

VEGETATION LINE TRANSECTS OF
GOOSE PASTURE AND POOL NO. 1

VEGETATIVE TRANSECTS
Clarence Cannon NWR
1970-1980

PART OF
WILDLIFE MANAGEMENT STUDY - PROJECT 2

"Evaluating Production of Moist Soil Plants in the
Mississippi River Flood Plain and Their Subsequent
Use by Waterfowl"

BY

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CLARENCE CANNON NATIONAL WILDLIFE REFUGE
ANNADA, MISSOURI

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INTRODUCTION

Naturally occurring moist soil food plants in the Mississippi River flood plain are highly adapted to changing environmental conditions. Burgess (1970) found that domestic food plants such as Japanese millet, proso millet and buckwheat had little success because of floods, drought, and infestations of wild millet, smartweeds, and foxtail grasses. Burgess also stated that moist soil food plants have an inherent ability to adapt to natural conditions.

Wildlife Management Study - Project No. 2, dated May 15, 1969 was developed to evaluate the production of moist soil food plants in the Mississippi River flood plain and their subsequent use by waterfowl.

PROCEDURE

During the summer of 1970, permanent vegetation line transects were established and run in Goose Pasture and Pool No. 1 at Clarence Cannon National Wildlife Refuge.

The Goose Pasture line transect runs north-south. The north point is marked by a permanent steel fence post located ten feet below the top and inside of the north boundary levee. The south terminus, which is due south of the north post, was marked by a permanent steel fence post located 150 feet west of the newly installed water control structure and 40 feet north of the four-wheel drive trail. The length of the transect line is 2,400 feet.

The Pool No. 1 line transect runs north-south. The south point is marked by a permanent steel fence post located at the base and north of Bryant's Creek levee. The north point is marked by a permanent steel fence post located 15 feet south of the brush-covered drainage ditch. The length of the transect line is 1,025 feet. Figure 1 shows the location of the line transects.

The transects for both pools start at the south and run north along an imaginary straight line to the north post. Only one man is needed

to pull the 100 foot tape measure and record the plant species. The recorder walks north until he reaches the end of a 50 foot or 100 foot distance, depending on the length used, and marks that point.

A one-quarter mile acre square quadrant (3.3 feet on each side) was placed squarely ahead of this point. The next quadrant was walked exactly the same distance north of the previously marked end point. Each quadrant constitutes a sample, and each sample is exactly 50 or 100 feet apart, depending on the length required. The proposed length between samples in Goose Pasture was 100 feet. In Pool No. 1 50 and 100 foot lengths between samples were compared. The 50 foot length provided a more precise analysis of the vegetation. It is recommended that a 50 foot length be used. Figure 2 describes the position of the quadrant and the transect line.

The presence-absence unit of measure for each species was recorded for each sample. This was summarized as a frequency of occurrence, which is defined as "an expression of the percentage of sample plots in which a species occurs". The results were ranked according to percentage and the percentages were rounded off to the nearest whole per cent.

Photographs were taken using Kodachrome II showing the north-facing and south-facing aspect of each line transect, and samples showing conspicuous densities of certain plant species. These slides should be a valuable tool for year-to-year comparisons of the same transect line. Table 1 notes the photographs included in this study.

Water gauge readings from Goose Pasture and Pool No. 1 were also recorded. The importance of including these readings cannot be overestimated. Water level management will be the ultimate result of this study. With out a practical connection to waterfowl management, line transects are a waste of valuable time.

Major moist soil plant species encountered in this study were added to the refuge herbarium. This should be a valuable assistance to students and refuge managers who conduct future line transects at Clarence Cannon National Wildlife Refuge.

It is recommended that all vegetation line transects be run in as similar a fashion from year-to-year as possible to provide comparable results.

RESULTS

Plant species encountered in each sample are given in Table 2 and Table 3. The frequency of occurrence of plant species are given in Table 4 and Table 5.

In Pool No. 1, Polygonum pennsylvanicum and Echinochloa sp. were the most conspicuous moist soil food plants. Several lower profile plant species such as Convolvulus arvensis, Eleocharis obtusa, and Ammania coccinea occurred in most samples. The variety of plant species in Pool No. 1 was sparse. However, the random heterogeneous mixing of these plants would appear to be quite attractive to the particular and changeable tastes of waterfowl.

The zonation effect of Echinochloa sp., P. pennsylvanicum, and A. coccinea was evident in Goose Pasture. Both the sample data and photographs of the area show 10 to 80 foot zones of a single species occurring on the east end of Goose Pasture. The primary cause of this were slight differences in elevation which resulted in varying depths of standing water. In general, A. coccinea grew in the depressions, P. pennsylvanicum in the transitional zone, and Echinochloa sp. on the drier sites (although often quite wet).

