

SQUAW CREEK NATIONAL WILDLIFE REFUGE  
Mound City, Missouri

ANNUAL NARRATIVE REPORT  
Calendar Year 1986

U.S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

SQUAW CREEK NATIONAL WILDLIFE REFUGE

Mound City, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1986

Bolin A. Heck      4/23/87  
Refuge Manager      Date





Phillip W. Elhi      5/4/87  
Refuge Supervisor Review      Date

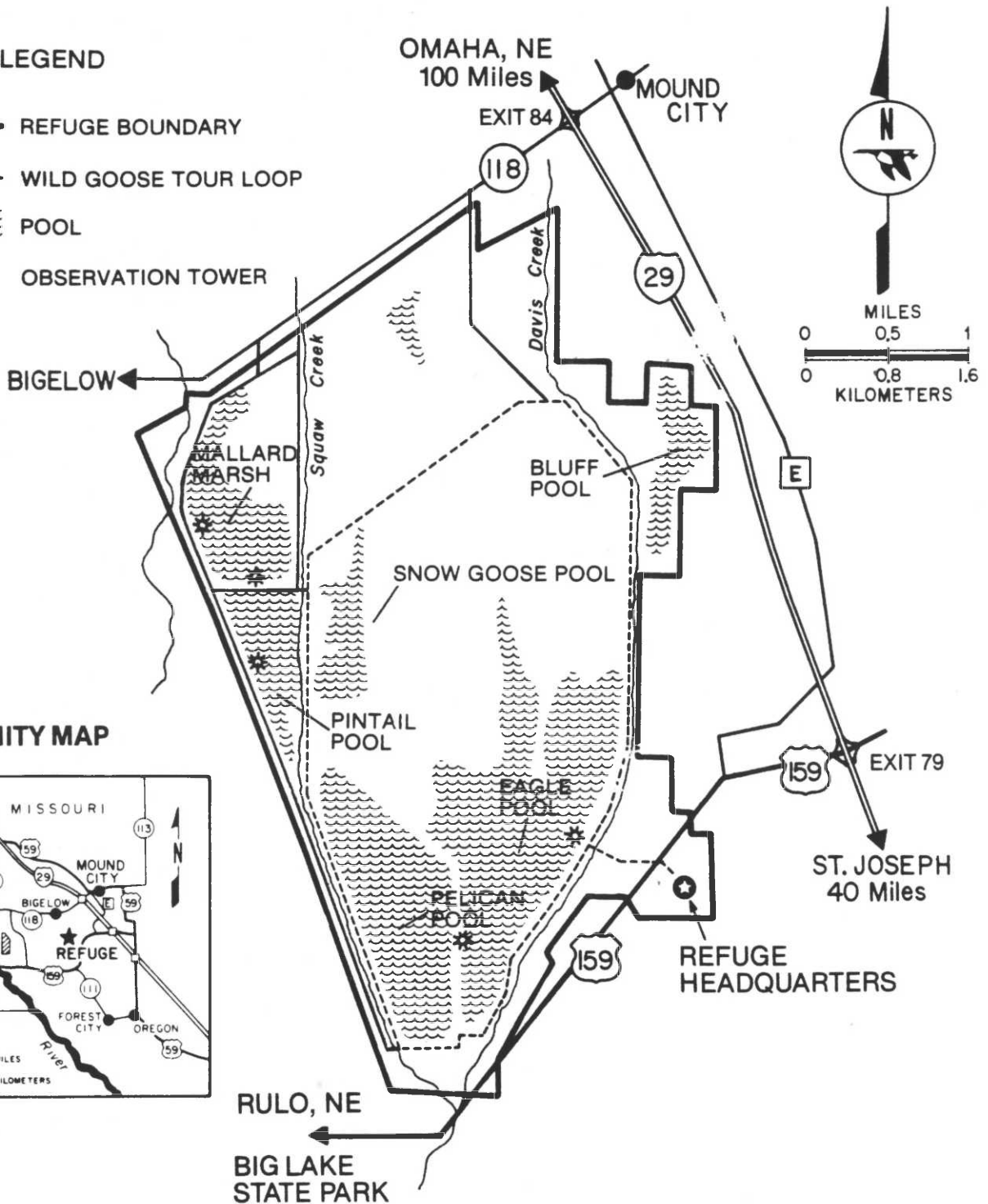
Thomas F. Follath      5/4/87  
Regional Office Approval      Date

# Squaw Creek National Wildlife Refuge

Mound City, Missouri

## LEGEND

-  REFUGE BOUNDARY
-  WILD GOOSE TOUR LOOP
-  POOL
-  OBSERVATION TOWER



## VICINITY MAP



## TABLE OF CONTENTS

	<u>Page</u>
A. <u>HIGHLIGHTS</u>	2
B. <u>CLIMATIC CONDITIONS</u>	3
C. <u>LAND ACQUISITION</u>	
1. Fee Title.....	Nothing to Report
2. Easements.....	Nothing to Report
3. Other.....	Nothing to Report
D. <u>PLANNING</u>	
1. Master Plan.....	Nothing to Report
2. Management Plan.....	4
3. Public Participation.....	Nothing to Report
4. Compliance with Environmental and Cultural Resource. Mandates.....	Nothing to Report
5. Research and Investigations.....	4
6. Other.....	Nothing to Report
E. <u>ADMINISTRATION</u>	
1. Personnel.....	6
2. Youth Programs.....	7
3. Other Manpower Programs.....	Nothing to Report
4. Volunteer Program.....	7
5. Funding.....	8
6. Safety.....	8
7. Technical Assistance.....	Nothing to Report
8. Other Items.....	8
F. <u>HABITAT MANAGEMENT</u>	
1. General.....	8
2. Wetlands.....	9
3. Forests.....	12
4. Croplands.....	12
5. Grasslands.....	14
6. Other Habitat.....	Nothing to Report
7. Grazing.....	Nothing to Report
8. Haying.....	14
9. Fire Management.....	15
10. Pest Control.....	Nothing to Report
11. Water Rights.....	Nothing to Report
12. Wilderness and Special Areas.....	15
13. WPA Easement Monitoring.....	Nothing to Report



G. WILDLIFE

1. Wildlife Diversity.....	16
2. Endangered and/or Threatened Species.....	16
3. Waterfowl.....	20
4. Marsh and Water Birds.....	22
5. Shorebirds, Gulls, Terns and Allied Species.....	24
6. Raptors.....	24
7. Other Migratory Birds.....	25
8. Game Mammals.....	25
9. Marine Mammals.....Nothing to Report	
10. Other Resident Wildlife.....	27
11. Fisheries Resources.....Nothing to Report	
12. Wildlife Propagation and Stocking.....Nothing to Report	
13. Surplus Animal Disposal.....Nothing to Report	
14. Scientific Collections.....Nothing to Report	
15. Animal Control.....	29
16. Marking and Banding.....Nothing to Report	
17. Disease Prevention and Control.....	29

H. PUBLIC USE

1. General.....	30
2. Outdoor Classrooms - Students.....Nothing to Report	
3. Outdoor Classrooms - Teachers.....Nothing to Report	
4. Interpretive Foot Trails.....Nothing to Report	
5. Interpretive Tour Routes.....	30
6. Interpretive Exhibits/Demonstrations.....	31
7. Other Interpretive Programs.....	31
8. Hunting.....Nothing to Report	
9. Fishing.....	34
10. Trapping.....Nothing to Report	
11. Wildlife Observation.....	35
12. Other Wildlife Oriented Recreation.....	36
13. Camping.....	37
14. Picnicking.....	37
15. Off-Road Vehicling.....Nothing to Report	
16. Other Non-Wildlife Oriented Recreation.....Nothing to Report	
17. Law Enforcement.....	37
18. Cooperating Associations.....Nothing to Report	
19. Concessions.....Nothing to Report	

I. EQUIPMENT AND FACILITIES

1. New Construction.....	38
2. Rehabilitation.....Nothing to Report	
3. Major Maintenance.....	39
4. Equipment Utilization and Replacement.....	42
5. Communication Systems.....	43
6. Computer Systems.....Nothing to Report	
7. Energy Conservation.....Nothing to Report	
8. Other.....Nothing to Report	

J. OTHER ITEMS

1. Cooperative Programs.....	44
2. Other Economic Uses.....Nothing to Report	
3. Items of Interest.....	44
4. Credits,.....	45

K. FEEDBACK 46



### INTRODUCTION

Squaw Creek National Wildlife Refuge, located in extreme northwest Missouri near Mound City, was established August 23, 1935 by executive Order 7156 "in order to effectuate further the purposes of the Migratory Bird Conservation Act" and lands were to be used "as a refuge and breeding ground for migratory birds and other wildlife." All land is held in fee title and there are no satellite units.

Most of the 6,934 acres comprising the refuge are located along the eastern edge of the Missouri River floodplain in an historic wetland area. Habitat types and acreages are as follows:

Wetlands	2,775
Grasslands	1,772
Forests	1,497
Croplands	810
Administration	80

There are seven managed impoundments and one unmanaged impoundment totaling approximately 2,300 acres, all of which are managed primarily for migrating waterfowl. Water sources are gravity flow from diversion of Squaw and Davis Creeks plus whatever rainfall hits the refuge.

Croplands are farmed by four cooperative farmers who plant soybeans and corn in rotation and aerial sow wheat in the beans. Refuge shares normally amount to 400 acres of wheat and 200 acres of standing corn on a one-third to two-thirds share basis. There are also two haying permittees who harvest prairie grass and alfalfa each year.

Wildlife includes tremendous numbers of waterfowl, a large wintering concentration of bald eagles, pelicans, deer, pheasants and various other species.

Visitors to the refuge enjoy an eight mile circular auto tour which is open all year from sunrise to sunset. Approximately 55,000 people will visit the Refuge each year, many from urban areas such as St. Joseph, Kansas City and Omaha none of which is farther than 125 interstate highway miles distance.

#### Land Acquisition Funding

<u>Fund</u>	<u>Acreage</u>	<u>Cost</u>
Six Million	761.32	\$34,275.46
One Million or E.C.F.L.A.	2,161.89	57,081.92
Resettlement Administration or ERA	3,843.91	115,527.16
Duck Stamp Act	40.00	4,000.00
Land and Water Conservation Fund	<u>37.50</u>	<u>3,750.00</u>
TOTAL	6,886.62	\$214,624.54

#### A. HIGHLIGHTS

This year was among the wettest on record (B).

Burrough's Audubon Club from Kansas City kept the headquarters open for weekend visitors this fall (E-4).

Five new moist soil units totaling 250 acres were constructed this summer (F-2).

Bald eagle numbers peaked at 310 this year, the second highest population on record (G-2).

A new record high number of snow geese was recorded for the Refuge November 9 with 600,000 were counted (G-3).

A special deer hunt on the Refuge is proposed for next year (G-8).

Avian cholera killed 1,300 waterfowl this fall (G-17).

The eight annual "Eagle Days" program attracts 1,398 participants (H-7).

Refuge celebrates its 50th anniversary one year late (H-7).

Refuge hosts the August project leader meeting and receives a standing ovation (J-2).

#### B. CLIMATIC CONDITIONS

January and February were mild for this area with below zero temperatures recorded only three times. Weather in spring and summer was cool with the last below freezing weather of the spring recorded April 11th and the highest summer temperature was 97°F. The first freeze in the fall was recorded October 13th at 30°F, nine days earlier than average. One below zero temperature was recorded during the fall on November 13th at -3°F. December was relatively mild but snow on the 8th and 9th covered the ground and drove waterfowl south.



Flood stage on Squaw Creek Ditch

BH 5/86

During this extremely wet year precipitation was recorded 96 days most of which was in the months of July, August and September, each of which had 12 days precipitation. The month of May had an amazing 11.65 inches of precipitation, 7.32 inches above normal for the month. Overall, the 56.55 inches of precipitation was 24.92 inches more than the average annual rate.



# TEMPERATURE AND PRECIPITATION RECORDS

CALENDAR YEAR  
1986

	Temperatures		High Range	Low Range	Normal Average	Precipitation		
	Max	Min				Total	Normal	Snow
JAN	67	-3	67-18	-3-38	26.2	trace	1.08	
FEB	62	-4	62-14	-4-44	31.5	2.20	1.15	11"
MAR	89	15	89-29	15-62	40.0	2.75	2.39	
APR	89	28	89-40	28-70	54.2	3.65	3.17	
MAY	84	44	84-66	44-59	64.8	11.65	4.33	
JUN	97	59	97-80	59-74	73.9	5.40	5.43	
JUL	97	62	97-82	62-76	78.2	6.75	3.41	
AUG	90	40	90-70	40-70	76.5	5.90	3.90	
SEP	89	49	89-70	49-75	67.8	9.60	4.15	
OCT	78	30	78-56	30-58	57.6	4.85	2.62	
NOV	64	-3	64-22	-3-39	40.0	1.60	1.68	2"
DEC	49	4	49-20	4-38	28.0	2.20	1.21	3"
Total -						56.55	34.52	16"

## D. PLANNING

### 2. Management Plan

Part III of the Habitat Management Plan was completed with a sigh of relief and approved as written on October 1.

### 5. Research and Investigations

Squaw Creek NR83 -- "Evaluating the Effects of Impoundment Management on Invertebrates and Implications for Waterfowl Use of Refuges" by Ned M. Gruenhagen, University of Missouri, Master's Study.

Field work has been completed. Data is being computerized for later analysis and use in the thesis which should be complete next year.

Squaw Creek NR84-1 -- "Aquatic Invertebrate Diversity and Seasonal Abundance as They Relate to Aquatic Plants" by Larry Rizzo, Northwest Missouri State University, Master's Study.

Field work has been completed and the thesis is being written.

Squaw Creek NR84-2 -- "Studies on the Ecology of Deer Parasites at Squaw Creek NWR" by Dr. David Ashley and Dr. Donald Robbins, Missouri Western State College.

#### Objectives:

- A. To survey parasites of deer on Squaw Creek Refuge.
- B. To survey the Refuge for potential intermediate hosts and identify transmission possibilities of deer parasites.
- C. To examine potential impact of parasites on the health of Refuge deer.
- D. To compare parasites in the high population density of deer on Squaw Creek Refuge with those of deer at lower population levels in other areas.

One buck about 18 months old was collected on the Refuge July 17, 1986 for analysis. Two parasite species, Trypanosoma cervi and Setaria yehi were found in the specimen. Parasitic insects were collected in replicate samples (two traps per site). Six of the Center for Disease Control miniature light trap of which six were used in three trap sites, and two "malice traps" were used in one trapping area. This trap is a tent-type trap that uses carbon dioxide as an attractant for parasitic insects and captures insects both day and night.

Captured insects are being sorted into groups which will be identified with the assistance of the Arbovirus Ecology Laboratory in Ft. Collins, CO. Preliminary sorting seems to indicate twelve species of mosquitos and four species of biting flies are captured in traps on a regular basis.

Deer serum was isolated and injected into the blood of living rabbits who then produced antibodies. Blood from engorged insects will be mixed with the antiserum derived from rabbit blood to see if there is an agglutination reaction which would indicate if the insect has been feeding on deer. In this manner a host preference for various biting insect species can be determined and this should indicate which species are vectoring the parasites in deer.

Next year plans are to continue collecting insects and deer viscera for analysis.

Squaw Creek NR85-1 -- "Seasonal Changes in Endoparasites of White-tailed Deer in Missouri with Studies on the Meningeal Worm, Paraelaphostrongylus tenuis" by Joe Cisneros, University of Missouri, Master's Study.

Objectives:

1. To determine endoparasites present in Missouri's white-tailed deer.
2. To determine seasonal variation in endoparasite assemblages of Missouri white-tailed deer.
3. To describe the geographic and ecological distribution of selected white-tailed deer parasites within the state of Missouri.
4. To compare the parasite assemblages between high and low density populations of white-tailed deer.
5. To review the literature pertaining to the biology and significant endoparasites in Missouri deer.

Fourteen samples were collected from Squaw Creek during four collection periods (February-March, April-May, June-July, September-October). Fecal examination revealed three species of parasites present in local deer: Ostertagia sp., an abomasal nematode, Paraelaphostrongylus tenuis, the brain meningeal worm, and Eimeria odocoilei, a protozoan parasite of the intestine. Details on these infections are as follows:

Ostertagia sp.: Eggs were isolated in deer feces collected during February-March, June-July and September-October periods; 14 examined, 3 infected; 21% prevalence.

Parelaphostrongylus tenuis: Singular first stage larvae isolated in feces during February-March, April-May, September-October collection periods; 14 examined, 3 infected; 21% prevalence.

Eimeria odocoilei: 50-100 oocysts were isolated in a single sample (1g feces) from April-May period; watery feces, mild coccidiosis, possibly debilitating; 14 examined, 1 infected; 7% prevalence.

These infections are typical for white-tailed deer based on other studies. This study indicates no major parasite problem of those parasites detectable by the fecal flotation procedure. The mild coccidian infection is the only infection worth noting, but the low prevalence seems to indicate that this is a rare occurrence. None of these parasites pose a threat to wildlife, domestic livestock or humans. Overall, 43% of the fecal samples examined from Squaw Creek had evidence of parasite infection.

#### E. ADMINISTRATION

##### 1. Personnel



*Berlin*

*"Chip"*

*Tom*

- |    |   |                          |       |     |
|----|---|--------------------------|-------|-----|
| 1. | Berlin A. Heck                                  | Refuge Manager           | GS-11 | PFT |
| 2. | Thomas G. Bell                                  | Assistant Refuge Manager | GS- 9 | PFT |
| 3. | Joyce A. Jones                                  | Administrative Clerk     | GS-5  | PFT |
|    | (Transferred to Denver Finance Center 10/24/86) |                          |       |     |
| 4. | Jacob (Chip) Lehmer                             | Maintenance Worker       | WG- 8 | PFT |

## Personnel Ceilings FY 1981-85

	Permanent Full-Time	Part-Time	Temporary
FY-86	4	0	0
FY-85	4	0	0
FY-84	4	0	0
FY-83	4	0	0
FY-82	5	0	2*

\*Two 700 hour Biological Aids

## 2. Youth Programs

Eleven YCC program enrollees for this year were selected May 23 with six boys and five girls being picked from 31 applicants to work June 2 through July 25 (three enrollees were retained through August 8). The director of the camp was Robert Davenport and his assistant was Steve Hicks. Projects completed this year included fencing and posting, setting out turtle basking logs, painting draglines and loader, clearing beaver dams, repairing observation towers, noxious weed control, brush control and concrete pouring.

