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MINGO NATIONAL WILDLIFE REFUGE
Puxico, Missouri

ANNUAL NARRATIVE REPORT
Calendar Year 1990

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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REVIEW AND APPROVALS

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Refuge Manager	3/9/91 Date	3.14.91 Refuge Supervisor Review Date

	
Regional Office Approval	3/25/91 Date

INTRODUCTION

Mingo National Wildlife Refuge is located in portions of Stoddard and Wayne Counties in southeast Missouri, approximately 150 miles south of St. Louis. It was established in 1945 under authority of the Migratory Bird Treaty Act as a resting and wintering area for migratory waterfowl. The refuge contains 21,676 acres and lies in a linear basin formed in an ancient abandoned channel of the Mississippi River. The area is predominately a bottomland hardwood swamp bordered on the west by the foothills of the Ozark Uplift and on the east by a terrace called Crowley's Ridge. Elevations along the top of these ridges range as high as 405' msl compared to the 340' msl elevation of the basin.

Historically, the Mingo National Wildlife Refuge area was a haven for wildlife before logging, drainage, and conversion to agriculture altered the area. Bankruptcy of the Mingo Drainage District in the 1930's set the stage for federal acquisition and subsequent restoration of the swamp and its productivity. Peak waterfowl populations of 125,000 mallards and 75,000 Canada geese have been recorded.

The refuge contains approximately 15,000 acres of bottomland hardwoods, 1,275 acres of cropland and moist soil units, 700 acres of grasslands, and 5,000 acres of marsh and water. There are 7 natural areas on the refuge and 99 identified archaeological sites. In 1976, 7,730 acres were designated as a wilderness area. The Mingo Job Corps Civilian Conservation Center with 224 enrollees is located on the southeast corner of the refuge.

Recreational activities such as fishing; waterfowl, squirrel, turkey, and deer hunting; canoeing; and wildlife observation are very popular on the refuge. Annual visitation to the refuge the past 5 years has averaged about 150,000 visits. Facilities available to the public include a visitor center, a cooperative association sales outlet, a 3/4-mile self-guided boardwalk trail, a 25-mile self-guided auto tour, four observation towers, picnic tables, and a picnic shelter.

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K. FEEDBACK 50L. INFORMATION PACKET - - (inside back cover)

A. HIGHLIGHTS

Charles "Ab" Walk retired with 28 years government service (E-1).

The continuing education program had another successful year (J-1).

Waterfowl use on rice leases was good (F-15).

Swampbuster activity increases (E-7).

Bowhunters took a record 106 deer (H-8).

B. CLIMATIC CONDITIONS

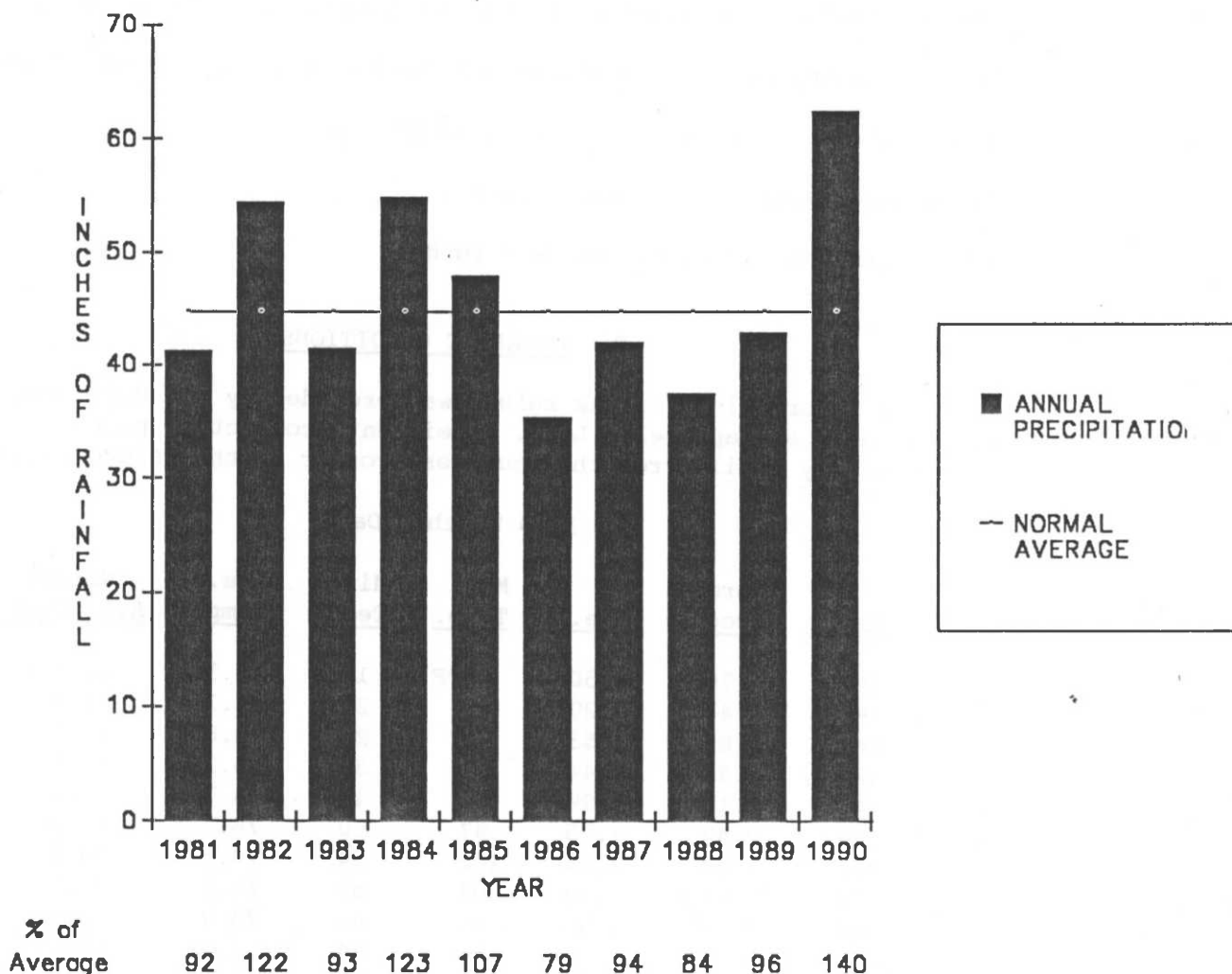
Climatic information for the refuge was provided by the U.S. Army Corps of Engineers at Wappapello Lake. Their data collection point is located approximately 1 mile from the southwest corner of the refuge boundary.

1990 Weather Data

<u>Month</u>	<u>Normal Prec.</u>	<u>Ave.</u>	<u>Max. Temp.</u>	<u>Min. Temp.</u>	<u>Ave. Temp.</u>	<u>Normal Ave. Temp.</u>
JAN	5.76"	3.50"	68°F	18°F	42.3°F	34.4°F
FEB	8.43	3.29	69	21	44.3	37.9
MAR	3.03	4.53	76	20	48.8	46.1
APR	5.36	4.44	84	30	56.2	58.9
MAY	6.16	4.99	84	42	63.7	67.2
JUN	2.42	3.75	97	50	76.2	75.8
JUL	3.48	3.38	102	54	79.5	79.5
AUG	5.61	3.39	97	57	76.9	78.2
SEP	2.43	3.56	98	46	73.7	70.8
OCT	5.19	2.96	84	34	57.4	60.3
NOV	4.78	3.70	78	33	53.0	47.4
DEC	9.84	3.25	66	6	39.2	37.2
Total	62.49"	44.74"			59.3°F	57.8°F

As the above table indicates, 1990 was marked by a year of abundant precipitation. June and July were slightly below normal in cumulative totals of rainfall allowing the moist soil units and other wetland habitat to dry out. Excellent rains followed providing good water conditions throughout the refuge.

TEN YEAR COMPARISON OF ANNUAL PRECIPITATION



C. LAND ACQUISITION

1. Fee Title

A preliminary project proposal was submitted to acquire 4,100 acres of land for addition to the refuge. The twofold purpose of this proposal is to protect additional wetlands and to add critical habitat along the refuge boundary.

Realty opened a new office at Mingo National Wildlife Refuge effective August 13. Wayne Weier, a native of Piedmont, Missouri returned to his home state to head-up this new office. Wayne will be responsible for acquisition projects in the south end of the region. Presently the refuge is providing Wayne with administrative support.

Refuge personnel continued with their involvement with New Madrid National Wildlife Refuge. Staff members met several times with Project Coordinator Jim Salyer to discuss development and management of the proposed refuge. The refuge staff also assisted Jim with a public meeting at New Madrid on September 11. Approximately 75 people attended the meeting.

A draft Environmental Impact Statement should be completed for the project in June 1991.

Gerald Clawson was detailed to lead the acquisition and planning effort for the Walnut Creek National Wildlife Refuge in Iowa. An environmental assessment and a preliminary management concept plan were prepared and a temporary office was established. A contract was awarded for a master plan and an Environmental Impact Statement.

The refuge administrative staff also provided support to this new refuge.

4. Farmers Home Administration Conservation Easements

Currently Mingo National Wildlife Refuge has 24 conservation easements on 18 Farmers Home Administration inventory properties. We have an additional six properties in which we have proposed easements but as of yet they have not been accepted. Of the 24 easements that have been accepted, 11 have quitclaim deeds while the remainder are being managed under caretaker agreements.