The most abundant plant species in Goose Pasture was E. obtusa. It is low in profile, abundant on low moist sites, and appears somewhat intolerant to shade. It was most commonly associated with A. coccinea and Stellaria graminea.

A. coccinea often occurred in nearly solid stands. During late July, many large seeds developed on each plant. No reference as to its wildlife value could be found. The total quantity of seed produced by this species in Goose Pasture certainly ranks very high.

Goose Pasture and Pool No. 1 have a readily observable plant profile. In general, there are the tall conspicuous species such as P. pennsylvanicum, Echinochloa sp., and Chenopodium album. There was also a low, inconspicuous and frequently dense layer of A. coccinea, S. graminea, E. obtusa, and C. arvensis. The layering and zonation effect of plant species seems to be an important characteristic of moist soil habitats.

MOISTURE CONDITIONS

At the time the Goose Pasture transect was conducted, no water gauge had been installed at the water control structure. However, the water level was marked on a steel post. As soon as the gauge is installed, a reading will be obtained from the marked post. In general, only the ditches, four shallow pools and a few depressions contained water.

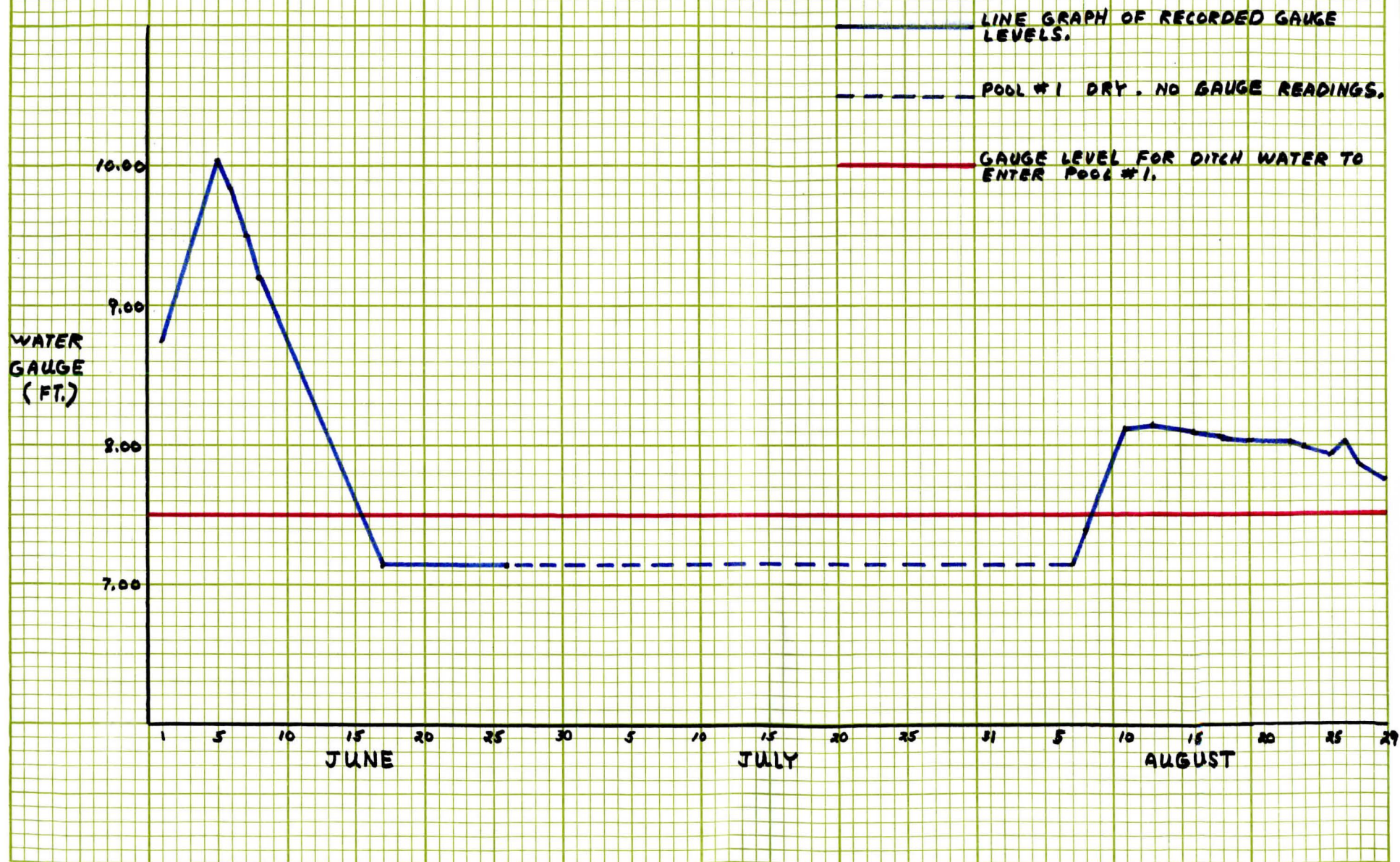
Pool No. 1 was dry during the transect. The water gauge at water control structure No. 1 read approximately 6.80. This water was in the east-west ditch and was not high enough to enter the pool. (See Figure 1).

