were removed from the mat with a knife.

Set # 2.

The mixture of vegetation was put on wet sand which was maintained in this condition throughout the experiment. Excess rainwater was poured off and saved for renewal of moisture as lost by evaporation. The depth of vegetation on this set was also about six inches at the start.

Set # 3.

The vegetation was put on sand covered in water with the water level maintained over the vegetation throughout the experiment. Again, excess water from rain was used later as make up water for the replacement of evaporated moisture.

Set # 4.

The vegetation was put in water and maintained in this condition throughout the experimental period. Samples for analysis were taken from the mass.

The percentage of nitrogen to dry weight was calculated from the percent dry weight of the sample.

DRY VEGETATION

SET # 1.

		% DRY WT BASIS			% WET WT.	
DAY	DATE	% DRY WT.	% T [P]	% [N]	% [P]	%[N]
0	5/28/85	17.42	.127	1.89	.022	0.33
6	6/3/85	62.28	.185	1.75	.115	1.09
13	6/10/85	90.7	.226	2.34	.205	2.12
27	6/24/85	89.15	.129	1.49	.115	1.32

VEGETATION ON WET SAND

SET # 2.

		% DRY WT BASIS			% WET WT.	
DAY	DATE	% DRY WT.	% T [P]	% [N]	% [P]	%[N]
0	5/28/85	17.42	.127	1.89	.022	0.33
6	6/3/85	15.63	.168	3.41	.026	0.53
13	6/10/85	48.72	.147	2.24	.072	1.09
27	6/24/85	29.95	.183	2.66	.055	0.80

VEGETATION ON SAND & IN WATER

SET # 3.

DAY	DATE	% DRY WT BASIS			% WET WT.	
		% DRY WT.	% T [P]	% [N]	% [P]	%[N]
0	5/28/85	17.42	.127	1.89	.022	0.33
6	6/3/85	15.19	.143	2.08	.022	0.27
13	6/10/85	28.90	.126	1.80	.036	0.52
27	6/24/85	14.00	.170	1.83	.024	0.26

VEGETATION IN WATER

SET # 4.

DAY	DATE	% DRY WT BASIS			% WET WT.	
		% DRY WT.	% T [P]	% [N]	% [P]	%[N]
0	5/28/85	17.42	.127	1.89	.022	0.33
6	6/3/85	14.56	.236	1.44	.034	0.21
13	6/10/85	10.52	.097	1.57	.010	0.16
27	6/24/85	10.10	.081	1.12	.008	0.11

INFORMATION FROM 1984 HARVEST SEASON

Phosphorus input 1980 est 5602 Lbs.

Phosphorus output 1980 est 4651 Lbs.

Phosphorus retained 951 Lbs.

Nitrogen retained 1968-71 est 6046 Lbs.

1984 harvest Source	vegetation pounds	phosphorus pounds	nitrogen pounds
Lake 30%	508,200	112.4	1,673.2
Beach dry 14%	237,160	273.2	2,584.8
Beach wet 56%	948,640	206.1	2,997.2
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Total	1,694,000	591.7	7,255.2