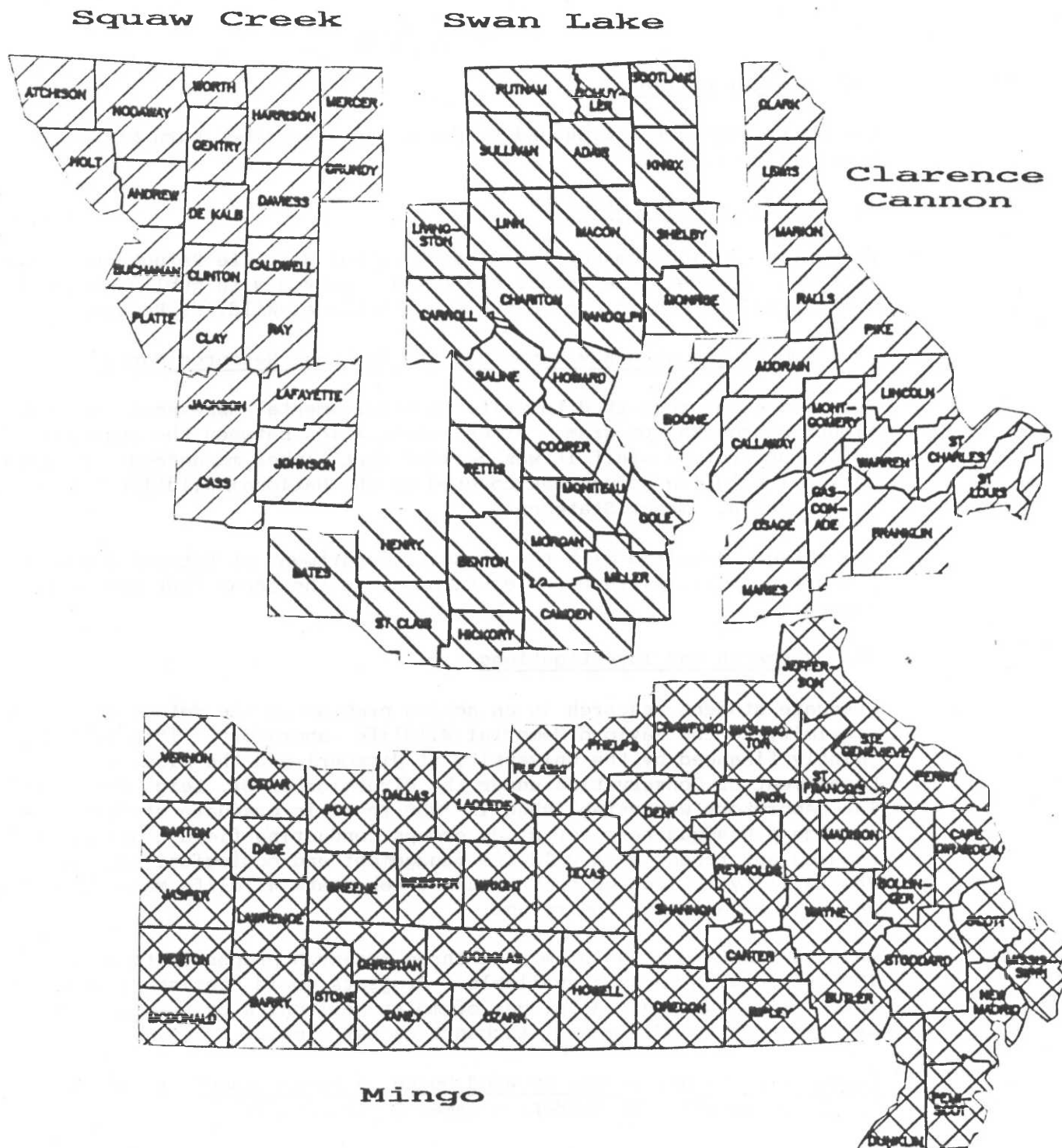
Properties with Accepted Conservation Easements

<u>County</u>	<u>Landowner</u>	<u>Acreage</u>
Barton	Abts	37.7
	*Achey	41.9
	*Reaves	11.7, 11.8, 17.4, 9.1
	West	5.9
Butler	*Fuemmeler	10.8, 2.9
	McCombs	10
	*Petty	14.7, 21.3
Cape	Propst	29.6
	Seabaugh	10
Dade	*Mareth	19.7
Dunklin	*Fieser	35.4
	Hostetler	92.5
Lawrence	Mattlage	4
Ripley	Bliss	3.2
	Luye	6.8, 17.9
Stoddard	Crowell	18.7
	Kleffer	12.7
Texas	Kuhn	<u>43.8</u>
Total	18	480.6

*Quitclaim deeds

We have boundary posted all of the above properties except Mattlage, Luye, and Kuhn.

U.S. Fish and Wildlife Service Farm Bill Property Management Zones



D. PLANNING

2. Management Plan

The water management plan and trapping and prescribed burn proposals were all submitted.

3. Public Participation

No public meetings concerning Mingo National Wildlife Refuge were held in 1990. However, the refuge staff was involved with public meetings concerning New Madrid and Walnut Creek National Wildlife Refuges.

4. Compliance with Environmental and Cultural Resource Mandates

The refuge was requested to write an environmental assessment for our timber management program. After consultation between the regional office and refuge staff it was decided that timber management in Mingo National Wildlife Refuge was covered by the National Wildlife Refuge Environmental Impact Statement.

The refuge consulted with the Missouri Department of Natural Resources concerning cultural resource disturbance in the areas that are to be logged.

5. Research and Investigations

Graduate student research is an active program on the refuge due to our proximity to the Gaylord Memorial Wildlife Laboratory. This facility is jointly financed by the University of Missouri and the Missouri Department of Conservation under the direction of Dr. Leigh Fredrickson. The Laboratory was established in 1956 to train graduate students and to provide a headquarters for study groups conducting field observational studies and research on wildlife management and ecological problems. The facility is located on the Duck Creek State Wildlife Management Area which is adjacent to the refuge.

Gaylord Laboratory has submitted three research proposals to begin in 1991 if funding becomes available. Projects would consist of additional moist soil management data, use of moist soil units by nongame species, and the effects of human disturbance on waterfowl.

Evaluation of Habitat Use by Wood Ducks in Mingo Swamp" (33540-41 Progress Report) PhD Student - James R. Kelley, Jr.

Objectives:

1. Estimate the number and density of natural nest sites available to wood ducks at a representative bottomland hardwood study area.

2. Estimate biweekly the number and density of wood duck breeding pairs and broods, and the social structure of the breeding population, with quadrat and, if feasible, transect sampling methods.
3. Estimate the proportion of the study area occupied by wood duck breeding pairs and broods (as defined in Geissler and Fuller 1986).
4. Estimate nest success rates of wood ducks nesting in natural cavities and nest boxes by sampling potential nest sites and by radio-tracking breeding females.
5. Estimate the survival rate of radio-marked females, the proportion of hens that attempt to nest, the proportion of hens that successfully raise broods, and the recruitment rate per hen and/or average brood size at fledging.
6. Develop a species account of the wood duck.

Trapping of wood ducks began in late March. Both rocket nets and decoy traps were employed. Thirty-six birds were captured and fitted with radio transmitters. Monitoring of radios continued until early December.

Weekly censuses of wood ducks began on March 10. Census plots were located in all major habitat zones. Numbers of paired and unpaired birds and broods were recorded. Censuses continued until December 10. * Data are being entered in the computer, thus results will be unavailable for sometime.

A new habitat map of floodable areas of the Mingo-Duck Creek area has been constructed. A pilot was contracted to take aerial photos of the study area on August 31. From this map the area of each habitat zone was determined with a digitizer. Approximately 5,818 ha of live forest, 840 ha of scrub/shrub, 74 ha of dead timber, 1,640 ha of open water/emergents, and 990 ha of agriculture/moist soil habitat was found on the Mingo-Duck Creek area (uplands not included). Telemetry locations are being coded with the aid of the habitat map. Field work was completed this year. Final analysis will be complete by April 1991.

"Develop and Field Test Knowledge Base System for Moist Soil Management"
(33540-42) Director/Professor Leigh H. Fredrickson in cooperation with Fort Collins National Ecology Center.

Objectives:

1. Allow refuge managers to utilize the knowledge and experience of a few experts in their "day-to-day" management of moist soil units.
2. Provide a systematic approach to moist soil management, insuring that all relevant information is considered and that unexpected possibilities are not overlooked when formulating a management strategy for moist soil units.

3. Provide an institutional memory (a common repository) for a dynamically growing knowledge base as new research is conducted and experience at some refuges is gained.
4. Provide a mechanism for transfer of expertise to new managers at a refuge or to new Fish and Wildlife Service employees.

Expert systems provide a promising framework for developing a moist soil management tool. These systems capture the knowledge and problem-solving processes of experts in a particular field so they can be made available to a larger group of less experienced people. While the system provides an expert's approach to problem solving, the user must provide his experiences and knowledge of local conditions. Expert systems analyze a problem in much the same way as human experts do--by combining problem specific knowledge with rules-of-thumb that experience teaches. This experiential understanding and the ability to use it to make educated guesses is what distinguishes experts from laymen. The ability to utilize general knowledge, rules-of-thumb, and incomplete or uncertain information, along with the ability to explain their line of reasoning, is what distinguishes expert systems from conventional computer software.

The development of a moist soil management support tool will be spread over a 4-year period. Development of the expert system will be a collaborative effort; the National Ecology Center (NEC) will provide initial development and documentation with at least one staff person from refuges involved in the development process so they can eventually refine the system and provide user support. Leigh Fredrickson (University of Missouri-Columbia) will be the primary source of subject matter expertise.

In 1988, a prototype was developed. During 1989 the system continued to be refined. Test were made during 1990 using Mingo National Wildlife Refuge data and personnel to further refine the system. Additional data will be completed in 1991.

"Movements and Survival of Wood Duck Broods in the Mingo Swamp" (33540-43 Progress Report) MS Student - James H. Gammonley

Objectives:

1. To look at habitat use and movements of wood duck broods in relation to their developmental stage.
2. To look at habitat use, movements, and survival of wood duck broods in relation to the nesting experience of females.
3. To develop a mortality schedule in relation to duckling age.

In 1988, use of wood duck nest boxes was high with 1,533 wood duck and 357 hooded merganser ducklings produced on Mingo National Wildlife Refuge and Duck Creek State Wildlife Management Area. The total of 1,890 ducklings produced in nest boxes is an increase of 41 percent over 1987.

Forty nesting female wood ducks received radio transmitters. The movements of radio-marked hens with broods were monitored daily to examine brood habitat use. Permanent telemetry stations have been established throughout the Mingo National Wildlife Refuge study area. Bearings for each bird are taken from two telemetry stations within a 15-minute period, and the two bearings must be within 60-120 degrees apart to be accepted.

Nine hundred sixty-four wood duck and one hundred fifty-nine hooded merganser ducklings were web-tagged in 1988. Broods were trapped beginning in late June, and web-tagged ducklings were identified to determine brood survival. Brood trapping was confined to Pool 1 in 1988.

Telemetry data for 1988 indicate that major brood-rearing areas within the study area are Pool 1 on Duck Creek State Wildlife Management Area and Rockhouse Marsh and Monopoly Lake on Mingo National Wildlife Refuge. These areas are characterized by large expanses of dense vegetation containing emergent wetland, scrub-shrub, and live forest habitats, and permanent water. Drainage and agricultural ditches within and surrounding Mingo National Wildlife Refuge appear to be the primary travel routes to brood-rearing areas.