DISCUSSION

Continuing development of moist soil areas on Clarence Cannon National Wildlife Refuge make comparisons between Goose Pasture and Pool No. 1 this year and in subsequent years difficult. The number of acres of moist soil habitat will be increasing as funds for development permit. The importance, however, of an initial plant species survey of the newly developed Goose Pasture area will provide valuable information of a changing habitat from cropland to a moist soil habitat.

The effects of drawdown, particularly time and length, appear to have a considerable influence on the development of moist soil food plants. Hopkins (1962) said that too early drawdowns cause unwanted plants to be established before conditions were suitable for the germination of smartweeds and other desirable plants. Uhler (1956) preferred a biennial drawdown to an annual de-watering, because the latter may permit the excessive development of undesirable plants. Meeks (1970) studied drawdowns in Ohio from March to June and found that a May drawdown produced the best vegetation for wildlife. Grail (1951) recommended dropping water levels in Missouri in June to produce wild millet. Burgess (1970) indicated that a July 1 - September 15 drawdown would produce an excellent stand of wild millet at Squaw Creek National Wildlife Refuge, while earlier drawdowns would produce inaccessible growths of nodding smartweed (P. lapathifolium).

FIGURE 1. WATER LEVELS IN POOL #1 DURING JUNE-AUGUST, 1970 ON CLARENCE CANNON NATIONAL WILDLIFE REFUGE



The large seeded smartweeds (P. pennsylvanicum, P. coccineum), which often occurred in the late millet crop, produced more valuable seeds and less bulk than nodding smartweed.

On Clarence Cannon National Wildlife Refuge the ability of naturally occurring moist soil food plants to develop in layers or zones of different plant species under a variety of environmental conditions could adequately replace many cultivated crops.

COST

| | |
|---|----------------|
| Manpower - 20 hours - (GS-5 \$3.27/hour Project Cost) | \$ 65.40 |
| Equipment and Supplies | <u>\$ 4.00</u> |
| TOTAL | \$ 69.40 |

