

ANNUAL NARRATIVE REPORT  
Calendar Year 1982  
U.S. Department of the Interior  
Fish and Wildlife Service  
Mingo National Wildlife Refuge  
Puxico, MO 63960

MINGO NATIONAL WILDLIFE REFUGE

Puxico, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1982

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

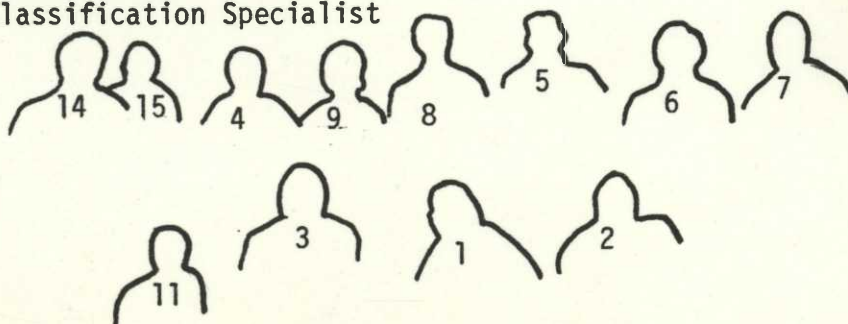


### PERSONNEL

1.	Gerald L. Clawson	Refuge Manager	GS-12	EOD	1971	PFT
2.	Eric T. Sipco	Assistant Manager	GS-9	EOD	1977	PFT
3.	Thomas G. Bell	Outdoor Recreation Planner	GS-9	EOD	1977	PFT
4.	Howard G. Shelton	Administrative Assistant	GS-7	EOD	1965	PFT
5.	Audrey Walk	Maintenance Leader	WL-8	EOD	1954	PFT
6.	Richard L. Sebree	Maintenance Worker	WG-8	EOD	1969	PFT
7.	Avery Walk	Tractor Operator	WG-7	EOD	1962	CSFT
8.	Douglas J. Siler	Maintenance Helper	WG-5	EOD	1977	PFT
9.	Judy L. McClendon	Information Receptionist	GS-4	EOD	1977	CSFT
10.	Thomas W. McGowan	Janitor	WG-2	EOD	1977	PI
11.	Brenda Reinert	Clerical Aid	GS-1	EOD	4/5/82	TI
12.	Tina Wilson	Biological Aid	GS-2	3/20	-8/27	TI
13.	Doreen Dublin	Biological Aid	GS-1	8/29	-11/29	TI

### VISITORS

- |     |                  |                             |
|-----|------------------|-----------------------------|
| 14. | Daniel A. Miller | Personnel Officer, Region 3 |
| 15. | Ruth A. Anderson | Classification Specialist   |







1 2 3 4 5

YCC CREW

1. Christopher E. Morris	Enrollee
2. Lisa M. Lawrence	Enrollee
3. Cheryl L. Pogue	Enrollee
4. James S. Bowling	Enrollee
5. Scarlett A. Shelby	Enrollee

Review and Approvals

Barry L. Lawton      3/2/83  
 Submitted By      Date

\_\_\_\_\_  
 Regional Office      Date

\_\_\_\_\_  
 Washington Office      Date



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### A. HIGHLIGHTS

Spring tornadoes and winter rains caused extensive damage in surrounding communities (Section B).

A workshop on the ecology of wintering waterfowl was held on the refuge in April (Section D).

The wetland management program was very successful this year (Section F).

Two bald eagles were hatched on the refuge under a cooperative program with the Missouri Department of Conservation (Section G).

A family of five trumpeter swans were relocated from LaCreek refuge to Mingo under an experimental reintroduction program (Section G).

One entry from the refuge sponsored National Hunting and Fishing Day Poster contest won honors in the National Contest (Section H).

A new spring firearm turkey hunting program was conducted for the first time (Section H).

Several new pieces of equipment were purchased (Section I).

Maintenance Leader Walk received a \$500 outstanding performance award (Section J).

### B. CLIMATIC CONDITIONS

Total rainfall for 1982 was 54.43 inches compared to the normal average of 44.74 inches. However, rainfall for eight months of the year was actually eleven inches below normal and the months of January, April, November, and December made up for it. Monthly average temperatures were below average for eight months but no trend or correlation to precipitation was apparent.