1984 harvest of retained phosphorus and nitrogen

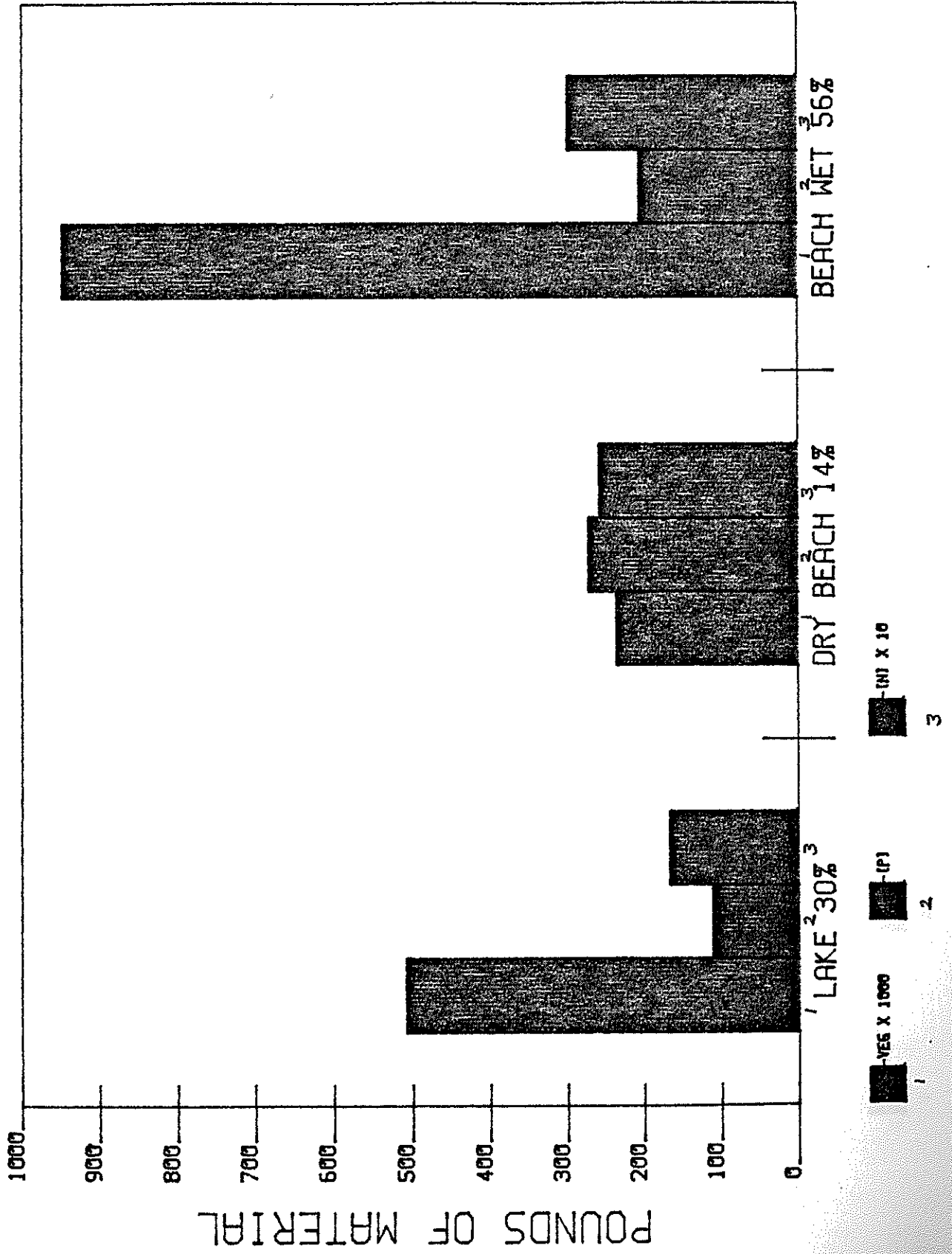
Harvested 62% of retained phosphorus

Harvested 120% of retained nitrogen