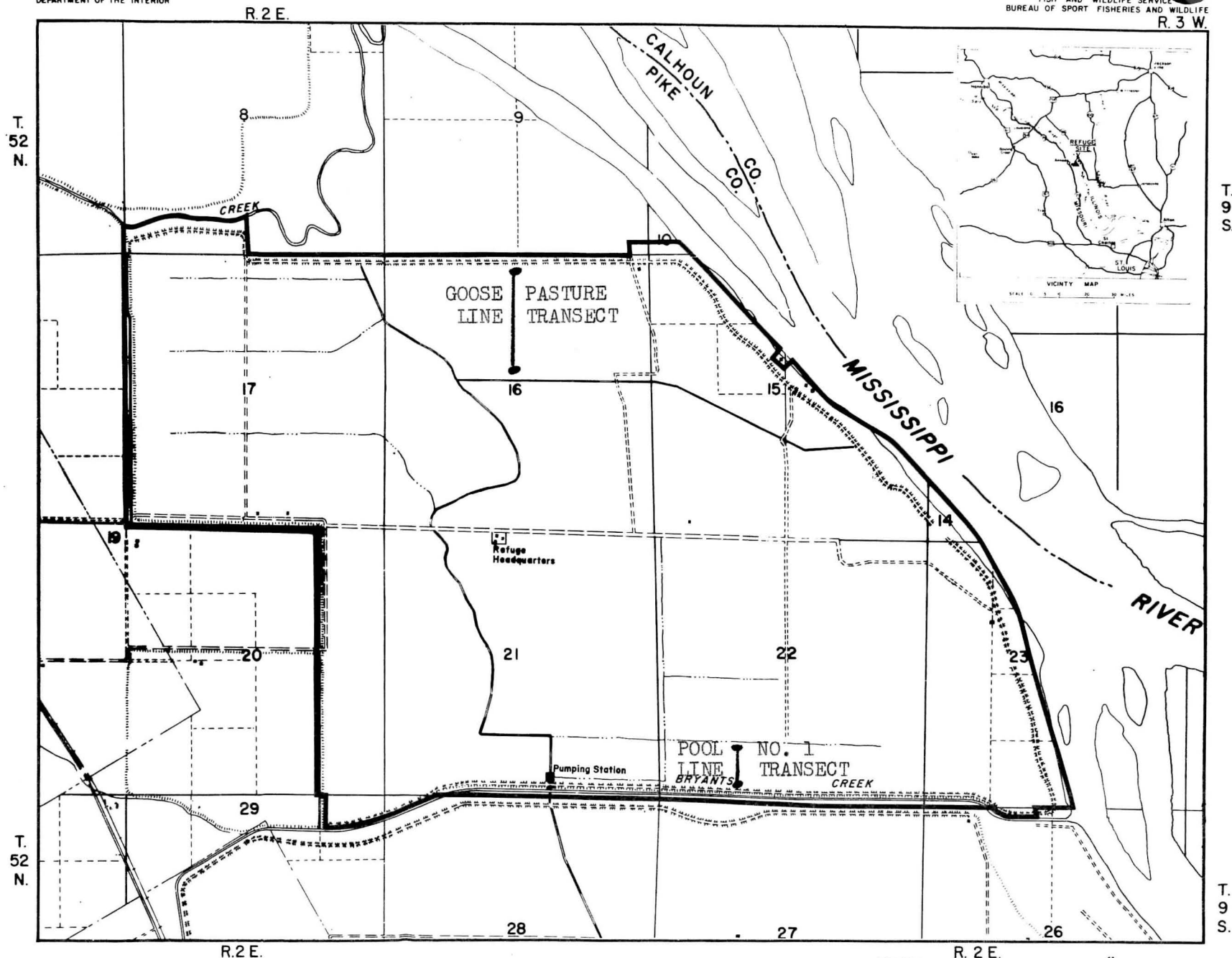
FIGURE NO. 1 - Location of permanent line transects at Clarence Cannon National Wildlife Refuge, July, 1970.

CLARENCE CANNON NATIONAL WILDLIFE REFUGE

PIKE COUNTY, MISSOURI

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

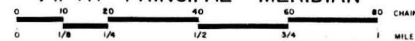


COMPILED IN THE BRANCH OF ENGINEERING
FROM AERIAL PHOTOGRAPHS AND SURVEYS
BY THE B.L.M.

MINNEAPOLIS, MINNESOTA

SEPTEMBER, 1963

FIFTH PRINCIPAL MERIDIAN



6 5 4 3 2 1
7 8 9 10 11 12
13 14 15 16 17 18
19 20 21 22 23 24
25 26 27 28 29 30
31 32 33 34 35 36

TOWNSHIP
DIAGRAM

6°
TRUE NORTH
MAGNETIC 4°
MEAN
DECLINATION
1960

FIGURE II.

Position of quadrant in relation to the transect line.

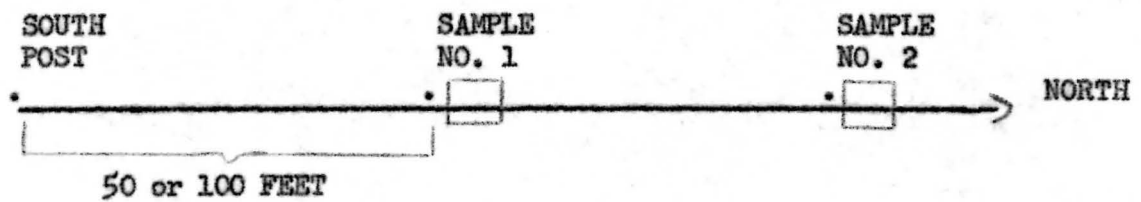


TABLE I.

List of photographs taken during the vegetation line transect of Goose Pasture and Pool No. 1 at Clarence Cannon National Wildlife Refuge, July, 1970.¹

| <u>PHOTO KEY</u> | <u>DESCRIPTION</u> |
|------------------|---|
| A. | Goose Pasture. South boundary of line transect looking north. |
| B. | Goose Pasture. North boundary of line transect looking south. |
| C. | Goose Pasture. Sample No. 3 of line transect. |
| D. | Goose Pasture. Sample No. 8 of line transect. |
| E. | Goose Pasture. Sample No. 14 of line transect. |
| F. | Goose Pasture. Sample No. 15 of line transect. |
| G. | Goose Pasture. <u>Ammania</u> , <u>Echinochloa</u> and <u>Stellaria</u> near Sample No. 17. |
| H. | Goose Pasture. <u>Ammania</u> , <u>Echinochloa</u> and <u>Stellaria</u> near Sample No. 17. |
| I. | Pool No. 1. South boundary of line transect looking north. |

¹ - Colored slides using Kodachrome II. Located in refuge slide collection.