The year started with the third wettest and sixth coldest January on record. Rainfall for the month totaled 12.38 inches, the most of any month. The coldest temperature of the year was  $-12^{\circ}$  on January 17. Record low temperatures were recorded for the dates of January 18, February 7, February 9, and April 6. In contrast record high temperatures were set for March 16 and March 18.

Snowfall for the year was eighteen inches with the total being about equally divided between January and February. Most of the snow was followed by either rain or warm periods and did not last compared to recent years. Freeze up of most refuge impoundments occurred on January 8. The last frost of the spring was on April 24.



Wind and water temporarily put the refuge boardwalk out of commission in January.

February had the least amount of rainfall with a total of 1.04 inches followed by September with 1.44 inches. The highest temperature of the year was 100° recorded on August 6; however, overall average temperatures for June, August, and September were noticeably below average making for a very pleasant summer. The first frost of the fall occurred on October 21, sixteen days earlier than last year, but well past the average date of October 12.

Tornadoes and severe thunderstorms in April and June caused localized property damage in surrounding communities. During the June storm the refuge lost several trees to high winds and an extension on the chimney at the old refuge shop was blown down. The chimney was no longer needed, however, the refuge vehicle it fell on required \$200 worth of repairs.



Vehicle damaged by chimney in freak accident.

The biggest weather story came at the end of the year when severe rainstorms the night of December 2 and again on Christmas Eve caused extensive flooding and property damage in communities in Wayne and Bollinger Counties which adjoin the refuge. Dozens of homes and businesses were flooded and numerous roads including some major highways were closed. The refuge received its share of water which created ideal waterfowl habitat conditions in the timber and moist soil units. Some damage occurred to refuge roads and Duck Creek's water control structure in pool 8.

### C. LAND ACQUISITION

#### 1. Fee Title

No further work was done on acquiring boundary round-out tracts identified several years ago.

One adjoining landowner came up with a proposal to trade his cut over land to the refuge for a beautiful wooded tract next to the refuge auto tour. His offer was refused.



## D. PLANNING

### 1. Master Plan

Since changing from Region 6 to Region 3 in 1980 the question of master planning for Mingo has been up in the air. However, a Planning Needs Assessment meeting with Regional Office personnel was held in January 1983. This meeting should determine Mingo's needs and priority in the master planning system for Region 3 refuges.

### 2. Management Plan

Updates were completed on the refuge's water management plan, and waterfowl depredations plan. New amendments to the refuge's hunting and trapping plans approved last year were implemented.

### 3. Public Participation

No public meetings were held during the year. The poor attendance and response received in 1980 did not seem to justify repeating the process. Periodic news releases were issued during the year to keep the public informed on refuge programs and activities.

A special news conference was held at the refuge on September 2 to acquaint the press with the experimental trumpeter swan restoration program at Mingo sponsored by the Missouri Department of Conservation. Twenty-two people attended the conference and observed the release of the swans.

### 5. Research and Investigations

Graduate student research is an active program on the refuge due to our close proximity to the Gaylord Memorial Laboratory. This facility is operated by the University of Missouri under the direction of Dr. Leigh Fredrickson. During the year we had four ongoing graduate student research projects, one new graduate student project initiated, one student project proposed for 1983, and two ongoing non-student projects conducted by technicians from the Gaylord Lab. One thesis was received on a completed master's study. The following annual progress reports were received for each study:

Mingo NR 82 - "The Relationship Between the Wintering Strategies of Mallards and the Dynamics of Lowland Hardwood Wetlands in the Upper Mississippi Delta" (33540-1) Graduate Student - Mickey Heitmeyer

The objective of this study is to examine the energy flow between lowland hardwood wetlands and wintering mallards. Habitat use, flocking structure, physiological condition, and daily and seasonal activity information have been employed in addition to feeding ecology work to elucidate the energy mechanisms operating within lowland hardwood habitats.

