

REVIEW AND APPROVALS

SWAN LAKE NATIONAL WILDLIFE REFUGE

Sumner, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1996

<u></u>	<u>6/22/97</u>	<u></u>	<u>7/7/97</u>
Refuge Manager	Date	Geographic ARD	Date
<u></u>		<u>7/10/97</u>	
ARD Refuges & Wildlife		Date	

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INTRODUCTION

Swan Lake National Wildlife Refuge (NWR) was established by Executive Order 7563 on February 27, 1937. Purchase of the 10,795 acres began at that time with money from the "N.I.R., Agriculture, Wildlife Refuges Funds". Following purchase of the land, the Civilian Conservation Corps began work on the refuge creating wetlands, constructing roads and buildings, and initiating the refuge farming program. The primary purpose for establishment of the refuge was to provide a nesting, resting, and feeding area for waterfowl, primarily ducks. An important secondary purpose was to preserve a remnant flock of prairie chickens. Unfortunately, inadequate grassland habitat was available to maintain a viable population.

Since establishment of the refuge, the primary emphasis on waterfowl species has changed from ducks to the Eastern Prairie Population of Canada geese. Canada geese were first observed using the refuge in the early 1940's, and numbers increased gradually to peak populations of from 150-200,000 annually during the early 1970's. Swan Lake NWR is now a primary wintering area for one of the largest concentrations of Canada geese in North America.

The refuge lies in the glacial till plain of north-central Missouri, in Chariton County, near the town of Sumner. It is located near the confluence of the Grand and Missouri Rivers, and is bordered on the south by Yellow Creek. Most of the refuge is relatively flat, with elevations ranging from a minimum of 653.96 MSL to a maximum of 741.56 MSL.

The refuge acreage is divided into five major habitat types: 1,000 acres of bottomland hardwoods, 3,840 acres of wetlands and moist soil units, 1,950 acres of croplands, 3,050 acres of open water, and 600 acres of grasslands.

In 1955 the Missouri Department of Conservation (MDC) and the U.S. Fish and Wildlife Service (Service) entered into a cooperative agreement to permit managed goose hunting on Swan Lake NWR. This agreement stipulates that MDC is responsible for management of lands immediately surrounding goose hunting blinds. The State currently manages 31 blinds and farms approximately 800 acres of refuge land. A second cooperative agreement was signed in 1980 to permit deer hunting on refuge lands during a special annual historic weapons hunt. Hunters are limited to muzzle loading rifles. The Missouri Department of Conservation is responsible for the administration of this hunt also.

Enactment of the 1985 Food Security Act resulted in additional responsibilities for the refuge, primarily through establishment of conservation easements on Farmer's Home Administration (FmHA) inventory properties. Beginning in 1988, FmHA properties were reviewed and easements established to be managed as part of the National Wildlife Refuge System. Due to the the large numbers of FmHA properties in this portion of Missouri, easement management has and continues to be a major activity. Farmer's Home Administration has recently undergone reorganization and is now included under the new Farm Service Agency (FSA).

SWAN LAKE NATIONAL WILDLIFE REFUGE

State Hunting Hdqtrs.

Refuge
Office

North

Silver Lake

South Pool

Yellow Creek
Research Natural Area

- 1 - Swan Lake Levee
- 2 - Cross Levee 1 (Silver Lake Levee)
- 3 - South Pool Levee
- 4 - Cross Levee 5 and location of
Swan Lake Water Control Structure





Our mission is “to conserve, protect, and enhance fish & wildlife and their habitats for the continuing benefit of the American people”.

A. HIGHLIGHTS

- Avian cholera and snow geese arrive in November. (Section G.17)
- Moose on the loose. (Section G. 8)
- Second largest flood in history recorded during May. (Section B)
- Aerial seeded millet successful. (Section F.2)
- Staffers attend moist soil workshop. (Section F.2)
- Administrative Assistant Hannebaum retires. (Section E.1)
- Refuge crop production a bust for second straight year. (Section F.4)

B. CLIMATIC CONDITIONS

The year started out unusually dry with no rainfall recorded for January and February. Though the total annual precipitation for 1996 was about three inches below normal, May rainfall, at almost five inches above normal, caused extensive flooding of farm fields, forest and moist soil units on the Refuge. By May 29th, the Grand River at Sumner, Missouri reached a level of 38.9 feet or the second highest level ever recorded. This level was surpassed only in 1993, when the river levels exceeded 42 feet. Precipitation was recorded on 14 of 31 days in May. Snow flurries were recorded as late as March 25, and as early as October 22. The 1996 snowfall total of 12.15 inches was 5.86 below the 53 year average of 18 inches. The first frost occurred on October 10.

Temperatures ranged from a high of 104 degrees Fahrenheit in July to a record setting -18 degrees in February. Temperatures for 10 months out of the year were below normal. Temperatures for November were 8.4 degrees cooler than average. Below freezing temperatures were reported during seven months, and temperatures with below zero readings occurred in two months.

Weather data are collected by refuge personnel mainly during weekdays. A summary of precipitation and temperature data can be found in Table 1.

Table 1. Precipitation and temperatures for Swan Lake NWR, 1996.

	<u>Precipitation in inches</u>		<u>Snow</u>		<u>Temperature</u>			
	1943-1996		1943-1996		1996		1990-1996	
Month	1996	Mean	1996	Mean	Maximum	Minimum	Avg. Hi	Avg. Hi
January	Trace	1.27	9.75	5.66	65	-9	37.4	38.8
February	0	1.22	0	3.60	74	-18	47.4	46.0
March	3.60	2.62	0.10	3.85	70	0	47.0	54.8
April	2.87	3.29	0	0.13	86	22	67.1	66.6
May	9.50	4.84	0	0	94	30	76.8	78.2
June	3.50	4.94	0	0	99	49	82.4	87.8
July	3.30	4.63	0	0	104	48	89.7	90.9
August	1.70	3.61	0	0	98	57	89.0	91.8
September	5.05	4.23	0	0	92	38	76.6	78.7
October	1.18	2.64	0	0	85	32	66.6	71.2
November	2.60	1.83	2.0	.78	72	11	44.4	52.4
December	0.07	1.52	0.30	3.98	65	0	41.3	41.9
Total	33.4	36.6	12.15	18.01				

#2 - With it's 7,900 square mile watershed extending into Iowa, the Grand River has been a constant source of flood water and debris. Siltation, strangely enough, has been minimal.

(JAG, 4/96)



#3 - Hundreds of levees along the Grand River have been constructed over the years to protect farmland from periodic flooding. Hydrology has been severely altered in Chariton County alone.

(JAG, 12/96)



#4 - Increased frequency of flooding, more significant flows and velocity, and resulting damage to habitat and facilities are of major concern. Are we just in a wet cycle or is this pattern destined to stay?

(JAG, 6/96)



2. Easements

Swan Lake has responsibility for wetlands and wildlife habitat restoration in twenty-eight counties in north central Missouri, for implementing conservation provisions of the Farm Bills, and for FSA conservation easement review and management programs.

The refuge oversees sixty-two conservation easements where the Service was granted administrative, management, and enforcement jurisdiction by FSA under the authority of the Farm Bill. The easements total 3,688 acres of additional responsibility. Fifty-nine of those properties are owned by private individuals while three are still government inventory lands. One of the inventory farms is proposed to be transferred to the Missouri Department of Conservation (MDC) via fee title transfer. The conservation easements are scattered over twenty of the twenty-eight counties in our management district. Like the fee title properties the nearest easement is twenty-five minutes away while the farthest is a four hour drive north to the Iowa border.

Successful transfer via fee title to MDC of two Howard County inventory properties was completed in October. The transfer had been in the works for at least three years!

The refuge was advised in May by FSA that a former inventory farm in Sullivan County, where a forty-four acre conservation easement had been proposed and surveyed, was sold minus the easement. FSA contended that the new FAIR ACT "restricted the placement of conservation easements on certain crop land". The fact that East Yellow Creek (a 679 mile state priority watershed) bounded the property on the west somehow did not come into consideration at all. A wetland determination completed by NRCS personnel in 1993 classified the forty-four acres in question as a combination prior converted and natural wetland. The area also had a cropping history. Totally disregarded was the fact that the proposed easement boundaries had been surveyed twice, the Service had posted the property twice, restored three wetlands under a caretaker agreement and reimbursed a neighbor for fencing costs. Not including salary costs, the Refuge spent \$5,200 on this easement.

The Refuge requested that FSA survey five former inventory farms that had been sold prior to the conservation easements being surveyed. FSA agreed to survey two farms and concluded that surveys were unnecessary on the three others. The two surveys in Macon County were completed in October (Dawson) and November (White).

A determination of "no adverse impact" was made on three conservation easements (Niemeier, Wessel and Ayers) concerning an increase of road right-of-way. Chariton, Schuyler and Sullivan County Commissions proposed to increase the roads right-of-way for bridge construction and maintenance. The respective counties received written authorization from the private landowners also.

Thirty-three easement inspections were completed. Contaminant surveys and Certificates of Inspection and Possession were executed for twenty-four easements during the period.