TABLE II.

Plant species observed in samples taken at 100 foot intervals on a vegetation line transect of Goose Pasture at Clarence Cannon National Wildlife Refuge, July 14, 1970.

| <u>SAMPLE NUMBER</u> | <u>SPECIES</u> | <u>SAMPLE NUMBER</u> | <u>SPECIES</u> |
|--------------------------|--|--------------------------|--|
| 1 | Algae <u>Polygonum coccineum</u> <u>Callitriche hermaphroditica</u> 95% open water Water depth - 5 inches. | 9 | <u>P. pennsylvanicum</u> - dense <u>Ambrosia</u> sp. <u>Cyperus</u> sp. <u>E. obtusa</u> |
| 2 | <u>P. coccineum</u> <u>Ammania coccinea</u> <u>Stellaria graminea</u> <u>Eleocharis obtusa</u> Mudflat. Sparse vegetation. | 10 | <u>P. pennsylvanicum</u> - dense <u>Asclepias</u> sp. <u>Ech.</u> sp. <u>Thlaspi arvense</u> <u>Trifolium</u> sp. |
| 3 | <u>E. obtusa</u> <u>A. coccinea</u> - dense Water depth - 1 inch. | 11 | <u>P. pennsylvanicum</u> - dense <u>Trifolium</u> sp. <u>Ech.</u> sp. <u>E. obtusa</u> |
| 4 | <u>A. coccinea</u> Water depth - 1 inch. | 12 | <u>P. pennsylvanicum</u> - dense <u>E. obtusa</u> <u>Cyperus</u> sp. |
| 5 | <u>A. coccinea</u> <u>E. obtusa</u> Water depth - 2 inches. | 13 | <u>P. pennsylvanicum</u> <u>Ech.</u> sp. <u>Setaria</u> sp. <u>E. obtusa</u> <u>Cyperus</u> sp. <u>A. coccinea</u> |
| 6 | <u>A. coccinea</u> <u>E. obtusa</u> | | |
| 7 | <u>A. coccinea</u> <u>Polygonum pennsylvanicum</u> <u>Echinochloa</u> sp. <u>E. obtusa</u> | 14 | <u>E. obtusa</u> - dense <u>Stellaria graminea</u> - dense <u>P. pennsylvanicum</u> <u>Ech.</u> sp. <u>Cyperus</u> sp. |
| 8 | <u>P. pennsylvanicum</u> - dense <u>A. coccinea</u> <u>E. obtusa</u> | | |

TABLE II. - CONTINUED

| <u>SAMPLE NUMBER</u> | <u>SPECIES</u> | <u>SAMPLE NUMBER</u> | <u>SPECIES</u> |
|--------------------------|--|--------------------------|--|
| 15 | <u>Stellaria graminea</u> - dense <u>A. coccinea</u> <u>E. obtusa</u> | 21 | <u>Ech. sp.</u> <u>Stellaria graminea</u> <u>E. obtusa</u> - dense <u>A. coccinea</u> <u>P. pennsylvanicum</u> |
| 16 | <u>Stellaria graminea</u> - dense <u>Ech. sp.</u> <u>E. obtusa</u> <u>P. pennsylvanicum</u> <u>A. coccinea</u> | 22 | <u>Ech. sp.</u> <u>E. obtusa</u> - dense <u>P. pennsylvanicum</u> <u>A. coccinea</u> <u>Stellaria graminea</u> |
| 17 | <u>E. obtusa</u> - dense <u>Stellaria graminea</u> <u>A. coccinea</u> <u>Ech. sp.</u> | 23 | <u>Stellaria graminea</u> - dense <u>E. obtusa</u> - dense <u>Ech. sp.</u> <u>P. pennsylvanicum</u> <u>A. coccinea</u> |
| 18 | <u>E. obtusa</u> - dense <u>Stellaria graminea</u> <u>Ech. sp.</u> <u>A. coccinea</u> | 24 | <u>Spartina pectinata</u> - dense <u>Asclepias sp.</u> <u>Trifolium sp.</u> <u>Ech. sp.</u> <u>Cassia fasciculata</u> <u>Ambrosia sp.</u> |
| 19 | <u>P. Pennsylvanicum</u> <u>Ech. sp.</u> <u>E. obtusa</u> | | |
| 20 | <u>P. pennsylvanicum</u> - dense <u>Ech. sp.</u> | | |

END OF TRANSECT.