E. ADMINISTRATION1. Personnel

3 6 11 12 5 2
7 1 8 4

1/91 Linda Kuykendall

<u>Name</u>	<u>Title</u>	<u>Grade</u>	<u>EOD Year</u>	<u>Type of Appointment</u>
1. Gerald Clawson	Refuge Manager	GS-12	1971	PFT
2. Jerry Kuykendall	Primary Assistant	GS-11	1984	PFT
3. Charles Shaiffer	General Biologist	GS-11	1988	PFT
4. Steven Lenz	Refuge Operation Specialist (Public Use)	GS-9	1987	PFT
5. Judy McClendon	Office Assistant (Typing)	GS-6	1977	PFT
6. Brenda Foster	Information Receptionist	GS-3	1982	PFT
7. Howard Shelton	Maintenance Leader	WL-8	1965	PFT
8. Douglas Siler	Engineering Equipment Operator	WG-8	1977	PFT
9. Charles Walk	Tractor Operator (retired 8/31)	WG-7	1962	CSFT
11. Clifford Placher	Engineering Equipment Operator	WG-8	1988	PFT
12. Judy Greenlee	Biological Aid (Wildlife)	GS-4	1990	CSFT
13. John Wesley Riddle	Green Thumb Worker (21 hrs./week)		6/90	
14. Jeanie McKensie	YCC Crew Leader		1990	Contract

Personnel changes during the year were as follows:

Gerald Clawson was temporarily promoted July 15 to GS-13 as Acting Manager at Walnut Creek National Wildlife Refuge. Jerry Kuykendall was temporarily promoted July 29 to GS-12 as Acting Manager at Mingo National Wildlife Refuge.

Judy Greenlee was converted from GW-3 (stay-in-school temporary appointment) to permanent career seasonal full time Biological Aid GS-4 effective May 20.



Two Judys, McClendon and Greenlee, both graduated from Southeast Missouri State University this year with B.S. degrees in Biology. 5/90 Mike McClendon

Charles A. Walk retired effective August 31 with 28 years of government service.



Katherine and Ab Walk at retirement dinner.

9/90 JM

The following table compares on board strength for the past 5 years.

<u>Year</u>	<u>PFT</u>	<u>PPT or Seasonal</u>	<u>Temporary</u>	<u>Total FTE</u>
90	9	2	1	10.3 (authorized)
89	10	2	3	11.3 (authorized)
88	10	2	1	10.2 (authorized)
87	9	2	2	10.2 (actual)
86	9	2	1	9.2 (actual)

2. Youth Programs



1 3 5 2
 4 6 7/90 SL

- | | |
|--------------------|-------------|
| 1. Jeanie McKensie | Crew Leader |
| 2. Marty Bryant | Enrollee |
| 3. Brandon McGowen | Enrollee |
| 4. Jodi Parsley | Enrollee |
| 5. Todd Siler | Enrollee |
| 6. Julie Wilfong | Enrollee |

This year the Youth Conservation Corps (YCC) consisted of five enrollees and a crew leader. Jeanie McKensie was hired as crew leader through a contract with the Puxico school system at a cost of \$67.67/day.

The 1990 YCC season was a successful one. The crew leader was a newcomer to southeast Missouri and the YCC program but she had an avid interest in outdoor activities and natural resources. The crew size was optimal, any smaller and it would have been difficult to complete projects.

This year, the YCC projects devoted more time (approximately 250 hours each) among three different subject areas instead of completing one large project. Trail, facility, and picnic facility maintenance (restaining picnic tables) represented a good face-lift to our visitor center and recreation areas. Three biological-oriented projects comprised of placing fish shelters in a lake, building a water control structure for moist soil development, and maintaining our waterfowl banding trap were completed. The Sweet Cabin, a historical site, was

restored by assisting the maintenance staff replace cypress "shakes." Furthermore, a wide variety of films were shown to provide environmental awareness and to stimulate their interests in natural resources. The diversity of the work projects subdued the monotony and was welcomed by all.

The YCC program is a much needed one. The enrollees worked hard and completed many jobs that may have gone undone. They all gained valuable experience and feel proud of the work they did for the refuge and its resources.

The Job Corps Center officially dedicated the new "double dormitory" on July 13. This new structure replaces two older dormitories constructed in 1965. It is intended to house 112 corpsmembers and was constructed under contract at a cost of \$1,100,000. Greg Brannum, aid to U.S. Representative Bill Emerson, gave the principal address at the dedication ceremony.



Greg Brannum represented Congressman Bill Emerson at Job Corps' Dorm Dedication

7/90 JM

Other significant changes on Center include a reduction in the welding program from two instructors to one and a reduction in the carpentry program from three instructors to two. The culinary arts program was broadened and enlarged and a new instructor added. Physical improvements included remodeling of the recreation hall basement to provide classroom space for the health program. One of the Quonset huts was remodeled to provide a meeting place for the Explorer troop. The female dormitory was enhanced through addition of a privacy fence, sun deck, new carpeting, etc.



2/91 JM



Corpsmembers salvaging fish from Gritman Lake site.

7/90

No heavy equipment work was completed on the refuge this year. The welding program produced pipe gates for other refuges and downsized a heavy equipment trailer for DeSoto National Wildlife Refuge.



Job Corps welding program produces gates for other refuges.

2/91 JM

Corpsmembers and staff participated in a major refuge cleanup and tree planting effort on April 19. Other corpsmember efforts included removal of illegal deer stands, acorn collection, etc.



Corpsmembers assisting with refuge cleanup.

4/90

3. Other Manpower Programs

The Green Thumb program continued to provide some excellent assistance to the refuge. Willie Oliver, our Green Thumb worker for over 2 years was moved down to Job Corps in June and replaced by Wesley Riddle. The duties of this position include keeping buildings, roadsides, and public use areas clean and litter free and assisting with light mechanic and carpentry projects.



Willie Oliver "transferred" to Job Corps after 2 years as our Green Thumb worker. 6/90 JM



John Wesley Riddle - Green Thumb worker.

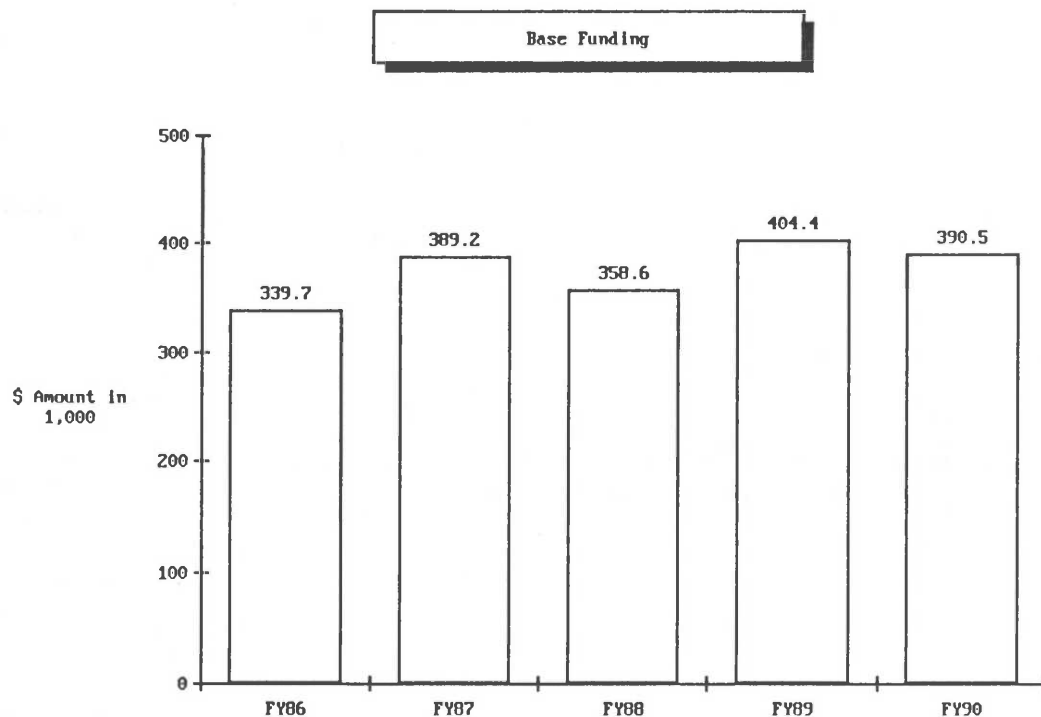
12/90 SL

4. Volunteer Program

A total of 1,015 volunteer hours was recorded for 1990. A local Audubon Society helped out during our weekend auto tours. They provided assistance to visitors on Fry Bluff and Monopoly Lake overlooks during spring and fall auto tours with eagle nest viewing. This added a personal touch to the tours. Additionally, a volunteer assisted with our environmental education program during the spring tour group season and a teenage volunteer helped the staff in the visitor center by answering questions and selling entrance permits and various interpretive material.

5. Funding

Base funding for the past 5 years was as follows:



Additional special funding over the last 5 years was as follows:

FY86	YCC	\$ 17,500
FY87	YCC	\$ 5,310
	Flatbanks Bridge	\$122,000
	Ditch 3 Radial Gate	\$143,000
FY88	YCC	\$ 8,500
FY89	Flexible Maintenance (asphalt repair)	\$ 22,000
FY90	Fire Management	\$ 22,200
	Farm Bill (rice leases)	\$ 15,000
	Wetland Restoration	\$ 6,000

In FY89 and FY90 YCC funding (\$8,500 each year) was included in the base. The FY90 figures do not include nongame money (\$5,000) provided to the University of Missouri, funds for quarters maintenance (\$2,215), or fee collection (\$4,060) which is "no year" money obligated during the year.

The entrance fee program began on March 15 and ended November 30. Thirty percent of the single visit and group fees are returned to the refuge to offset expenses.

Entrance Permits

<u>Type of Permit</u>	<u>Number</u>	<u>\$ Receipt</u>
Single Visit	5,197	\$10,481.16
Group/Commercial	2	50.00
Golden Eagle	6	150.00
Golden Age	307	
Golden Access	48	
Duck Stamp*: 1990-91	620	\$ 7,750.00

*Station sales totals include stamps sold for waterfowl hunting

6. Safety

Safety meetings were held monthly with program responsibilities rotated among employees. Films available through the regional safety office were especially helpful providing a nucleus for the meeting. Films shown were as follows.

January	Winter Driving Techniques
February	Communication Skills
March	Proper Use of Fire Extinguishers
April	Back Power
May	Proper Use of Seat Belts
June	Chain Saw Safety
July	Stay Afloat
August	Using Fire Extinguishers The Right Way
September	Lock to Zero and Assault On Time
October	Wellness at the Worksite: Time is Now
November	Earthquake
December	Listening Skills

All employees were given the opportunity to be tested for Lyme disease. Five declined to be tested. All tests were negative.

Some concern was expressed in a 1989 station inspection regarding safety of the Monopoly Lake overlook platform. The platform was rehabilitated during 1990 with new decking, railing, and structural supports.

Two reportable accidents/incidents occurred during the year. An Engineering Equipment Operator had to have a metal sliver removed from his lip. This was a result of using a chisel on a rusted bolt. A YCC enrollee required medical attention for an insect sting.

The station safety plan was updated in January.

The station safety committee was unchanged with Clawson, McClendon, and Siler serving as members.

7. Technical Assistance

The refuge continued to routinely provide plans for bird feeders, wood duck nest boxes, bird houses, etc. Gerald Clawson served on the Girl Scout Council property committee and as Council advisor for conservation activities. Steve Lenz is certified as a hunter education instructor and assisted with locally sponsored hunter education courses.