C. LAND ACQUISITION

1. Fee Title

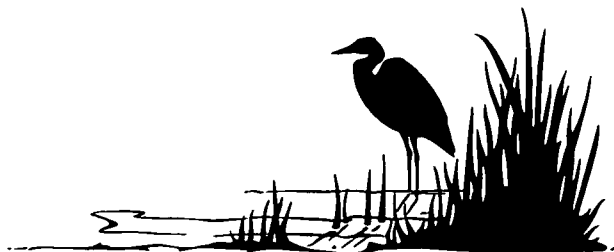
The refuge is responsible for the management of nine individual fee title tracts comprising 1,683 acres. Four tracts were obtained through the Farm Service Agency (FSA) inventory property disposal process. The other five tracts were deemed surplus property by the U. S. Army Corps of Engineers (COE) and deeded to the Service in 1991. The former COE tracts are located within the floodplain of Truman Reservoir, in west-central Missouri. The nearest fee property is located within twenty minutes of the refuge while the farthest is a four hour drive. The four former FSA tracts were inspected during the period.

An application for a right-of-way permit was received from an engineering firm representing the Shelby County Commission in December. The County is seeking to increase the current road right-of-way to replace and maintain a bridge over the North Fork of the Salt River on the former Robuck property by 0.27 acres. A right-of-way package is currently being prepared.

The former Moresi FSA property in Cedar County includes a house and several out buildings, all in good condition. Disposal of approximately 25 acres of this property, that includes the buildings via a land exchange for an adjacent twenty acres owned by Mr. Randall Bland, has been on-going for several years. Progress was made however, as Regional Office staff completed an appraisal for both tracts of land in August. The exchange would benefit the Service as demolition of the buildings would no longer be necessary and the twenty acre tract to be acquired improves access. Potential flooding of adjacent property by constructed wetlands would also be eliminated.

Mist netting on the East Fork of Yellow Creek for bats was conducted August 3-8 on the former Schmitt property, Chariton County, by University of Missouri, graduate student Craig McFarland. The mist netting objective was to collect information for toxicologic analyses in order to determine insecticide levels in two surrogate bat species; the little brown bat and the northern long-eared bat. These two bats are considered surrogate species for the federally endangered Indiana Bat. Under normal circumstances a federally protected species may not be captured and sacrificed for research. Neither species was captured at the site.

Approximately 50 acres of the Schmitt fee property was disced by refuge staff in preparation for native warm-season grass planting in the summer of 1997.



#5 - The refuge oversees 62 conservation easements totaling 3,688 acres. Easements are scattered over 20 of the 28 counties within our management district, and are frequently one hour distant or more.

(JAG, 5/95)



#6- Whereas many easements taken have minimal value when compared to problems inherited, some support healthy bottomland hardwoods, valuable wetlands, and important wildlife habitat.

(JAG, 7/96)



#7- When feasible, cooperative agreements are negotiated with easement owners for improvements to individual tracts. Native grass establishment and reforestation are examples.

(JAG, 6/96)



A complete set of aerial photographs for all easements was purchased during the period.

A five acre experimental plot of eastern gamma grass was planted on the William Niemeier easement in April. The area promptly flooded.

Wetland restoration of two old river oxbows was undertaken on two basins for a total of six acres on the former Comstock property, Scotland County in December.

A potential debt cancellation conservation easement was reviewed on the John Rardon property, Linn County, along with NRCS and FSA team members 2/20. A conservation plan was drafted for the 65 acre tract by the team 3/20. No further action has been taken.

3. Other

Nothing to report.

D. PLANNING

1. Master Plan

Nothing to report.

2. Management Plan

The EPP Management Plan (Eastern Prairie Population of Canada geese) was revised in June of 1992. The more updated and realistic refuge responsibilities stated within the plan reflect current population trends and reduced food production requirements. Under the revised plan, a sustained zone population of 100,000 Canada geese (10/15 - 3/15) and a refuge contribution of 35,274 bushels of grain annually is desired.

3. Public Participation

Congressional interest, as well as private inquiries pertaining to refuge management, the goose population, funding, the hunting program, water manipulation, etc. has decreased substantially in recent years. Hopefully, this is an indication that we are communicating better with the public, and working harder at selling the National Wildlife Refuge System and sound management techniques.

4. Compliance with Environmental and Cultural Resource Mandates

Section 404 permits are pursued from the Corps of Engineers for all wetland related work and/or flood rehabilitation projects when required. No major projects requiring permits were scheduled during the period.

5. Research and Investigations

Nothing to report.

6. Other

Nothing to report.

SWAN LAKE STAFF 1996



7, 5, 6, 4
2, 1, 3

E. ADMINISTRATION

1. Personnel

		<u>EOD</u>	<u>STATUS</u>
1. John A. Guthrie, Refuge Manager	GS-485-12	12-03-90	PFT
2. Bridget E. Olson, Wildlife Biologist	GS-486-09	03-21-95	PFT
3. Rose J. Hannebaum, Administrative Tech.	GS-303-06	04-08-90	PFT
4. Harold C. Milligan, Eng. Equip. Oper.	WG-5716-08	05-14-75	PFT
5. Stuart L. Burnside, Tractor Operator	WG-5705-06	04-07-72	PFT
6. Irvy L. Miller, Tractor Operator	WG-5705-06	03-23-80	PFT
7. George Peyton		Retired	

#8 - Administrative Technician Rose Hannebaum retired after 10 years of government service. Rose and husband Don are shown at the retirement party with eagle print and retirement certificate.

(JAG, 2/97)



Administrative Technician Rose Hannebaum retired during the period due to health reasons following ten years of government service. Although her official termination date was listed as 1/23/97, 12/2/96 marked her last official day at the office pending use of accumulated sick leave. We wish her well. For those interested in contacting her, she can be reached at 1776 N 100th St, Minneapolis, Kansas 67467.

With retirement of the assistant manager in May, 1994, and the addition of a private lands biologist in 1995, total station personnel on board has remained at six. Temporary personnel have been non-existent over the last ten years.



2. Youth Programs

YCC and other youth programs were again absent during the period due to funding constraints and continued staff involvement in flood related activities.

3. Other Manpower Programs

Nothing to report.

4. Volunteer Program

Volunteers contributed significantly to refuge operations during 1996. Chillicothe Audubon Society members assisted with waterfowl census work, shorebird surveys, non-game bird point count surveys, and special weekend visitor center openings. The Mendon Lion's Club graciously donated their time and talents in serving lunch to disabled deer hunt participants. Members of Sumner Community Betterment also assisted in special visitor center openings.

5. Funding

A five year annual O&M funding history is illustrated below. Funding was been adequate to accomplish most refuge programs over the period illustrated. Special flood damage funding in recent years has allowed the refuge to accomplish larger, more expensive construction projects which may not have been funded in the future under normal circumstances.

Five Year Annual O&M Funding History

<u>Funding Code</u>	<u>FY-92</u>	<u>FY-93</u>	<u>FY-94</u>	<u>FY95</u>	<u>FY-96</u>
1121 (PL)	59,000	36,000	56,000	47,000	46,500
1230 (Non-game)	-	-	-	-	1,130
1261 (Oper.)	211,916	202,015	208,902	214,024	251,200
1262 (MMS)	132,011	349,596	125,806	111,806	30,000
9120	1,200	-	400	-	-
1221	1,500	-	-	-	-
1902 (WRP)	-	-	-	-	8,500
9110 (Fire)	-	-	-	-	100
TOTALS	405,627	587,611	391,108	372,830	337,430

In addition, to the above, DeSoto NWR contributed \$10,000 in support of Swan Lake's force account farming program through an inter-elevator grain transfer during the period.

6. Safety

Safety meetings were held periodically covering a wide variety of topics pertaining to refuge activities. Safety items accomplished during the period included: needed equipment repairs, replacement of worn out tires on vehicles/equipment, completion of step test requirements for prescribed burning participants, annual completion of Lyme disease testing, replacement of old and worn out equipment and vehicles, and LE refresher training for one staff member. Safety in operation and maintenance of equipment is and will continue to be a high priority with all staff members.

Refuge staff members Milligan, Miller, Burnside and Guthrie received audiometric hearing checks 4/16/96.

7. Technical Assistance

Technical assistance is given to numerous individuals or groups during the course of a year upon request. Questions about wetland restoration, wildlife habitat plantings, food plot establishment, moist soil management, wildlife depredations, etc. are answered or referred to the proper contact.

8. Other-Farm Bill and Private Lands

Assistance with minimal effect determinations, wetland restoration projects, WRP site and development plans, and other technical related matters was accomplished as requested in conjunction with local NRCS offices.

F. HABITAT MANAGEMENT

1. General

Swan Lake National Wildlife Refuge is located in the floodplain of the Grand River, near its confluence with the Missouri River in north-central Missouri. Yellow Creek borders it on the south and three intermittent creeks; Turkey, Elk and Tough Branch flow directly into the refuge from the north. Locust Creek, another creek of major importance, runs adjacent to the refuge on the west side before it flows into the Grand River. Hickory Creek, a small intermittent creek, flows into Yellow Creek on the east side of the refuge.

Since most of Swan Lake NWR is relatively flat, (fall is less than 1 foot/mile) it is commonly flooded by these water sources making habitat management difficult at times. Portions of the refuge impacted by periodic flooding require annual adjustments to water management, cropland management, moist soil management and planned wetland improvements based on what conditions permit to be accomplished.

A major goal of habitat management is to diversify refuge lands into a mixture of habitat types beneficial to all wildlife. We can improve nesting cover, reestablish bottomland hardwoods, increase field edge, plant native grasses, and modify farming practices for the benefit of many species of wildlife, while still meeting annual waterfowl objectives.