While the term wintering is used to define the period of time when mallards are present on lowland hardwood wetlands, actual biological periods within the annual cycle are more useful for examining mallard use of these wetlands. Individual mallards are not all in the same biological status at the same time during winter, and each pursues its own "biological program" as dictated by its respective condition. The first mallards begin arriving at Duck Creek and Mingo in October while still completing the prealternate molt. Most birds are unpaired at this early arrival. Most later migrants (November-December) have completed the prealternate molt. Pairing begins for most individuals when the full alternate plumage is attained and at a "pairable physiological condition". Once pairs are formed, molt by most males (a previously undescribed supplemental molt) and females (prebasic molt) is initiated. The prebasic molt of females can be delayed, interrupted, or accelerated depending on environmental and climatic conditions during winter. Many females complete the prebasic molt before vernal migration. Once this molt is at or near completion, females deposit large fat and protein reserves from foods consumed at Duck Creek and Mingo before migrating north. These reserves are obtained by intense and segregated feeding bouts by pairs. Early paired females that have completed the prebasic molt migrate first in the spring and apparently use these reserves for migration and egg production upon arrival in northern prairie regions. Other females that are younger, lighter, and at a slower rate of gonadal development do not finish the prebasic molt on winter areas and must migrate while still molting.

The seasonal changes within the biological activity of individual birds utilizing lowland hardwood wetlands are accompanied by respective shifts in resource acquisition, flocking structure, and habitat use. Individuals that are molting (both the prealternate and prebasic) and pairs immediately before and after the prebasic molt consume more animal matter (40-50% dry wt) than do migrant and unpaired individuals (0-5% dry wt). Invertebrate foods are different and come from different habitats between fall and late winter however. Seasonal trends of food consumption, habitat use, and behavior can all be related to energy and nutrient (i.e. amino acids, fatty acids, minerals, and vitamins) demands of individuals within respective biological periods of the annual cycle. The decline in gregariousness and the subsequent segregation of pairs during daylight hours accompanies the transition from migrant unpaired to paired molting status. The change in flock structure is necessary to allow optimal foraging on invertebrates by molting and prevernal migrant pairs. Gregariousness and tight flocks are used by birds to benefit roosting, obtaining high energy foods in open environments, and when wetland area is limited.

Mingo NR 82 - "Larval Fish Distribution in Relation to Flooding Regime in Bottomland Hardwood Wetlands" (33540-2) Graduate Student - Elaine Stewart

Objectives:

1. Determine the spatial distribution of larval, juvenile and small adult fishes among areas with different flooding regimes.
2. Determine diel and seasonal distribution of fishes among areas used.
3. Compare the spatiotemporal distribution and relative abundance of selected species among areas.

Larval, juvenile and small adult fishes were collected with activity traps from late March through early August 1981 and from late February through early August 1982. Four areas with different flooding regimes were sampled.

1. Pin oak area: natural-temporarily flooded, located on Mingo National Wildlife Refuge.
2. Overcup oak area: natural-seasonally flooded, located on Mingo National Wildlife Refuge.
3. Dead timber area: natural-semipermanently flooded, located on Mingo National Wildlife Refuge.
4. Dead timber - Pool 1 area: modified-semipermanently flooded, located at the periphery of a reservoir on Duck Creek State Wildlife Management Area.

All three areas on Mingo were sampled in both 1981 and 1982. The dead timber - Pool 1 area was sampled only from April through August 1982. Two previous areas in live timber on Duck Creek State Wildlife Management Area were eliminated after 1981 due to lack of flooding in both years.

Species composition and timing of use differed among all areas. The most species were captured from dead timber on Mingo (21), followed by dead timber - Pool 1 (13), and overcup oak and pin oak (both with 11). Predominant species in all areas on Mingo include banded pygmy sunfish, starhead topminnow, mosquitofish, flier, and grass pickerel. Predominant fishes on Duck Creek State Wildlife Management Area include largemouth bass, brown bullhead, and grass pickerel. Most species captured on Mingo moved freely from one area to another; use of a



particular area may be related to selection of water depth and/or exploitation of invertebrate resources. Between-year differences in use of areas were primarily related to large differences in timing and depth of flooding.

Mingo NR 82 - "Limnological Investigations at the Mingo-Duck Creek Area"  
(33540-3) Graduate Student - Glenn Wylie

Objective 1. Determine water chemistry fluctuations over time among aquatic habitats.

Water samples from the Mingo-Duck Creek area have been taken weekly from February to August 1981, and biweekly since then. Samples were taken from Pools 1, 2, and 3 on Duck Creek, and from Rockhouse Marsh, Monopoly Marsh, Moist Soil Unit 7, flooded timber along Ditch 6, and Lick Creek on Mingo.

Waters of the Mingo-Duck Creek area are generally soft, unbuffered, of low to neutral pH, and are eutrophic according to their nutrient content. The pH could fluctuate as much as three units daily during the summer from photosynthetic activity. The chemistry of these waters is greatly affected by the dominance of rainfall and associated runoff as the source for the standing waters in the area.