Two incidents were reported this summer. One involved an asthma attack by one enrollee who had a chronic condition. She was taken to her physician who treated and released her. A preventable accident occurred when one enrollee removed her gloves to hand wire clips to another enrollee who was clipping barbed-wire to the fence posts. The wire broke, cutting her hand and requiring several stitches to close.

The YCC program has been very valuable because the sweat they left here gives youths a proprietary interest in the Refuge. This interest pays off when they reach voting age.

## 4. Volunteer Program

It is difficult for a visitor to understand how a huge, expensive (\$355,000) office like we have can be closed on Saturday and Sunday when so many people want to come in for information. This problem is partially resolved by having volunteers staff the office during peak public use period each fall.

This year the Burrough's Audubon Club from Kansas City which has adopted the Refuge provided volunteers to staff the headquarters on weekends in October, November, and December. They did an outstanding job (they made me look good) as they got rave reviews from the public. They are already planning to do it again in the spring.



5. Funding

## Funds Status FY 1981-86 (All sources)

	1986	1985	1984	1983	1982
1210				197,000	130,000
1220				7,000	1,000
1240				10,000	37,000
1260	189,700	234,700	243,000		
1520	17,000	7,500	14,000	26,400	
1994					276
5300				20,000	
8610	2,000				
Total	208,700	242,200	257,400	260,400	168,276

Following is a summary of some major expenses during the fiscal year (all fund sources):

Equipment rental - dragline (ARMM)	\$ 9,972
Equipment rental - bulldozer (ARMM)	19,318
YCC	17,000
Repair engine (Lorraine crane)	1,350
Transport new Lorraine dragline	750
Culverts and water control structures	4,900
Repair office air conditioner	665
Dragline cable	1,090

6. Safety

Four accidents/incidents were reported this year. Two were YCC incidents, as described in E.2. Assistant Manager Bell suffered a sprained wrist in a fall after slipping on ice and two visitors wrecked a car on the tour route resulting in bumps and bruises and an expensive repair bill.

8. Other Items

Refuge staff attended several quarterly "four-state law enforcement meetings" with conservation agents from northwest Missouri, southwest Iowa, northeast Kansas, and southeast Nebraska. These meetings provide an opportunity to meet the agents in the area and to discuss law enforcement and other matters of mutual interest.

F. HABITAT MANAGEMENT1. General

Wet conditions this year resulted from unusual amounts of rainfall and the diversion of Porter Creek into the north end of the refuge by an off-refuge landowner which hampered water management efforts.

These included prescribed burning, drawdowns of various marsh units and mechanical disturbance of vegetation in several units. Overall, natural food production for waterfowl could only be rated as fair. Mild temperatures through autumn and early winter allowed waterfowl to stage in large numbers through the end of the year. Pools remained open through the end of December providing abundant waterfowl habitat.

## 2. Wetlands

Squaw Creek NWR contains approximately 2,600 acres of seasonally flooded shallow fresh marsh, most of which is managed for moist soil plant production. Figure 1 indicates the water levels planned for each major impoundment versus actual management. The four major impoundments total 1,950 surface acres, but there are four smaller managed impoundments totaling 450 acres and one unmanaged impoundment of 200 acres.

Following is a summary of pool conditions in 1986.

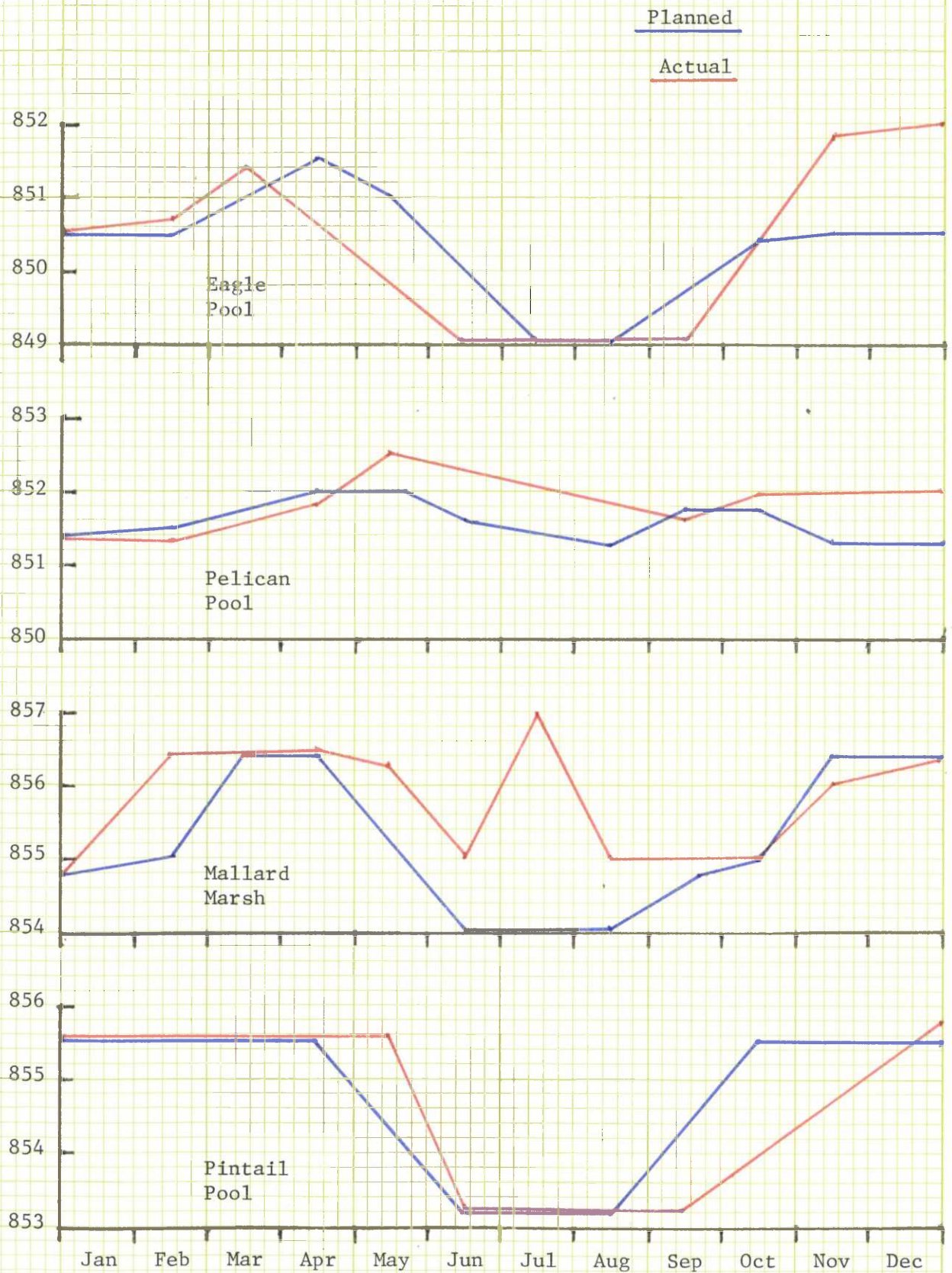
Eagle Pool - (900 acres) was drained during the summer to encourage growth of moist soil plants. The combination of a very wet summer (5.4" of rain in June, 6.75" in July and 5.9" in August) coupled with the diversion of water from Porter Creek into the Refuge hampered efforts to drain Eagle Pool. Higher, drier sites in Eagle Pool responded well with lush growths of wild millet, rice cut grass, sprangle top, and some smartweed. Lower, wet sites became subject to rapidly spreading growth of several undesirable plants including river bulrush and American lotus.

Plans for a mid-summer burn in the upper end of Eagle Pool to thin dense stands of cattails were abandoned because of the wet conditions. Management of undesirable densities of all the perennials discussed above is planned for 1987.

Pelican Pool - (600 acres) was held high for the third year in a row to maintain marsh habitat during summer when other pools were drained. Two broad leaf perennials dominated this pool in 1986, northern arrowhead and American lotus. Several small patches of river bulrush occur in the central section of this pool, and river bulrush and cattail occur in dense stands in the northern end of the pool. The arrowhead senesced in mid-September, opening the pool and attracting waterfowl to decaying plant matter and associated invertebrates. Puddle ducks, especially pintail and blue-wing teal, made use of this pool for feeding and loafing early in the fall. Later in the year, this pool was dominated by huge numbers of snow geese loafing and feeding on arrowhead tubers.

Snow Goose Pool - (100 acres) was drawn down in May to promote growth of moist soil plants. Snow Goose Pool is divided into two sub-units by a levee that was renovated in 1984. The southern unit is comprised of desirable moist soil plants (water millet,

Figure 1. Water Levels (m.s.l.) in the Four Primary Impoundments During 1986



sprangletop and rice cutgrass) surrounded by a band of encroaching river bulrush. The northern unit is a mix of river bulrush, cattails, willow saplings, Reed canary grass, smartweed, sunflowers and a variety of other plants. The northern subunit was flooded in March to provide habitat for spring migrant waterfowl. Response by mallards, green-winged teal, gadwall, wigeon and blue-winged teal was enthusiastic. The southern unit was flooded to a depth of approximately 30cm in October and received heavy use from ducks and geese during fall migration.

Cattail Pool - (130 acres) held water during the fall but cattails choked off most of the area. Plans to burn this area in mid-summer, twice if possible, had to be delayed due to wet conditions. Plans for 1987 call for a burn in this unit to retard the growth of cattails and to open areas for production of desirable annuals.

Mallard Marsh - (250 acres) was burned in July, 1985 to thin dense stands of river bulrush. The 1985 burn resulted in some openings in the bulrush stands that produced stands of smartweed and sprangle top. Plans called for a similar burn in 1986, followed by disking but wet conditions precluded this action. River bulrush quickly recolonized the areas opened by the 1985 burn. We will try to burn again in 1987, but we may be forced to consider chemical control (Rodeo), an expensive alternative.

Pintail Pool - (200 acres) is located immediately south of Mallard Marsh and suffers from the same problems as Mallard Marsh. Although Pintail Pool was kept full all fall, little use by waterfowl was observed. Pintail Pool and Mallard Marsh were the best pools for moist soil management on the Refuge in the late 1960's according to ex-manager Harold Burgess. Plant succession resulting in a stable stand of river bulrush had reduced attractiveness to waterfowl indicating a need to setback succession.

Long Slough - (60 acres) is managed as an extension of Eagle Pool because of its lack of a manageable source of water. American lotus has been a problem in this pool for several years. The diversion of Porter Creek into the Refuge has worsened the problems associated with this pool by making it impossible to drain in the summer. American lotus now covers 95 percent of this pool to the exclusion of almost all other vegetation. Waterfowl use was almost non-existent in Long Slough in 1986.

Rice Paddies - (60 acres) are comprised of several shallow units with a pumped water supply which were constructed in the 1950s to raise rice for attracting ducks. They were abandoned in the early 1970s and were idle until 1986. Mechanical disturbance in 1985 (several discings) opened up a dense monotype of cordgrass (Spartina pectinata), encouraging production of several annuals





Bidens is abundant in the old Rice Paddies during a wet summer. BH 8/86

including smartweeds, Bidens and sunflowers. Flooding was initiated in March 1986 and waterfowl response was excellent. Over 3,000 mallards, 500 blue-wing teal and several hundred other ducks began using the rice paddies less than 18 hours after the pump was turned on. Ducks continued to use this area throughout the spring migration.

Wet conditions prevented discing of these pools in 1986, and cordgrass reclaimed most of the acreage gained in 1985. Bidens did produce seed in much of these pools. The rice paddies were not flooded during the 1986 fall migration but will be again during the coming spring. Discing will be attempted again in 1987.

Bluff Pool - (200 acres) is basically unmanaged, holding water all year as a low sump type area. Runoff from fields and beaver dams holds this pool at levels that support mostly Canada geese and a few mallards. Cattails have neutralized the value of most of the pool for waterfowl except for the center where lotus has become the dominant vegetation type. The area is not well suited to burn for control of cattails due to the proximity of private land.

The only significant source of water for Refuge pools results from diversion of Squaw and Davis Creeks. A rollergate structure is used on Squaw Creek and a dirt plug put in by dragline is used on Davis Creek. Both creeks are channelized, as are all creeks in this area, and they carry a tremendous load of topsoil when they flood. The creeks must be cleaned every few years to maintain adequate flow capacity to handle the floods.



New MSU's - (250 acres) were designed by Lyle Stemmerman (WA) and Refuge staff and were included in management recommendations in the WELUT study done in 1985. Using bulldozers hired under an equipment rental contract, old levees were renovated, ditches cleaned and culverts installed to create five new moist soil units. These units should be completed in 1987 with installation of water control structures, allowing manipulation of water levels and implementation of other management practices to benefit waterfowl. Currently, two of these units are in crops, two in Reed canary grass, and one in trees, mainly willow and cottonwood, providing an excellent diversity of habitat type for ducks.

### 3. Forests

Several tracts of lowland timber, primarily willow, cottonwood, soft maple and hackberry exist on Squaw Creek. These tracts range in size from less than an acre up to approximately two hundred acres and are for the most part unmanaged. Most of these areas are the result of silt deposition in marshes, a problem which, over the years, has raised the elevation of the land enough to change the vegetative composition from open marsh to lowland timber.

Refuge staff planted pinoaks, cypress and pecans in the same area of Snow Goose Pool that was planted with similar trees in 1985. YCC later made cages of hardware cloth to protect the young trees from browsing by deer and rabbits. It is hoped to eventually develop a small green tree impoundment in this part of Snow Goose Pool.

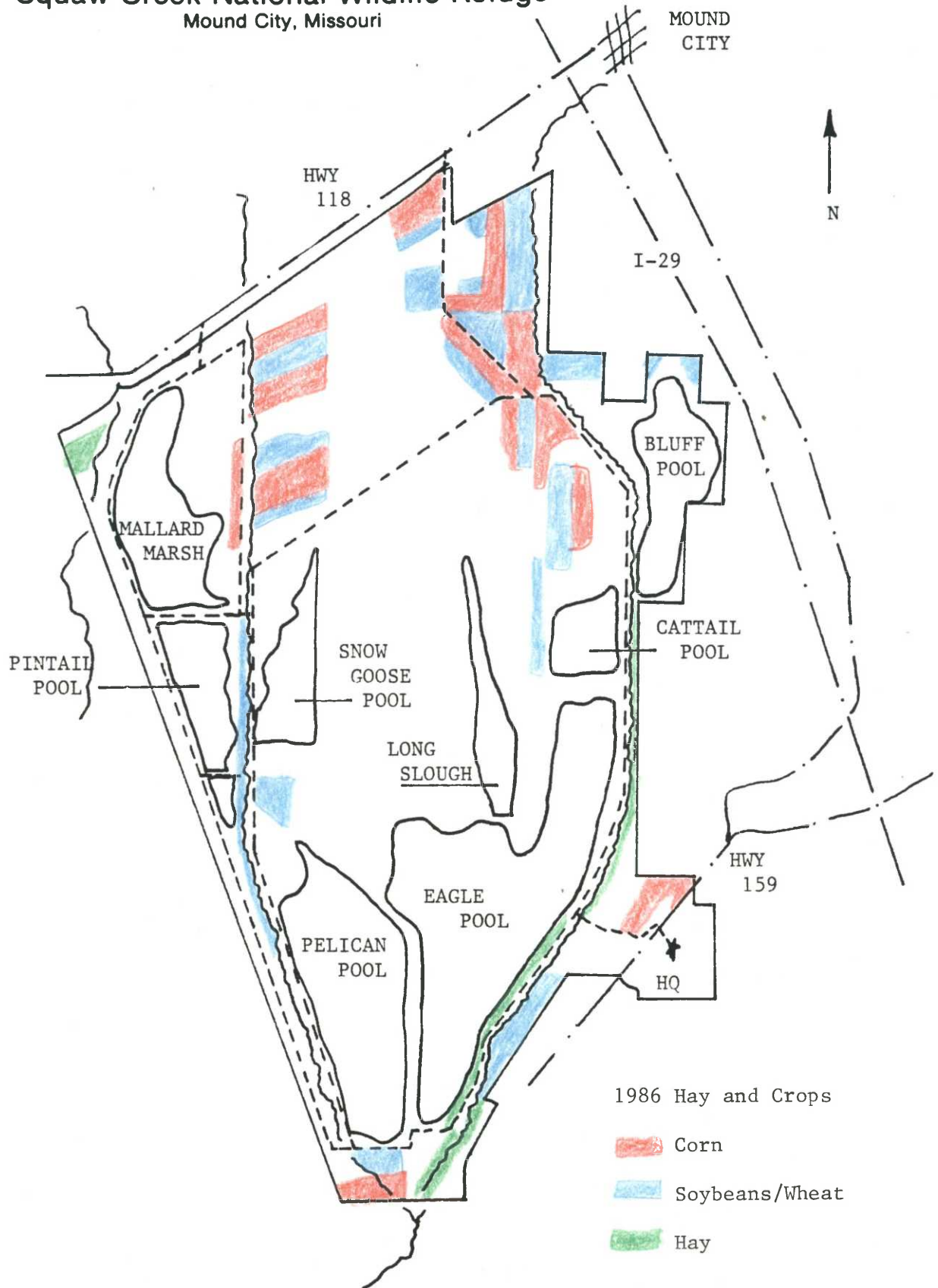
### 4. Croplands

Approximately 773 acres are farmed on the Refuge by four cooperators who receive two-thirds of the value of the crop for their shares. This crop division is standard in this area and was set up several years ago with the help of local SCS and ASCS offices. The farmers each planted half their acreage in beans and half in corn on an annual rotation. The Refuge share this year was 186 acres of corn left standing in the field and 360 acres of wheat interseeded by airplane into the immature soybeans. After the beans are harvested, the wheat really starts to grow to provide green browse for waterfowl, deer and other wildlife. An additional 28 acres were drilled with wheat to provide green browse. If enough wheat remains to make it economically feasible, it will be harvested on a share basis in 1987.