#9 - Three important management programs are illustrated on this page. Force account farming helps the refuge meet EPP management goals as mandated by the MDC, and adds to habitat diversification.

(JAG, 6/96)



#10- Water management is used to encourage natural growth of waterfowl foods, such as wild millet and smartweed, through timely drawdowns. Shorebird use can also be enhanced during migration periods.

(JAG, 6/96)



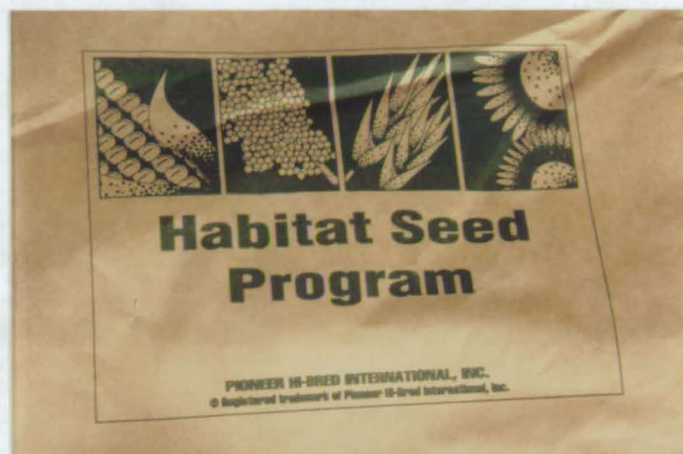
#11- Native grasses, bottomland hardwoods, and other historical nesting cover/ wildlife habitat, are planted Refuge wide as available money and conditions permit.

(JAG, 7/96)



- #12-The Habitat Seed Program through Pioneer Inc., and Burris Seed Corn Co. of Illinois have been contributors to the refuge farming program over the years....

(JAG, 4/96)



- #13- ...Winter wheat seed, sunflower seed, milo, alfalfa seed, and seed corn have been made available to the refuge at minimal or no cost. Donated seed is excellent for food plots, revegetation of construction sites, etc.....

(JAG, 10/96)



- #14- ...milo was aerial seeded into moist soil units with millet successfully during 1996. Sixty bags of seed corn were delivered to local Quail Unlimited members in a cooperative refuge/Quail Unlimited venture.

(JAG, 8/96)



2. Wetlands

Wetland management generally consists of a gradual drawdown in the early spring of the two large moist soil units, Swan Lake and South Pool. Smaller units are drained on a staggered schedule from April through June. All units are normally reflooded during the fall or spring months. Typically, all of the moist soil units are flooded naturally at least once each year. As with most plans dependent on weather, water level management of individual pools must be flexible and adjusted annually according to changing conditions.

Extensive rainfall and resulting refuge flooding from later May thru mid-June delayed water management plans in many refuge units. In early July, about 300 acres of mud flats were aerial seeded to Japanese millet by a local pilot at a cost of \$3.89/acre. A planting rate of 10 lbs. millet/acre was used. In addition, 900 lbs. of milo seed previously acquired, was also aerial applied. As illustrated by the accompanying pictures, seeding was overall very successful.

In an effort to re-establish a grass cover crop on all flood damaged portions of levees and construction sites, numerous attempts were made with a variety of grass/cover type plantings during July. Winter wheat (1 ½-2 bu./ac.), native grass (8-10 lbs. PLS/ac.), perennial ryegrass (1-2 lbs./ac.), and KY31 tall fescue (15 lbs./ac.) were all tried with limited success. The lateness of planting as well as dryness at planting time were limiting factors.

Flooding has always been a part of Swan Lake NWR and its management programs. Emergency spillways allow flood waters to enter and exit wetland units with minimal damage to existing levees and water control structures. But an increasing number of new levees and rising height of existing levees along the Grand River System have influenced both the frequency and severity of annual flooding. Couple this with the top three floods in history recorded in 1993, 1995 and 1996, and you have the makings of a very unsettling time. The question is, are we destined to see this every year, or are we just in a very wet cycle?

With July drawdown of refuge moist soil units being the norm, all nine units totaling in excess of 3,000 acres produced fair to good waterfowl foods. Wild millet and bidens were especially successful. Even three years after the Great Flood of 93, American Lotus has not returned to refuge waters in significant amounts.

In September, four staff members attended a three day Moist Soil Management Workshop held in Williamsville, MO. The workshop was sponsored by Gaylord Lab, University of Missouri, with a team of instructors led by Leigh Fredrickson. Basic principles of all phases of moist soil management were discussed and combined with field exercises. Maintenance staff were given the opportunity to attend because they are involved in moist soil management at Swan Lake, their input and suggested improvements in the current water management program are valued, and it was a break from the normal routine and somewhat of a reward for continued good work. When all was said and done, we came back a more knowledgeable staff with a better understanding of moist soil management and its benefits.

#15-In order to aerial seed millet in July, moist soil units were first drained prior to seeding. A wet/muddy environment is desirable to insure good germination and stand establishment.

(JAG, 7/96)



#16-A local pilot was contracted to seed 300 acres of mudflats to Japanese millet in early July. Seeding rate was 10 lbs. millet seed per acre at a cost of \$3.89/acre.

(JAG, 7/96)



#17-The existing refuge runway was used by the pilot. Refuge staff assisted in loading the plane with seed after each trip to moist soil units. The process went very well.

(JAG, 7/96)



#18-Sprouts from seeded millet could be seen only days after planting. Mudflats quickly dried out as wind and sun worked on exposed ground.

(JAG, 7/96)



#19-Eventual stands of aerial seeded millet were impressive and periodic rainfall aided stand establishment. Fields were flooded in September through November to encourage waterfowl use.

(JAG, 8/96)



#20-Annually, moist soil units provide abundant food for migrating waterfowl - both during spring and fall migration periods. Units also benefit shorebirds and wading birds by providing shallow water habitat.

(JAG, 9/96)



#21-Ideally moist soil units should be disturbed by later May, periodically. With wet springs and early summer the norm here, fall tillage of MSUs has become more attractive with results impressive.

(JAG, 9/96)



#22-Units fall disced and partially flooded received extensive use by migrating waterfowl during both spring and fall migration periods. Shorebirds also found habitat conditions attractive.

(JAG, 9/96)



#23-Refuge staff members attended a Moist Soil Management workshop sponsored by Gaylord Lab in September. Here, Charlie Shaffer of Mingo NWR explains the basics of adequate waterfowl food production to participants.

(JAG, 9/96)



3. Forests

Although nothing was accomplished on the refuge in terms of planting bottomland hardwoods during the period, the potential exists in abandoned farm fields for establishing native forest species. Yellow Creek Research Natural Area is located along the southern boundary of Swan Lake Refuge and supports our most impressive stand of bottomland hardwood timber. The area encompasses 1,000 acres.

4. Croplands

Cropland management is conducted on approximately 1,950 acres of the refuge. All farming is done for account either by refuge employees, who farm about 1,150 acres of the interior of the refuge, or by Missouri Department of Conservation personnel, who farm about 800 acres on the refuge perimeter adjacent to goose blinds.

The farming program has been based on biological farming practices in which no pesticides or fertilizers are used. In recent years however, to make up for a failed legume crop vital to biological rotations, minimal fertilizer and lime were applied. The fertilizer and lime application rate was determined by soil tests run by the University of Missouri.

In an effort to re-establish the refuge legume crop, 305 acres of cropland were frost seeded to a red/alsike clover mixture in mid-February. Five pounds alsike clover and six pounds red clover were planted per acre. The well established crop was destroyed in early June however, by flood waters.

In a similar venture, 216 acres of corn planted April 24-26 were a victim of flooding, poor germination, cool/wet weather and cutworms. The surviving 80 acres of corn following a second planting June 20 were marginal, with an estimated yield of from 65-75 bushels per acre produced. Remaining corn ground was fall tilled in preparation for next years crop.

The pre-approved herbicide Sutan was applied to all corn acreage at a rate of 7-8 pints per acre. A minimal application of Sutan removes foxtail competition during early stages of corn growth.

The goals of the refuge farming program are: (1) to meet waterfowl food objectives as listed in the EPP Management Plan and mandated by the Missouri Department of Conservation (35,274 bushels of grain produced annually), (2) promote habitat diversity for both migratory and resident wildlife, (3) demonstrate biological farming principles, (4) build existing soil organic matter and nutrients depleted by past farming operations, and (5) compliment other refuge management programs for the benefit of wildlife and people.

During the period, the Refuge's lone permittee farmer, John Zeilstra, planted 125 acres of crop under a 70% - 30% share system. Based on this agreement, the permittee received 87.5 acres of soybeans and the refuge 37.5 acres of corn in 1996. Only pre-approved agricultural chemicals were applied.

5. Grasslands

In an effort to reduce station mowing costs and time, approximately two acres normally mowed near headquarters were seeded June 18th to a mixture of native grasses and forbs. A seeding rate of 10-12 lbs. PLS/acre was used with an assortment of prairie forbs. Little bluestem and sideoats gramma were the predominant grass species.

Prescribed burning of 230 acres of planted native warm season grasses was accomplished 4/9/96. The "hill", located along our east boundary, was burned previously in 1990. Prescribed fire is used to restore and maintain warm season grass stands and curtail invasion by undesirable woody species. An excellent stand of big bluestem and Indiangrass resulted from this years burn, but control of woody vegetation was only fair. In portions of the field, grass stands have in some cases become too rank for wildlife use and could require mechanical manipulation in the future.