Multiple discriminant function analysis identified natural waters, marshes, and flooded timber more than 90% of the time using variables related mostly to nutrient content.

Objective 2. Determine aquatic primary production over time among habitats.

Community production was sampled using a modified diel pulse method and measurements were taken biweekly beginning in spring 1981. The water-fowl management pools have the least production.

Macrophyte production estimates from biomass harvesting begun in summer 1982 show that above-sediment production of lotus (Nelumbo) is on the order of 400 g (dry wt) per square meter. Values for other macrophytes are on the order of 100g/m<sup>2</sup> for Chara, 200g/m<sup>2</sup> for Brasenia, and 100g/m<sup>2</sup> for Myriophyllum.

Objective 3. Measure detritus processing over time at selected sites.

The litter bag method of decomposition study indicated that terrestrial detritus decays much more slowly than aquatic detritus. In nine months lotus leaves have decayed to 20% of original weight, (Brasenia) to less than 10%, and pin oak to 80%.

Objective 4. Assess zooplankton dynamics in seasonally flooded areas compared to those of the parent water body.

Zooplankton were sampled from the waterfowl management pools (Pools 2 and 3, and from the parent water body (Pool 1) upon flooding of Pools 2 and 3 in the fall of both 1981 and 1982. Zooplankton numbers showed an immediate two to three orders of magnitude increase in the waterfowl management pools compared to those of Pool 1. These high numbers were generally maintained throughout the fall and into the winter. This exploitation by zooplankton of the waterfowl management pools shows their ability to translate detrital production into secondary production.

Mingo NR 82 - "Breeding and Foraging Behavior of Red-Shouldered Hawks in Southeastern Missouri" (33540-4) Graduate Student - Margaret Parker

Objectives:

1. To examine the territorial and foraging behavior of red-shouldered hawks during both the breeding and non-breeding seasons.
2. To serve as a companion study to investigations on nesting and year-round foraging habitat use.

During the summer of 1982, observations were made of birds foraging, and vegetation analyses were conducted at the foraging sites. During the coming months, birds will be trapped and outfitted with radio transmitters. These marked birds will be tracked to determine home range limits and habitat use. When possible, visual observations will be made on their foraging behavior.

During the breeding season, detailed observations will be made at three nests. Observers will identify and quantify food items brought to the nest, sibling interactions and parental behavior. We hope to make complete a picture as possible of breeding behavior and the additional stress on the foraging birds.

We hope to continue the study through the fall of 1983, to supplement last summer's observations and to observe dispersal of juvenile birds.

Mingo NR 82 - "The Effects of Flooding on Pin Oaks in Southeastern Missouri" (33540-5) Gaylord Lab Staff

This project started out as a post-doctorate study to determine the long-term effects of green tree reservoirs on pin oaks. However, the University of Missouri professor conducting the research transferred

and the work was picked up to some degree by the research technicians at the Gaylord Lab. The following progress report was submitted:

The experimental site on Duck Creek was flooded continuously during 1982. Water depths were held between 1 and 4 inches. None of the pin oak trees died but there was no mast production and the canopy was reduced.

Mingo NR 82 - "The Ecology of Wood Ducks and Hooded Mergansers" Dr. Leigh Fredrickson and Gaylord Staff (No number assigned)

This has been a long-term continuing study of Dr. Fredrickson's on many different facets of wood ducks and hooded mergansers. Several papers have already been published on this research. Current activities involve a continuing data collection on the production from wood duck boxes mostly on the Duck Creek Wildlife Area adjacent to the refuge. The following report was submitted:

In 1982, 87 active wood duck nests were found and of these nests, 41 were successful and 46 failed. The 41 successful nests produced 519 ducklings, of which 399 were web tagged. Sixteen adult females were banded on the nest.

Seven hooded merganser nests were located. Five nests were successful and two nests failed. The five successful nests produced 51 ducklings. All of the young were web tagged and two adult females were banded on the nest.

The following new study was approved and started during the year:

Mingo NR 82 - "Litter Decomposition and Nutrient Dynamics in Bottomland Hardwood Ecosystems" (33540-6) Graduate Student - Don Batema

#### Objectives:

The purpose of this research is to determine the importance of the decomposition process in the energy flow and nutrient dynamics in bottomland hardwood forests. Specific objectives are to:

- A. Compare decomposition rates and subsequent nutrient changes of various leaf species in relation to forest type (pin oak-sweetgum, overcup oak-red maple) and water regime (natural vs. managed).
- B. Characterize population dynamics of the bottomland hardwood aquatic macroinvertebrate community.
- C. Relate nutrient changes in leaf decomposition to macroinvertebrate abundance.