The corn is strip-harvested and the Refuge share (usually about 180 acres) is left in the fields standing during the fall so the geese will not use it (they cannot reach the ears to eat them and cannot take off very well in standing corn). Holding back the corn shredding also prevents short-stopping the waterfowl migration and prevents complaints from area hunters that we are holding the birds on the Refuge.

# Squaw Creek National Wildlife Refuge

Mound City, Missouri



# REPORT OF FERTILIZER USE

CALENDAR YEAR  
1986

CROPS/ACRES	COMMON NAME	FORMULATION	BULK LBS/ACRE	AVAILABLE N PER ACRE P K	COMMENTS
Corn/174 (Maley)		30-10-30 Granular	100	N-30,P-10,K-30	Total N-P-K available in these fields
		30-10-0	100	N-30,P-10,K- 0	
		32-0-0	100	N-32,P- 0,K- 0	
				N-92 P-20 K-30	
Corn/139.5 (Tenny)		60-20-20 Liquid	200	N-120 P- 40 K- 40	
Corn/51.4 (Loucks)		21-7-7	570	N-120 P- 40 K- 40	
Corn/7 (Whipple)		30-10-30 Liquid	100	N-100	
		30-10-0	200	P- 30	
		32-0-0	30	K- 30	
Soybeans/52 (Loucks)		10-34-0 Liquid	15	N- 1.5	
				P- 5	
				K- 0	
Soybeans/38 (Tenney)	Ammonia	Anhydrous N	100	N-	

# REPORT OF PESTICIDE USES

CALENDAR YEAR  
1986

Crops and Target Pests	Acres or other Unit Treated	Pesticides Used Common Name (No Trade Names Unless Identical / Common Name)	Total Product Used Expressed in Pounds AI or AE	Comments
Corn/broadleaf weeds	139.5	Bicep (Metolachlor and Atrazine) 2/3 gallon/acre	3 lbs. AI/acre	Tenney (May 6)
Soybeans/broadleaf weeds	117.4	Treflan (Trifluralin) 1 quart/acre	1 lb. AI/acre	Tenney (June 4)
Soybeans/broadleaf weeds	117.4	Basagran (Bentazon) 1.2 pints/acre	.6 lbs. AI/acre	Tenney (June 25)
Corn/broadleaf weeds	51.4	Bicep (Metolachlor and Atrazine) 2/3 gallon/acre	3 lbs. AI/acre	Loucks (May 5)
Corn/broadleaf weeds	51.4	Aatrex (Atrazine 80w)	1/2 lb. AI/acre	Loucks (May 5)
Soybeans/grasses	52			Loucks (June 4)
Soybeans/broadleaf weeds	52	Basagran (Bentazon) 1.2 pints/acre	.6 lbs. AI/acre	Loucks (June 25)
Corn/annual grasses and broadleaf weeds	7	Bladex (Cynazine) and Atrazine (Aatrex 80w)	2 lbs. AI of Cynazine /atre and 2 lbs. AI Aatrex 80w/acre	Whipple (April 29)

## REPORT OF PESTICIDE USED

CALENDAR YEAR  
1986

Crops and Target Pests	Acres or other Unit Treated	Pesticides Used Common Name (No Trade Names Unless Identical / Common Name)	Total Product Used Expressed in Pounds AI or AE	Comments
Soybeans/annual grasses	15	Dual (Metolachlor) 1.5 pints/acre	1.1/4 lbs. AI/acre	Whipple (June 16)
Soybeans/broadleaf weeds and grasses	15	Basagran (Bentazon) 1 pint /acre and Poast 1 pint/acre	.5 lbs. Basagran AI/ acre and .2 lbs. Poast AI/acre	Whipple (July 18)
Corn/broadleaf weeds	174	Atrazine 2.5 pounds/acre	2 lbs. AI/acre	Maley (May 3, 5, 24 and 26)
Soybeans	176	Prowl (Pendimethalin) 1 quart/acre	1 lb. AI/acre	Maley (June 12, 13)
Soybeans	35	Bladex (Cynazine) 2.5 pounds/acre	2 lbs. AI/acre	Maley (July 8)



In winter after waterfowl have migrated we shred the corn with a mower to provide food for resident wildlife and migratory birds, and to provide food for waterfowl returning in the spring. Mowing also exposes the grain to ensure that it is eaten so it will not volunteer when corn litter is disced in the spring for planting soybeans.

Wheat seeded into beans is not normally allowed to mature and after the pheasants, deer and waterfowl have had use of it all fall, winter and spring, it is plowed under to serve as a green manure crop for corn which follows. This practice can be effective in adding organic matter to the soil and it stabilizes the soil in winter.

#### Crop Yields for 1986

Cooperator	Corn		Soybeans		Refuge Shares		
	Acres	Avg. Yield	Acres	Avg. Yield	Wheat(a)*	Corn(a)	Bushels
Maley	174	103 bu/a	176	20 bu/a	176	87	8,961
Tenney	139.5	50 bu/a	117.4	7	79**	70	3,500
Loucks	51.4	79 bu/a	52	23.1 bu/a	52	25.7	2,025
Whipple	7	90 bu/a	15	31 bu/a	7.5	3.5	315

\*Winter wheat is aerially sowed in soybeans and is disced down in spring so none is harvested.

\*\*Two fields of soybeans were lost completely to deer depredation and so wheat was sown in the late summer.



Chip shows a soybean field devastated by deer. Note the short browsed beans which are late in the season. BH 9/86

An additional 28.4 acres of wheat was planted with a drill by cooperator Maley. This wheat provided green browse for wildlife all winter and will be harvested this spring on a 1:2 share basis.

Prices have been so low (corn sank below \$1.00/bushel for awhile in November '86) that our cooperative farmers have had a hard time making ends meet. In addition to the usual topics discussed at our annual farm meeting in December, survival of small farming operations took a prominent place. They did not ask more of the Refuge but they did want understanding.

#### 5. Grasslands

Several types of grassland occur on the Refuge and serve various functions. The large expanse of lowland prairie (Calamagrostis and Spartina association) in the north central part of the Refuge serves as nesting cover for pheasants and year round cover for deer massasauga rattlesnakes, short-eared owls, and several other species of interest. This 1,800 acre prairie is the largest of its type left in Missouri. A 30 acre restored upland prairie (field A-2) comprised of switchgrass and big and little bluestem is very rank and provides excellent winter cover for pheasants. Several small plots of native upland prairie occur in the loess bluffs above the Refuge headquarters. These plots, ranging in size from a few hundred square feet up to 7-acres, are made up of diverse mixes of grasses and forbs found in few places in Missouri. These loess bluff prairies are unique remnants of a once extensive system.

#### 8. Haying

Alfalfa hay is planted for three basic reasons; one is to provide habitat diversity, two is to provide wildlife food, and three is to get someone other than us to mow our roadsides. Two cooperators have planted approximately 95 acres of alfalfa, primarily along roadsides and on spoil areas along Davis Creek. Hay is not normally cut until June 15 each year to maximize wildlife use. This year an infestation of thistles and sour dock caused relaxing of this rule and the first cutting was allowed May 19. Persistent problems with these two noxious weeds prompted phone calls from neighbors and county commissioners. A local farmer was contracted to spray thistles and dock in problem areas with Esteron 99 (2,4-D). Results were excellent.

When a permittee plants alfalfa on the Refuge we allow him three free cuttings to compensate him for his planting expenses. After that the hay is sold for \$5.00 per ton. In future years sealed bids will be taken for Refuge hay.

This year 91.4 tons of hay were cut of which 37.4 tons were from old plantings and generated payments of \$197.