The Soil Conservation Service (SCS) is required to consult with the U.S. Fish and Wildlife Service on swampbuster provisions of the Food Security Act (Farm Bill). The following is a summary of swampbuster consultations where minimal effect determinations were being requested:

<u>County</u>	<u># of Consultations</u>	<u>No Minimal Effect</u>	<u>Minimal Effect w/ Mitigation</u>	<u>Minimal Effect</u>
Stoddard	18		5	13
Butler	23	6	10	7
Scott	7	2	2	3
Cape Girardeau	2			2
Pemiscot	1		1	
Dunklin	3		1	2
Mississippi	4	1	2	1
Randolph County, IL	1	1		

In addition we consulted with SCS personnel in making wetland determinations on two tracts in Ripley County and one in Stoddard County. We also participated in commenced drainage hearings on four tracts in Butler County and one tract in Stoddard County. Of these, we concurred with three and declined concurrence on two.

The Soil Conservation Service completed wetland mapping in the Missouri bootheel in 1990 and began sending out maps to landowners. This increased our workload significantly and we expect it to increase further in 1991. Although a wetland evaluation technique has been developed for Missouri, it is subjective in nature and does not recognize migratory bird winter habitat values as we see them in the lower Mississippi River delta.

F. HABITAT MANAGEMENT

2. Wetlands

Rockhouse Marsh was drawn down as planned. However, the drawdown was late due to excessive rainfall and incomplete due to poor internal drainage. As a result, American lotus flourished in the wetter areas limiting moist soil plant production to pool edges and high portions of the marsh. Control of woody vegetation was limited to less than 50 acres due to wet conditions.

Monopoly Marsh remained flooded as planned. American lotus covered approximately 80 percent of the pool - down significantly from the estimated 98 percent in 1989. This marsh provides excellent brood habitat for wood ducks and is a well used waterfowl roosting area.

The Stanley Creek impoundment was drawn down late as planned and had good moist soil plant production.

The green tree reservoirs (Pool 5 and Pool 8) had only fair mast production and waterfowl use was moderate in the fall. Pool 5 received excellent use in January and February following good mast production in 1989.

Moist soil unit plant production was generally excellent. Water levels and habitat conditions are described in detail in the 1991 annual water program.

3. Forests

No new timber sales were initiated this year. A contract was negotiated with Westvaco Paper Company to cut a 102-acre tract in Compartment 9. The price agreed upon was \$2,733.60 based on \$1/ton with a \$500 performance bond which was received and is being held. The sale will be a hardwood pulp sale and will have to be marked. It was not initiated this year due to wet conditions.

Compartment 10 was examined in 1989 and a prescription written in 1990. Some sale activity is indicated and will likely be marked along with Compartment 9 in 1991.

4. Croplands

Refuge permittees farmed 475 acres. Additional units were planned but conditions were too wet to allow planting. These included Unit 13 (Luken Farm Moist Soil Unit - Lowell Berrong - 90 acres) and Unit 19 (Barry Stewart - 40 acres). The Missouri Department of Conservation agreed to plant corn in Units 1 and 10 but were unable to do so.

Milo was a substitute crop in Units 6 and 8 due to wet conditions. Farming is done in a traditional manner using corn or milo in rotation with soybeans. The refuge receives one-third of the corn or milo which

is left in the field. The permittee receives all soybeans but also provides all the fertilizer and chemicals and plants wheat following soybean harvest. The wheat is intended for winter browse and is plowed down the following spring.

Corn production averaged 60-80 bushels/acre which was fairly good. The ban on Atrazine was a matter of some concern but seemed to work out okay. Crop acreages by unit were as follows:

<u>Unit</u>	<u>Permittee</u>	<u>Acres Farmed</u>	<u>Corn</u>	<u>Milo</u>	<u>Beans</u>
2	W. Payne	100	43		57
3	R. Walk	44			44
4	G. Payne	100			100
5	R. Walk	28	28		
6	G. Payne	105		50	55
8	G. Payne	98		98	
Total		475	71	148	256

The primary purposes of the farming program are to provide habitat diversity and to benefit the wintering goose flock. Without farming, fields would quickly revert to hardwood timber losing edge effect and diversity now available. Deer and turkey use the corn fields in the winter, particularly if there is a mast crop failure. Deer make good use of the soybean fields in the summer helping reduce off-refuge depredation problems. The fields are good viewing areas for wildlife.

Refuge staff planted an additional 83 acres to wheat as follows:

Unit 25	(Goose Pen) - 18 acres
Unit 9	(Southwest of MSU-4) - 18 acres
Unit 12W	(Schoolhouse) - 18 acres
Unit 10	(Otto Cookson) - 6 acres
Unit 27	(Sassafras) - 18 acres
MSU 12	(Egypt Gate) - 5 acres

5. Grasslands

The refuge manages 659 acres of grasslands in 20 different units. Many of the units are a fescue/clover mix. For the past 4 years the refuge has been converting the hay fields from fescue to a redtop, timothy, and clover mixture.

The renovation of three units was completed in 1990. The Walker field (Unit 14), Wilfong field (Unit 8, field 6 and part of field 5), and the Shop field (Unit 25) were seeded to redtop, timothy, ladino, and wheat. The seeding rate used is 6 pounds redtop, 3 pounds timothy, 2 pounds ladino, and 1½ bushel of wheat per acre.

The Indian Mound and the bluff tower fields were reseeded with ladino and wheat. These two units are along our public use road and attract a considerable number of deer and subsequent wildlife observers. It is not unusual in the early evening hours to see 20-25 deer in these 2-acre fields.



Deer made good use of the roadside food plots. 12/90 CS

The renovation of Sassafras Ridge (Unit 27) began in 1990 with the planting of winter wheat. This unit will be planted to soybeans the spring of 1991. The beans will be disked down in July, followed by a fall planting of redtop, timothy, clover, and wheat.

There are also 27 acres of native warm season grasses in Unit 18. This field was burned in the spring of this year. There was a misunderstanding with the permittee and he hayed the unit in August. We had planned on resting the unit until 1991.

All grassland units are maintained by haying, grazing, mowing, or burning.

7. Grazing

Grazing was permitted on nine grassland units totalling 496 acres. There was a change in permittees this year as Eddie Sifford rented Grazing Unit 19 replacing G.W. Sifford. All other permittees remained the same.

The grazing season ran from April 1 through October 15 on six of the units and was extended to November 15 on Units 11, 18, and 19. The grazing rate fee for the season was \$6.26 per AUM, an increase of \$.60

over last year. Cows with calves are calculated at 1.25 AUM and yearlings as .75 AUM. The grazing rate is calculated each year using the 3-year average beef price formula described in the Refuge Manual and data furnished by the Missouri Department of Agriculture.

Each permittee was required to top dress a portion of his unit with fertilizer or lime. The permittee's grazing fees are reduced by $\frac{1}{2}$ to cover the cost of purchasing and applying the soil amendments. Permittees were also required to mow their entire unit at the end of the grazing period (September or October) for waterfowl use and brush control.

AUM rates and refuge receipts from the grazing program are shown in the following table.

<u>Unit</u>	<u>Acres</u>	<u>AUM</u>	<u>Receipts</u>	<u>Permittee</u>
GU-11	45	142.5	\$ 446.03	Jerry Koppman
GU-7 & 15	115	243.7	762.94	Claud Walk
GU-16	45	115.8	362.45	Herman Wilfong
GU-17	57	130	406.90	Wayne Elledge
GU-18	117	283.13	886.20	E.C. Elledge
GU-19	45	171.5	536.80	Eddie Sifford
GU-21 & 22	72	203.96	638.39	Herman Wilfong
Totals	496	1,290.59	\$4,084.71	

Table of Soil Amendments

<u>Unit</u>	<u>Treatment</u>
GU-11	2.275 ton NPK
GU-7 & 15	3.525 ton NPK
GU-16	1.71 ton NPK
GU-17	2.08 ton NPK
GU-18	4.19 ton NPK
GU-19	2.38 ton NPK
GU-21 & 22	3.11 ton NPK

8. Haying

Haying is usually conducted on units where grazing is not feasible due to a lack of water or inadequate fencing.

Because of the poor quality of the grasses in our hay fields, there were no hay bids this year. We negotiated a price with our permittee grazers to cut hay on their grazing leases.

<u>Unit</u>	<u>Acres</u>	<u>Price/Ton</u>	<u>Total Tons</u>	<u>Receipts</u>	<u>Permittee</u>
GU-7	32	\$4.00	20.95	\$ 83.80	Claud Walk
GU-16	25	\$1.00	16.5	16.50	Herman Wilfong
GU-18	60	\$8.00	58.56	468.48	E.C. Elledge
Totals	117		96.01	\$568.78	

9. Fire Management

There were four prescribed burns in 1990. In support of the continuing education program, we burned 6 acres in Moist Soil Unit 8W and 3 acres in Moist Soil Unit 9S. The burns occurred in May.

We also burned Moist Soil Units 3 and 4 levees to control false indigo.

Lastly, we burned 27 acres of native warm season grasses in Grazing Unit 18.

10. Pest Control

The following herbicides were used in 1990.

<u>Herbicide</u>	<u>Acres</u>	<u>Crop</u>	<u>Target</u>
2-4D Amine	71	Corn	Broadleaf/Weeds
2-4D Amine	148	Milo	Broadleaf/Weeds
2-4D Amine	57	Soybeans	Broadleaf/Weeds
Basagran	256	Soybeans	Broadleaf/Weeds
Blazer	212	Soybeans	Broadleaf/Weeds
Poast	199	Soybeans	Johnson Grass
Roundup	44	Soybeans	Johnson Grass

Two staff members currently hold Missouri Public Operator Pesticide licenses.

12. Wilderness and Special Areas

In 1985 the Missouri Department of Natural Resources developed a State Implementation Plan (SIP) dealing with visibility protection of Federal Class I areas which includes the Mingo National Wildlife Refuge wilderness area. The plan identified a need for some sort of visibility monitoring.

If a plume or unnatural haze is observed, the plan calls for notification of the local Department of Natural Resources office as soon as practical after the occurrence. There were no plumes or unnatural haze noted in 1990.

14. Farmers Home Administration Conservation Easements

In 1990 we boundary posted 10 conservation easements owned by 7 different landowners. Easements posted this year were: Abts, Achey, Crowell, Decker, Fieser, Petty, Propst, Reaves, and West.

We also planted cherrybark acorns on the Fieser and Petty properties and surveyed them for wetland restorations. We anticipate doing the restorations in 1991.

15. Private Lands

In 1990 the refuge obtained, by lease agreement, 450 acres of harvested rice ground and 1,050 acres of adjacent dry land sites. The rice fields were reflooded to provide wetland habitat for migratory waterfowl. The dry land sites functioned as buffer zones to minimize disturbance.