A small eleven acre native grass plot was burned in January in response to recent MDC research concerning timing of burns. Their research indicates that fall or winter burns are actually more beneficial in terms of promoting a healthy grass stand and responses by native forbs than spring burns. Spring burns however, are still required for woody vegetation control. Our test burn resulted in an excellent stand of native grass.

6. Other Habitats

Portions of several refuge fields planted to corn in 1995, were left standing during 1996 and allowed to grow up in annual weeds. This is a simple and successful way to establish a wildlife food plot beneficial to a variety of refuge wildlife.

7. Grazing

Nothing to report.

8. Haying

Nothing to report.

9. Fire Management

See Section F.5 (Grasslands).

10. Pest Control

Encroachment of brush on refuge levees and in moist soil units continues to be a major problem. Prescribed burning and mechanical means such as discing or mowing have slowed but not alleviated the problem. Chemical control is possible, but cost and environmental damage lends itself to the unacceptable. To compound the problem, many existing refuge levees were originally constructed with side slopes too steep to maintain.

#24-In an effort to reduce mowing costs, a portion of the headquarters lawn was planted to native grasses/forbs on June 18. The planting site was first selected (taller grass)

(JAG, 6/96)



#25-.....an application of Round-up herbicide took care of existing grass and weeds. Dead stubble was then burned, thus providing a very black and dusty environment to seed into.....

(JAG, 6/96)



#26-.....With the gracious help of Squaw Creek NWR's personnel (Mike Callow) and equipment, a mixture of native grasses and forbs were interseeded into the plot at 10-12 lbs/PLS per acre.

(JAG, 6/96)



11. Water Rights

Nothing to report.

12. Wilderness and Special Areas

Nothing to report.

13. WPA Easement Monitoring

Nothing to report.

G. WILDLIFE

1. Wildlife Diversity

Four main habitat types on the refuge (wetland, grassland, forest, and cropland) are maintained or enhanced to provide nesting, resting, and feeding areas for a wide array of migratory and native wildlife. Also present are areas in transition between habitat types (cropland-grassland, grassland-shrub). The transition zones provide edge habitat as they succeed from one seral stage to the next. Vegetative growth is encouraged by eliminating mowing in isolated fields and field edges. Enhancement measures undertaken for wildlife diversity include the conversion of 760 acres of cropland to moist soil units over the past decade. The units are managed for high invertebrate populations and a variety of plants species that are attractive to a myriad of wetland dependent wildlife species. Prairie areas are burned periodically to maintain and rejuvenate native grass stands. Yellow Creek Research Natural Area provides approximately 1,000 acres of old growth bottomland hardwood forest habitat.

This diversity of habitat supports a variety of breeding and migratory birds. Swan Lake's bird list boasts 239 species and 11 accidentals.

2. Endangered and/or Threatened Species

The bald eagle and peregrine falcon are federally listed threatened and endangered species found on the refuge. Eagles are common winter residents while peregrine falcons are spring and fall migrant visitors.

Eagles were increasingly attracted to the dead and dying snow geese that were succumbing to avian cholera through the latter part of November. The eagle population peaked December 17, at 91 birds. About 6,500 Canada geese, 1,500 snow geese and 250 ducks were also present.

In November, refuge staff captured and transported an immature, female bald eagle to the University of Missouri, Columbia, Raptor Rehabilitation Center. The eagle could not fly and appeared ill or injured. Examination revealed an injured wing that had become infected rendering the bird flightless. The eagle was rehabilitated and released to the wild in March, 1997.

#27-Missouri is home to more than 300 species of spiders. British arachnologists have estimated populations ranging from 11,000 spiders per acre in woodlands to more than 2 ½ million spiders in a grassland acre.

(JAG, 5/96)



#28-The refuge supports at least 40 species of mammals. While one can only admire the beavers ambition, damage to trees, levees and water control structures is significant.

(JAG, 11/96)



#29-Of the 239 species of birds which frequent Swan Lake NWR, few are more interesting than wading birds such as the green heron pictured at right.

(BO, 6/96)



A peregrine falcon was observed on the refuge 4/29 and again 10/21 and remained on the area for about a week.

Several wildlife species on the Missouri Department of Conservation's *Rare and Endangered Species Checklist of Missouri* may be found on the refuge including:

<u>Common Name</u>	<u>State Status</u>	<u>Occurrence at Swan Lake, 96</u>
Northern Harrier	Endangered	Common during spring and fall
Cooper's Harrier	Rare	One fall sighting
Sharp-shinned hawk	Rare	None observed
American bittern	Endangered	One spring sighting
King rail	Endangered	None observed
Upland sandpiper	Watch List	One fall sighting
Black Tern	Extirpated	Common Migrant
Eastern massasauga	Endangered	None observed

3. Waterfowl

The first fall migrant flock of Canada geese arrived 9/18 with about 300 individuals. Flock size increased six-fold between the first and second week of October to reach a season high of 55,738 on 10/15. Richardson's Canada geese comprised about 95% of the peak population while interiors made up the remaining 5%. The interior and migrant giant Canada geese began to arrive in larger numbers in mid-November. Snow geese numbers peaked at 80,550 (11/18), while greater white-fronted geese were noted earlier in the fall with a season high of 80 on 10/7.

Wintering geese remained in the vicinity throughout January and February, retreating southward briefly during cold snaps. Canada goose numbers peaked at 5,780 the second week of January, while snow geese numbers peaked at 32,000 the latter part of February before heading north (Table 2). A flock of 130 greater white-fronted geese was observed on the refuge 3/11. A single greater white-front as well as a snow goose remained on the refuge throughout the summer. They were often observed together.

The fall peak duck population reached 92,100 on 11/4, 77% of which were mallards and 10% green-winged teal. The onset of migration was indicated by the arrival of blue-winged teal at the end of August. Soon to follow were the pintail and shoveler. The mallard population peaked at 70,917 on 11/4, but the early onset of cold weather triggered a rapid decline shortly thereafter. Notable sightings during the fall included several black ducks and a mallard/pintail hybrid (11/12).

Dabbling duck numbers increased from a January total of 105 to a peak of 8,492 on 3/23. Mallards accounted for 46% of the March peak, with green-winged teal and northern pintail comprising 20% and 16% respectively. Several broods of mallards and wood ducks were encountered during the summer months.

Table 2. Fall migration Swan Lake NWR, 1996.

Species	Peak populations				1996 Fall use days
	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
GEESE					
Canada	383	55,738	8,625	9,904	1,245,315
Lesser snow	8	2,433	80,550	17,761	1,288,791
White-fronted	1	80	10	0	970
Ross' geese			1		8
DUCKS-DABLERS					
Mallard	63	9,683	70,917	3,073	1,069,060
N. Pintail	2,824	29,590	6,460	2	541,176
N. Shoveler	249	2,045	2,046	3	60,971
Wood duck	338	690			7,913
GW teal	10	7,398	11,973		144,831
BW teal	2,675	4,797	28		81,171
Gadwall		14,795			127,950
A. Wigeon		1,162	114		22,160
Black duck			1	1	15
DIVERS					
Bufflehead			114	1	1,284
Canvasback		8	2		87
Common Merganser			24	17	388
Hooded Merganser			26		260
Lesser Scaup		960	40		8,288
Redhead		4	70		562
Ring-necked Duck		240	304	140	7,708
Ruddy duck		1,982	463	13	19,979

#30-Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They are diverse in plant species such as water primrose.

(JAG, 7/96)



#31-Timely drawdown of moist soil units and periodic disturbance encourage: plant diversity, invertebrate production and availability, wildlife use, and waterfowl food production.

(JAG, 7/96)



#32-Hop sedge is typically found in wet woods and wet prairies. Both tubers and seeds of species in the genus *Cyperus* are important waterfowl foods.

(JAG, 7/96)



Diving and sea duck numbers fluctuated between 700 and 1,100 during February 20-March 23. Common mergansers accounted for over 80 percent of the February population while lesser scaup made up the bulk of the March counts. No divers are thought to breed on the refuge. Diver use of the refuge was more extensive during the fall with peak usage recorded in October. Ruddy duck accounted for 57% of the peak usage and lesser scaup 29%.

4. Marsh and Water Birds

The Swan Lake bird checklist contains 25 species of marsh and water birds. Eighteen species of this group were observed in 1996, including a May 11 observation of 11 white-face ibis and three common moorhen on May 30 (Table 3). Species not seen during 1996 include American bittern, king rail, eared grebe, black-crowned night heron, Virginia rail, sandhill crane, and tricolored heron. The first sighting of western grebes on the refuge was documented on 11/12. The three grebes were observed on Silver Lake from 11/12-25. Coots accounted for 90% of the total use days for marsh and water birds.

Refuge staff wrote a work plan to conduct a pilot secretive wetland bird survey on a moist-soil unit using call-response methodology. However, due to prolonged flooding of the unit the survey was not conducted. A new route will be selected for the 1997 season.

Table 3. Marsh and Water Bird Use Swan Lake NWR, 1996.