# Squaw Creek National Wildlife Refuge

Mound City, Missouri

## LEGEND

- REFUGE BOUNDARY
- - - WILD GOOSE TOUR LOOP
- ~~~~~ POOL
- \* OBSERVATION TOWER

OMAHA, NE  
100 Miles

EXIT 84

MOUND CITY



MILES  
0 0.5 1  
KILOMETERS  
0 0.8 1.6

BIGELOW

Squaw Creek

MALLARD MARSH

BLUFF POOL

SNOW GOOSE POOL

PINTAIL POOL

EAGLE POOL

PELICAN POOL

REFUGE HEADQUARTERS

ST. JOSEPH  
40 Miles

## VICINITY MAP



RULO, NE

BIG LAKE  
STATE PARK

1986 Prescribed Burns





Alfalfa generates a few dollars for the system plus  
providing excellent habitat for many wildlife species.

BH 7/86

#### 9. Fire Management

Although more were planned, wet conditions this year restricted our prescribed burning program to three burns totaling 25 acres.

- a. Field A-2 (30 acres) - burned the west half of this field on April 17 to rejuvenate it and kill invading trees.
- b. Loess bluff field (7 acres) - burned April 9 - this fire burned prairie grass to rejuvenate it and to kill invading dogwoods. This area is one of the few remnants of the original upland prairie in this area and is preserved as natural area.
- c. Mallard Marsh Roadsides (approximately 3 acres) - burned April 11 to prevent woody species from crowding roadsides and encroaching into Mallard Marsh.

#### 12. Wilderness and Special Areas

The 100 acres Loess Hills Research Natural Area (G8 aeolian land form) and the 250 acre Bluejoint-sloughgrass Prairie Research Natural Area (K-73 northern cordgrass prairie) are the only areas included in this category. The large 7 acre field on top of the bluffs was burned. No management activities other than protection took place in the Bluejoint-sloughgrass Prairie Natural Area.

## G. WILDLIFE

### 1. Wildlife Diversity



Snapping Turtles are abundant on the Refuge.

BH 6/86

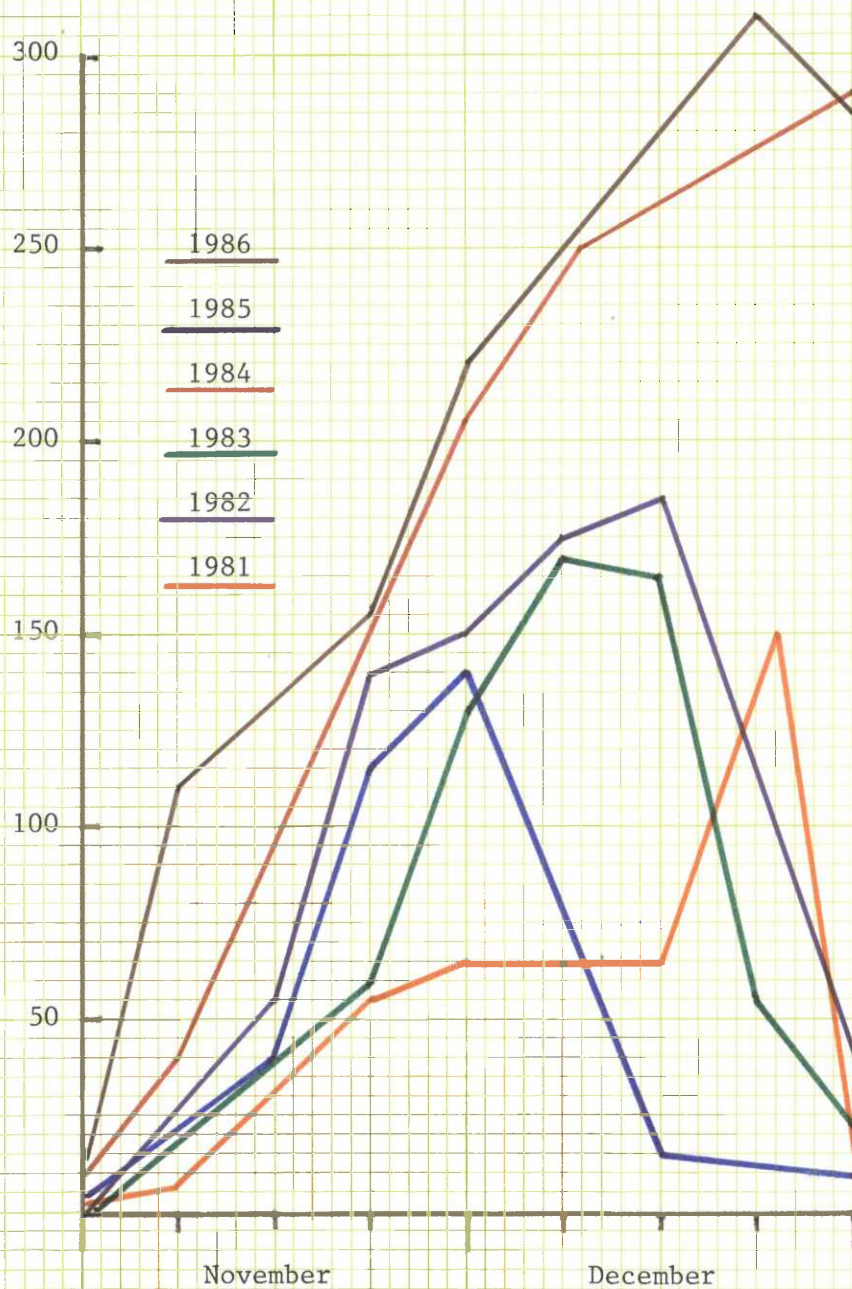
Squaw Creek NWR contains a diversity of habitat types and consequently a diversity of wildlife species; 321 species of birds, 34 species of mammals and 36 species of reptiles and amphibians have been reported on the Refuge. Management efforts at this Refuge are designed to maintain habitat diversity through intensive manipulations of the various habitat types.

### 2. Endangered and Threatened Species

Three endangered species have been observed on the Refuge in recent years; the peregrine falcon, least tern, and bald eagle. Least terns and peregrine falcons are both occasional visitors to Squaw Creek and were observed in 1986. Bald eagles begin to arrive in October each year and build their numbers as waterfowl numbers climb. Peak numbers for eagles usually occur during the first two or three weeks in December. Bald Eagle numbers peaked at 310 this year on December 19. This high population was due to several factors including a fowl cholera die off of approximately 1,500 snow geese, mild weather conditions which allowed waterfowl to stay in the area through December and hunting pressure on these same waterfowl which resulted in maintaining a flock of walking wounded on the Refuge for eagles to feed on.



# Wintering Bald Eagle Populations on Squaw Creek NWR (1981--1986)





Bald Eagle Numbers in 1986







This Refuge hosts more bald eagles than any other area east of the Rockies. GS 12/86



Eagles at the restaurant checking the menu. A goose said that there are 26 hungry patrons in this picture. BH 12/86

Eagles also benefitted from an unusual occurrence in January 1986. Bitter cold temperatures through December 1985 and early 1986 created a fish kill in Pelican pool. A thaw in late January allowed eagles access to the carp, gar and bullheads that bobbed to the surface. When Refuge pools refroze in February the rafts of dead fish remained on the surface imbedded in the ice. Carpsicles anyone? Eagle numbers increased from three on January 12th to 66 on February 5th and remained abnormally high throughout the rest of the winter. The last bald eagles of spring were observed on March 23rd when two immature and one adult were observed soaring over the Refuge.

As eagles become more commonplace in Missouri reports of eagle deaths are bound to increase. Such was the case in 1986. On November 18, an immature bald eagle was reported lying in the middle of a county road just west of the Refuge. A necropsy by the National Wildlife Health Lab in Wisconsin determined electrocution to be the cause of death. Apparently this bird brushed two powerlines at once with its wingtips while flying. More disheartening is the reporting of at least four eagles gunshot in the state during the fall of 1986 as well as several deaths of undetermined cause. One can only hope this is a function of increased eagle numbers and reporting rather than a reflection of a deteriorating attitude towards these beautiful birds.

Missouri produced a very comprehensive list of its rare and endangered flora and fauna in 1984, many species of which occur on the Refuge. Plants are of particular note due to the ecology of northwest Missouri which is comparable to areas farther west. The Loess hills which extend through the Refuge also have an unique ecosystem which contains some of the plants on the list but plants are difficult to identify so we deal primarily with the fauna.



The massasauga rattlesnake is the only poisonous species occurring on the Refuge.

MB 10/86

## Missouri Rare and Endangered Birds on the Refuge

Species	Missouri Status	Occurrence at Squaw Creek NWR during 1986
American Bittern	R	Uncommon migrant - peak of 3 on May 11 and again on September 14
Little Blue Heron	R	Common migrant - peak of 70 in late August - early September
Snowy Egret	E	One pair on Refuge from mid-August until mid-September
Black-crowned Night Heron	R	Uncommon migrant-peak of 10 on Aug 31
Yellow-headed Blackbird	R	Uncommon resident with several small nesting colonies in Eagle and Pelican Pools
King Rail	E	One observed on May 18
Double-crested Cormorant	E	Common migrant - peak of 200 on September 28
Sharp-shinned Hawk	E	Occasional migrant - several sightings in September and October
Cooper's Hawk	E	Occasional migrant - several sightings in September and October
Northern Harrier	E	Common migrant but never more than two sighted on Refuge at a time in 1986
Osprey	E	Occasional migrant - sightings in April, May and September
Bald Eagle	E	Common spring and fall migrant and uncommon winter resident. See separate Table.
Least Tern	E	Uncommon migrant - flock of 25 seen in May, three in September

\*E = Endangered

R= Rare



The Refuge contains several species of animals classified as rare or endangered by the state of Missouri. The Refuge harbors the last stronghold in Missouri for the endangered massasauga rattlesnake primarily occurring in the central prairie area. Fox snakes are uncommon here but are listed as endangered by the state. A Blanding's turtle, endangered in Missouri, was found on the Refuge in 1984, but there is no evidence to indicate a breeding population here.

At the suggestion of the Missouri Department of Conservation Herpetologist we placed a number of basking logs in the area the Blandings turtle was seen in 1984 and in other likely spots. YCC enrollees placed the willow logs and anchored them with wire and old metal fenceposts. Turtles, mostly painted, used these logs all through the rest of the summer but no more Blanding's were sighted, leading us to believe that the turtle was a released "pet".

The long-tailed weasel, listed as rare, has been recorded on the Refuge and a mountain lion, listed as endangered, was verified a few years ago by several reliable observers in several sightings. Neither of these two mammals were seen in 1986.

Occurrence of Missouri rare and endangered birds on the Refuge during 1986 is shown in Table 7. These are only the birds that have been seen here in the recent past.

### 3. Waterfowl

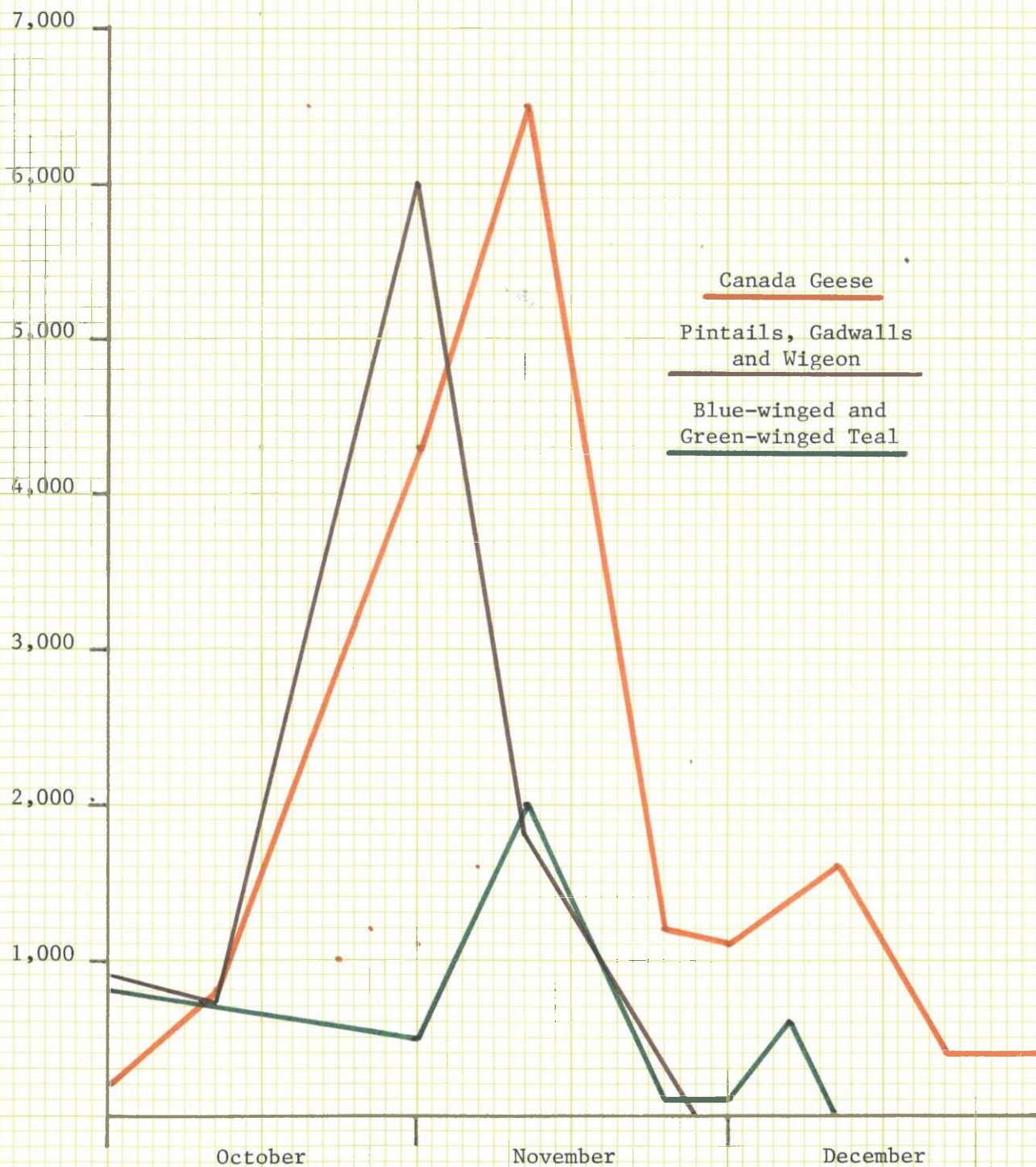


They could have named them snow geese or blizzard geese.

KB 12/86



Weekly Peak Populations for Major Waterfowl Species  
(Fall 1986)





Snow Goose Peak Populations  
In Thousands  
(1976--1986)





Weekly Peak Populations for  
Snow Geese and Mallards  
(Fall 1986)





A new record for snow goose numbers occurred November 9th when 600,000 crowded Refuge pools following a major storm in the Dakotas and Nebraska. Mallard numbers peaked at 200,000 on December 12th. Much to hunters' chagrin, mallard numbers had been very low until December 12th - and the duck hunting season had closed on the 10th.

Ice left Refuge pools for good the last week of February and waterfowl showed up almost immediately. Four species of geese and fifteen species of ducks were all present on the Refuge by March 9th. Representatives of almost every species of duck normally found in this part of the flyway were present on the Refuge through March. Snow geese numbered 100,000 through most of the month and mallards peaked at 14,300 the second week of March. Both species fed heavily in Refuge corn fields where the Refuge share of standing corn had been mowed in January and February.

Most waterfowl had moved on north by mid-April, but a few shovelers, blue-winged teal and mallards stayed on until May 20th. Wood ducks remain all summer to nest and raise young.

Fall migration began in mid-August with arrival of the first few flocks of blue-wing teal and the staging of large groups of wood ducks. The first mallards, pintails and green-wing teal showed up in small flocks during September as Refuge pools began to fill as a result of rainfall and diversion of water from Squaw Creek.



Mallard ducks dropping into Eagle Pool.

BH 11/86

# PEAK FALL POPULATION OF DUCKS 1935 - 1986

Manager	Year	Peak	Manager	Year	Peak
Gerald	1935		Kenneth	1958	242,775
Spawn	1936	No	Krumm	1959	210,076
		Data		1960	194,630
Percy	1937			1961	100,000
Depuy	1938				
			Harold	1962	201,510
John	1939	250,000	Burgess	1963	197,780
Dahl	1940	250,000		1964	258,500
				1965	392,940
James	1941	225,000		1966	405,690
Walton	1942	145,000		1967	221,910
	1943	400,000		1968	183,630
				1969	250,033
Laurence	1944	405,000		1970	175,000
Longley	1945	220,090		1971	257,507
Lloyd	1946	171,590	Gerald	1972	167,925
Gunther	1947	108,702	Nugent	1973	777,591
	1948	163,801		1974	212,125
				1975	240,380
Bruce	1949	248,000		1976	297,485
Stollberg	1950	121,304			
	1951	91,340	Berlin	1977	416,926
	1952	135,180	Heck	1978	290,597
	1953	250,709		1979	363,872
	1954	187,390		1980	106,086
	1955	234,235		1981	233,235
	1956	214,745		1982	309,403
	1957	245,945		1983	200,325
				1984	75,027
				1985	66,745
				1986	200,866

MONTHLY WATERFOWL USE - DAYS

(selected species or groups)

	Snow Geese	Canada Geese	White - Fronted Geese	Mallards	Other Dabblers	Diving Ducks	Total
Jan		713		1,240	31	62	2,046
Feb	64,400	980	1,260	12,600	1,764	1,148	82,152
Mar	1,325,000	39,835	20,150	203,050	85,870	8,370	2,682,275
Apr	5,100	30	600	1,800	31,680	1,800	41,010
May	31			279	4,402	62	4,774
Jun				180	2,490		2,670
Jul				62	2,573		2,635
Aug					7,285		7,285
Sep	90			300	33,420		33,810
Oct	117,180	17,050	372	62,930	85,901	1,674	285,107
Nov	9,968,000	94,080	5,600	910,000	109,900	28,784	11,116,364
Dec	2,697,000	25,110	217	2,480,000	6,479	899	5,209,705
	15,176,801	177,798	28,199	3,672,441	371,795	42,799	19,469,833

Populations slowly climbed through October reaching about 14,000 ducks, 11,000 coots, 4,270 Canada geese, 600 white-fronts and 400,000 snow geese by the time waterfowl season opened on November 2nd. Duck numbers appeared to peak at about 50,000 (95 percent mallards) on November 23rd and then began a gradual decline to about 30,000 on December 11th before the overnight arrival of an eye-popping flock of an additional 170,000 mallards and a sprinkling of pintails, redheads and green-wing teal. This flock gradually dwindled to 40,000 ducks by the end of the year.

Goose population trends were more traditional. The record peak of 600,000 snow geese on November 9th lasted about 40 hours. Snow geese population levels then returned to a more normal 350,000 when the rest of the birds dispersed out to state and private areas within fifty or sixty miles of Squaw Creek. The snow goose population had fallen to 275,000 by the end of November and further dwindled to 16,000 by December 15. Snow goose numbers fluctuated up and down between 16,000 and 35,000 throughout the rest of December and into the new year as flocks seemed to move back and forth with every warm or cold front. All in all, it was a most interesting year.

Waterfowl production at this latitude is restricted to wood ducks and a few mallards with an occasional blue-winged teal family. Wood duck production is enhanced by a nesting box program. YCC put up ten new boxes in 1986. Wood duck production from all sources is estimated at 60 per year.

Although we kept a vigil for the return of the 20 tundra swans that used Squaw Creek in the fall of 1985, and also received reports that trumpeter swans may be passing through northwest Missouri, no swans were observed in 1986.

#### 4. Marsh and Water Birds

We no longer report most of the species occurring in this group on quarterly output forms but we do maintain records for our own use.

As in most years the first migrants in this group to arrive at the Refuge were pied-billed grebes which showed up the first week in March. Close behind them were white pelicans and great-blue herons. Pelican numbers peaked at 600 in late March. A total of 21 species of marsh and water birds were recorded this year.

Few species nest on the Refuge but least bittern use river bulrush for nesting over water and a few green herons have nests scattered around the Refuge. It is suspected that sora rails nest here but a nest has yet to be discovered. Pied-billed grebes nests have been documented in past years. A pair of common moorhens nested in Pelican Pool for the second year, producing three young this year.



Coots migrated in and settled on Pelican Pool.  
For several days after their arrival they  
remained tightly packed together. BH 11/86



A great egret finds easy pickings in Pelican Pool. BH 11/86



5. Shorebirds, Gulls, Terns and Allied Species

This year was not very good for shorebirds because the vegetation grew very fast once pools were lowered. Snow Goose Pool received most of the shorebird use as it was manipulated to benefit these species. The peak of the spring migration occurred during the week of May 11 when five species were identified. No large concentrations of any one species of shorebirds were observed all year. Few shorebirds were evident this fall but 25 endangered least terns, 15 Forsters terns and 6 Bonapartes gulls were all observed using Refuge pools.

6. Raptors



Great horned owls are common the Refuge much to the regret of mice and small birds. BH 12/86

A total of 27 raptor species including three accidentals have been recorded on the Refuge. In 1985 there were sightings of 18 raptor species with no sightings of accidentals. If Harlan's hawk is considered a separate species (many people lump them with red-tailed hawk) then you can add one species to both above categories. The most common species of hawk occurring here is the red-tailed hawk with a peak of 26 on December 14. Great-horned and barred owls are common with a peak of about 20 for each species through much of the period. The most common raptor species on the Refuge each year is the bald eagle with a peak of 310 recorded December 19th.

7. Other Migratory Birds

Mourning doves are common on the Refuge from spring thaw until freeze-up in late autumn. The annual mourning dove coo count was completed May 21 about 25 miles southeast of the Refuge. The route is run by Chip Lehmer. Chip counted 194 calls by 33 doves. A total of 56 doves were seen.

Great-tailed grackles and yellow-headed blackbirds, both relatively uncommon in this area, nested in small colonies in Pelican Pool this year.

8. Game Mammals



There are many healthy deer on the Refuge. KB 11/86