Initial response by waterfowl to flooded areas came during the first 2 weeks of waterfowl season (November 1-15, 1990). Flooded areas were utilized by an estimated 3,000 to 8,000 birds daily during this period. From November 15 to December 12 unseasonably warm and dry weather depleted the water in the majority of pumped fields. From December 12, 1990 to mid-January 1991 the areas remained in a dry or frozen state and received little waterfowl use. From January 15 to date warm temperatures and adequate rainfall reflooded the fields. As waterfowl returned to the local area, waterfowl use on the rice fields became moderate to heavy.

Although the lease agreement terminated on February 15 allowing landowners to drain off the water, areas remained wet and to this date, 10 days later, continue to receive heavy use. Observers from Mingo National Wildlife Refuge and Otter Slough State Management Area have regularly reported 20,000 to 40,000 ducks and 40,000 to 60,000 geese using the area daily during February. These numbers reflect the majority of the waterfowl currently in the local area. Conservative estimates for use days in the 450-acre rice fields are 760,000.

G. WILDLIFE

1. Wildlife Diversity

Mingo National Wildlife Refuge encompasses some of the most diverse wildlife habitat and resultant wildlife species in Missouri. In all, Mingo National Wildlife Refuge hosts over 240 species of birds, 38 mammals, 64 reptiles and amphibians, and 49 species of fish.

2. Endangered and/or Threatened Species

The peregrine falcon, bald eagle, and Indiana bat are the only three nationally listed endangered species that occur at Mingo National Wildlife Refuge and its satellite refuge. The Indiana bat hibernates at

Pilot Knob National Wildlife Refuge, a satellite, and the other two species occur at Mingo National Wildlife Refuge. Also, several state listed endangered species are found on the refuge such as the osprey, sharp-shinned hawk, Cooper's hawk, red-shouldered hawk, barn owl, Swainson's warbler, double-crested cormorant, trumpeter swan, Northern harrier, king rail, and green water snake.

Peregrine falcons are rare visitors to the refuge. One was observed by a refuge staff member during 1989. This was the first and last sighting since 1986. However, bald eagles are a common sight on Mingo National Wildlife Refuge, especially from November through February. The wintering bald eagle population can peak at 50 birds. In late December 1990 eagle numbers peaked at 45.

The bald eagle hacking program was discontinued in 1989. The previously established goal of 40 eagles released/fledged established by the Missouri Department of Conservation had been reached.

The eagle nest on Monopoly Lake (#1) fledged three young in 1989 and again in 1990. This has been an active and successful nest since 1985. A new nest was located along Ditch 4 (#2) in 1989 and produced one young that year. This nest was not used during the 1990 nesting season, but will be observed for activity during the 1991 nesting season. During 1990 a third nest was discovered. The Ditch 4 nest (#3) fledged two young in 1990.

Summary of Bald Eagles Released/Fledged at Mingo NWR

Year	Eagles Known To Hacked	Be Lost	Fledged From Monopoly Nest #1	Fledged From Ditch 4 Nest #2	Fledged From Ditch 4 Nest #3
1981	2	0	nest made		
1982	3	0	no eggs		
1983	3	1*	adult killed, 2 eggs		
1984	4	0	new adult, no eggs		
1985	6	0	2		
1986	7	1**	3		
1987	5	1**	3		
1988	4	0	2		
1989	Project Completed		3	1	
1990	Project Completed		3		2
Total	34	3	16	3	2

* Recovered after 1 year from release; permanently disabled

** Electrocuted by power line

A pair of bald eagles fledged two young in 1990 on Pool 1 at Duck Creek State Wildlife Management Area. This is the third year eagles have been fledged from this nest. Duck Creek State Wildlife Management Area is a

6,500-acre state waterfowl area on Mingo National Wildlife Refuge's northeast boundary. It is a possibility that the adult eagles were a product of the hacking program at Mingo National Wildlife Refuge.

Occasional sightings of osprey, double-crested cormorants, sharp-shinned hawks, and Cooper's hawks have occurred in 1990. No sightings of the barn owl, king rail, Swainson's warbler, or green water snake were recorded. The red-shouldered hawk is a common bird on the refuge with several known nest locations. Northern harriers are on the refuge in abundance during the winter months. Trumpeter swans are discussed in the waterfowl section of the narrative.

3. Waterfowl

During 1990 Mingo National Wildlife Refuge received above normal rainfall and provided favorable growing conditions for moist soil plants in the managed units. Waterfowl use of these areas was as expected, high with 1.3 million waterfowl use days recorded for 1990. Waterfowl use is continuing as spring migration time approaches. Duck and goose populations peaked during spring migration in February with 70,000 Canada geese and 65,000 ducks recorded. During December duck numbers declined from 47,000 to 3,000 because of freezing weather. Canada goose populations on the refuge continued to increase with population numbers jumping from 15,000 the second week of December to 40,000 the following week.



Waterfowl use in moist soil unit.

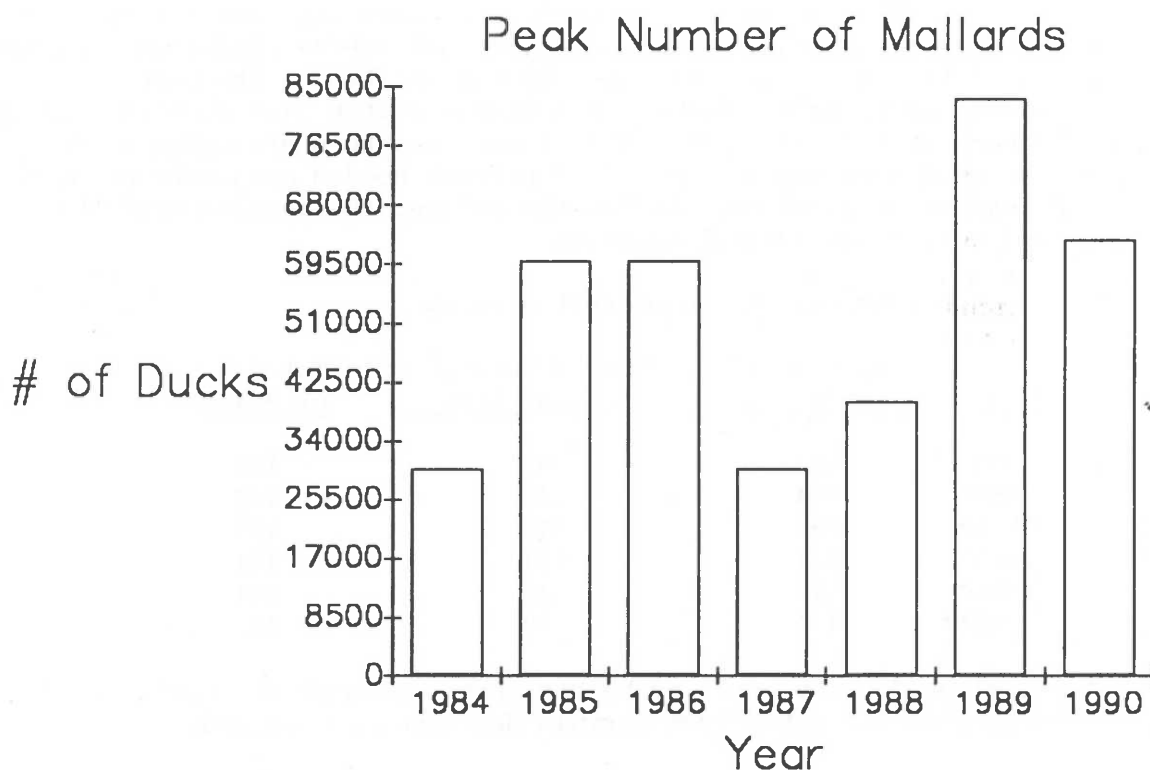
12/90 CS

Peak waterfowl populations during the period of November 1 through March 31 for the past 6 years are shown on the following page.

<u>Winter</u>	<u>Month</u>	<u>Canada Geese</u>
1990-91	Jan.	47,000
1989-90	Feb.	70,000
1988-89	Dec.	35,000
1987-88	Feb.	75,000
1986-87	Jan.	22,000
1985-86	Jan.	36,690

<u>Winter</u>	<u>Month</u>	<u>Ducks</u>
*1990-91	Dec.	52,000
1989-90	Nov.	89,700
1988-89	Jan.	80,600
1987-88	Nov.	52,000
1986-87	Dec.	76,550
1985-86	Feb.	77,500

*1990 only



In the last several years, snow geese populations have been increasing in January and February in southeast Missouri.

<u>Year</u>	<u>Snow geese</u>
1990	35,000
1989	50,000*
1988	25,000
1987	55,000
1986	70,000

*At Mingo during spring migration, remained only 5 days

These birds primarily stay at the Otter Slough Wildlife Management Area and on private lands in Stoddard and Butler Counties. Over 200,000 birds have been passing through this area the past couple of years.

A few pairs of Canada geese nest at Mingo National Wildlife Refuge each year. These geese are spillovers from Duck Creek State Wildlife Management Area's resident giant Canada flock.

Graduate students from Gaylord Lab have been monitoring wood duck nest box activity on Mingo National Wildlife Refuge since 1987. All nests were checked at the beginning of nesting and then rechecked after hatch for success or failure and some ducklings were web tagged.

Previous to 1987, boxes were checked in January and February and reported as successful, unsuccessful, or not used. Production was then estimated from a formula developed by Gaylord Lab: the number of successful nests multiplied by 18 (average clutch size doubled) and then by 50 percent survival rate. That figure was then estimated as 90 percent wood duck production and 10 percent hooded merganser production. To determine total production for the refuge, the results were then doubled to include natural cavities.

Wood duck box production is presented below.

<u>Year</u>	<u>Wood Duck Production</u>	<u>Hooded Merganser Production</u>	<u>Total # of Boxes</u>
1990	578	293	100
1989*	794	248	104
1988*	693	243	121
1987*	427	111	121
1986*	316	35	101
1985**	454	50	112

* Actual production verified by box checks throughout nesting period.

** Production estimated from formula developed by Gaylord.

The trumpeter swan restoration program was put on hold in 1988 because of the lack of available subadult swans. However, two immature swans were released in 1990 from the St. Louis Zoo and has added to the viewing excitement for visitors. The peak population of swans at Mingo National Wildlife Refuge remains at 11 birds.

During the 1990 waterfowl season two swans were shot by hunters at Duck Creek State Wildlife Management Area. They were not banded and were likely migrants from the Hennepin County, Minnesota population. The hunters were apprehended and charged with the violations. Each hunter received a \$2,000 fine.

4. Marsh and Water Birds

Mingo National Wildlife Refuge is the home to a variety of marsh and water birds. Commonly observed birds in this category include sora rails, little blue herons, green-backed herons, great blue herons, yellow-crowned night herons, pied-billed grebes, and cattle egrets.