- D. Measure nutrient transfers in throughfall, litterfall and precipitation to the forest floor and relate these fluxes to litter decomposition.
- E. Characterize bottomland soils in the two forest types, particularly the availability of nutrients for heterotrophic activity.

Field work for the project began in the summer of 1982 with site selection. Two forest types were selected for study: (1) pin oak-sweetgum and (2) overcup oak-red maple. For each forest type two flooding regimes will be examined: (1) natural flooding - Mingo National Wildlife Refuge and (2) managed green tree reservoir - Duck Creek Wildlife Management Area. Within each forest type and flooding regime four replicated plots were established for a total of sixteen study plots.

On each plot, throughfall collectors, litterfall traps, and invertebrate baskets were put in place. Litter bags were prepared after peak leaf fall and placed on each plot in December. Sample collection on litter accumulation, litterfall, throughfall, water, and invertebrates began during the fall and will continue through June 1984.

One thesis was received on a completed study entitled, "Leaf Decomposition, Macroinvertebrate Production and Wintering Ecology of Mallards in Missouri Lowland Hardwood Wetlands" by David White, University of Missouri, August 1982

The following findings and recommendations were taken from the thesis:

The timing of the peak energy demands of molt and migration of female mallards may have evolved in response to moderating weather at the end of winter, thereby reducing high daily energy requirements by avoiding additional thermoregulatory costs. During cold spring weather, the rising costs of molt and migration may be sufficient to depress spring reserve energy especially if their condition was already low. If weather had remained favorable in February, and flight from Mingo had not been necessary the high reserves acquired in January could have been maintained through the peak of molt.

In years when winter temperatures in southeastern Missouri are moderate, female mallards may remain in better condition. Lowland hardwood wetlands may supply the lipids for the spring fattening of female mallards. Because the winter of 1980 was cold, mallards left southeastern Missouri with low lipid reserves in spring. Lipid reserves essential for reproduction were probably acquired from wetlands between Mingo and the northern breeding grounds.

The acorns density estimate ( $14.2\text{g/m}^2$ ) used to calculate the foraging area ( $2.38\text{m}^2/\text{day}$ ) necessary for a female mallard to meet her daily needs, may have overestimated what existed in late winter 1980, when most (18/20) of the ducks were collected. This figure was based on a twelve-year study of acorns collected in baskets during the fall. Undoubtedly acorn densities during late winter 1980 were lower because of a mediocre fall 1979 acorn crop, deterioration and acorn consumption by wildlife during winter. Nevertheless the possibility of selection of invertebrates over acorns exists.

The relationship between lowland hardwood wetland food availability and the ability of female mallards to exploit those resources is difficult to examine. Additional data on foraging rates and efficiencies, daily time budgets and wetland agricultural habitat use must be determined to understand the seasonal energy balance between female mallards and their wetland habitats.

The ability of female mallards to meet present or future energy and nutritional needs during the course of the annual cycle must be evaluated against the supplies of available food resources and endogenous reserves and the demands of reproduction, migration, molt and the environment. During the course of the annual cycle, lipid reserves are lowest during incubation. Hypothetically food resources are readily available and temperatures are moderate, potentially enabling females to recover quickly by increasing lipid stores following incubation. During spring, supplies of foods and reserves are low and the demands of migration, molt and the environment are high. Thus the potential for female mallards to meet present or future needs to assure their survival and successfully reproduce is probably restricted most during late winter and spring.

#### Management Implications

1. Leaf decomposition is an important process that generates detrital foods for benthic invertebrates. The process is enhanced by alternating wet winters and dry summers. Variations of 5-8 months in the wet phase did not result in any significant differences in protein, tannin or ash content of decomposing pin oak and sweetgum leaves on a green tree reservoir and a naturally flooded lowland hardwood wetland.

2. Growth and production of isopods, an important food of the mallard is strongly related to the duration of the wet phase. The maintenance of standing water on lowland hardwood wetlands from October - April may increase isopod production. Isopods and other invertebrates may be made available to feeding mallards

if water levels are held within the feeding range of mallards, 10.5 - 26.9 cm. Dry period survival of isopods may be aided by their use of shallow puddles that hold water through the summer. Any constant, long duration flooding plan must, of course, consider the effects upon the vegetation.