MARSH/WATERBIRD SPECIES	PEAK POPULATION	DATE	USE DAYS
Pied-billed Grebe	18	10/01	733
Horned Grebe	5	11/05	40
Western Grebe	3	11/12	69
American White Pelican	581	09/13	23,642
Double-crested Cormorant	46	10/01	1111
Least bittern	1	05/07	8
Great Blue Heron	258	07/31	13,334
Great Egret	219	08/13	9,313
Snowy Egret	3	08/21-09/03	125
Little Blue Heron	2	05/15,08/06	39
Cattle Egret	4	04/25	40
Green Heron	3	08/28	54
Yellow-crowned Night Heron	2	06/02	16
Common Moorhen	3	05/30	24

Coot	17,499	10/15	431,503
White-faced Ibis	11	05/07	11
Common Loon	1	11/18	2
TOTAL USE DAYS			480,064

5. Shorebirds, Gulls, Terns and Allied species

Spring shorebird usage was limited by high water levels. Peak migration occurred 4/25 with lesser yellowlegs (122), semipalmated plover (1), killdeer (6), American avocet (1), spotted sandpiper (2), least sandpiper (14), pectoral sandpiper (68), dunlin (21), dowitchers (3), Wilson's phalarope (3) and "peeps" (124). May and early June flooding of Swan Lake Pool delayed the drawdown schedule. The pool didn't reach planned low water elevations until late July. The resulting exposed mudflats and sparsely vegetated pool edges provided ideal habitat throughout August for shorebirds returning from their breeding grounds (Table 3). Twenty species of shorebirds were observed throughout the fall period compared to the 14 species recorded during spring. Weekly shorebird count information was sent to Manomet Observatory (Manomet, MA) as part of the International Shorebird Survey. Manomet staff indicated that the stilt sandpiper counts at Swan Lake "are quite high by national standards."

Table 3. Peak Shorebird Numbers, Swan Lake NWR, 1996

Lesser Golden Plover	1	08/28	Western Sandpiper	2	08/21
Semipalmated Plover	2	05/21	Least Sandpiper	200	08/28
Killdeer	480	08/28	White-rumped Sandpiper	2	08/28
American Avocet	29	10/28	Pectoral Sandpiper	1360	08/28
Greater Yellowlegs	4	04/16	Dunlin	21	04/25
Lesser Yellowlegs	160	08/28	Stilt Sandpiper	1440	08/28
Solitary Sandpiper	10	08/13	Buff-breasted Sandpiper	1	08/13
Upland Sandpiper	1	08/28	Short-billed Dowitcher	107	08/21
Marbled Godwit	9	07/08	Long-billed Dowitcher	195	08/21
Ruddy Turnstone	1	05/11	Common Snipe	52	04/12
Sanderling	1	08/21	Wilson's Phalarope	3	04/25
Semipalmated Sandpiper	200	08/28			

Ten species of gulls and terns are listed on the refuge bird checklist of which seven were observed in 1996. About 500 Bonaparte's gulls were observed 10/15 and 250 ring-billed gulls 10/01 on Silver Lake. Black terns, once thought to breed in Missouri, are now only migrant visitors. These birds, on the Region 3 list of Migratory Nongame Birds of Management Concern, were observed in May (20), August (18) and September (14). Herring gull, Franklin's gull, Caspian tern, and Forster's tern were also observed during the year.

6. Raptors

Twenty-three species of raptors have been sighted on the refuge. The bald eagle and peregrine falcon are discussed under Section 2.

The most common raptors are the turkey vulture, red-tailed hawk, northern harrier, and barred owl. Red-tails and harriers are observed in small numbers (1-6) while conducting weekly waterfowl counts almost year-round. Barred and great-horned owls are often heard in the early morning hours near the refuge residence. An osprey was sighted 9/03, a merlin 10/12, and two red-shouldered hawks 12/18. Golden eagles were sighted throughout November.

7. Other Migratory Birds

Each year large flocks of grackles and red-winged blackbirds descend upon the refuge and surrounding area during fall migration. One flock noted on a moist soil unit levee was approximated at 8,000 birds. These large flocks frequently visit standing corn fields in the area.

Heavy Equipment Operator Milligan, conducted the annual Mourning Dove Call-Count Survey during the month of May. A total of 49 doves were heard and 15 seen on route 1881, compared to 73 heard and 31 seen in 1995. On route 2050, 50 doves were heard and 12 observed. This route was not completed in 1995 due to flooding though 53 doves were heard and 12 seen in 1994.

Missouri is within the Central Management Unit. The 1996 mourning dove population was significantly below that of 1995 level for the second year in a row in the unit. The mean number of mourning doves heard per route in Missouri was 10.0-19.9, 1995-1996.

A terrestrial breeding bird survey was conducted June 9, in the refuge's tall grass prairie habitat via point count method. Twenty-four species of birds and 66 individuals were detected on six census points (Table 4).

Three additional species; black-capped chickadee, eastern kingbird, and house wren were detected while the observers were traveling between points.

The common yellowthroat and red-winged blackbird were the two most common birds as both species were

Table 4. Bird species detected in tall-grass prairie habitat point count survey June 9, 1996.

Acadian Flycatcher ¹	Field Sparrow
American Crow	Great Blue Heron
American Robin ¹	Indigo Bunting ¹
Barn Swallow ¹	Mallard
Blue-Winged Teal	Northern Bobwhite
Brown-Headed Cowbird ¹	Red-Bellied Woodpecker
Cedar Waxwing ¹	Red-Headed Woodpecker
Common Yellowthroat ¹	Red-Winged Blackbird ¹
Dickcissel ¹	Ring-Necked Pheasant
Double-Crested Cormorant	Rose-Breasted Grosbeak ¹
Eastern Meadowlark ¹	Wild Turkey
Eastern Tufted Titmouse	Wood Thrush

¹ Denotes neotropical migrant landbirds

detected in each of the six plots for a total of 10 and 18 respectively. The dickcissel tied with the red-winged blackbird as the most abundant species with 18 individuals detected in five census plots. Consequently these two abundant species had the highest mean detected rates of 3.0 birds per census point. The common yellowthroat had a mean detection rate of 1.67 birds per point. Besides the dickcissel, two other grassland birds, the eastern meadowlark and field sparrow had mean detection rates of 0.33 and 0.17 respectively.

Data collected in 1996 provided information on species occurrence only. Survey data from proceeding years will be used to determine species distribution and composition between habitats, to study the yearly population changes, and establish relative abundance indices.

The Audubon Society's Christmas Bird Count took place December 28. The entire refuge falls within the Count area as well as nearby Fountain Grove Wildlife Area and Pershing State Park. Sixty-nine species and 18,857 individuals were observed. In comparison, 51 species and 15,017 individuals were observed in the 1995 count. The more abundant species encountered included the American tree sparrow (1025), house sparrow (655), European starling (531) and dark-eyed junco (275). The raptors and owls were out in full force with 10 species observed or heard.

The Grand River Chapter of The Audubon Society conducted a one day "Big Sit" 10/20. Members recorded all bird species seen or heard while in a stationary position from about 8:00 am to 5:00 pm. Forty-one species were counted. Number of individuals was not tallied. Waterfowl accounted for 14 of the 41 species.

8. Game Mammals

White-tailed deer, fox squirrels, raccoon, coyote, beaver, muskrat, opossum, and cottontail rabbits are mammals commonly encountered on the refuge and classified as game mammals in Missouri. The abundance of these species refuge wide is evident based on daily sightings throughout the course of a year. River otter are present but still rate as occasional sightings. Only white-tailed deer are hunted on the refuge. The primitive weapons hunt takes place under strict regulations and is administered by the Missouri Department of Conservation.

The river otter, once present only in isolated populations in few locations throughout the state, were reintroduced experimentally onto the refuge in 1982 by the Missouri Department of Conservation (MDC). The success of the released otter on the refuge lead to a state-wide reintroduction program as a method of population re-establishment. Missouri's otter restoration project has been a success, and the MDC opened the first trapping season on the otter in 1996.

On several occasions a bull moose was observed very near Swan Lake NWR. Although never sighted on the refuge, observations of the moose continued in the local area throughout much of January. By early February, almost as quickly as he arrived, the bull suddenly vanished and was not seen again.

9. Marine Mammals

Nothing to report.

10. Other Resident Wildlife

A breeding frog and toad survey was initiated on the refuge in 1996. The objective was to determine species occurrence and distribution of anurans on the refuge. A survey route that included eight wetland sites was selected. The survey route was completed only once (4/25), rather than three times as prescribed by the work plan. The refuge was flooded during the late spring and early summer time periods. Four anuran species were detected; western chorus frog, southern leopard frog, gray treefrog, and northern spring peeper. The southern leopard frog was the most frequently encountered species being detected at six of the eight wetland sites. All anuran species detected in the survey are considered common with nearly statewide distribution.

11. Fishery Resources

Current drawdown regimes, flooding frequency, and shallow water depths of impoundments, limit fishing opportunity on all waters except Silver Lake. The factors mentioned above provide habitat for a warm-water fish community in Silver Lake impoundment (3,000 acres). Boating is permitted on all waters. Motor usage (≤ 10 HP) is restricted to Silver Lake. A rock boat ramp, in need of improvement, provides access to Silver Lake.

Jim Milligan and Joanne Grady, Columbia Fishery Resources Office, conducted a fishery survey of Silver Lake July 30-August 1. The inshore fish community was sampled by a combination of electrofishing, experimental gill nets, and set lines.