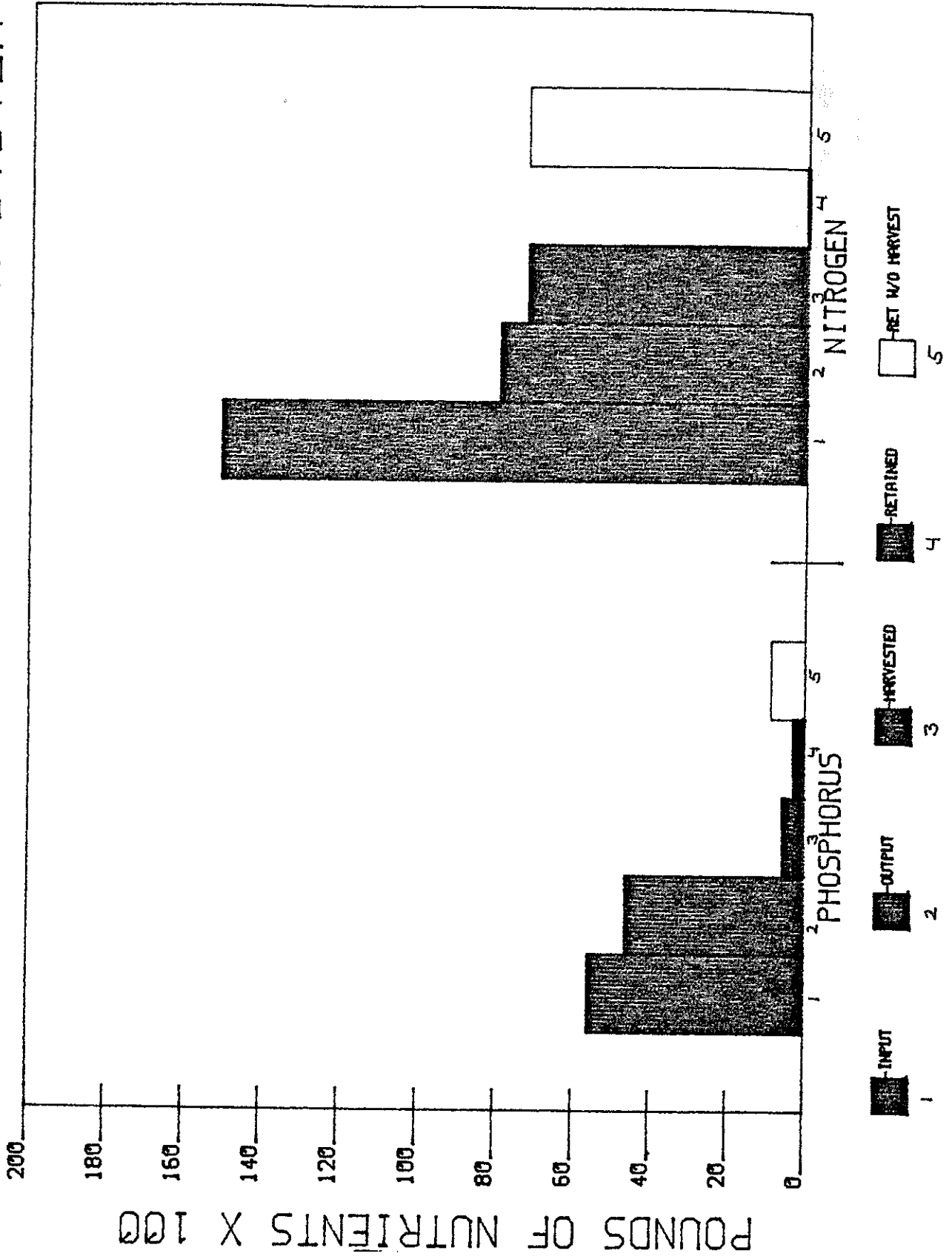
Lake Sallie Vegetation Data

Vegetation Type	Potamogeton crispus
Percent dry weight	6.34
Percent phosphorus	0.135
Percent nitrogen	0.748