TABLE III.

Plant species observed in samples taken at 50 foot intervals on a vegetation line transect of Pool No. 1 at Clarence Cannon National Wildlife Refuge, July 31, 1970.

| <u>SAMPLE NUMBER</u> | <u>SPECIES</u> | <u>SAMPLE NUMBER</u> | <u>SPECIES</u> |
|--------------------------|---|--------------------------|---|
| 1 | <u>Polygonum pennsylvanicum</u> <u>Echinochloa sp.</u> <u>Eleocharis obtusa</u> <u>Cyperus sp.</u> <u>Ammania coccinea</u> <u>Convolvulus arvensis</u> | 8 | <u>A. coccinea</u> <u>C. arvensis</u> <u>P. pennsylvanicum</u> <u>E. obtusa</u> |
| 2 | <u>P. pennsylvanicum</u> <u>E. obtusa</u> <u>A. coccinea</u> | 9 | <u>A. coccinea</u> <u>C. arvensis</u> <u>Abutilon theophrasti</u> <u>P. pennsylvanicum</u> <u>E. obtusa</u> |
| 3 | <u>P. pennsylvanicum</u> <u>E. obtusa</u> <u>Ech. sp.</u> <u>C. arvensis</u> | 10 | <u>A. coccinea</u> <u>P. pennsylvanicum</u> <u>C. arvensis</u> <u>E. obtusa</u> |
| 4 | <u>P. pennsylvanicum</u> <u>C. arvensis</u> <u>Chenopodium album</u> <u>E. obtusa</u> | 11 | <u>P. pennsylvanicum</u> <u>C. arvensis</u> |
| 5 | <u>A. coccinea</u> <u>C. arvensis</u> <u>Ech. sp.</u> <u>E. obtusa</u> | 12 | <u>Amaranthus sp.</u> <u>C. arvensis</u> <u>P. pennsylvanicum</u> |
| 6 | <u>A. coccinea</u> <u>Ch. album</u> <u>C. arvensis</u> <u>E. obtusa</u> <u>P. pennsylvanicum</u> | 13 | <u>Amaranthus sp.</u> <u>Ch. album</u> <u>C. arvensis</u> <u>P. pennsylvanicum</u> |
| 7 | <u>A. coccinea</u> <u>P. pennsylvanicum</u> <u>Ch. album</u> <u>Ech. sp.</u> <u>E. obtusa</u> <u>C. arvensis</u> | 14 | <u>P. pennsylvanicum</u> <u>Ch. album</u> <u>C. arvensis</u> <u>Ech. sp.</u> |
| | | 15 | <u>Ech. sp.</u> <u>P. pennsylvanicum</u> <u>C. arvensis</u> |

TABLE III. - CONTINUED

| <u>SAMPLE NUMBER</u> | <u>SPECIES</u> | <u>SAMPLE NUMBER</u> | <u>SPECIES</u> |
|--------------------------|--|--------------------------|--|
| 16 | <u>P. pennsylvanicum</u> <u>C. arvensis</u> | 19 | <u>P. pennsylvanicum</u> <u>C. arvensis</u> <u>Ech. sp.</u> |
| 17 | <u>C. arvensis</u> <u>P. pennsylvanicum</u> | 20 | <u>Ambrosia sp.</u> <u>P. pennsylvanicum</u> <u>Ech. sp.</u> |
| 18 | <u>P. pennsylvanicum</u> <u>C. arvensis</u> | 21 ¹ | <u>P. pennsylvanicum</u> <u>Ch. album</u> |

END OF TRANSECT

21¹ Distance between Sample Number 20 and 21 (end of transect) was 25 feet.

TABLE IV.

Frequency of occurrence of plant species from sample plots in Pool No. 1 at Clarence Cannon National Wildlife Refuge, July 31, 1970.

| <u>SPECIES</u> | <u>PERCENT OF FREQUENCY IN SAMPLES</u> | |
|--|--|-----------------------|
| | <u>50 FEET APART</u> | <u>100 FEET APART</u> |
| <u>Polygonum pennsylvanicum</u> (smartweed) | 95 | 100 |
| <u>Convolvulus arvensis</u> (field bindweed) | 86 | 80 |
| <u>Eleocharis obtusa</u> (blunt spikerush) | 47 | 50 |
| <u>Echinochloa</u> <u>sp.</u> (barnyard grass) | 39 | 20 |
| <u>Ammania coccinea</u> (tooth-cup) | 39 | 40 |
| <u>Chenopodium album</u> (lambsquarters) | 29 | 30 |
| <u>Amaranthus</u> <u>sp.</u> (pigweed) | 10 | 10 |
| <u>Cyperus</u> <u>sp.</u> (sedge) | 5 | 0 |
| <u>Abutilon theophrasti</u> (Indian mallow) | 5 | 10 |
| <u>Ambrosia</u> <u>sp.</u> (ragweed) | 5 | 10 |

TABLE V.