During most of the year our primary attraction for visitors is the abundance of white-tailed deer. The herd is estimated at about 600 animals during winter and as many as 180 have been counted in one field, feeding on the Refuge share of standing corn. The cooperator's share is combined early, if you were wondering. Even so, damage to crops is fast approaching the point of jeopardizing our cooperative farming program. A special deer hunt is proposed in January 1988 to thin this growing herd. Meanwhile we are telling the cooperative farmers to hang on one more year.



A pair of buck deer with locked antlers were reported on February 1 in Mallard Marsh. One of the deer was dead and reduced to a head, cape and forelegs. The other deer was in poor shape but still healthy enough to give Refuge Manager Heck and his son quite a race across Mallard Marsh, despite his gruesome burden. Heck and son managed to lasso the deer and the Berlin used his revolver to shoot tines off the living bucks antlers until the racks were freed. The freed buck appeared weak but ambled off on his own power. The strange thing about this situation is the evidence that coyotes had eaten the body of the dead deer up to the rib cage to free the still-living deer of much dead weight and allow it some mobility, still carrying the head and neck of the dead animal. Who says Refuge duty is dull?



Fox squirrels are common in Refuge habitats of oak in the bluffs and willow and cottonwood in the bottoms.

BH 11/86

Fox and gray squirrels are common on the Refuge. A better than average mast crop and Refuge corn shares made life pretty easy for the bushy tails this past year.

Cottontail rabbits are common residents around Refuge field borders.

#### 10. Other Resident Wildlife

Pheasant numbers seem to be stable with an estimated winter population of about 1,000 birds.

Only three covies of bobwhite quail were known on the Refuge this winter with a total count of about 40 birds. Harsh winters, wet conditions, and numerous predators seem to be the limiting factors in quail numbers. The eastern wild turkeys had an excellent production year in this area and birds are seen on the Refuge periodically. Their habitat is the bluffs east of headquarters where they travel to and from the Refuge in their wanderings. The population on the Refuge would average about ten birds. They are hunted in this county with a spring shotgun limit of two bearded birds and a fall limit of two shotgun and one archery bird.



It is not a sabre-toothed muskrat, but the common everyday variety needs protein and many of them take advantage of this ready source. BH 12/86

Musk rats are the most abundant furbearing species on the Refuge. Their numbers fluctuate based on our water management regime each year and this year you can see that we drained all but Pelican and Bluff Pools. We consider them a nuisance because of their burrowing habits but tolerate them because their houses provide so many nice perches for pelicans, geese, eagles and other species. A house count was completed December 28 and results, along with prior years, are shown in Table 10.



They are not shepherds but they are keeping a close watch on the flock from their muskrat house perches.

KB 12/86

#### Refuge Muskrat Houses

Pool	1982-83	1983-84	1984-85	1985-86	1986-87
Eagle Pool	263	582	27	5	17
Pelican Pool	307	364	289	346	390
Mallard Marsh	61	26	35	0	0
Pintail Pool	14	1	2	0	5
Snow Goose Pool	0	48	8	0	0
Cattail Pool	4	15	24	0	3
Long Slough	24	0	5	0	0
Bluff Pool	82	15	29	39	37
Total	755	1,051	419	390	452

Beavers are common on the Refuge and evidence of their presence is found in gnawed trees, plugged tubes, dammed creeks and sinkholes in dike roads. The beaver population at the end of 1986 is estimated at 30 animals, down from a peak of about 60 animals several years ago. Jack Fennel, Missouri Department of Conservation Wildlife Management Supervisor for Northwest Missouri, assisted Refuge staff by blowing up a couple of large beaver dams in Squaw and Davis Creeks in March.



### 15. Animal Control

When you consider that we normally peak at 450,000 geese and have a 20 million bird blackbird roost in an intensively farmed area, it seems amazing that we are not deluged with complaints and requests for assistance in controlling marauding birds. We do get a few comments but we maintain a supply of 25 propane cannons to loan out to farmers experiencing depredations. The farmers furnish propane and tanks and the system seems to work real well. Lyle Stemmerman, formerly U.S. Fish and Wildlife Service Wildlife Assistance Office and currently animal control specialist for APHIS of the Department of Agriculture, has allowed us to retain these cannons on loan. This system will hopefully work well for us, Lyle and area farmers.

### 17. Disease Prevention and Control

The area immediately surrounding the Refuge has been a steel shot zone for two years now and will expand slightly in 1987. Missouri will require steel shot for all waterfowl hunting in 1988. We hope to see a dramatic decrease in lead poisoning in future years.



Each year the Refuge has several flocks of sick and injured geese that hang out together awaiting death. Predators such as eagles and owls find easy pickings here while photographers eagerly click away, under the delusion that these are just tame geese.

BH 12/86

We had three avian cholera die-offs in our snow goose flock in 1986. Fowl cholera was verified as the culprit by the National Wildlife Health Lab in Madison, Wisconsin. Ron Windingstad of the NWHL visited the Refuge on December 9 and 10 to determine the extent of the problem. Ron paid visits to several state owned and private areas in Missouri, Nebraska and Iowa experiencing similar problems. See chart below:

<u>Date</u>	<u>Species</u>	<u>Cholera Killed Waterfowl</u>
11/26	Snow Geese	500
12/ 3	Snow Geese	300
12/4-9	Snow Geese	500

Dead geese were gathered by Refuge staff using long poles with hooks fashioned from welding rods. Assistant Manager Bell's Labrador retriever also received a workout. Carcasses were buried.

#### H. PUBLIC USE

##### 1. General

Visitors to this Refuge, with few exceptions, pursue non-consumptive wildlife-oriented recreation. In other words, they come here to look at the wildlife. In order of preference for viewing are waterfowl (particularly snow geese), deer, eagles, pheasants and pelicans. Other special interest groups come for one thing or another such as birdwatchers coming to view shorebirds, but they are in the minority. The trip often involves a stop in the headquarters to view the displays and then out to the ten-mile auto tour for a pleasant family outing. During nice weather many visitors will picnic by the headquarters.

Many locals visit the Refuge but a good number of visitors come from metropolitan areas such as St. Joseph, Kansas City and Omaha. during 1986 an estimated 86,272 persons visited the Refuge, mostly during the mid to late fall when waterfowl were present in large numbers.

##### 5. Interpretive Tour Routes

The auto tour route is about ten miles around on gravel. We keep it open all year for visitors to enjoy viewing wildlife. There have been debates regarding possible negative effects on wildlife and some do occur but we believe the indirect benefits to wildlife (we gain public support for our programs) far outweigh the small disturbance. The animals become accustomed to seeing vehicles and basically ignore them.

TR Code				Organization Number					Name				Report Period			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Yr	Mo	
3	0	1	0	3	3	5	1	0	0	0	D	S	T			

# Public Use Report

Page 1 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	
	18	19	20	21	22	23	24	25	26	27-35	36-45	46-55	
INTERPRETATION													
Wildlife Trails - Nonmotorized													
Self Guided	0	1	1	0	0	0	0	P	S				
Conducted	0	1	2	0	0	0	0	P	C	25	100		
Wildlife Tour Routes - Motorized													
Self Guided	0	2	1	0	0	0	0	P	U				
Conducted	0	2	2	0	0	0	0	P	T	30	60		
Interpretive Center	0	3	0	0	0	0	0	P	R				
Visitor Contact Station	0	4	0	0	0	0	0	P	Q	14,400	4,160		
Interpretive Exhibits - Demonstra													
Self Guided	0	5	1	0	0	0	0	P	A	7,400	740		
Conducted	0	5	2	0	0	0	0	P	M	3,727	3,727		
Other On-Refuge Programs	0	6	0	0	0	0	0	P	P	300	1,200		
ENVIRONMENTAL EDUCATION													
Students	1	0	0	0	0	0	0	P	E	14	14		
Teachers	1	1	0	0	0	0	0	P	B				
CREATION-WILDLIFE CONSUMPTIVE													
Hunting Mig. Birds - Waterfowl													
Ducks	2	0	1	0	0	0	0	P	D				
Geese	2	0	2	0	0	0	0	P	G				
Swans	2	0	3	0	0	0	0	P	N				
General Waterfowl	2	0	4	0	0	0	0	P	W				
Hunting Mig. Birds - Other	2	0	5	0	0	0	0	P	X				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Region 03 Station \_\_\_\_\_ Date Prepared \_\_\_\_\_

Name \_\_\_\_\_

Form 3-239a  
Rev. 12/75



# Public Use Report

Page 2 of 3

TR Code				Organization Number				Name				Report Period			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Yr	Mo
3	0	1	0	3	3	5	1	0	0	0	0	D	S	T	

Page 2 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	
	18	19	20	21	22	23	24	25	26				
RECREATION-WILDLIFE CONSUMPTIVE(c't)											27-35	36-45	46-55
Hunting Resident Game													
Upland Game Birds	2	1	1	0	0	0	0	P	L				
Big Game				Species Code									
Deer - Gun	2	1	2					P	H				
Deer - Bow	2	1	3					P	J				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
Small Game	2	1	5	0	0	0	0	P	Z				
Other Game	2	1	6	0	0	0	0	P	U				
Trapping	2	1	7	0	0	0	0	U	G				
Fishing													
Warmwater	2	2	1	0	0	0	0	U	W	585	1,655		
Coldwater	2	2	2	0	0	0	0	U	C				
Saltwater	2	2	3	0	0	0	0	U	S				
Clams, Crabs, Oysters, Frogs	2	2	4	0	0	0	0	U	Y				
Other Consumptive Wildl. Rec.	2	3	0	0	0	0	0	U	M				
RECREATION-WILDLIFE NON-CONSUMPTIVE													
Camping	3	0	0	0	0	0	0	U	H	60	2,080		
Picnicking	3	1	0	0	0	0	0	U	B	1,590	1,330		
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Region 3 Station \_\_\_\_\_ Date Prepared \_\_\_\_\_

Name \_\_\_\_\_

Form 3-239b  
Rev. 12/75

TR Code			Organization Number							Name				Report Period		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Yr	Mo	
3	0	1	0	3	3	5	1	0	0	0	D	S	T			

# Public Use Report

Page 3 of 3

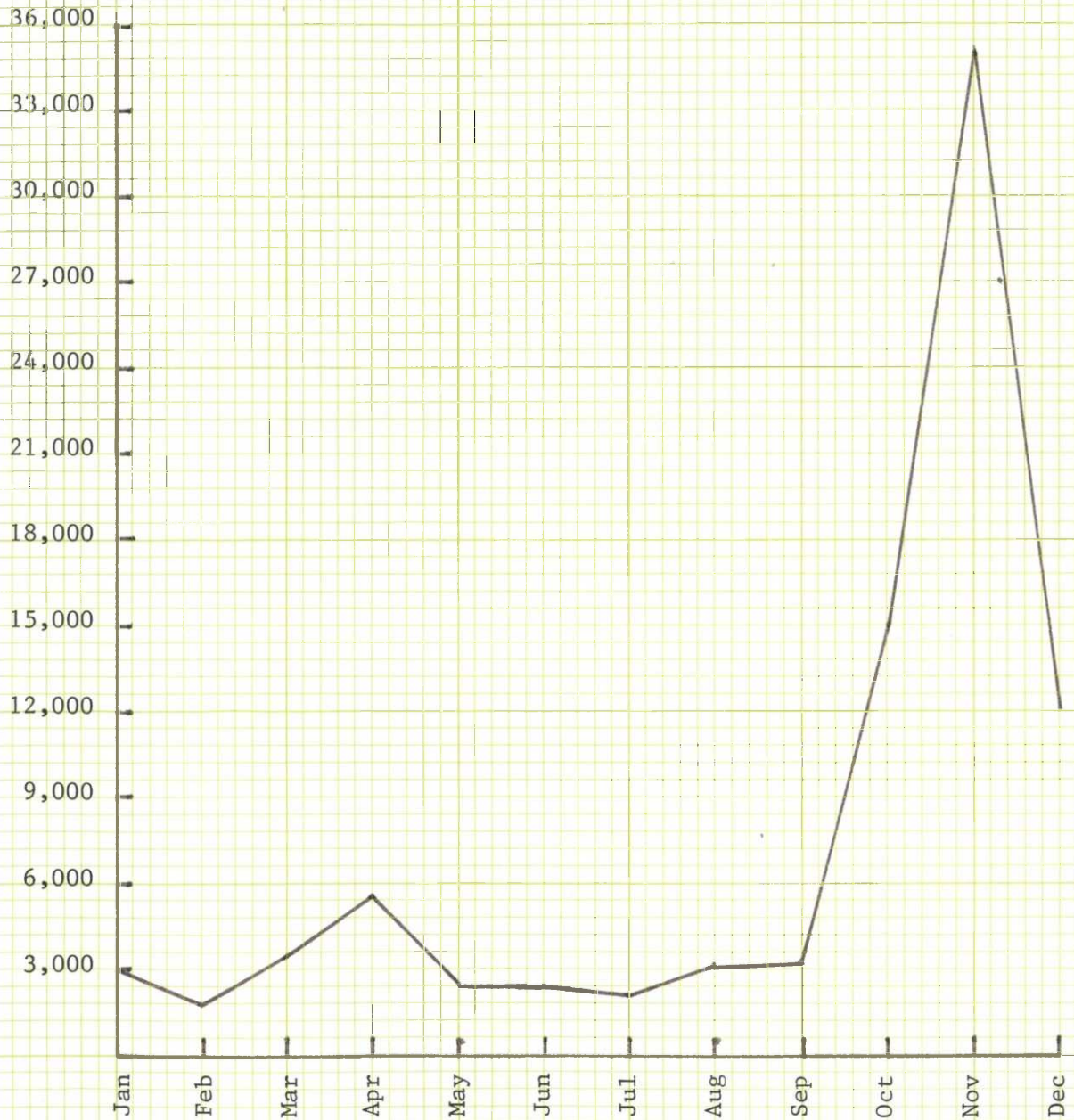
OUTPUT TYPE	LINE CODE										NO. VISITS	OUTPUT UNITS	
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE NON-CONSUMPTIVE												Act.Hr.	
Wildlife/Wildlands Observation													
Foot	3	2	1	0	0	0	0	U	E	17,600		17,025	
Land Vehicle	3	2	2	0	0	0	0	U	N	71,200		100,200	
Boat	3	2	3	0	0	0	0	U	L				
Other	3	2	4	0	0	0	0	U	P				
Photography	3	3	0	0	0	0	0	U	T	5,525		9,650	
Field Trials	3	4	0	0	0	0	0	U	X				
RECREATION - NON-WILDLIFE													
Camping	4	0	0	0	0	0	0	R	C	102		6,280	
Picnicking	4	1	0	0	0	0	0	R	P	2,290		2,390	
Swimming	4	2	0	0	0	0	0	R	S				
Boating	4	3	0	0	0	0	0	R	B				
Waterskiing	4	4	0	0	0	0	0	R	W				
Off Road Vehicling	4	5	0	0	0	0	0	R	V				
Other	4	6	0	0	0	0	0	R	M				
TOTAL VISITS TO REFUGE	0	9	0	0	0	0	0	P	V	86,272			
SH & WILDLIFE INFORMATION												Per.Sers.	
Public Inquires	5	0	1	0	0	0	0	F	P			5,410	
News Releases	5	0	2	0	0	0	0	F	N			57	
Personal Appearances	5	0	3	0	0	0	0	F	A			15	
Professional Services	5	0	4	0	0	0	0	F	S			28	
Exhibits	5	0	5	0	0	0	0	F	E			3	
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Region 3 Station \_\_\_\_\_ Date Prepared \_\_\_\_\_

Name \_\_\_\_\_

Form 3-239c  
Rev. 12/75

Total Visits to Refuge by Month--1986





6. Interpretive Exhibits/Demonstrations.



New interpretive signs by the headquarters.  
BH 12/86

New interpretive signs were put up by the headquarters this fall.

7. Other Interpretive Programs

This station pursues a very aggressive public use program for so few staff members. The interpretive programs which require staff time include slide programs and news releases. Both techniques are extremely effective in gaining acceptance, approval, and support of the public.

During the year a total of 47 programs were presented for 1,398 persons, both on and off the Refuge. A program is normally comprised of about 45 slides and a narration by a staff member. A presentation requires about 45 minutes and is very popular with school groups, but service clubs, social clubs and even professional groups eagerly seek out our services. Everyone loves wildlife.

Programs of note this year were several for college biology classes and clubs, one for the Beta Beta Beta regional meeting held here, the Audubon Societies of Missouri state meeting held here, the Missouri Native Plant Society state meeting here and the Missouri Society of Farm Managers meeting.



The weekly news release that keeps the public informed about Refuge events under the name "Squaw Creek Digest" is now carried by four area newspapers. Several samples are appended.

Refuge staff participated in three TV programs and five radio programs.

The eighth annual "Eagle Days" event (co-sponsored by the Refuge and Missouri Department of Conservation) occurred November 29 and 30. This event has become extremely popular with the public requiring pre-registration by participants. The program is a film about eagles, presentation of "Omega" the captive eagle by a handler from Dickerson Park Zoo in Springfield, and viewing wild eagles on the Refuge using scopes and binoculars we set up. Each participant received a Charles Schwartz eagle print (Schwartz "The Wild Mammals of Missouri") made exclusively for this event. This year 1,626 persons viewed the indoor program. A total of 3,300 persons visited the Refuge during the two days and viewed some of the 217 bald eagles here at the time.



Refuge 50th anniversary plaque with speakers from various groups. Jim Pylund, MDC; John Ellis, USFWS; Dr. Bruce McRae, Organizer; Lloyd Mielke, NACCCA; Berlin Heck, Refuge Manager; Bob McCrory, Mound City C of C. JJ 6/86

Last year when the 50th anniversary of this Refuge came and went without a firecracker (a nearly complete staff turnover changed plans) we discussed the idea of a celebration with the Chamber of Commerce of Mound City, who were looking for a project and after

numerous planning meetings (led by Dr. McRae) the celebration happened June 6 and 7. It was also a celebration of the 50th anniversary of the Civilian Conservation Corps whose members worked here. More than 200 persons attended including many damp eyed former CCC members who helped dedicate a brass commemorative plaque imbedded in a huge granite boulder on the Refuge. They also helped plant another tree by the boulder. More of this story may be read in the Squaw Creek Digest appended.



CCC Alumni at their reunion.

JJ 6/86

We have received loud criticism from a few people regarding the lack of water in Refuge impoundments each fall. We actually have dense stands of water millet in shallow water which is ideal for ducks. But people want to see the place looking like a lake, a condition they equate with ideal duck habitat. The severe drop in mallard numbers in the mid-continent population and corresponding drop in the Refuge population has reinforced their belief that the shallow Refuge pools have been the cause of poor duck hunting in the area. Several letters to editors of various newspapers and several letters to politicians regarding their opinions caused us to take decisive action. This fall, on the second day of duck season, Sunday November 2, we scheduled a "marsh walk" to show doubters the water and the food in these pools. We had newspaper articles locally and in St. Joseph that invited anyone interested in this matter to show up with their hip boots. Not one person showed.



The annual Boy Scout camporee was held south of the Refuge on May 3 and 4 and Refuge staff participated by laying out a plant identification trail.

9. Fishing

Fishing on the Refuge basically involves two hardy species, the bullhead and the carp. These two non-game fish are the only ones capable of surviving the ice cover of winter and the boiling heat of summer in shallow Refuge pools. No game fish are found on the Refuge and no potential for a fishery exists here as determined by fishery biologist Jim Milligan who completed an assessment of the situation and determined that no potential fishery exists here.