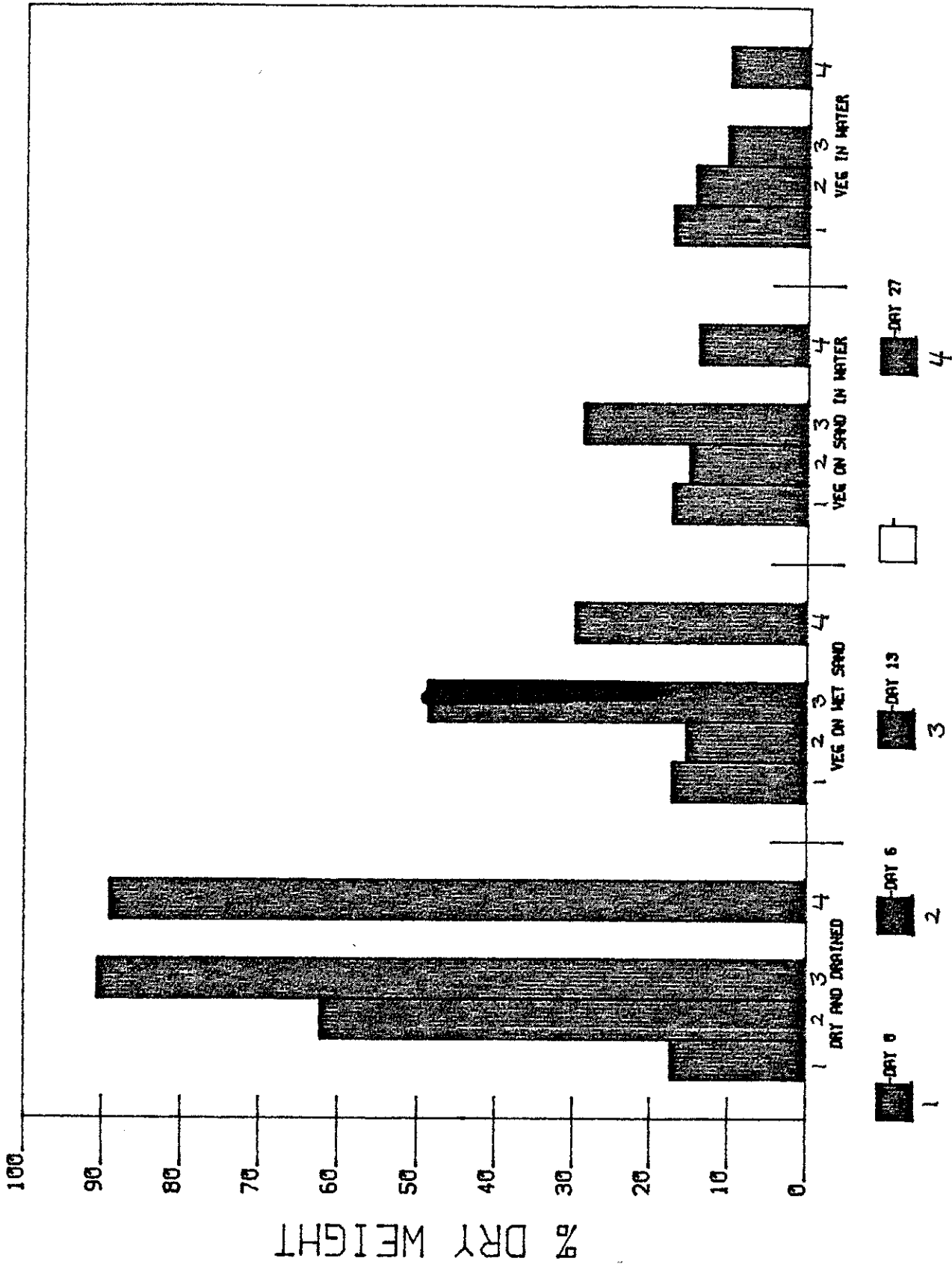
1984 LAKE SALLIE HARVEST



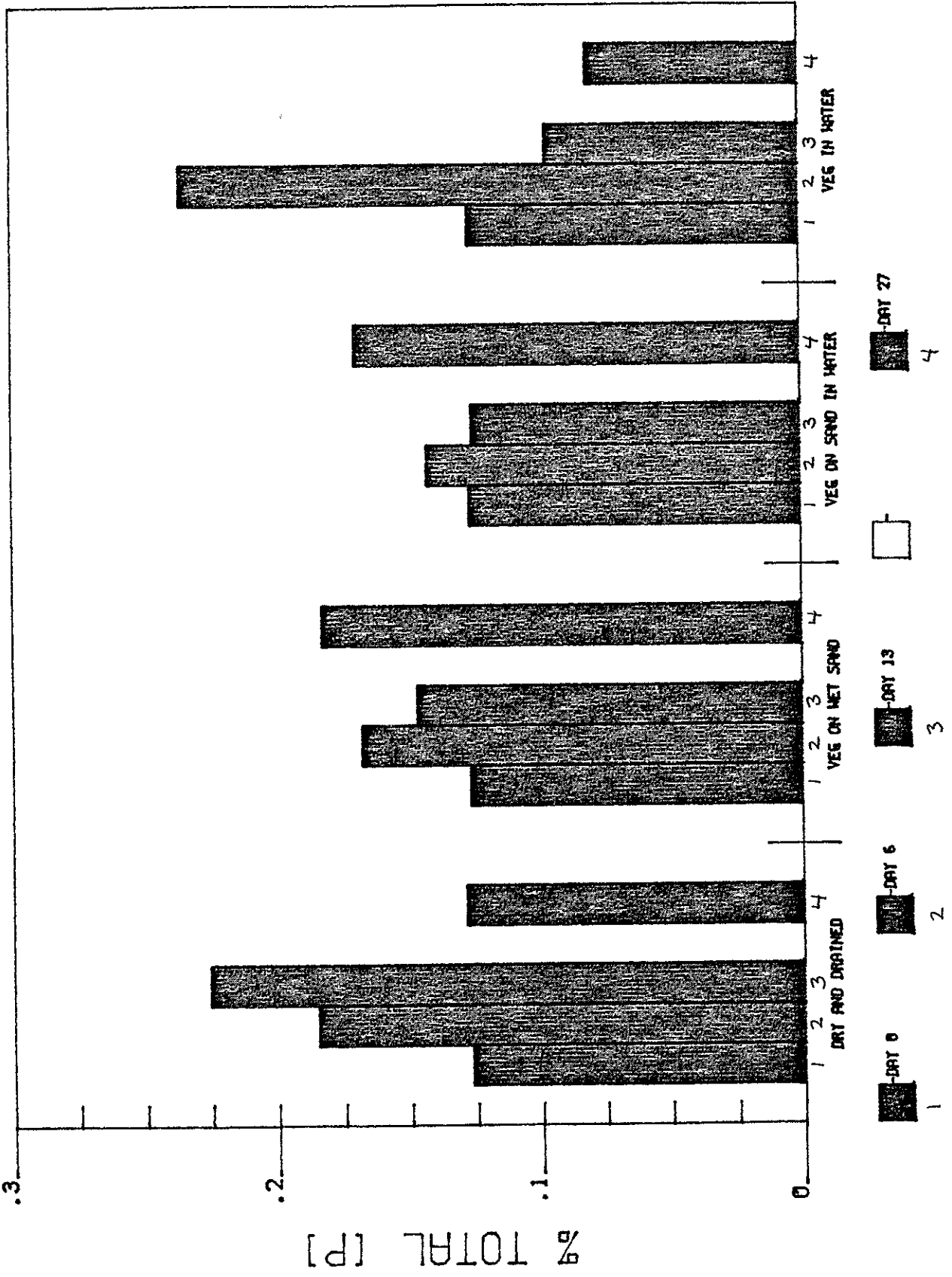
[N] AND [P] MOVEMENT THRU THE SYSTEM