Frequency of occurrence of plant species from sample plots in Goose Pasture at Clarence Cannon National Wildlife Refuge, July 14, 1970.

| <u>SPECIES</u> | <u>PERCENT OF FREQUENCY IN SAMPLES</u> |
|--|--|
| <u>Eleocharis obtusa</u> (blunt spikerush) | 79 |
| <u>Ammania coccinea</u> (tooth-cup) | 63 |
| <u>Polygonum pennsylvanicum</u> (smartweed) | 58 |
| <u>Echinochloa</u> <u>sp.</u> (barnyard grass) | 58 |
| <u>Stellaria graminea</u> (chickweed) | 38 |
| <u>Cyperus</u> <u>sp.</u> (sedge) | 17 |
| <u>Trifolium</u> <u>sp.</u> (clover) | 13 |
| <u>Polygonum coccineum</u> (smartweed) | 8 |
| <u>Asclepias</u> <u>sp.</u> (milkweed) | 8 |
| <u>Ambrosia</u> <u>sp.</u> (ragweed) | 8 |
| <u>Spartina pectinata</u> (slough grass) | 4 |
| <u>Callitriche hermaphroditica</u> (water-starworts) | 4 |
| Algae | 4 |
| <u>Setaria</u> <u>sp.</u> (foxtail grass) | 4 |
| <u>Cassia fasciculata</u> (partidge pea) | 4 |
| <u>Thlaspi arvense</u> (pennycress) | 4 |

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ADDENDUM

The vegetation line transects described are only a small part of this study. Observations covering waterfowl use of Goose Pasture and Pool No. 1 were started in August, 1970, and will continue through Fiscal Year 1971 as long as manpower is available.

WATERFOWL PRODUCTION - 1970
CLARENCE CANNON NATIONAL WILDLIFE REFUGE

TABLE I.

WATERFOWL PRODUCTION - 1970
CANNON REFUGE

| <u>SPECIES</u> | <u>BROODS</u> | <u>OBSERVED PRODUCTION</u> | <u>AVERAGE BROOD SIZE</u> |
|------------------|---------------|--------------------------------|-------------------------------|
| Wood Duck | 9 | 62 | 6.9 |
| Mallard | 2 | 9 | 4.5 |
| Blue-winged Teal | <u>1</u> | <u>2</u> | <u>2.0</u> |
| TOTAL | 12 | 73 | 6.1 |

Figures 1, 2 and 3 show the location of broods on the Clarence Cannon National Wildlife Refuge.

One mallard nest with five eggs was destroyed by plowing on the Clarence Cannon National Wildlife Refuge on June 29, 1970.

One wood duck box out of five checked on July 30, 1970 contained five hatched eggs and three unsuccessfully hatched eggs.

TABLE II.

DELAIR DIVISION
WATERFOWL PRODUCTION - 1970

| <u>SPECIES</u> | <u>BROODS</u> | <u>OBSERVED PRODUCTION</u> | <u>AVERAGE BROOD SIZE</u> |
|----------------|---------------|--------------------------------|-------------------------------|
| Mallard | 1 | 4 | 4.0 |
| Wood Duck | <u>1</u> | <u>1</u> | <u>1.0</u> |
| TOTALS | 2 | 5 | 2.5 |

Figures 4 and 5 show the location of broods on Delair Division of Mark Twain National Wildlife Refuge.

HATCHING DATES

Table III. shows calculated hatching dates of waterfowl broods on Clarence Cannon National Wildlife Refuge and Delair Division of Mark Twain National Wildlife Refuge during the summer of 1970 from brood sub-class data.

TABLE III.