Carp and bullheads are both popular on the dinner table in this area so we do get a fair amount of fishing pressure when carp are running and bullheads are biting.

Each spring when the water begins to warm up, we slowly release water from Eagle Pool which runs to the Missouri River eight miles south. Carp come upstream to spawn but stack up behind our gates where predaceous humans use bare treble hooks to snag them. Most carp are in the 5-10 lb. range with a snagging limit of 20 per day.

Bullheads are caught in Refuge pools primarily during spring using worms for bait and provide a fair amount of recreation each year.



Snagging carp below the spillway is a very popular activity each spring. BH 3/86



The log jam in Davis Creek disappears after a strategically placed dynamite charge is ignited by MDC personnel. BH 3/86

A log jam in Davis Creek below the Eagle Pool outlet ditch in early Spring prevented effective drainage in the creek, plus it prevented carp from progressing upstream. Jack Fennel of the Missouri Department of Conservation resolved the log jam problem with dynamite. The Eagle Pool radial gates were then opened March 27 and carp began running before the day was over. It was estimated that about 1,000 lbs. of carp were snagged each day for several days before the migration slowed.

Bullhead fishing was only good this year.

#### 11. Wildlife Observation

Nearly all visitors to the Refuge come to observe wildlife. Wildlife observation is an extremely high quality form of recreation here due to the proximity and abundance of wildlife along the auto tour route. The hundreds of thousands of waterfowl, hundreds of bald eagles, hundreds of deer, pheasants, squirrels and many other forms of wildlife which are easily observed from the auto tour route make the ten mile loop an exciting outdoor experience.





View of Eagle Pool from the headquarters. Visitors in the motor home are enjoying a closer look.

BH 11/86

There are several walking trails in various habitats for visitors who prefer to commune more intimately with nature. Pintail Point Trail will place you out in the middle of the eagles and geese between Eagle and Pintail Pools. If you like the quieter areas, a walk to the top of the bluffs behind the headquarters on Loess Bluff Trail for an elevated view of the marshes would be your choice. Wherever you walk or drive you will find an abundance of wildlife.

## 12. Other Wildlife Oriented Recreation

Photography is a very popular form of recreation on the Refuge with both amateur and professional participating. The great abundance of wildlife on the Refuge provides many photographic opportunities from car windows. We encourage visitors to remain in their autos which serve as mobile blinds.

Mushroom gathering is a very popular pastime during the spring. It was not a really good year for mushrooms due to dry weather during the mushroom season. The most sought-after types are morels, but many people collect Helvella and Verpa. Mushrooms "pop" in this area during the first half of May which is during spring turkey hunting season, a nice combination.

13. Camping

There are no public camping facilities on the Refuge but Boy Scout troops are allowed to use a primitive camping area in the wooded bluffs near the headquarters under terms of special use permits. During 1986, we accommodated 471 Scouts from 17 troops, mostly during the months of November and December.

14. Picnicking

Eight picnic tables and five grills are provided for visitors at the headquarters area and are very popular. Picnicking is almost invariably in conjunction with a drive around the auto tour or a hike up Loess Bluff Trail. During 1986 an estimated 2,290 visitors used the picnic facilities.

17. Law Enforcement



One of two deer found shot beside the tour route. Note the mark in the upper neck where a bullet passed through. No suspects were ever found.

BH 11/86

Two personnel at this station have law enforcement authority, Berlin Heck and Tom Bell. Missouri is one of the few states that gives federal officers state commissions so both officers have the option of charging violators under state statutes. This simplifies arrests because the nearest federally approved lockup is forty miles away, but a county jail is about five miles away.

The 40-hour LE refresher training was attended the week of March 17 by Heck and April 7 by Bell. Firearms requalification for both was completed October 3.

We maintain close contact with state officers and provide mutual assistance on a regular basis. We meet officers from nearby counties in Iowa, Nebraska and Kansas at quarterly four-state law enforcement meetings at which matters of mutual interest are discussed.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction



"Improvements" to the parking area resulted in the area being closed to visitors all fall and a temporary access to the headquarters being mowed through the vetch.

BH 10/86

Construction of the new headquarters parking area began October 1 with Knapp Construction awarded the contract for \$31,500. Weather was excellent with a mild fall but progress was extremely slow due to lack of any great interest by the contractor in completing the job. The parking lot was not usable by the public after October 1 due to construction. Concrete curbing was poured in early December before work was suspended for the winter on December 6. A total of 73 days were used leaving 17 days to complete all work remaining.



Preliminary surveying work was done in August to ascertain the best site to locate a water control structure on Davis Creek to be constructed next year. This project has been funded at \$145,000. A contract was awarded to Professional Service Industries, Inc. from Omaha, NE for \$2,779 to make soil test borings at the site selected for the water control structure. The company did not appear by the end of December.

### 3. Major Maintenance

The old county road (See map #) south from state highway 118 was rebuilt using an equipment rental contract (two bulldozers) in August and September. The road was widened and raised. Sixty feet of three- foot diameter culvert was put through the road in October to improve drainage. The north end of the road between the highway and old railroad bed was not owned entirely by the Refuge because when the county vacated the road, it reverted to abutting landowners. The Refuge owned on one side and therefore obtained property only to the centerline. Manager Heck met with the other owners (Mound City Development Corporation) in May and the members agreed to donate their half to the Refuge. Before it could be done, however, they added more and more stipulations until it became too much a problem to accept the donation under their terms. The road was rebuilt beside the old one so it is now entirely within the Refuge boundary.



Channelized creeks are the norm in this agricultural area and topsoil lost in the hills is a problem in the flatter ground downstream where it is deposited in the creeks channels reducing the flow capacity and resulting in floods.

BH 12/86





Two draglines clean the east side of Davis Creek ditch under an equipment rental contract. BH 8/86

Two one-yard capacity draglines were rented in May and June for 285 hours at \$34.99 per hour (ARMM project). They were used to clean silt from part of Davis Creek.



Chip sets a grade rod for a levee in the new moist soil units as dozers work in the background.  
BH 8/86



Two rented dozers build levees for new moist  
soil units. BH 9/86



Levee for new moist soil unit built this summer.  
BH 11/86

Two bulldozers (HD-11 and D-7) were rented from August through September for 555.6 hours at \$43.50 per hour. They were used to renovate County Road and levees for moist soil units. Wet weather and breakdowns, plus a late bid contract resulted in 55 hours not being used and the money lost.



Seeding wheat to stabilize new moist soil unit levees. BH 10/86

Five new moist soil units totaling 207 acres were constructed this summer west of Davis Creek. Eleven culverts were installed and will be fitted with water control structures next year. Rented bulldozers were used to renovate old ditches and levees to impound the areas.

Several flights of used steel fire escape stairs were purchased at ten cents per pound from a scrap metal dealer for use on lookout towers. They are extremely heavy duty and will last a lifetime, plus they are cheaper than building wooden stairs. One set was erected on the Pintail Point tower.

#### 4. Equipment Utilization and Replacement

In March we were looking for a vehicle for YCC and called the excess property folks in Kansas City. They mentioned they had a dragline located at an Air Force base if we needed it. Further



investigation led to a 1967 Loraine (3/4 yard) with only 180 hours on the meter. It has hydraulic controls and is ideal for this station. A 15 foot boom center section was constructed by a contractor to make 45 feet of boom which is minimum for our use.



Lorraine 3/4 yard dragline obtained excess from the Air Force last year with less than 200 hours on it. The new center section of boom was purchased this year to extend the boom length to 45 feet.  
BH 11/86

A new compact Jeep Comanche 4x4 was received in August. In mid-October it was taken to the AMC dealer because it was not running good. It was finally fixed and returned December 4. It had a computer problem.

##### 5. Communications System

The telephone system broke in August and the problem was in the control box. The system was obsolete after only four years, so the company could not repair it nor furnish a new control box. A new telephone system was ordered and in September a "Merlin" system from AT&T was installed. It has provided good service.

The headquarters area was tested in July to determine if a short-range AM transmitter could be used to inform visitors along the auto tour route of Refuge events and regulations. It was found to be a good location so the YCC installed underground copper wires in a radial pattern to serve as a ground field for the antenna. Financial limitations prevented further work on this project.



## J. OTHER ITEMS

### 1. Cooperative Programs

Two pheromone baited gypsy moth traps were put up near the headquarters June to September in cooperation with the Department of Agriculture to monitor gypsy moth movement in the state. This is the fourth year of this project and no moths were found.

### 2. Items of Interest

A greatly reduced revenue sharing check for \$14,090 was delivered to the Holt County Clerk on May 22.

Heck and Bell met with Joe Tieger (ES-Columbia, MO) on February 19 to discuss the implications of the farm bill and then attended the Missouri Wildlife Society meeting in Columbia.

Jay Hammernick (RF-2) and Terry Pennaz (EN) visited the Refuge August 13-14 to meet with representatives from Tibbets 40 Farms, Inc. The meeting was held as a result of a Congressional inquiry to gather facts and take action. A viable plan of action was developed that should resolve the flooding problem on the hunting club next year by ditching and diking.

Heck and Bell were certified for heavy equipment operation after attending training at Sherburne NWR May 5-8.

Lehmer attended fire training at LaCrosse April 28-May 2.

Heck, Bell and Lehmer passed their step test requirements.

Manager Heck:

Received his 20-year pin August 26 at a very young age.

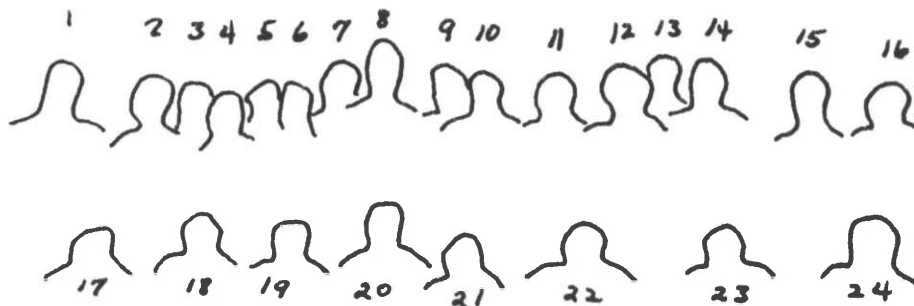
Completed 12 hours training for radiological monitors March 1 and 2.

Attended the regional programmatic meeting in St. Paul February 24-28.

Was a judge in the waterfowl category of the National Wildlife Art Show in Kansas City March 7.

Attended a waterfowl management seminar in Sioux City October 9 and 10.

Received a \$400 special achievement award for implementing recommendations made during a WELUT workshop last year.



1. Jim Gritman--DRD, Region 3
2. Mary Olsen--RF-2 Secretary
3. Kevin Sittauer--Asst. Mgr., Mingo NWR
4. Jack Frye--Mgr., Swan Lake NWR
5. Rick Schultz--Asst, Mgr., DeSoto NWR
6. Lee Hertzberger--Mgr., Muscatatuck NWR
7. Ross Adams--Mgr., Clarence Cannon NWR
8. Bob Stratton--Project Leader, Mark Twain Complex
9. Lyle Stemmerrman--Wildlife Assistance, Kansas City
10. Roger Boykin--Forester, Crab Orchard NWR
11. Berlin Heck--Mgr., Squaw Creek NWR
12. John Eadie--ARD, Refuges and Wildlife
13. Eric Sipco--Mgr., Chataqua NWR
14. Tom Follrath--Chief of Staff, Refuges and Wildlife
15. Wayne Stanley--Mgr., Louisa District, Mark Twain
16. Jerry Cummings--RF-2 Biologist
17. Gerry Clawson--Mgr., Mingo NWR
18. John Guthrie--Mgr., Union Slough NWR
19. Jay Hamernick--Asst. Supervisor, RF-2
20. John Ellis--Supervisor, RF-2
21. Norrel Wallace--Project Leader, Crab Orchard NWR
22. George Peyton--Mgr., Calhoun District, Mark Twain
23. George Gage--Mgr., DeSoto NWR
24. Tom Bell--Asst. Mgr., Squaw Creek NWR

Clerk Jones worked in regional office July 21-25 for orientation. She also attended an eight-hour secretarial seminar in St. Joseph April 25.

Clerk Jones worked here for less than two years before transferring to Denver Finance Center at the end of October.



The event of the social season occurred here August 25-29 when we hosted the project leader annual work planning meeting. The only casualty was Supervisor John Ellis who twisted his knee in a volleyball game.

Lyle Stemmerman (Wildlife Assistance - Kansas City) spent several days surveying and planning moist soil units. He received a \$500 Special Achievement Award for his outstanding work on this project. It was his first award ever.

#### 4. Credits

Heck wrote Sections A, B, C, D, E, H, I, and J. Bell wrote Section F and G.

Because we are without the clerical services of a Refuge Assistant at the present time, the generous offer of assistance from the DeSoto NWR staff was gratefully accepted for typing this document.

Photo credits: BH = Berlin Heck, TB = Tom Bell, JJ = Joyce Jones, BB = Bill Bennett (St. Joseph Gazette), KB = Kenny Bahr, MB = Mike Blair (KS F&G), GS = George Schiel.

*I want to thank George Bage at DeSoto NWR for letting Wanda Harbottle secretary this report. She used a computer and spent many hours on it and I thank her even more than George. I couldn't have done it without you, Wanda. Berlin*



K FEEDBACK

I used to enjoy fishing where I was raised in Louisiana and was fairly successful at it. I recall once I found a pond where I saw evidence of lots of fish but I could not catch one regardless of what bait I used or how persistent I was. One of the local rednecks came by one day as I was flailing the water to a froth (like Guthrie fly fishing) and I complained about the lack of fish in the pond. He said that the pond had plenty of fish but I was just using the wrong fishing technique to catch one, whereupon he produced a stick of dynamite and we had our pick of lots of fish. And this brings me to the subject of the OPM pool that is full of potential federal workers. We assume that all we have to do to catch one is ask for the register, screen the names and select one of the top three applicants. A simple method that is designed to land lunkers, but it does not always work.

In the past three year, I have hired two secretaries by requesting the OPM register. The first time it took six months from the time I submitted the SF-52 until I was able to select one. I was fortunate to get a good one despite the fact that I was able to select from only two names, the last two on the register. In order to obtain the third name, I would have had to wait for another six or eight weeks for the register to open and tests to be given.