5. Shorebirds, Gulls, Terns, and Allied Species

The more commonly seen shorebirds are common snipe, pectoral sandpiper, spotted sandpiper, semipalmated sandpiper, and greater yellowlegs. During 1990 more birds were observed than in the past due to prolonged drawdowns of the moist soil units.

6. Raptors

Raptors observed on Mingo National Wildlife Refuge include red-tailed hawk, red-shouldered hawk, Cooper's hawk, sharp-shinned hawk, American kestrel, Northern harrier, bald eagle, turkey vulture, black vulture, barred owl, great horned owl, and screech owl.

Other raptors seen but not as numerous as the above include: osprey, rough-legged hawk, peregrine falcon, Mississippi kite, saw-whet owl, barn owl, and short-eared owl. The Mississippi kite, a nesting species on Mingo National Wildlife Refuge, is on Missouri's rare species list.

7. Other Migratory Birds

The refuge conducted two mourning dove coo counts. Results of the past 7 years are shown below.

<u>Year</u>	<u>Route #0050 (Butler/Stoddard Co.)</u>		<u>Route #0072 (New Madrid Co.)</u>	
	<u>Doves Seen</u>	<u>Total Calls</u>	<u>Doves Seen</u>	<u>Total Calls</u>
1990	93	32	66	26
1989	41	17	31	30
1988	53	info. not required	92	175
1987	77	244	58	239
1986	51	201	71	222
1985	62	216	37	258
1984	56	144	56	221

The Mingo National Wildlife Refuge Christmas bird count, which also includes nearby Wappapello Lake, was held December 29, 1990. The Farmington Chapter of the Audubon Society coordinated the count which recorded 74 species, 7 species less than in 1989. The 1990 count was hampered by ice on roadways and fog.

8. Game Mammals

Several of Missouri's game mammals occur on the refuge: white-tailed deer, fox squirrel, gray squirrel, red fox, gray fox, coyote, woodchuck, cottontail rabbit, and swamp rabbit.

Also, the following furbearers are on the refuge: mink, muskrat, opossum, striped skunk, beaver, raccoon, weasel, river otter, and bobcat.

11. Fisheries Resources

Mingo National Wildlife Refuge's fisheries management centers around two impoundments and the old Mingo River channel. Management includes occasional shocking for population status, limited stocking, and enforcement of fishing regulations. Most refuge impoundments are subject to annual flooding and summer drawdowns for moist soil plant production. Management of the ditches, creeks, and rivers is restricted by seasonal flooding. May and Fox Ponds are two impoundments where active management does occur.

Fishing restrictions are intended to improve the quality of the bass populations. No bass may be kept at Fox Pond and no bass under 12 inches may be kept at May Pond. In all other waters state regulations apply. May and Fox Ponds were checked by the Fisheries Biologist during the summer of 1989. May Pond fish populations were found to be stable. However, Fox Pond was showing a slight decline in all age classes of bass. During 1990, 20 brush shelters were placed along the shore to provide bass fingerling protection.

14. Scientific Collections

The Missouri Department of Conservation did not trap turkeys on Mingo National Wildlife Refuge in 1990.

Turkeys Trapped on Mingo National Wildlife Refuge

<u>Season</u>	<u># Trapped</u>	<u># Juveniles</u>	<u># Adults</u>
1990-91	0	0	0
1988-89	9	7	2
1987-88	53	22	31
1986-87	24	6	18
1985-86	26	15	11

15. Animal Control

Beaver have been a major nuisance in years past by undermining roads, girdling trees, and plugging culverts and water control structures. Mingo National Wildlife Refuge continues to issue a trapping permit to basically one trapper to control beaver. In the beginning of the furbearer season in 1989, we had one trapper on the refuge. However, he

quit in December because of very low beaver prices. He had been removing beaver from Mingo National Wildlife Refuge since 1985 and apparently having some impact on beaver populations. During 1989 the problems were on the rise again because of reduced trapper effort. During 1990 problems associated with beaver activities continue to increase. In December a local trapper agreed to remove beaver. The following table depicts results of his effort and the previous 5 years.

Beaver Removed By Calendar Year

<u>Year</u>	<u># of Beaver</u>
1990	496**
1989	133*
1988	431
1987	289
1986	333
1985	144

*note: Represents January - March removal. Estimated removal in November-December would be an additional 40 beaver.

**note: Represents December 1990 through February 1991 removal.

16. Marking and Banding

Refuge staff and Duck Creek State Wildlife Management Area personnel participated in a collar observation project. The goose observation quota for the last few years has been 1,200 observations, and requires an extensive amount of time spent reading the neck collars of wintering Canada geese with a spotting scope.

Observation totals for the past five seasons are listed below.

<u>Season</u>	<u>Total Observations</u>
1990-91	293
1989-90	876
1988-89	1,990
1987-88	1,094
1986-87	983

H. PUBLIC USE

1. General

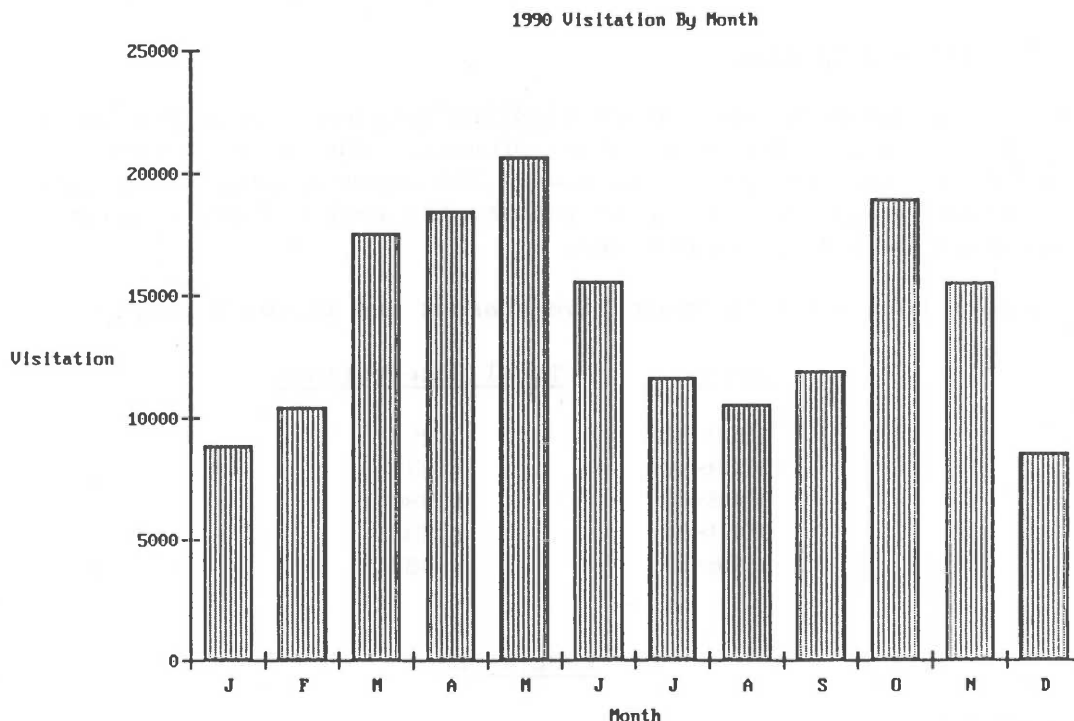
Mingo National Wildlife Refuge initiated an entrance fee program in May 1988. The entrance fee period is between March 15 and November 30, however the program was temporarily shut down (2 days) for administrative expectations to occur in late June. Annual visitation has increased despite the fee program.

Visitation declined from 1982 until 1987. The tide seemed to reverse in 1988 with an increase in visitation. The upward trend continued in 1990 with a 3 percent increase over 1989 visitation, however this increase may be deceptive. The deception, according to past years data, is because slightly increased numbers are accountable for most public use activities. In 1990, substantial visitation increases for the interpretive trails and hunting categories (sections H.4 and H.8) compensated for decreased numbers in other activities.

Annual Visitation

<u>Year</u>	<u>Visitation</u>
1990	168,886
1989	163,855
1988	153,445
1987	130,350
1986	137,527

Peak visitor public use coincides with good weather as well as the arrival of spring wildflowers and fall "colors."



Periodically news releases are issued throughout the year to inform the public of current events on the refuge. There were 12 news releases issued in 1990.

Television coverages by KFVS-TV, a Cape Girardeau, Missouri CBS affiliate broadcasted refuge activities on the "Heartland Outdoors" program. Special events such as the spring auto tour, trumpeter swan release, and wildlife viewing potential were filmed.



Television crew filming swan release.

2/90 CS

After several years of solicitation with state highway department, the department installed refuge directional signs at the intersections of state highways 60 at 51 and state highway 51 at county highway C. Visitors commented that the signs helped them locate the refuge.

2. Outdoor Classrooms - Students

The outdoor classroom program for students is a high emphasis program. The refuge recruits schools, scouts, church groups, and other youth groups to participate in the environmental education program. During April and May, volunteers are interfaced with the school groups to free the staff from conducting time consuming activities. This volunteer participation benefits both the students and the refuge.

Listed below are environmental education visitation figures for the past 5 years.

<u>Year</u>	<u>Visits</u>	<u>Activity Hours</u>
1990	2,271	9,084
1989	2,895	11,553
1988	2,326	9,304
1987	1,849	7,396
1986	1,959	7,836

Since 1987, the outdoor classroom program has been growing by visits until 1990. This slight decrease is somewhat disturbing because this year Earth Day was celebrated. Maybe the schools were doing their own in-house activities or were suffering from restricted travel or budget deficits; we don't know. We do know instructors are aware and concerned about natural resources, conservation, and environmental issues because of the inquiries we receive regarding these topics. For whatever reason, we hope that a renewed upward trend will continue in the 1990's.

Two Missouri Hunter Education programs were presented at the refuge during the year. The first occurred on February 24 with 74 in attendance. The second was on August 25 with 40 in attendance. This program is mandatory for any person born on or after January 1, 1967 to purchase any firearms hunting permit. Assistant Refuge Manager Steve Lenz served as one of the instructors.

3. Outdoor Classrooms - Teachers

Universities make frequent use of the refuge for field trip purposes. This includes groups that are exclusively teachers from Southeast and Southwest Missouri Universities whose curriculum requires a visit to the refuge to become acquainted with the environmental education resources available to them at Mingo National Wildlife Refuge.

Periodically throughout the year local teachers request educational materials as an aid in teaching the students in their classroom. The teachers become aware of materials that are available through letters, bulletin board information, or mainly by the teacher "grapevine."

4. Interpretive Foot Trails

There are two interpretive foot trails on Mingo National Wildlife Refuge, the Boardwalk Nature Trail and the Hartz Pond Trail.