CALCULATED HATCHING DATES

| <u>FIVE DAY INTERVAL</u> | <u>SPECIES</u> | | | <u>TOTAL</u> |
|--------------------------|------------------|----------------|-------------------------|--------------|
| | <u>WOOD DUCK</u> | <u>MALLARD</u> | <u>BLUE-WINGED TEAL</u> | |
| May 20 - 25 | 1 (10) * | | | 1 (10) * |
| May 26 - 31 | | 1 (6) * | | 1 (6) * |
| June 1 - 5 | | | | ----- |
| June 6 - 10 | 2 (17) * | | | 2 (17) * |
| June 11 - 15 | 2 (14) * | | | 2 (14) * |
| June 16 - 20 | 1 (6) * | 1 (4) * | | 2 (10) * |
| June 21 - 25 | 1 (9) * | | | 1 (9) * |
| June 26 - 30 | | | | ----- |
| July 1 - 5 | | | | ----- |
| July 6 - 10 | 1 (2) * | | | 1 (2) * |
| July 11-15 | 1 (4) * | 1 (3) * | | 2 (7) * |
| July 16 - 20 | 1 (1) * | | | 1 (1) * |
| July 21 - 25 | ----- | ----- | 1 (2) * | 1 (2) * |
| TOTALS | 10 (63) * | 3 (13) * | 1 (2) * | 14 (78) * |

* Number of ducks produced are in parentheses.

DISCUSSION

Goose Pasture served as brood habitat in June and July for eight of the twelve broods produced on Clarence Cannon National Wildlife Refuge. All but one brood left the area as drought conditions occurred in August.

Development of Goose Pasture from cultivated fields to moist-soil -- habitat will appreciably increase available breeding and brood habitat on Clarence Cannon National Wildlife Refuge.

FIELD DATA

WATERFOWL BROODS - CANNON. NWR

| SPECIES | DATE | LOCATION | SIZE | AGE | REMARKS + NEW BROOD |
|-----------|---------|---|--------|--------------|---|
| WOOD DUCK | 6/6/70 | BRENTS CREEK NEAR PUMP HOUSE GOOSE PASTURE | 10 | I or IIa | (W1) REPORTED BY D. ADAMS |
| WOOD DUCK | 6/24/70 | BURN RAIL SLOUGH NEAR CUT IN RIVER DIKE | 6 | IIb | (W2) |
| WOOD DUCK | 6/24/70 | GOOSE PASTURE | 6 | IIc | (W3) |
| WOOD DUCK | 6/26/70 | GOOSE PASTURE | 6 | IIc | SAME |
| WOOD DUCK | 7/1/70 | GOOSE PASTURE | 7 | II? (a or b) | (W4) |
| WOOD DUCK | 7/1/70 | GOOSE PASTURE | 9 | IIb | (W5) |
| WOOD DUCK | 7/2/70 | NE SW, SEC 23 | 9 (10) | II (?) | (W6) PROBABLY BROOD 3 or 5 |
| WOOD DUCK | 7/9/70 | GOOSE PASTURE | ? | ? | |
| WOOD DUCK | 7/10/70 | SOUTH BOUNDARY GOOSE PASTURE | 2 | IIa | (W7) Banded both ducks |
| WOOD DUCK | 7/15/70 | GOOSE PASTURE | 6 | IIc | (M-1) |
| WOOD DUCK | 7/22/70 | SW QTR., SEC. 10 | 8 | III | (W-8) |
| MALLARD | 7/22/70 | GOOSE PASTURE | 5 | IIa | M-1 |
| WOOD DUCK | 7/22/70 | GOOSE PASTURE | 8 | IIa | |
| WOOD DUCK | 7/23/70 | GOOSE PASTURE | 4 | IIb | (W-9) TRAPPED |
| WOOD DUCK | 7/23/70 | GOOSE PASTURE | 5 | IIc | TRAPPED |
| MALLARD | 7/23/70 | GOOSE PASTURE | 3 | IIb | (M-2) TRAPPED |
| MALLARD | 7/23/70 | GOOSE PASTURE | 1 | IIa | M-1 TRAPPED |
| MALLARD | 7/27/70 | GOOSE PASTURE | 2 | IIb | M-1 |
| BWT | 8/18/70 | GOOSE PASTURE | 1 | | APPEARED SMALLER, COULD NOT FLY. MALE CHARACTERISTICS EVID. ON WING. PROBABLY A LOCAL BUT NOT FOR CERTAIN |

WATERFOWL BROODS - DELAIR DIVISION

| | | | | | |
|---------|---------|----------------------------------|---|----------|-------|
| MALLARD | 7/7/70 | LOWER SWAIN INLET (LAKE SIDE) | 4 | I or IIa | (M-1) |
| DUCK | 8/12/70 | UPPER BUTCHER | 1 | IIb | (W-1) |

WATERFOWL BROODS - CANNON

| | | | | | |
|---------|---------|---------------|---|------|--------------------|
| MALLARD | 6/29/70 | SEC 21 | 5 EGGS IN NEST ABANDONED DUE TO PLOWING | | |
| BWT | 8/31/70 | GOOSE PASTURE | 2 (♂+♀) | IIIa | (B-1) ♀ WAS Banded |