Sixteen fish species were collected (Table 5). Four additional species, found in past surveys, were not collected in the 1996 sample and included golden shiners, river carpsuckers, longnose gar, and flathead catfish. Carp, freshwater drum, shortnose gar and bigmouth buffalo made up the majority of Silver Lake fishes. Other species of interest to local anglers such as channel catfish, black bullhead, white crappie, black crappie and largemouth bass, collectively made up approximately 15-20% of the fish community. Water quality is a limiting factor to improving sport fishery habitat on Silver Lake. Additional status and trends monitoring surveys will be conducted every two to three years.

Table 5. Fish species collected in fishery survey of Silver Lake, Swan Lake NWR, 1996.

Bigmouth Buffalo	Largemouth Bass	Black Bullhead
Quillback Sucker	Black Crappie	Red shiner
Bluegill	Smallmouth Buffalo	Common Carp
Shortnose Gar	Channel Catfish	White Crappie
Freshwater Drum	Yellow Bullhead	Green Sunfish
Gizzard Shad		

- #33-Recent studies have indicated a good population of channel catfish and flat-heads in Silver Lake. Improved fisherman access is one of 1997's main goals.

(JAG, 6/96)



- #34-The eastern spiny softshell turtle is currently abundant in refuge waters. Periodic flooding however, is slowly reducing depth and capacity of Silver Lake, our main reservoir pool.

(JAG, 7/96)



- #35-Freshwater mussels can be found in most refuge impoundments, Maple leaf (bottom R.), white heel splitter (top R.), and giant floater (center) are common species.

(JAG, 6/96)



12. Wildlife Propagation and Stocking

Personnel from School of Forestry, Fisheries and Wildlife, Louisiana State University, Baton Rouge had been collecting white-tailed deer fawns from the state of Missouri for the past four years. Although the deer were not collected from the refuge herd, the fawns were kept and rehabilitated at the State Hunting Headquarters (located on the refuge) until transfer to Louisiana. Graduate students were comparing the rate of antler growth and weight gain between MO and LA white-tailed deer. An average of 40-60 "orphaned" fawns were collected annually. It was discovered however that the professor in charge of the study was selling the male fawns to hunting preserves in order to cover the costs associated with the study such as feed! The collection of Missouri's unsuspecting fawns was immediately discontinued.

13. Surplus Animal Disposal

Nothing to report.

14. Scientific Collections

Nothing to report.

15. Animal Control

Nothing to report.

16. Marking and Banding

Pre-season banding of Canada geese on the refuge has been accomplished in recent years by MDC personnel with assistance from refuge staff. Due to a combination of personnel changes at the State Hunting Headquarters on the refuge and lack of habitat at the banding site, no Canada geese were banded on the refuge for the first time in 48 years.

Another attempt by MDC personnel to capture and band wood ducks on the refuge was unsuccessful.

17. Disease Prevention and Control

An outbreak of avian cholera occurred on Swan Lake NWR from 11/12 - 12/02. A snow goose carcass was initially sent to the National Wildlife Health Center, Madison, WI where avian cholera was confirmed. Dead waterfowl were picked up by MDC and FWS personnel on the refuge in amounts ranging from 2-90 daily throughout the course of the outbreak. Retrieved birds were burned using the refuge incinerator. Birds were picked up in three pools; Silver Lake, Swan Lake and MSU1. A total of 393 birds were collected. Snow geese comprised 98% of the total mortality. Three Canada geese, three Ross' geese, one mallard, two green-winged teal, and one ruddy duck were also collected.

#36-Avian cholera is a highly infectious disease caused by the bacterium, *Pasteurella multocida*. Since 1970, occurrence of the disease has increased dramatically in the United States. It is now one of the major causes of waterfowl mortality.

(JAG, 12/96)



#37-Suspected cholera at Swan Lake was confirmed by the National Wildlife Health Center in Madison, WI, during November. From 11/12-12/2, 393 specimens were picked up of which 98% were snow geese. Collected birds were incinerated.

(JAG, 12/96)



#38-Of major concern was the presence of 43,000 ducks on the refuge during the avian cholera outbreak, but only four ducks were picked up during the entire period. Cold weather in early December ended the problem abruptly.

(JAG, 11/96)



An estimated 43,000 ducks, 39,000 snow geese and 2,000 Canada geese were utilizing the refuge at the onset of the outbreak. The average day-time temperature during the outbreak was 37 degrees with a range of 25-58 degrees. Day-time freezing temperatures on 11/24-26 effectively halted the outbreak by freezing the pools. Goose numbers had dwindled to 9,000 and ducks to less than 100 by December 2. However, bald eagles continued to concentrate on the refuge and partake in the goose feast with a peak of 90 recorded on 12/17.

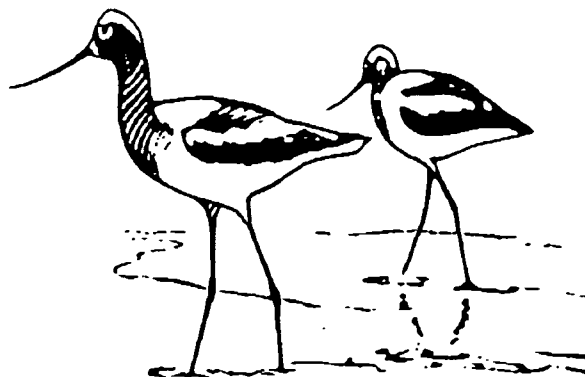
H. PUBLIC USE

1. General

Approximately 30,000 people visited the refuge in 1996. Wildlife observation accounted for 80% of the visitation. Many people drive through the refuge in the evenings during the year. Autumn is the most popular time for people to visit due to the arrival of waterfowl, the migration of many other birds, and presence of fall colors.

People enjoy stopping at the Visitor Center throughout the year. In 1996, over 3,000 people took advantage of the opportunity to view wildlife videos, ask questions, and look at the many available exhibits. In latter October and November, weekend visitors were able to enjoy the Visitor Center, when it normally would be closed, due to refuge volunteers manning facilities.

Other popular activities on the refuge included hunting and fishing, accounting for 10 % of the total visitation. In addition, a number of people hiked the nature trail, photographed wildlife, and participated in other consumptive wildlife recreation, such as picking berries or pecans, and collecting deer sheds.



#39-On occasion, visiting school groups were briefed by MDC personnel on sexing and aging geese, banding techniques, and species identification. A good example of inter-agency cooperation.

(JAG, 10/96)



#40-Wildlife Biologist Olson spent significant hours working with local school groups and organizations promoting Swan Lake NWR. Students pictured are conducting refuge waterfowl survey.

(JAG, 11/96)



#41-During National Wildlife Refuge Week in October, visitors were greeted with an 8 mile auto tour route and accompanying brochure. Management practices, refuge wildlife, on-going programs, and the FWS were emphasized.

(JAG, 10/96)



#42-The visitor center contains numerous displays, wildlife mounts, an informational video, and assorted brochures. An outside informational kiosk substitutes for refuge staff during periods of office closure.

(JAG, 12/96)



#43-Just about everyone in Missouri fishes. The refuge is open to public fishing 3/1-10/15 annually. Channel catfish, bullhead, and crappie are the most sought after species. Improving fisherman access is 1997's goal.

(JAG, 6/97)

#44-Wildlife observation accounts for nearly 80% of all refuge visitation. The big draw is fall migration, but spring migration, bald eagles, white-tailed deer and white pelicans are also important.

(JAG, 11/96)



#45-In special refuge school programs, MDC personnel were recruited to assist refuge staff in manning set stations. Here MDC Biologist Mack Ellis displays his grass-land management knowledge to local students.

(JAG, 10/96)



#46-Three very popular primitive weapons deer hunts were held in January on Swan Lake NWR. A total of 105 deer were harvested. Participants were selected and the hunts run by the MDC under cooperative agreement.

(JAG, 1/97)



#47-Three disabled deer hunt volunteers pose with head of typical buck this portion of Missouri has become known for. Disabled hunters (all but one wheel-chair bound) harvested a total of 8 deer.

(JAG, 1/97)



2. Outdoor Classrooms - Students

Nothing to report.

3. Outdoor Classrooms - Teachers

Nothing to report.

4. Interpretive Foot Trails

The old 3/4-mile loop habitat trail was relocated adjacent to refuge headquarters during 1996. Periodic flooding and reoccurring damage resulted in the new, more reliable location. The current 1/2-mile trail leads to an existing banding site along Swan Lake. Future plans include wood chips, interpretive displays and signing.

5. Interpretive Tour Routes

A special eight mile auto tour route was developed for National Wildlife Refuge Week, October 5-13, 1996. The route traversed through the refuge and contained eight numbered stops explained within a brochure. Stops emphasized native grasses, water control structures, croplands, the refuge hunting program, Silver Lake, moist soil management, wildlife, habitat diversity, and the Refuge System.

6. Interpretive Exhibits/Demonstrations

The refuge Visitor Center contains six exhibits with lifelike mounts of birds and animals, and numerous photographs with interpretive texts. In addition, a habitat touch table is available. Although these exhibits are enjoyed, the two VCR units are much more popular. One video contains an introduction to the refuge and explains the activities to enjoy during each season. The second VCR unit, set up in our small theater, allows the visitor to select a video out of seven different subjects including: the North American Waterfowl Management Plan, pelicans, "the duck stamp story", river otters, snakes and America's Wetlands. Future plans are to redo many of the office displays and update information. Most exhibits are over fifteen years old and in need of repairs.