The second time is now and I have been without a secretary for six months once again, waiting for the OPM system to function. I finally received one name on the register and two non-competitive applications from which I was fortunately able, once again to obtain a highly qualified applicant. The OPM system is not working because registers are maintained in cities where civilized city folk desire jobs in the city. Few or none of the registrants would dream of going into the wilderness of Squaw Creek to accept a GS-5 job so the register names are exhausted for each vacancy without finding anyone willing to be considered.

The solution is simple, like dynamite, and it may be illegal, like dynamite, but it would work, like dynamite. Each remote station that is farther than commuting distance from an OPM register should be given local recruiting authority for wage grade and administrative positions. You may be surprised at what could be landed in a short time.

Missouri Independent, Mound City, Mo., Thursday, February 6, 1966



# Squaw Creek Digest

By: Berlin A. Heck, Refuge Manager

Last week I talked about deer antlers falling off during the bucks' annual molt this time of year, but this weekend I ran across a buck that wished his antlers would fall off.

Dan and Donna Browning came by the house on Saturday just before sundown and reported seeing a buck way out in Mallard Marsh and it had something tangled in its antlers that resembled a blanket. They said the deer was having problems moving about with it but now and then would toss its head and make the object flop around.

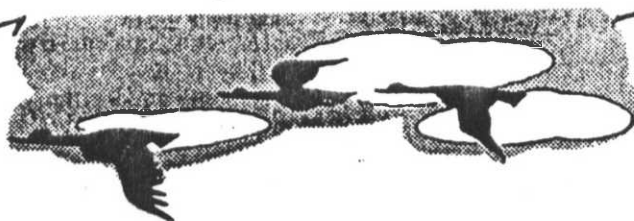
A person never knows what he is going to encounter out there so my son, Bucky, and I went to investigate with hip boots, hacksaw, rope and pistol (I don't want to make headlines for being gored by a deer I'm trying to help). We got there a little after sundown and could see the deer way out there near the north end of the marsh so we grabbed our gear and started walking. There were lots of cockleburs out there and I found that they love to fall down inside hip boots and make one uncomfortable.

When we got close the deer saw us and started scrambling towards the woods some distance away. I could then see that part of another buck was locked antlers with this one and he was dragging the remnants around. We started running (full speed) to head the deer off - he couldn't make it well because he kept tripping on the dead deer's hanging skin. I could see that the deer was getting close to the woods when Bucky asked me if I wanted him to head the deer. I said "yes" and then found that only one of us had been running at full speed before. He headed the deer about 150 yards ahead of me and got it moving back into the cattails.

The deer tired out after a chase around and then I turned cowboy to try to lasso the antlers (they were big with about 12-14 points on the live one and 8 points on the dead one). It is tough to throw a piece of limber nylon rope with cockleburs stuck all over it but I caught them on the first loop. I then changed plans because I had wanted to throw the deer and saw off the antlers. A deer is a little too agile to even think of getting that close, so I caught another loop on his antlers and Bucky and I worked from either

side to hold him. Finally, after the buck tired down I eased close to him (8 feet is close) and shot off one of his antler tines with my pistol. We had another fierce struggle before he calmed down again and I got close again and shot another one that was locked. I could then see that he was free but the loops were holding their heads together. So, with a pistol in one hand and a knife in another I got close and cut the ropes. The big buck was able to shake loose of the dead deer and then shake off the rope loops and the last I saw he was headed for the woods.

This incident is the second like this I have heard of, the other being a buck shot during the season some years back with the remains of another on its head. I don't know if the coyotes ate the body of the dead one while attached to the live one or if the sharp hooves cut the meat out of the dead one. I think it must have been coyotes because the weight of a whole carcass would have kept the live deer's head down so he couldn't raise his hooves to strike the dead animal. That big buck must have felt odd listening to coyotes eating deer flesh so close to him, but they did him a great favor in reducing the weight of the carcass to about 50 lbs. so he could move around with it to get water. It was an exciting rescue and somehow that little revolver seemed inadequate for defense against that powerful, agile, well-armed deer, so I was very happy to see him run off after being freed.



## Squaw Creek Digest

By: Berlin A. Heck, Refuge Manager

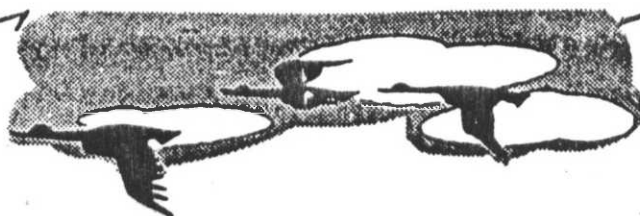
Not too many years ago the word "birdwatcher" brought out visions of strange looking old ladies in tennis shoes running about with binoculars listening for tweets and twitters that only they could decipher. Saturday and Sunday the Audubon Society of Missouri held its annual meeting here at the Refuge, organized by Dr. Dave Easterla from NWMSU. The forty people who attended this function are anything but the little old ladies in tennis shoes. These are very influential and knowledgeable people with a great interest in wildlife which seems to be very normal today. I did some birdwatching with the group Saturday morning and it is amazing to me how Audubon members can identify all types of wildlife. It was a wet but productive meeting which will be fondly remembered by participants.

Last Friday about 35 students from the Refuge Manager training Academy in Iowa came down to visit the Refuge and see how we operate. After 16 years in this business I was not going to tell them exactly how I operate because it might get back to my boss in Minneapolis, but I did tell them about our program here and they were extremely impressed with the amount of wildlife we have. Most Refuge Managers brag when they get 25,000 geese and a couple of eagles but we can see how poor they really are when we look at the abundant wildlife on Squaw Creek.

Saturday we saw the first broods of ducks this year, a wood duck brood with six young, another with 18 young and a shoveler brood with 12 young. There were many muskrats swimming about and I know visitors love to see them. They are easy to spot along the southeast side of Pelican Pool. If you are down that way look for the beaver lodge along the south dike of Pelican Pool right where the swallow house complex is sitting. It

looks like a bunch of sticks stacked up along the edge of the dike. There is another one in the willow trees along the west side of the pool. The swallow house apparently has occupants as I have seen tree swallows going in and out of the holes. If you will sit quietly in your yard and watch the birds you might be very surprised at how many nests are nearby.





## Squaw Creek Digest

By: Berlin A. Heck, Refuge Manager

At the south end of Pelican Pool there are several bright white birds that one would guess are egrets because they are so white. But if you ask me I'll tell you that they are little blue herons. Little blue herons that are white seems as contradictory as snow geese that are blue (since the two color phases of geese were lumped into one species). The mystery is simple to solve - some species do not mature their first year and they have what we might call an "immature plumage". The white, little blue herons are first year birds in their immature plumage which will soon change to a "blue" plumage similar in color to that of the great blue heron. Of course the blue, snow goose is another problem because it keeps its color all through life. I have had many people ask me if the blue goose was the immature snow goose and have also met people who thought the blue goose was the summer plumage and the snow goose was the winter plumage. It can get confusing because some rabbits, partridge, weasels and others change plumage or pelage as the seasons change.

We have had two white pelicans hanging around during this summer,

mostly near Pintail Point' where there are many carp, bullheads and other small animals for them to feed on. And they do have a good appetite. I read where they average about four pounds of fish per day but they dine on rough fish so don't worry about them impacting the fishery.

Last week Chip and I were down by the big spillway gates at the south end of Eagle Pool trying to wash out some of the debris left by the recent floods. We were cranking the three large spillway gates up and down but there was a good amount of resistance due to dirt-dauber nests on the gears. So I lifted off one of the large gear covers to see about cleaning the gears. Now I'm not one who really hates snakes and I tolerate them as just another form of wildlife, but there were about 10 big snakes under that cover. Needless to say, I stepped back rather hastily and with abnormally long strides. As it turned out they were mostly banded water snakes with a couple of diamond-back water snakes and a rat snake mixed in. None were poisonous types but who examines snakes closely when they are writhing about near your legs? I am considering filing for medical retirement due to job-related stress.



## Squaw Creek Digest

By: Berlin A. Heck, Refuge Manager

Sunday morning was sunny with good visibility but I still could not spot the high flying geese. I was in the back yard picking lima beans when I heard them talking. I untangled myself from the vines and looked and listened but they would not talk again so I could spot them. There is something about spotting those first flocks of geese that I imagine made the first settlers pause from their harvest to look upward. In some ways it is an ominous sound, warning us about the approaching winter, but now it stirs the heart and soul - what would autumn be like without the geese?

It seems like an awful long time but I have been in Refuges for more than 16 years. In that time I have seen many changes but none so sweeping as the Wildlife Law Enforcement Program. When I was first hired I went to Montezuma Refuge in western New York for a 16 hour training program that was mainly a tall tale telling session. At the end of two days I was handed a badge and told to "go get 'em". Today, before an employee can do anything he must attend an intensive 10 week school at the Federal Law Enforcement Training Center in Georgia. If he passes, he is given a badge and other equipment and told to "go get 'em". However, in order to keep that badge, he must qualify with his revolver every six months and must attend a week-long refresher training course each year. Last Friday Tom Bell and I drove up to DeSoto Refuge north of Omaha to qualify on their firing range under the expert guidance of Iowa Conservation Officer Dick Johnson. We both passed, which means we can carry a badge for another six months.

While traveling to and from Iowa

we spotted two ospreys (fish hawks) and a falcon that could have either been a peregrine or a prairie falcon. The peregrine is federally endangered but migrates through here in small numbers. The prairie falcon is a western bird but they do visit this area now and then. These birds normally use the updrafts from the river bluffs to help them on their way.

An interesting thing about the endangered peregrine is that it was once called "duck hawk" because it caught ducks to eat when there were no sandpipers around. I recall an article in "Outdoor Life" magazine many years ago in their monthly one-page story called "this happened to me" which recounts true tales sent in by hunters and fishermen of their experiences. Anyway, one story by a duck hunter referred to a foggy, still morning in his duck blind when suddenly he heard a loud whirring sound and looked out to see a duck hawk strike one of his decoys on the water. The whirring sound had been the wind through feathers as it made its 100 mph dive on the decoy. The hunter stated that he came out of his shock in time to end the duck-killing career of that hawk. A story like that impressed me - negatively - but I was impressed. The hunting license in Louisiana where I was raised had duck hawks listed on the back as "outlaw birds", legal to be shot anytime. The license remained unchanged until 1961 when the outlaw was given a pardon. Times do change. All hawks are now protected by state and federal law with the duck hawk being also protected under the endangered species act, a tough, strong and unforgiving law whose object is to give additional protection to wildlife in danger of extinction. Who can argue with that?



## Squaw Creek Digest

By: Berlin A. Heck, Refuge Manager

Bald eagles have been causing quite a stir here lately. Their number had increased to a total of 217 birds last week, when I counted 132 adults and 85 immature birds. They are here to feed on the sick, injured and dead waterfowl on the Refuge. I do not know how much goose it takes to stuff an eagle but they must be able to eat a whole goose in a day. A goose weighs about six pounds and the eagles gorge themselves on all but the bones so it is a considerable feast. If you have recently driven around the Refuge, you likely noticed the flocks of sick and injured geese that stay near the road. These birds are all doomed, because once a bird that normally flies loses its ability to fly, it is unable to find food or escape from predators. The ultimate end of the crippled birds will likely come from eagle talons or coyote teeth. Nature is sometimes considered cruel by humans, but it is very efficient.

On Sunday I got a call from a woman who had seen an injured goose at the south end of Pelican Pool. It was suffering by itself, which means it was near death. She wanted to catch it and rehabilitate it, so I asked her if she had the proper permits, which she did. I came out to see what she could do and observed that the bird was in deep water with a thin covering of ice. She was with a group of people on a tour, but she wanted to fix up that goose that I could see was beyond help. I suggested she select a different goose

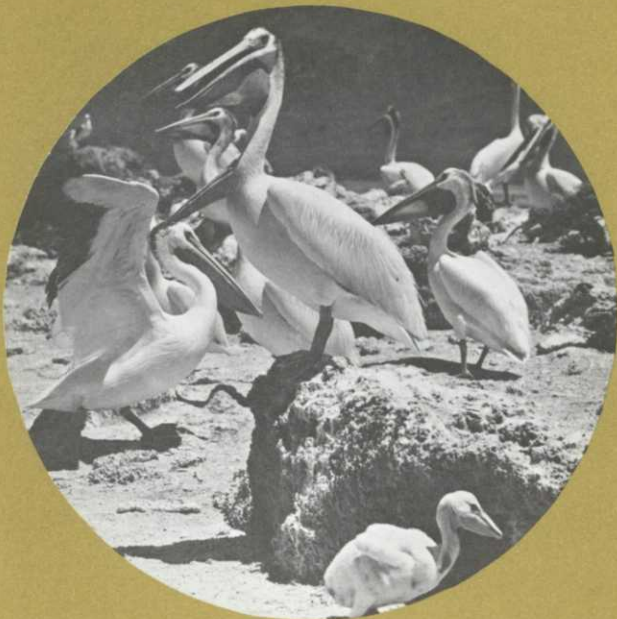
from the crippled flock that might have a chance to survive. She said that this particular goose had hooked her and she wanted to save it. I told her I wanted to watch her wade out in the two-feet of water and one-foot of mud and try to snag that bird that would try to escape from her by swimming farther away. She was hesitant, so I suggested that maybe the half-inch thick ice would hold her. She saw through that immediately. Her friends then became concerned about her getting hypothermia in the cold water and tried to discourage her. She finally abandoned the plan to catch that goose, which relieved me because I was also concerned about her going out there.

I may come across as somewhat callous regarding these birds, but I see so much death out there that it is overwhelming to contemplate. Humans are more concerned about animals that are closer to them genetically and in daily living. For example, the death of a dog would be of much greater concern than that of a snake or even a harmless worm. I have seen people protest the hunting of deer while they killed mosquitoes with abandon. The biologist cannot afford to put value on life based on its location on the evolutionary chain, because management decisions we make are life or death for various species. The main concern is that nutrients are recycled and kept in the food chain. Here is where humans could learn something from nature.



For further information, contact the Refuge Manager, Squaw Creek National Wildlife Refuge, P.O. Box 101, Mound City, Missouri 64470.

Squaw Creek National Wildlife Refuge is one of a system of refuges administered by the U.S. Fish and Wildlife Service and is dedicated to the preservation and conservation of wildlife. The financial base for this system was established in 1934 through the passage of the Migratory Bird Hunting Stamp Act. This Act requires waterfowl hunters to purchase an annual migratory bird or "duck stamp." Funds collected from duck stamp sales have been used to purchase numerous refuges that provide habitats necessary to sustain a variety of wildlife for both hunters and nonhunters to enjoy.