The Boardwalk is a major attraction to the public. The trail is constructed of a raised boardwalk traversing bottomland hardwoods and Rockhouse Marsh. It is .8-mile long with a .2-mile spur leading to an observation tower overlooking Rockhouse Marsh. There is a self-guiding interpretive brochure, keyed to numbered stops explaining the ecology of the area. During 1990, 21,725 visitors used this trail responding with a twofold increase over 1989. This increase was partially observed because many visitors walk the trail for exercise with a tranquil atmosphere.

The Hartz Pond Trail, even though the trail does not have an interpretive brochure, is used by school groups for aquatic biology studies and other interpretive classes. The Youth Conservation Corps changed the route and trimmed the brush to eliminate erosion and installed picnic tables to provide a work place for students.

5. Interpretive Tour Routes

The auto tour is open two Sundays in April for spring wildflower viewing and each Sunday in October and November for viewing wildlife and autumn colors. A self-guiding brochure interprets various refuge management techniques, development, and habitat types to the visitors as they drive the 25-mile long tour route.

In 1990, 1,179 visitors drove the spring auto tour for a total of 3,537 activity hours, up from 1989 when 585 visitors recorded 1,155 hours. Easter Sunday and the advent of Earth Day coupled with favorable weather conditions provided an opportunity for families to get out and enjoy "God's and Mother's" creation. During the fall auto tour 3,476 people recorded 6,952 activity hours on the tour, compared to 5,394 people and 10,203 hours in 1989.

Each year, during August, the community of Puxico celebrates its annual homecoming. Native sons and daughters return home to renew acquaintances and visit relatives. In support of this event the refuge opens the auto tour for homecoming week. This year 156 activity hours were recorded by 78 people.

6. Interpretive Exhibits/Demonstrations

The visitor center continues to be the center of the interpretive program. Exhibits, dioramas, audio-visual shows, and displays that deal with wildlife management, swamp ecology, archaeology, geology, and history are housed here. In 1990, 15,494 people visited the center for a 7 percent decrease from 1989.

Refuge staff and regional personnel are currently preparing a prospectus for revamping the visitor center, displays, exhibits, and audio-visual equipment.

The refuge joined with the Missouri Department of Conservation and the Missouri Water Patrol in setting up an exhibit at the Cape Girardeau district fair. Our part included an information booth, a trumpeter swan display and an assortment of "touch and feel" items. The "touch and feel" items, such as antlers, beaver teeth, snake skin, and a "stuffed" beaver are a big hit with children of all ages. A considerable amount of written and verbal information was dispensed. The Conservation Department estimates 85,000 people viewed the exhibits during the 6 days.

Armed Forces Day is celebrated in May. The refuge staffed an information booth at Wappapello Lake, a U.S. Army Corps of Engineers project, but rain began to fall in buckets and people scattered for cover. Needless to say, the event was rained out.

7. Other Interpretive Programs

Several overlooks exist along the main bluff road and the auto tour route. One of these, Monopoly overlook, has a self-interpretive panel explaining the history of Monopoly Lake.

8. Hunting

a. Squirrel

Squirrel hunting is allowed on Mingo National Wildlife Refuge from the Saturday preceding Memorial Day through September 30. Season totals for 1990 were 342 hunters bagging 360 fox and 233 gray squirrels for a hunter success rate of 1.83. In 1989, 257 hunters harvested 287 squirrels for a 1.12 success rate. Southeast Missouri has received mild winters and bumper acorn crops the past 2 years. This year the acorn crop was poor.

b. Deer

The archery deer season ran from October 1 through December 31. This was the third consecutive year hunters were able to take two deer and two turkeys with archery equipment. In 1990, a record number of deer were harvested although hunter success rate remains unchanged.

<u>Year</u>	<u>Bucks</u>	<u>Does</u>	<u>Total Deer</u>	<u># Hunter Visits</u>	<u>Deer Harvested/ 100 Visits</u>
1990	58	44	106*	5,801	1.8
1989	52	29	87**	4,818	1.8
1988	55	27	88**	4,950	1.8
1987	33	23	56	4,063	1.4
1986	23	18	41	3,928	1.0

*Hunters recorded four deer without identifying sex.

**Hunters recorded six deer without identifying sex.

The historic weapons hunts are a cooperative effort between the U.S. Fish and Wildlife Service and the Missouri Department of Conservation to provide hunting opportunity through sound wildlife management. The number of hunters is restricted to maintain the quality of the sport, yet allow the proper harvest of deer. Hunters may use muzzle loaders, archery equipment, or crossbows, depending on what valid hunting permit they possess. As represented in the table, hunter interest increased while hunter success remained somewhat stable.

	<u>Bucks</u>	<u>Does</u>	<u>Total Deer</u>	<u>Quota/Applied</u>	<u># Hunted</u>	<u>Success Rate</u>
1990 (Jan.)	18	20	38	150/1370	133	28.6%
1989 (Jan.)	17	23	40	150/1248	144	27.8%
1987 (Dec.)	16	17	33	125/640	99	33.3%
1986 (Dec.)	12	12	24	125/597	106	22.6%

c. Turkey

The spring firearm turkey season began April 23 and ended May 6. Untimely weather conditions, primarily rainfall, have significantly put a damper on successful turkey hatches for the last several years. Hunter check stations report a high percentage of adult birds harvested. High water conditions and lack of "gobbling" music contributed to low hunter numbers. Listed below is spring turkey hunting information for the past 5 years.

<u>Year</u>	<u># Turkey Harvested</u>	<u># Hunters Visits</u>	<u>Success Rate</u>
1990	9	161	5.5%
1989	23	250	9.2%
1988	9	241	3.7%
1987	16	270	5.9%
1986	27	303	8.9%

The archery turkey season runs concurrent with the archery deer season, October 1 through December 31. Archers bagged four turkeys, a comparable data figure for many years.

d. Waterfowl

Waterfowl hunting is allowed on Pool 8, a 2,000-acre greentree reservoir, in the northeast corner of the refuge. This unit is managed by a cooperative agreement with the Missouri Department of Conservation as a wade and shoot area. Duck Creek State Wildlife Management Area conducts the duck hunt on a reservation/draw operation where hunters may opt for a blind or the wade-and-shoot area. Surprisingly to some people, many hunters selected the wade-and-shoot area as their method of hunting because of success ratios. The season began November 3 and ended December 3. Mild temperatures were exhibited nationwide during the first half of our season. Waterfowl migration was slow and ducks and geese did not begin to show up until the last part and after the season. During the 30-day season, 1,069 hunters harvested 927 mallards, 544 wood ducks, 1 black duck, 1 green-winged teal, 1 shoveler, and 1 gadwall.

<u>Year</u>	<u>Ducks</u>	<u>Geese</u>	<u>Hunters</u>	<u># Bird/Hunter</u>
1990	1,475	0	1,069	1.37
1989	1,999	0	1,105	1.81
1988	873	1	727	1.20
1987	206	0	162	1.27
1986	337	0	262	1.29

9. Fishing

Fishing continues to be one of the most popular recreational uses of the refuge. The majority of the fishermen are locals making several annual visits. In 1990, there were 36,855 fishermen visits and 131,555

activity hours recorded. Contrary to what was reported last year, fishing was poor. Fishing opportunities fluctuate with current weather conditions and water management objectives. High water levels contributed to low fishing success at the Ditch 4 culvert between Monopoly and Gumstump pools. Furthermore, Rockhouse Marsh was drawn down to stimulate moist-soil plants and this dewatering ditch system does not provide good fishing access. These factors are partially responsible for the decrease in fisherman visits over last year (37,893).

10. Trapping

Beaver trapping is covered under Section G. Wildlife (Animal Control).

11. Wildlife Observation

Wildlife observation is the most popular public use on Mingo National Wildlife Refuge. In 1990, 49,501 visitors recorded 65,868 activity hours in this category compared to last year's figures of 55,496 and 66,232, respectively. Wildlife observation and fishing activities are somewhat interrelated. When one activity decreases, the other activity suffers as well.

12. Other Wildlife Oriented Recreation

Collection of blackberries, mushrooms, and, to a lesser extent, nuts occurs on Mingo National Wildlife Refuge. There are never large numbers of people involved, but it remains popular among a few locals.

Wildlife photography is also a form of recreation practiced by a relatively small but constant number of people.

14. Picnicking

Picnic tables are provided at May Pond, Red Mill Pond, Flatbanks area, the Job Corps spillway, and Ditch 5. The majority of use is by fishermen, although people visiting the refuge for other types of recreation also use the tables.

17. Law Enforcement

Enforcement efforts centered around activities on the refuge. Excellent cooperation exists with Missouri Department of Conservation agents. Managers Clawson, Kuykendall, and Lenz have law enforcement authority.

This year due to the nature of some of our infractions we asked for assistance from the state, county, or local law enforcement agencies. Table 1 itemizes violations that were disposed of in U.S. District Court or FOC and Table 2 reports on-refuge violations that were filed through judicial systems other than Central Violations Bureau.

SUMMARY OF 1990 VIOLATIONS

Table 1

<u>VIOLATION</u>	<u>#</u>	<u>AMOUNT PAID EACH VIOLATION</u>
Unauthorized possession of a loaded firearm on Mingo NWR.	7	\$ 50
Attempt to take migratory game birds with shot other than steel (lead).*	3	\$ 50
Taking a gamebird (turkey) in a closed area on Mingo NWR.	1	\$ 50
Attempt to take wildlife (deer) from a public roadway on Mingo NWR.	1	\$ 50
Archery Hunting in a closed area on Mingo NWR.	3	\$ 50
Fishing on Mingo NWR without a valid and proper Missouri fishing permit.	4	\$ 50
Violation of state regulations: Snagging during closed season.	2	\$ 50
Fishing in an area closed to public access on Mingo NWR.	3	\$ 50
Trespass on Mingo NWR in a closed area.	7	\$ 50
Trespass on Pilot Knob NWR in a closed area.	1	\$ 150
Trespass on Mingo NWR after official closing hours.**	12	\$ 50
Unauthorized entry on Mingo NWR (early entrance).	1	\$ 50
Unauthorized entry on Mingo NWR (no entrance fee).	6	\$ 50
Operating a motorized vehicle in a careless manner.	1	\$ 50
	2	\$ 30
Littering on Mingo NWR.	<u>1</u>	<u>\$ 50</u>
Total	54	\$2560

*1 case is pending

**warrant was issued for 1 case

Table 2

<u>Violation</u>	<u>#</u>	<u>Disposition</u>
Fishing on Mingo NWR without a valid and proper Missouri fishing permit (juvenile).	2	Fine and court costs - \$44
Class C Felony: possession of stolen car and illegal firearm (sawed off shotgun)..	4	24 months unsupervised probation - referred to Kansas.
Purchase alcohol for minor.	1	On-refuge violation was plea bargain for off-refuge DWI.
Minor in possession of alcohol.	1	Warrant issued.
Felony: possession of metamphetamine.	1	4 years supervised probation; 2 years jail time - suspended.
Theft of entrance fees.	4	\$50 restitution to FWS; state court costs; 24 months unsupervised probation and jail time served.
	1	Same as previous with 6 months jail time.
	1	Same as previous with 2 years prison sentence.
Possession of marijuana.	2	Pending.