7. Other Interpretive Programs

In addition to many school groups and several organizations visiting the refuge during the period, refuge staff participated in numerous programs during 1996.

8. Hunting

Goose Hunting

Goose hunting on Swan Lake NWR has been a popular refuge program since 1955. The hunting program is run annually by the Missouri Department of Conservation under cooperative agreement. The 1996 Canada goose season was scheduled for 40 days in the Swan Lake Zone. Several changes were made in the hunting program this year with a goal of improving overall quality and success rate. All blinds were evaluated based on hunter success, crippling loss, numbers of days selected and management costs. Based on this information, the poorest blinds were removed from the program during 1993-96, leaving 31 total. In an effort to improve hunting quality, several blinds were relocated and/or replaced with newer styled ones.

The 1993 goose hunting season marked the final year of a four year half-day hunt study. Based on results of this study, improvements will be gradually instigated to boost overall quality of the hunting program. Preliminary data suggested that about half of the goose hunters within the Swan Lake Zone favored half-day hunting. In 1994-96, the decision was made to annually permit all-day hunting for geese from stabilized refuge blinds. MDC data has shown that 80% of waterfowl hunters are headed home by 1:00 pm even if all-day hunting is permitted. It was felt that with significant blind reduction occurring in recent years, conversion to half-day goose hunting may be unrealistic at this time.

The 1996 Canada goose season was split with the first period beginning October 26th and concluding November 3rd. During the first seven days area hunters harvested 87 Canada geese, three white-fronted geese and four snow geese, with a zone harvest of 540. Hunter pressure was heavy with 15 parties turned away opening weekend. A total of 41,285 geese were recorded in the Swan Lake Zone prior to the opening.

The second portion of the season began November 29th, and ended December 29th. Changing weather conditions caused the refuge goose population to fluctuate daily. A high of 19,375 Canada geese was recorded 12/09 using Swan Lake during the second split. The 1996 goose season ended with 1,559 hunters harvesting 646 geese on the refuge.

A comparison of Swan Lake's Canada Goose population, harvest and food production data over the last 13 years (1983-1996), is illustrated below:

<u>Year</u>	<u>Season Length</u>	<u>Bag Limit</u>	<u>Zone Peak Pop.</u>	<u>Zone Quota</u>	<u>Refuge Hunters</u>	<u>Refuge Harvest</u>	<u>Zone Harvest</u>	<u>Bushels Grain</u>
1983	70 days	1	131,500	20,000	6,552	1,875	8,727	51,938
1984	50 days	2	64,250	16,000	6,374	2,646	12,851	13,192
1985	50 days	2	78,100	16,000	5,095	2,242	11,204	37,518
1986	50 days	2	77,985	16,000	5,686	1,659	6,726	58,994

NORTH

MISSOURI DEPARTMENT OF
CONSERVATION STATE
HUNTING HEADQUARTERS

ROUTE E

ROUTE CC

SWAN LAKE
1100 ACRES

SILVER LAKE
3050 ACRES

WET
MARSH

SWAN LAKE NATIONAL WILDLIFE
REFUGE HEADQUARTERS

PRIV
PROPL

SOUTH LAKE
800 ACRES
(MARSH)

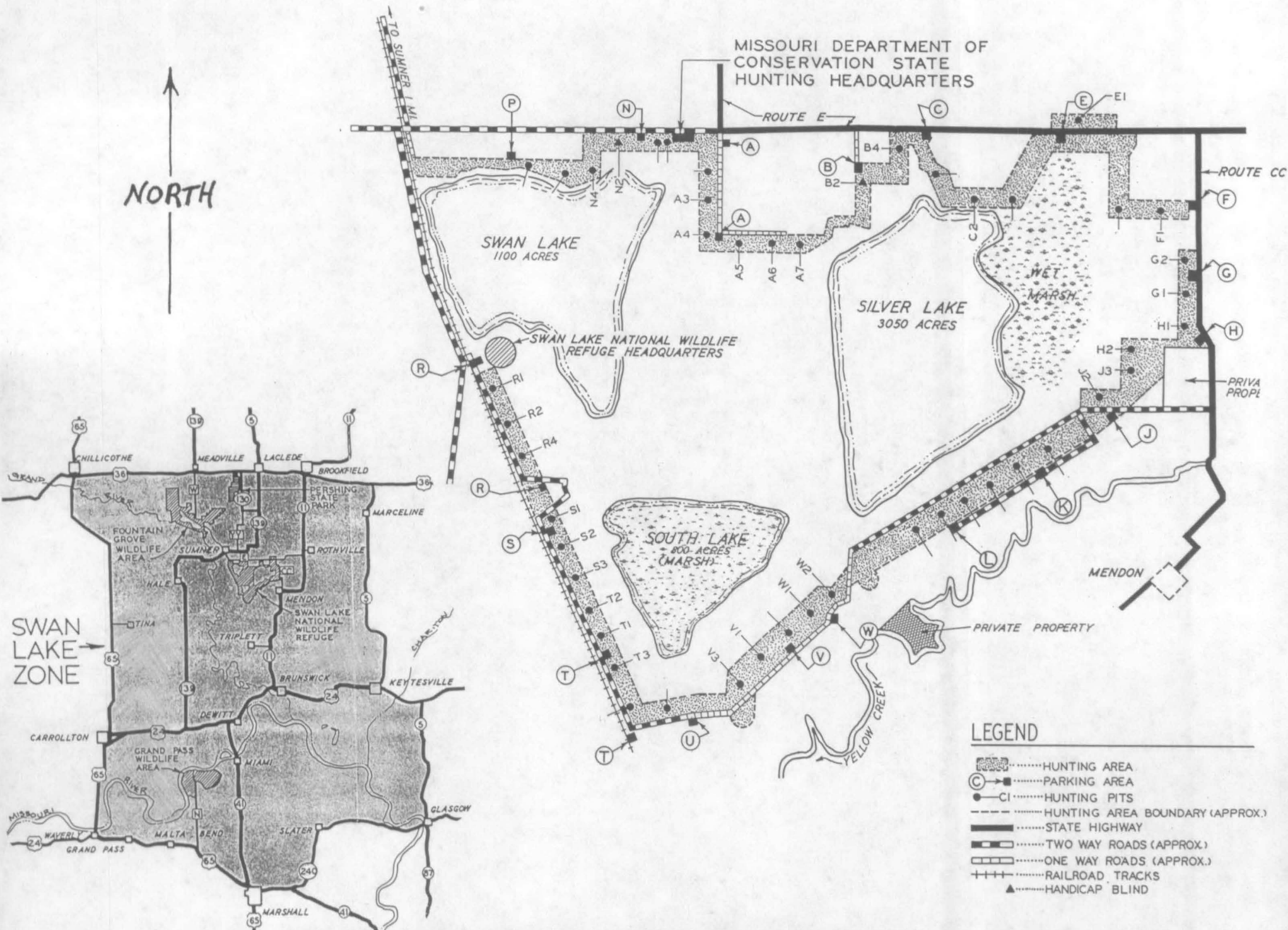
MENDON

PRIVATE PROPERTY

SWAN
LAKE
ZONE

LEGEND

- HUNTING AREA
- PARKING AREA
- HUNTING PITS
- HUNTING AREA BOUNDARY (APPROX.)
- STATE HIGHWAY
- TWO WAY ROADS (APPROX.)
- ONE WAY ROADS (APPROX.)
- RAILROAD TRACKS
- HANDICAP BLIND



1987	40 days	2	54,025	10,000	4,672	1,668	6,345	42,574
1988	40 days	2	111,450	10,000	4,435	1,836	8,978	35,042
1989	40 days	2	118,000	10,000	4,298	1,660	5,822	41,037
1990	50 days	2	67,065	10,000	4,946	1,316	5,216	12,809
1991	50 days	2	87,800	10,000	4,152	1,161	5,955	25,075
1992	50 days	2	57,700	10,000	3,579	979	4,627	28,000
1993	33 days	2	50,950	5,000	2,289	852	5,913	2,700
1994	40 days	2	42,350	5,000	2,262	675	4,192	33,520
1995	40 days	2	30,100	5,000	1,544	515	2,977	9,000
1996	40 days	2	41,285	5,000	1,791	601	3,616	8,000

Primitive Weapons Deer Hunt

Two primitive weapons deer hunts were held on Swan Lake NWR during the period. The primary goal of these special hunts is to keep an already abundant white-tailed deer population in check. On January 4-5, an any-sex hunt was held for which 936 applicants applied for 85 available permits. Another 165 people applied for 85 permits during the second but antlerless-only deer hunt on January 18-19.

During the first hunt, 77 hunters (that showed) harvested 49 deer. Weather conditions were ideal with a mean temperature of 50°F on Saturday. A few nice bucks were taken using muzzle loader firearms during the first hunt, with all participants seemingly enjoying the experience.

In the second special hunt, 70 hunters harvested 48 deer. Antlerless-only deer can be taken during this hunt. Bonus tags (allowing a second additional antlerless-only deer to be taken), can be used in either hunt.