Adult and young white pelicans in nesting colony. U.S. Fish and Wildlife Service photo by David B. Marshall.

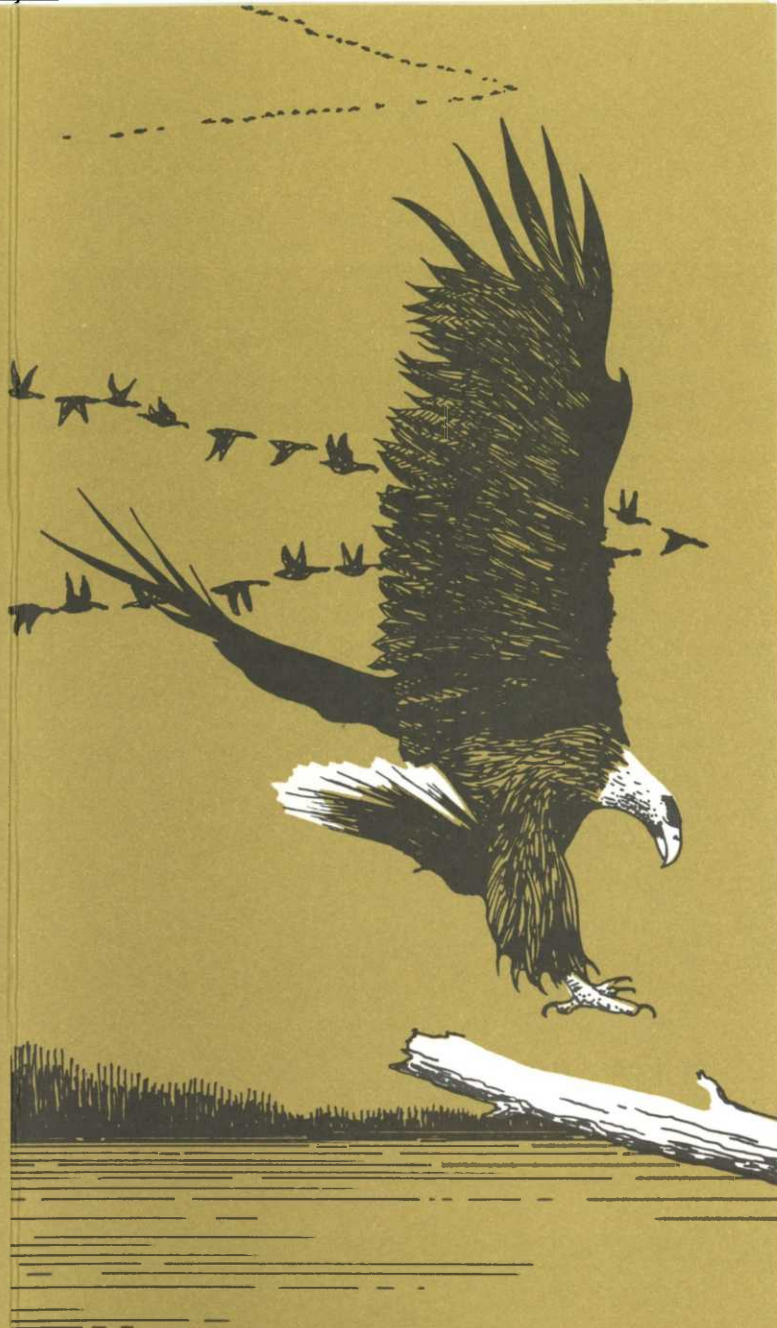
**U.S. FISH AND WILDLIFE SERVICE**  
Department of the Interior



RF6-63560-1



May, 1982



# SQUAW CREEK

**NATIONAL WILDLIFE REFUGE**  
**MOUND CITY, MISSOURI**



### WINGBEATS FROM THE NORTH

For thousands of years, time in the Missouri River Basin has been measured by the twice annual migration of waterfowl. Each spring and fall, northwestern Missouri was inundated by a noisy confusion of ducks and geese. From northern Canada and the prairie pothole country, they flocked into the marshes and backwaters of the wild Missouri.

However, far-reaching changes have transformed the valley in the past 150 years. Prairie cordgrass marshes and the natural, sandbar-studded Missouri River channel have largely disappeared as a result of marshland drainage and the deepening and straightening of the channel. To partially meet the needs of wildlife in a changed, less hospitable environment, Squaw Creek Refuge was established in 1935. Here, amidst 6,900 acres (2,792 hectares) of manmade marshes, waterfowl and other wildlife can still find critically needed food, water and shelter.

### THE BLUFFS

Overlooking the refuge from the east are the loess bluffs, a rare geologic formation of wind-deposited soil from the past glacial period. On top of the bluffs are some of the last remnants of the once vast native prairie that dominated the area prior to the influx of immigrants during the past three centuries. Against the backdrop of the bluffs, hundreds of thousands of migratory birds provide a stirring spectacle, just as they did for Lewis and Clark and the Indians before them.



"These first cold nights set the birds o-wing on long, strong flights . . ." — Olaus Murie

### REFUGE MANAGEMENT

The primary objective of the refuge is to preserve and perpetuate migratory birds and other species of wildlife. The refuge uses a variety of management practices to meet the needs of wildlife. A major program is marsh and water management to provide feeding and resting areas for migratory birds. Other programs such as farming, haying, and mowing—as well as controlled burning—are also used to provide food, cover, and habitat for a variety of wildlife.



"Snow Geese Take Wing" Photo by Mary Tremaine — Omaha, Nebraska

### FUR AND FEATHERS

Migratory birds rest and feed at Squaw Creek Refuge during their long spring and fall migrations. In September, pelicans are among the first heralds of fall. Great blue herons wade in shallow ponds, fishing for their dinner. Sandpipers running along the water's edge leave fragile patterns in the mud and are startled into flight by a swiftly passing shadow.

Other early migrants, pintail, gadwalls, and teal are soon joined by mallards, snow geese, and Canada geese. At peak migration times, 200,000 geese and as many, or more, ducks feed and rest in the marshes.

In the late fall and early winter, bald eagles ride the air currents, soaring in great arcs over the marsh below. As many as 300 of these birds, the American national symbol, winter on Squaw Creek Refuge.

The refuge is rich in its variety of wildlife. It is home for 33 kinds of mammals, 35 species of reptiles and amphibians, and 289 species of birds. Beaver and muskrat find food and cover in the marsh. Coyotes hunt the uplands and whitetail deer seek shelter in willow thickets and groves of cottonwood trees. Fields of native cordgrass prairie hide mice and voles—the prey of many species of hawks and owls.

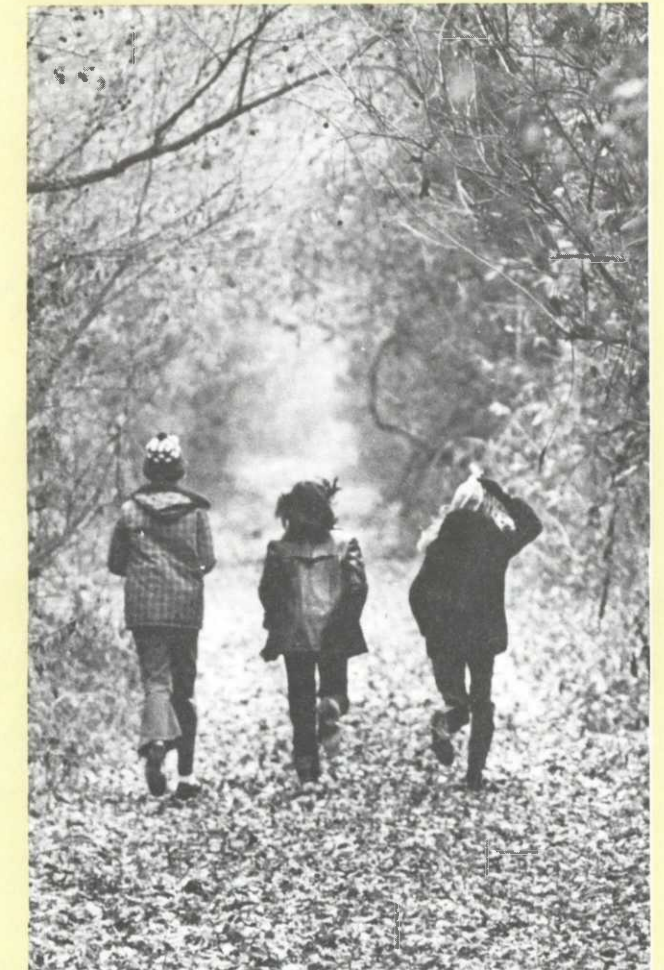
### INVITATION TO SQUAW CREEK

Squaw Creek Refuge furnishes the public with an excellent opportunity to enjoy wildlife in its natural setting. Refuge roads and foot trails provide access to many wildlife observation areas. Viewing towers and wayside exhibits, located at key points, are excellent vantage points for viewing and photographing wildlife. From a high point on the Loess Bluff Trail, hikers can view the Missouri River floodplain and much of the refuge. Parts of Kansas and Nebraska can also be seen on a clear day.

Squaw Creek Refuge is open daily from sunrise to sunset, although some roads may be closed during wet weather. In addition to the spectacular viewing of waterfowl, eagles and deer, seasonal activities such as fishing and photography can be enjoyed by refuge visitors.

No camping is permitted on the refuge; however, camping facilities are available at Big Lake State Park, 8 miles (13 kilometers) west of the refuge. Restroom facilities are available at the Refuge Headquarters complex. Office hours are Monday through Friday from 8 a.m. to 4:30 p.m.

Photo by Don Bradley — St. Joseph, Missouri





# Squaw Creek National Wildlife Refuge

Mound City, Missouri

## LEGEND

- REFUGE BOUNDARY
- WILD GOOSE TOUR LOOP
- POOL
- OBSERVATION TOWER

OMAHA, NE  
100 Miles

EXIT 84

MOUND CITY



MILES  
0 0.5 1  
KILOMETERS  
0 0.8 1.6

BIGELOW

MALLARD MARSH

BLUFF POOL

SNOW GOOSE POOL

PINTAIL POOL

EAGLE POOL

PELICAN POOL

REFUGE HEADQUARTERS

ST. JOSEPH  
40 Miles

## VICINITY MAP



RULO, NE

BIG LAKE  
STATE PARK

## Calendar of Events

**Squaw Creek  
National Wildlife Refuge  
P.O. Box 101  
Mound City, Missouri**

Wildlife measures a year not in days, weeks and months, but in the greening of the trees, the arrival of the geese, the birth of young, and a million other natural events. Some of the significant natural events occurring on the refuge are listed below.

**January 1—February 1:** Most prominent species—pheasants, hawks, coyotes and a large wintering deer herd. Dress warmly, and be prepared to walk as the roads may be closed by snow drifts.

**February 1—April 1:** Northward migration of waterfowl; best time of year to observe greatest variety of waterfowl in bright plumage. Some years the birds bypass the refuge and there are no large concentrations of waterfowl. Beaver cuttings seen along refuge creeks.

**Mid-March—May 1:** Spring, red bud time—a wonderful time for a hike in the loess hills to observe wild flowers, passerine birds.

**April 1—December 31:** Refuge open to public fishing. No special permit required, just state license. State laws govern methods and limits.

**May 1—May 20:** Warbler migration.

**Late July—Early August:** American lotus (water lily) in bloom on refuge impoundments. Deer with fawns may be seen along the tour routes.

**Mid-August—Mid-September—**Shorebirds on mudflats around refuge impoundments.

**October 1—December 1:** Fall waterfowl migration in full swing, concentrations of up to 200,000 snow geese and 250,000 ducks common.

**Mid-November—January 1:** One of the largest concentrations of bald eagles in United States may be seen here. More than 300 birds peak population.

Restrooms and picnic tables available at headquarters, five miles south of Mound City, Highway 159 exit off I-29.

Ten miles of auto touring roads provide ready access to refuge (or bring your bicycle).







**UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH & WILDLIFE SERVICE**

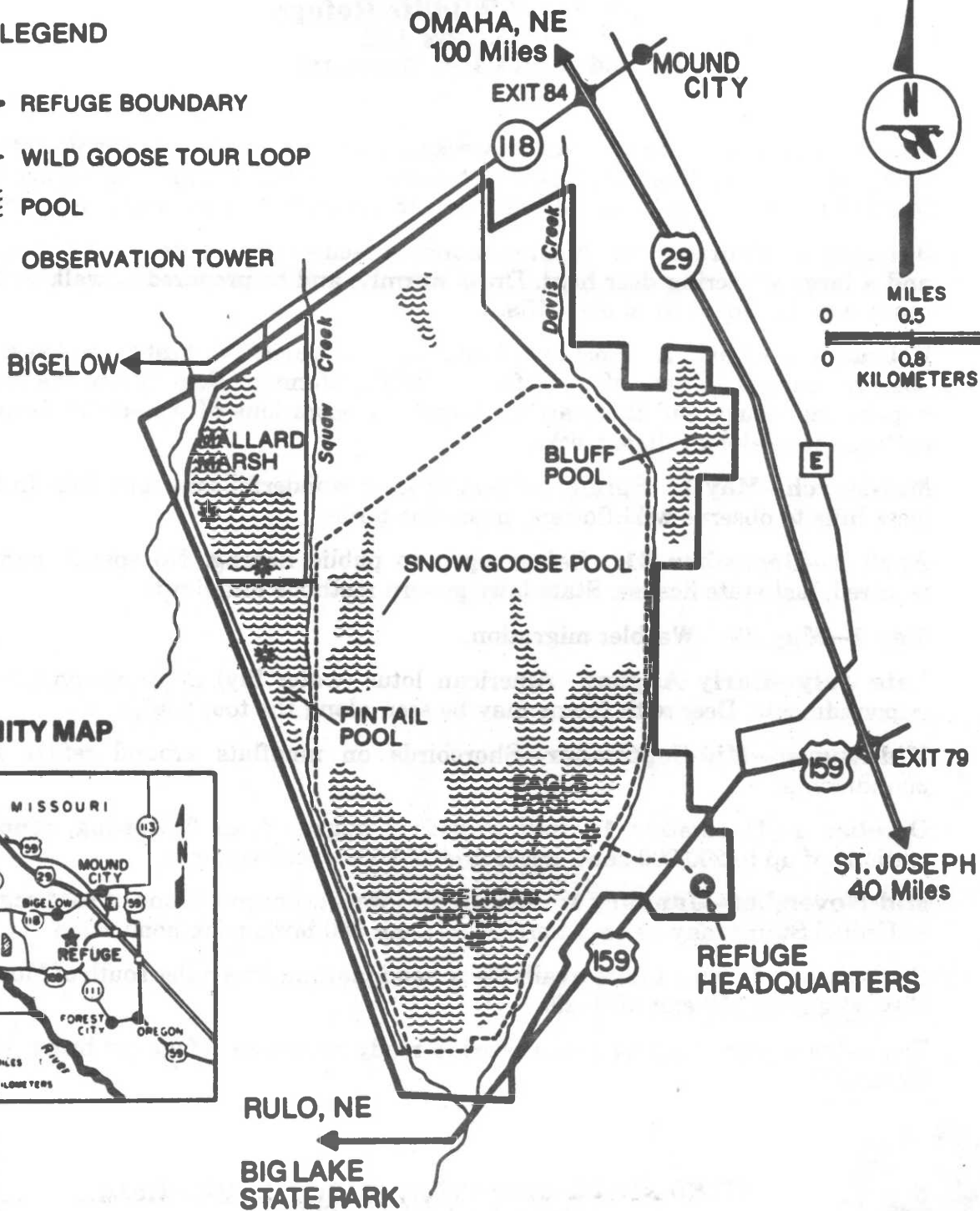
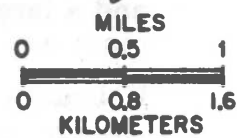


# Squaw Creek National Wildlife Refuge

Mound City, Missouri

## LEGEND

-  REFUGE BOUNDARY
-  WILD GOOSE TOUR LOOP
-  POOL
-  OBSERVATION TOWER



## VICINITY MAP





## Accidental Birds

These 33 additional species are considered accidentals; they have been observed on the refuge only once or twice.

Tri-colored Heron  
Glossy Ibis  
White Ibis  
Greater Flamingo  
Brant  
Barnacle Goose  
Black-bellied Tree Duck  
Fulvous Whistling Duck  
Eurasian Wigeon  
Surf Scoter  
Oldsquaw  
Mississippi Kite  
Gyr Falcon  
Greater Prairie Chicken  
Whooping Crane (E)  
Ruff  
Black-necked Stilt

Red Phalarope  
Black-legged Kittiwake  
Parasitic Jaeger  
Sabine's Gull  
Laughing Gull  
Common Ground Dove  
Snowy Owl  
Three-toed Woodpecker  
Scissor-tailed Flycatcher  
Black-billed Magpie  
Mountain Bluebird  
Townsend's Solitaire  
Bronzed Cowbird  
Evening Grosbeak  
Lark Bunting  
Snow Bunting

## Sighting Notes

Time in Field \_\_\_\_\_ Date \_\_\_\_\_

Weather \_\_\_\_\_

Observers \_\_\_\_\_

Species Total \_\_\_\_\_

Location \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For additional information contact: Refuge Manager, Squaw Creek National Wildlife Refuge, P.O. Box 101, Mound City, Missouri 64470. Phone 816/442-3187.



**DEPARTMENT OF THE INTERIOR  
U.S. FISH AND WILDLIFE SERVICE**

RF3-33580-2-8/83

# Birds of

**SQUAW CREEK  
National Wildlife Refuge**



**MISSOURI**

## Legend

This bird list contains 268 species which have been recorded on the refuge. Another 33 birds, listed under "Accidental" birds, have been reported but are not normally expected to be present.

**S**—Spring ..... March-May  
**s**—Summer ..... June-August  
**F**—Fall ..... September-November  
**W**—Winter ..... December-February

**a**—abundant—common species that is very numerous  
**c**—common—certain to be seen in suitable habitat  
**u**—uncommon—present but not certain to be seen  
**o**—occasional—seen only a few times during a season  
**r**—rare—seen at intervals of 2-5 years  
**(E)**—Endangered

\*Indicates birds which nest locally

Birds	S	s	F	W
Common Loon	r		r	
Pied-billed Grebe*	c	u	c	r
Horned Grebe	u		u	
Eared Grebe	u	r	u	
Western Grebe	r		r	
American White Pelican	a	u	a	
Double-crested Cormorant	c	r	c	
American Bittern*	o	o	u	r
Least Bittern*	u		u	
Great Blue Heron	c	u	c	r
Great Egret	u	u	u	
Snowy Egret	r	u	r	
Little Blue Heron	u	u	r	
Cattle Egret	o	u	u	
Green-backed Heron*	u	c	o	
Black-crowned Night-heron*	o	c	o	
Yellow-crowned Night-heron*	o	c	o	
White-Faced Ibis	o	r	r	
Tundra Swan	r		r	r
White-fronted Goose	u		c	r
Snow Goose	a	r	a	o
Ross' Goose				u
Canada Goose	a	u	a	c
Wood Duck*	o	c	c	r
Mallard*	a	c	a	u
American Black Duck	o		u	
Northern Pintail*	a	r	a	o
Green-winged Teal	c	r	c	u
Blue-winged Teal*	c	o	c	r
Cinnamon Teal	o		c	r
Gadwall	c	r	c	r
American Wigeon	c	r	c	o
Northern Shoveler	c	r	c	r
Canvasback	u		c	r
Redhead	o	r	o	r
Ring-necked Duck	c		u	r
Greater Scaup				
Lesser Scaup	c	r	c	u
Common Goldeneye	o		o	u
Bufflehead	u		u	
White-winged Scoter			u	
Ruddy Duck	u	o		
Hooded Merganser	u	u	u	r
Common Merganser	c		o	c
Red-breasted Merganser	o		o	r
Turkey Vulture	u	c	u	
Osprey			o	
Bald Eagle (E)	u		c	c
Northern Harrier*	u	o	u	u
Sharp-shinned Hawk	u	r	u	u

Birds	S	s	F	W
Cooper's Hawk	o	r	o	o
Northern Goshawk				r
Red-shouldered Hawk	r	r	r	r
Broad-winged Hawk	r	r	r	o
Swainson's Hawk	o	c	o	c
Red-tailed Hawk*	c	o	c	o
Rough-legged Hawk				o
Golden Eagle				o
American Kestrel	o	o	o	r
Merlin				r
Peregrine Falcon (E)	r		r	r
Prairie Falcon			r	r
Ring-necked Pheasant*	c	c	c	c
Wild Turkey*	u	u	u	u
Northern Bobwhite*	u	u	u	u
Yellow Rail	r		r	
King Rail*	u	u	u	
Virginia Rail*	u	o	u	
Sora	c	o	c	
Common Moorhen	o	u		
American Coot*	a	o	a	r
Sandhill Crane	r		r	
Black-bellied Plover	c		u	
Lesser Golden-Plover	c	r	u	
Snowy Plover	r			
Semipalmated Plover	u	u	o	r
Piping Plover	o	o	r	o
Killdeer*	c	c	c	o
American Avocet	u			
Greater Yellowlegs	c	u	c	
Lesser Yellowlegs	c	c	c	
Solitary Sandpiper	u	u	u	o
Willet	u	r	o	
Spotted Sandpiper*	c	c	c	
Upland Sandpiper*	o	o	o	
Whimbrel	r			
Long-billed Curlew	r	r		
Hudsonian Godwit	o	r		
Marbled Godwit	o	o	r	
Ruddy Turnstone	u	o	r	
Red Knot	r			
Sanderling	o	o	o	
Semipalmated Sandpiper	c	c	c	
Western Sandpiper	o	c	c	
Least Sandpiper	c	c	c	
White-rumped Sandpiper	c	u	u	
Baird's Sandpiper	u	u	u	c
Pectoral Sandpiper	c	u	u	o
Dunlin	u	r	u	
Stilt Sandpiper	u	u	o	
Buff-breasted Sandpiper	r	o	o	



Birds	S	s	F	W
Short-billed Dowitcher	u	u		
Long-billed Dowitcher	c	o	c	
Common Snipe	u	o	u	r
American Woodcock*	u	o	o	
Wilson's Phalarope	u	o	o	
Red-necked Phalarope	u	o	o	
Franklin's Gull	c	o	c	
Bonaparte's Gull	o	r	o	
Ring-billed Gull	c	o	c	o
Herring Gull	u	r	u	r
Caspian Tern	o	r	o	
Common Tern	o		u	
Forster's Tern	u	o	u	
Least Tern	r	o	r	
Black Tern	c	c	o	
Rock Dove*	o	c	o	o
Mourning Dove*	c	c	c	o

Birds	S	s	F	W
Black-billed Cuckoo*	u	u	u	
Yellow-billed Cuckoo*	c	c	u	
Common Barn Owl*	r	r	r	r
Eastern Screech Owl*	c	c	c	c
Great Horned Owl*	c	c	c	c
Barred Owl*	c	c	c	c
Long-eared Owl	o		r	u
Short-eared Owl	o	r	o	u
Northern Saw-whet Owl				o
Common Nighthawk	o	u	o	
Chuck-wills Widow*	u	u		
Whip-poor-will*	u	u	r	
Chimney Swift*				
Ruby-throated Hummingbird*	o	u	o	
Belted Kingfisher	u	u	u	r
Red-headed Woodpecker*	c	c	c	u
Red-bellied Woodpecker*	c	c	c	c
Yellow-bellied Sapsucker	o		o	u
Downy Woodpecker*	c	c	c	c
Hairy Woodpecker*	u	u	u	u
Northern Flicker*	c	c	c	u
Olive-sided Flycatcher	u	r	u	
Eastern Wood Pewee*	u	u	o	
Yellow-bellied Flycatcher	r		r	
Acadian Flycatcher*	u	u	u	
Alder Flycatcher	u	u	u	
Willow Flycatcher*	u	u	u	
Least Flycatcher	u	u	u	
Eastern Phoebe*	u	u	u	
Great Crested Flycatcher*	u	u	u	
Western Kingbird	o	r	o	
Eastern Kingbird*	c	c	u	
Horned Lark*	u	u	u	c
Purple Martin*	c	c	c	
Tree Swallow*	c	u	u	
Northern Rough-winged Swallow	u	u	u	
Bank Swallow*	a	c	a	
Cliff Swallow	c	a	a	
Barn Swallow*	c	c	a	
Blue Jay*	c	c	c	c
American Crow*	c	c	c	c
Black-capped Chickadee*	c	c	c	c
Tufted Titmouse*	c	c	c	c
Red-breasted Nuthatch	r		r	o
White-breasted Nuthatch*	u	u	u	u
Brown Creeper	u			u
Carolina Wren*	o	o	o	o
Bewick's Wren	r	r	r	
House Wren*	c	c	u	



Birds	S	s	F	W
Winter Wren	o		o	o
Sedge Wren*	u	u	u	
Marsh Wren*	u	u	u	
Golden-crowned Kinglet	u		u	c
Ruby-crowned Kinglet	c		c	o
Blue-gray Gnatcatcher*	u	u		
Eastern Bluebird*	u	u	u	r
Veery	r			
Gray-cheeked Thrush	u		u	
Swainson's Thrush	c		c	
Hermit Thrush	o		o	r
Wood Thrush*	u	u		
American Robin*	c	c	c	o
Gray Catbird*	c	c	o	
Northern Mockingbird*	o	o	o	r
Brown Thrasher*	c	c	u	
Water Pipit	r		r	
Bohemian Waxwing				o
Cedar Waxwing*	c	u	c	o
Northern Shrike				r
Loggerhead Shrike	u	u	u	u
European Starling*	c	c	c	a
White-eyed Vireo	o	r	r	
Bell's Vireo*	c	c	u	
Solitary Vireo	o		o	
Yellow-throated Vireo*	o	u	o	
Warbling Vireo*	c	c	u	
Philadelphia Vireo	u		u	
Red-eyed Vireo*	c	c	u	
Golden-winged Warbler	o		o	
Tennessee Warbler	u		u	
Orange-crowned Warbler	u		u	
Nashville Warbler	u		u	
Northern Parula	u		u	
Yellow Warbler*	c	c	u	
Chestnut-sided Warbler	u		u	
Magnolia Warbler	u		u	
Yellow-rumped Warbler	c		c	
Black-throated Green Warbler	u		u	
Blackburnian Warbler	u		u	
Palm Warbler	u		u	
Blackpoll Warbler	u		u	
Black-and-white Warbler	u		u	
American Redstart*	c	u	u	
Prothonotary Warbler*	r	r	r	
Ovenbird*	u	u	u	
Northern Waterthrush	u		u	
Louisiana Waterthrush	o		o	
Kentucky Warbler*	o	u		
Mourning Warbler	o		o	

Birds	S	s	F	W
Common Yellowthroat*	c	c	u	r
Wilson's Warbler	u		u	
Canada Warbler	o		o	
Yellow-breasted Chat*	c	c		
Summer Tanager*	r	u		
Scarlet Tanager*	o	o	r	
Northern Cardinal*	c	c	c	c
Rose-breasted Grosbeak*	u	u	o	
Blue Grosbeak*	o	u		
Indigo Bunting*	c	c	o	
Dickcissel*	c	c		
Rufous-sided Towhee*	c	c	c	c
American Tree Sparrow	c		c	c
Chipping Sparrow*	u	u	o	
Clay-colored Sparrow	o		o	
Field Sparrow*	c	o	c	
Vesper Sparrow*	c	o	c	
Lark Sparrow*	u	u	o	
Savannah Sparrow	u	r	u	
Grasshopper Sparrow*	o	u	o	
Henslow's Sparrow	r	r	r	
Le Conte's Sparrow	o		o	r
Sharp-tailed Sparrow	r		r	
Fox Sparrow	u		o	u
Song Sparrow*	c	c	c	u
Lincoln's Sparrow	u		u	
Swamp Sparrow*	c	r	c	u
White-throated Sparrow	c		c	o
White-crowned Sparrow	c		c	o
Harris' Sparrow	o		u	u
Dark-eyed Junco	c		c	c
Lapland Longspur			o	o
Bobolink*	u	r	u	
Red-winged Blackbird*	a	c	a	a
Eastern Meadowlark*	c	u	c	o
Western Meadowlark	o	o	o	o
Yellow-headed Blackbird*	u	u	u	r
Rusty Blackbird	c		c	o
Brewer's Blackbird	u		u	r
Great-tailed Grackle	o		o	o
Common Grackle*	a	c	a	c
Brown-headed Cowbird*	a	c	a	o
Orchard Oriole*	c	c	o	
Northern Oriole*	c	c	r	
Purple Finch			u	u
Red Crossbill			r	
White-winged Crossbill			r	
Common Redpoll			r	
Pine Siskin			u	
American Goldfinch*	c	c	c	u
House Sparrow*	a	a	a	a