18. Cooperating Associations

Mingo National Wildlife Refuge experienced a successful year of sales in cooperation with Midwest Interpretive Association. A total of 4,087 items was sold for an annual gross sale of \$8,364.07. This reflects an 18 percent decrease in items sold but an 18 percent increase in gross sales. Sweatshirts and T-shirts were added to the inventory and this factor contributed to the increase in gross sales. The number of available sale items decreased from 168 to 154.

The association purchased a television/video cassette recorder (\$637.56) and lecturnette (\$576.97) to be used in conjunction with environmental education and other public activities.

I. EQUIPMENT AND FACILITIES

1. New Construction

The wooden hunter access foot bridge across Ditch 3 was replaced by a metal foot bridge. All work was done by force account.



Hunter foot bridge.

2/91 JP

Two 36-inch culverts were installed on the west side trail. One of the culverts was installed just north of the Fry Bluff overlook and the other was placed north of the Monopoly overlook. The culverts should improve the drainage of these areas and eliminate the periodical washing out of these roads.

2. Rehabilitation

As reported in the 1989 narrative, the maintenance crew began remodeling the crew's room. Included in this project was the doubling of the room size, installing new cabinets, sheetrocking the walls, and moving the plumbing. In conjunction with the remodeling the crew's room, a shower and lavatory was added to the restroom. The project was completed in January.

The Hartz Pond trail, adjacent to the visitor center parking lot was rehabilitated. The trail was rerouted to reduce the steepness, a foot bridge was installed, brush cleared along the pond, and a picnic table was added.



Hartz Pond improvements.

2/91 JP

The schoolhouse exit hunter sign out bulletin board was moved south to the exit gate.

The Pool 6 levee was reworked in 1988 by contract. The borrow pit was dredged and spoil was placed on top of the levee. We did some preliminary work in reshaping the levee in 1989 and completed the project this year.



Pool 6 south dike was shaped and seeded.

2/91 JP

The gate at the deer hunters' parking lot was replaced after an encounter with a four-wheel drive pickup.



Gate replacement.

2/91 JP

The culvert and stoplog control structure for Moist Soil Unit 9 were replaced.

The Monopoly overlook tower was rehabilitated. The maintenance crew replaced the walkway, tower floor, and hand rails.



Monopoly Lake overlook was rehabilitated.

2/91 JP

Lastly, the carpenter shop was remodeled at year's end. New benches and shelves were constructed, tools sorted and stored, and the walls and floor painted.

3. Major Maintenance

Two storm doors and one exterior door were replaced on Quarters 12. Plastic gutters were also installed.

The outside trim and soffit of both Quarters 11 and 12 were painted.

Hand rails were installed on hunter access foot bridges.

The Luken Farm and highway 51 were boundary posted.

The front side of the Sweet Cabin roof was reroofed with cypress shakes. Green Thumb Worker Willie Oliver made the shakes.

Refuge roads were periodically bladed and road ditches were pulled. All roadsides and levees were mowed.

4. Equipment Utilization and Replacement

Vehicles

- ▶The 1983 Chevrolet van was replaced by a 1990 two-wheel drive Chevrolet Blazer.
- ▶The steering gearbox on the Plymouth Arrow was rebuilt.
- ▶The brake and clutch housing on the Ford pickup was replaced.
- ▶Routine maintenance and safety checks were performed on all vehicles and equipment throughout the year.

Heavy Equipment

- ▶On the Case dozer we replaced all the steel hydraulic hoses, seal kits in the cylinders, front oil seal, and torque converter temperature gauge.
- ▶Numerous electrical problems were repaired on the Champion grader.
- ▶The backhoe injector pump was rebuilt.

Farm Equipment

- ▶The power steering hose and air conditioner were repaired on the Case tractor.
- ▶The John Deere 3020 is equipped with a side mounted Motrim. Larger tires and dual rear wheels were added to increase the stability of this unit. The mow trim frame broke and was repaired.
- ▶The clutch, pressure plate, and throwout bearing on the John Deere 2640 were replaced.
- ▶Routine maintenance was performed on all heavy equipment and farm equipment.

5. Communications Systems

Two Midland 22 channel VHF highband radios were purchased. One of the radios replaced our Motorola base station in the office and the other was installed in the Chevrolet Celebrity. These radios are programmed with Missouri Department of Conservation, Sheriff's, Mutual Aid, and Civil Defense frequencies.

An Olivetti FL-2100 fax machine was purchased.

6. Computer Systems

The following software was bought: Wordperfect 5.1, Microsoft Chart, Microsoft Multiplan, Rightwriter, and a 5.1 Wordperfect upgrade.

An external 5¼" floppy drive was purchased.

7. Energy Conservation

Electrical and Fuel Usage

	<u>1990</u>	<u>1989</u>	<u>% Change</u>
Electrical	63,023	73,480	-14%
Gasoline	5,683	5,859	- 5
Propane	3,930	3,815	+ 3
Diesel	2,956	2,846	+ 4
Pump (Diesel)	415	717	-42

The decline in electrical use is attributed to a revamping of the thermostats controlling the heating and air conditioning units.

The dramatic decrease in pumping costs is due to the extremely wet fall.

J. OTHER ITEMS

1. Cooperative Programs

Mingo National Wildlife Refuge continues to work closely with the Missouri Department of Conservation. Joint ventures this past year included waterfowl hunting, and the historic weapons deer hunt. We also have an agreement with the Missouri Department of Natural Resources regarding visibility monitoring on the wilderness area. All of these are covered in more detail in other sections of the narrative.

The agreement with the University of Missouri-Gaylord Laboratory to lease the old office continued. Cooperative research is discussed under Section D.

Refuge Biologist Charley Shaiffer working in tandem with Dr. Leigh Fredrickson at Gaylord hosted three continuing education courses in 1990. The first course offered was on invertebrates. The course was held May 7-10. The other two courses were on moist soil management techniques and seed production. They were held August 27-30 and September 10-13. Personnel from 16 different states representing 11 agencies attended these sessions.

The classes and field work were held on the refuge. Lodging and food were provided by the nearby University of Missouri forestry camp.

3. Items of Interest

Refuge revenue sharing checks were sent to the following counties.

	<u>1990</u>	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>
Stoddard County	\$18,171	\$16,591	\$13,760	\$14,018	\$24,800
Wayne County	14,582	13,314	11,043	11,249	19,407
Iron County	149	136	113		

The payment this year was 78 percent of the amount authorized by law compared to 71 percent in 1989.

Meetings and Other Travel

Manager Clawson attended the WAM JAM at Grafton, Illinois, January 17-18.

Manager Clawson and Biologist Shaiffer attended the farm bill coordination meeting and wildlife conference held at the Lake of the Ozarks, Missouri, January 25-26.

Biologist Shaiffer traveled to the biologist conference at Brainerd, Minnesota, February 4-9.

Heavy Equipment Operators Placher and Siler along with Manager Kuykendall worked out of Lamar, Missouri on Farmers Home Administration easements, February 12-14.

Manager Clawson was detailed to Portland, Oregon the week of March 12 to work on the refuge management information system.

Manager Lenz was assigned to the Canada duck banding crew from July 27 to September 8.

Manager Kuykendall attended a farm bill meeting at Columbia, Missouri, August 1-2.

Managers Clawson and Kuykendall participated in Division 2's WAM JAM at Northfield, Minnesota, August 20-22.

Training

Region 3 Management Training Program, 160 hours, Minneapolis, MN, 1/22-26, 4/23-27, 9/10-13, 12/10-14: Kuykendall

Heavy Equipment Certification, 16 hours, Crab Orchard National Wildlife Refuge, 4/24-25: Placher

Wildlife Disease Workshop, 16 hours, Madison, WI, 1/8-10: Lenz

Supervisory Training, 32 hours, St. Louis, MO, 3/12-16: Lenz

Volunteer Workshop, 24 hours, Salt Lake City, UT, 4/2-8: Lenz

Archeological Workshop, 24 hours, Minneapolis, MN, 4/29-5/2: Lenz

Law Enforcement Refresher Training, 40 hours, Des Moines, IA, 3/11-16:
Kuykendall

Law Enforcement Refresher Training, 40 hours, Des Moines, IA, 3/19-23:
Lenz

Law Enforcement Refresher Training, 40 hours, Cape Charles, VA, 3/31-
4/7: Clawson

4. Credits

Sections A, E, F1-4, and K - Clawson

Sections D5 and G - Shaiffer

Sections B, C, D1-4 and 6, F5-13, I, and J - Kuykendall

Sections H - Lenz

Typing, Assembling, Etc. - Foster

K. FEEDBACK

This is an interesting time to be working for the Service. It's fun to do something different, and we certainly have that opportunity now. With all the private lands work and new refuges coming on line every day provides new and different opportunities. It certainly is a busy time, but fun nevertheless.

Although the swampbuster portion of the new farm bill was strengthened in 1990, it doesn't mean loss of wetlands is going to stop. We continue to lose small wetlands, particularly farmed wetlands less than 1 acre, through minimal effect provisions. The value of these wetlands during the winter and spring migration periods is not adequately built into the evaluation system.

Pilot Knob National Wildlife Refuge

Pilot Knob National Wildlife Refuge is a 90-acre tract on top of Pilot Knob Mountain in Iron County, Missouri. It was acquired by donation from the Pilot Knob Ore Company on July 22, 1987 for conservation purposes. More specifically, it contains some iron mine shafts created in the mid-1800's which are critical habitat for the endangered Indiana bat. A memorandum of understanding with the Missouri Department of Conservation signed by the Regional Director, August 25, 1987 calls for sharing of law enforcement and land management responsibilities.



Pilot Knob National Wildlife Refuge.

GLC

In 1988, a 3,910-foot long, 8-foot high chain link fence was constructed to restrict access for public safety and liability reasons. Since all entry to the mine shafts is prohibited for safety reasons, good population estimates are not available. Bats enter the shafts in the fall to hibernate and exit in the spring. Up to a third of the known world population of Indiana bats are believed to hibernate in the old mine.



Old mine shaft opening at Pilot Knob National Wildlife Refuge
- major entrance for Indiana bats. GLC



Indiana bat colony.

GLC

The U.S. Geological Survey and the Missouri Division of Geology (Department of Natural Resources) continue to have an interest in the property and were given access in accordance with a letter of authorization dated April 19, 1988. The deposits have certain unique features that add to insight of the nearby Pea Ridge mine and other deposits in the St. Francois Mountains.

Mingo National Wildlife Refuge personnel make several trips throughout the year for inspection, fence maintenance, and law enforcement purposes.