A highlight for the year was again our muzzleloader hunt for the physically disabled January 4-5. Seven hunters (all but one in a wheel-chair) participated. Each hunter was provided a volunteer with muzzleloader, pre-constructed blind, served lunch on hunt days, and other assistance as needed. Eight deer were harvested (some bonus deer) during the two-day hunt, and everyone had ample opportunity to harvest a deer. Words cannot describe the warmth and satisfaction that surrounds this hunt. Without great volunteers it could not take place. A total of 105 deer were harvested during the three scheduled hunts.

9. Fishing

The refuge is open to public fishing under State regulations between 3/1 and 10/15 annually. Fishing was enjoyed by an estimated 3,500 people during the period. Bullhead, carp, crappie, channel catfish, and big mouth buffalo are the most abundant fish species and thus make up most of the catch.

10. Trapping

Nothing to report.

#48-All too much time has been spent in recent years, including 1996, on flood recovery projects. From 1993-1996 we have endured the top 3 floods in history for this area.

(JAG, 7/96)



#49-South Pool emergency spillway was re-rocked and reset in elevation following flooding occurring in May/June. An estimated 1,850 tons of rip rap were placed on the 300' spillway.

(JAG, 8/96)



#50-In a variation from normal road maintenance, the refuge grader was used at last resort to raise the existing levee an additional 2' and block flood water from entering Swan Lake. It worked and the road was saved.

(JAG, 5/96)



11. Wildlife Observation

Wildlife observation continues to be the most important activity on the refuge. Many local people drive through the refuge in the evenings throughout the year to catch a glimpse of wildlife species. In the fall, roads are crowded as hundreds of visitors come to view waterfowl, or attempt to see one of the many large white-tail bucks. Almost half of the non-consumptive recreational use occurs in October and November during the peak of the fall waterfowl migration.

12. Other Wildlife Oriented Recreation

Nothing to report.

13. Camping

Nothing to report.

14. Picnicking

Nothing to report.

15. Off Road Vehicling

Nothing to report.

16. Other Non-Wildlife Oriented Recreation

Nothing to report.

17. Law Enforcement

The refuge has one LE person. In addition, cooperation provided by the State Conservation Agents is excellent and they conduct the majority of LE activities on the refuge. There were no significant law enforcement problems during the period.

Refuge Manager Guthrie attended 40-hour LE refresher training in Des Moines, Iowa 4/1-5. Requalification with the Service revolver was completed at DeSoto NWR 9/25.

18. Cooperating Association

Since 1991, Swan Lake NWR has offered souvenir items for sale through the Midwest Interpretive Association. Items sold include: t-shirts, sweatshirts, coffee mugs, bird books, calendars, posters, stationary, hiking trail guides, post cards, and other items. Sales have been a pleasant surprise and staff work load minimal. New items can be added at will.

19. Concessions

Nothing to report.

I. EQUIPMENT AND FACILITIES

[1. New Construction

[2. Rehabilitation

Work accomplished during the period emphasized improving refuge facilities, flood recovery rehab and repairs, upgrade of moist soil units, and replacement of outdated or damaged water control structures. Projects along these lines completed during the period included:

- Removal of eight hunting blinds, house, fuel storage tank and debris from newly acquired Zeilstra Tract (125 acres).
- Ridged up a one mile portion of Swan Lake levee, approximately 2 feet higher to a level that kept May flood waters from overtopping levee, saving our main entrance road from extensive flood damage.
- Completed flood repair work, resloping and reseeding, on ½ mile stretch of Cross Levee #5.
- Completed flood repair work, resloping and reseeding, on 2 ½ mile stretch of South Pool Levee.
- Rehab of Swan Lake Levee including resloping, road rock, debris removal and seed down of construction sites.
- Rehab of A Levee including resloping flood damaged portions, debris removal, and seed down of construction sites.
- Repair 300 feet of South Pool Spillway with the addition of 1,850 tons of riprap placed at an elevation of 660.0 or 2 feet lower than South Pool Levee (75'Wx300'Lx1½'D).
- Regraveled portions of refuge road system (est. at 5 miles) as a result of impacts of spring flood waters. Roads were top-dressed with an average depth of 2-3 inches of 1-1 ½ inch crushed rock.
- Reestablishment of 325 acres of refuge farmland to legumes flooded out during 1995. Legumes play an important role in our modified biological farming program.
- Repairs to all moist soil unit levees in the form of resloping and patching flood damaged portions. Most of the work centered on increasing levee slope and seeding down completed work immediately following construction.

- Finally, all other, but more minor, flood related and general rehab work that was accomplished during the period. The assistance received from RO staff and the refuge work force is greatly appreciated in completing the above projects.

3. Major Maintenance

- Tillage of MSU 7 (150 acres) with heavy disc to retard woody invasion and promote growth of desirable moist soil plants.
- Hired B&B Exterminators of Brookfield, MO to rid the office/visitor center of insect pests causing noticeable damage to building structure. Termites and carpenter ants were the main target species. (\$850)
- Repair and restrain office/visitor center cedar siding and interior support structure. (\$3,150)
- Repair and restrain equipment storage building (2,048 sq. ft.) located near maintenance shop. (\$1,540)
- Shingle roof, restrain and repair exterior siding on outside public restroom located within the headquarters complex. (\$1,450)
- Accomplish general upkeep and maintenance on refuge equipment and facilities to insure a safe working environment and promote longevity of facilities and equipment.

4. Equipment Utilization and Replacement.

No major replacement of equipment occurred during the period. Minor replacement of excess or under utilized and/or outdated equipment is an on-going process.

5. Communications Systems

Nothing to report.

6. Computer systems

Nothing to report.

7. Energy Conservation

Nothing to report.

8. Other

Nothing to report.

#51-The visitor center, outside restroom, and equipment storage building received a much needed staining during the period. Cedar siding may be esthetically pleasing, but certainly not maintenance free.

(JAG, 5/96)



#52-In the process of staining and replacing deteriorated panels, it was discovered that some interior structure had also been damaged by both water and carpenter ants. Problem spots were repaired as needed.

(JAG, 5/96)



#53-In a switch from normal maintenance work such as levee repair, road rehab and debris removal, the refuge dozer/operator occasionally assist MDC personnel in moving waterfowl hunting blinds to new locations.

(JAG, 3/96)



J. OTHER ITEMS

1. Cooperative Programs

Refuge staff work closely with the Missouri Department of Conservation, NRCS, and other special interest groups or individuals on a daily basis. Periodic coordination meetings are held with Missouri Department of Conservation personnel.

2. Other Economic Uses

Nothing to report.

3. Items of Interest

Refuge Manager Guthrie and Wildlife Biologist Olson attended the Missouri Forest, Fish and Wildlife Conference hosted by MDC and NRCS, Osage Beach, MO 1/31-2/2.

Olson attended a Heritage Tourism Meeting, Salisbury, MO 2/26. The group was interested in initiating a tour bus route of historic/cultural sites within Chariton County and wanted to make the refuge a stop on the tour.

Olson gave a slide show presentation to approximately 30 second and third grade students from nearby Bosworth school then a tour of the refuge, 3/15.

Olson hosted a meeting of the Heritage Tourism Group at the refuge 3/25. A slide show of refuge management and activities was well received by the 45 or so persons in attendance.

Olson presented a slide show of refuge activities to 18 people from nearby Moberly Community College, Environmental Biology class which was followed up with a refuge tour, 4/26.

Olson attended Nongame Bird Survey and Monitoring Methods training 4/29-5/3, Buchanan, TN.

Guthrie and Olson participated in the state Private Lands Meeting, Columbia, MO 5/8.

Olson attended a workshop entitled *Management Intensive Grazing* at the University of Missouri Forage Research Center, Linneus, MO, 5/22-24.

Refuge Manager Guthrie attended a Region 3 Project Leaders Meeting held in Minneapolis, MN, 7/22-26.

Olson presented mathematical calculations utilized during wildlife population estimates to seven summer school students from Stet High School's Basic Math Class, 6/4.

Olson gave a slide show and conducted a bird walk for Northwestern High School summer Science, Agriculture and Outdoor Recreation Classes, 6/7.

Olson presented a slide show to 40 children from Northwestern Elementary School summer classes, kindergarten through sixth grade, 6/10.

Guthrie, Olson, Lee Burnside and Levi Miller attended a Moist Soil Management Workshop, Popular Bluff, MO, 9/10-12.

As part of NWR week activities, refuge staff hosted a Conservation Day for 39 fifth and sixth graders from Hale R-1 and 11 second graders from Northwestern school. The children were bussed between sites and listened to presentations on topics such as general refuge management, prairie grasses and management, wetland and water management, and waterfowl identification, 10/10. Guest speakers included NRCS and MDC personnel.

Olson presented information on Eastern Prairie Population of Canada Geese at the refuge visitor center during the annual Goose Festival in nearby Sumner, MO, 10/26.

Olson presented a slide show on management of Swan Lake NWR to Brookfield High School Environmental Biology class, 11/15.

Olson guided tour of refuge to 23 students visiting from the Environmental Science Class, Brookfield High School, 11/26.

Olson and Guthrie attended 58th Annual Midwest Fish and Wildlife Conference, Omaha, NE, 12/9-11.

In addition to maintenance items listed under I.3, we neglected to mention replacement of our old phone system with the new AT&T Partner II System (\$4,200).

4. Credits

Sections A, D, E, F, H, I, J&K (Guthrie)

Sections B, C, G & J.3 (Olson)

Typing and editing the entire report. (Comstock)

K. FEEDBACK

See following page.