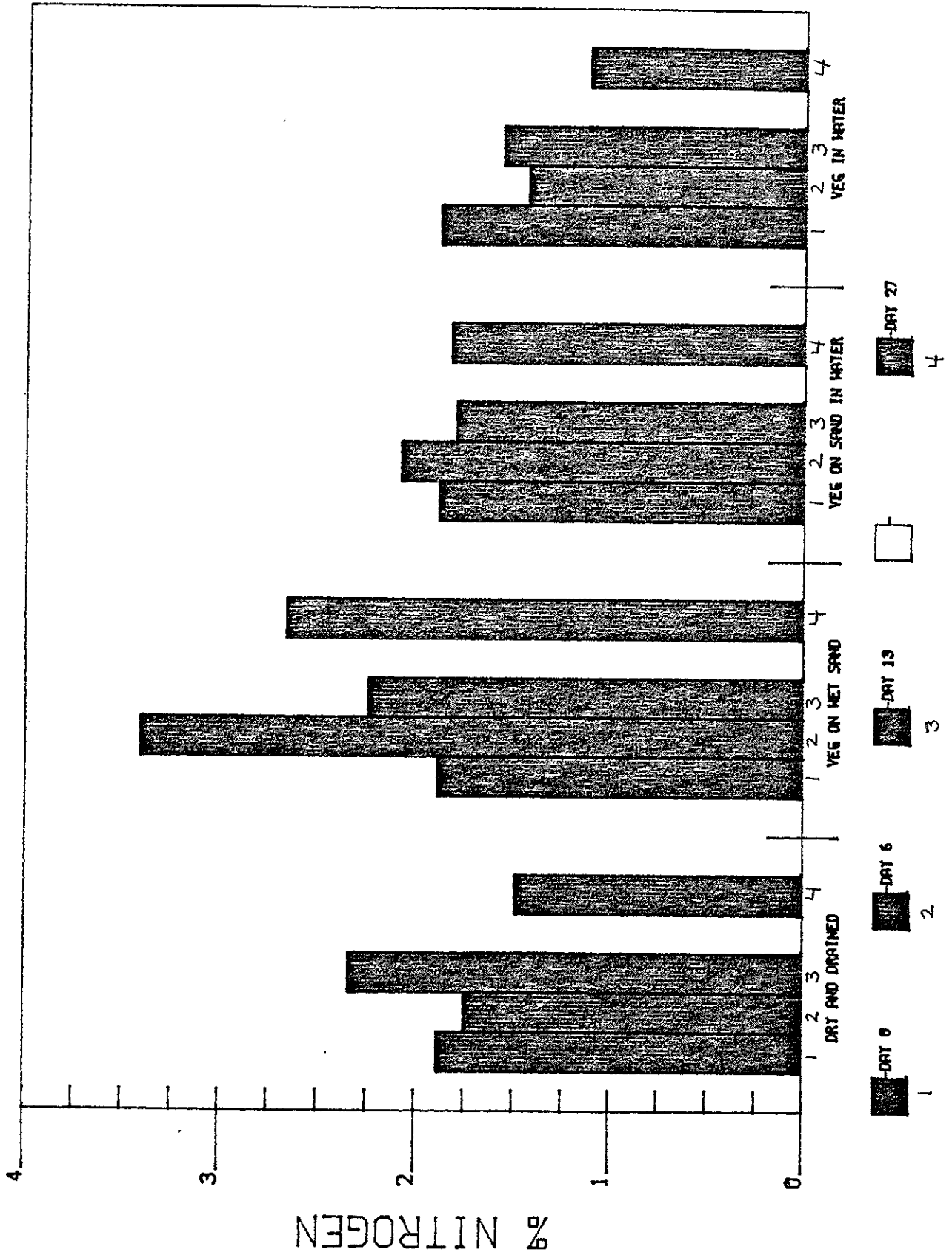
VEGETATION % DRY WEIGHTS



% TOTAL PHOSPHORUS



% ORGANIC NITROGEN



% PHOSPHORUS WET BASIS



% NITROGEN WET BASIS