3. Non-breeding condition of female mallards is generally highest during mid fall and lowest during late winter. High quality wetlands must be maintained along the mallards' migratory path to ensure survival and acquisition of lipid reserves critical for successful reproduction.

### Research Publications

The Fish and Wildlife Service's Resource Publication #148 entitled "Management of Seasonally Flooded Impoundments for Wildlife", by Leigh Fredrickson and T. Scott Taylor was released near the end of the year. This publication was largely based on data collected at Mingo and provides excellent information on moist soil management:

### Abstract

The concepts and practices that make up moist soil management were developed at Mingo National Wildlife Refuge in southeast Missouri from 1968 to 1982. Moist soil management offers opportunities to attract and hold a wide variety of wildlife on man-made impoundments. Plant and animal species differ with latitude, and some specific management techniques that work well at southern latitudes may have little or no value at northern latitudes, or vice versa. Nevertheless there are many ecological and management principles that are important in moist soil management, regardless of location. Low sites where row crops are often lost to flooding are particularly well suited for moist soil management. Optimum success requires good levees, control structures for precise water manipulations, and a pumping system to remove or add water. On some southern sites where annual rainfall is 100 cm or more, this management has been successful despite the lack of pumping potential. Precise water manipulations not only provide food and cover for many kinds of wildlife, but costs and energy consumption are less than for row cropping, and native foods are more nutritionally complete. Growth of woody and undesirable herbaceous plants are expected problems that require regular inspections and corrective measures if food production and wildlife use are to remain high. A group of small impoundments provides more management flexibility than a single large one because control of vegetation or flooding to attract one group does not preclude options to attract other wildlife on adjacent areas.



On April 14-16 a workshop was held at the refuge visitor center on the ecology of wintering waterfowl sponsored by the Gaylord Memorial Laboratory and the Delta Waterfowl Research Station. The workshop had twenty-six speakers and centered on the current research and knowledge on the ecology of wintering waterfowl as well as future research opportunities. The discussions covered the four general topics of habitat selection, social behavior, bioenergetics and habitat.

The papers presented at the meeting are available in a publication entitled "Workshop on the Ecology of Wintering Waterfowl", for \$2.00 from Delta Waterfowl Research Station, R.R. 1, Portage Le Prairie, Manitoba, Canada.



Attendees at the Workshop on the Ecology of Wintering Waterfowl

BACK ROW (l-r) Roger Pederson, Eric Bolen, Carl Korschgen, Stuart Paulus, Bucky Owen, Ken Reinecke, Rick Wishart, Dennis Raveling, Mike Anderson, Arnold van der Valk, Bill Hohman, Alan Afton, Frank McKinney  
 MIDDLE ROW (l-r) Dave Gilmer, Dave Ankney, Jim Nichols, Guy Baldassarre, Ron Brobney, Erwin Klaas, Milton Weller, Bruce Batt, Henry Murkin, Mike Haramis, Jim Lovvorn, Bill Alexander  
 FRONT ROW (l-r) Larry Jahn, Don Rusch, Harold Prince, Dennis Jorde, Rod Sayler, Fritz Reid, Pat Brown, Leigh Fredrickson, Mickey Heitmeyer, Scott Taylor, Rodger Titman, Bob Bailey, Gerald Clawson



## E. ADMINISTRATION

### 1. Personnel

No permanent personnel changes occurred during the year. Douglas Siler, maintenance helper, was converted from career seasonal to permanent full time on October 17. Douglas had been working fifty weeks per year since entering on duty in February 1977.

Temporary personnel changes during the year were as follows:

Termination - Ralph Freer on March 23 as a maintenance worker responsible for supervision of YACC enrollees.

Termination - Tina Wilson on August 27 as weekend information receptionist in the Visitor Center.

Appointment - Brenda Reinert on April 3 as a full time information receptionist, GS-1.

Appointment - Doreen Dublin on August 29 as weekend information receptionist, GS-1.

The following table compares on board strength over the past five years.

	<u>Permanent Full-Time</u>	<u>Permanent Part-Time</u>	<u>Temporary</u>
1982	7	3	4
1981	6	3	3
1980	6	3	4
1979	6	3	3
1978	7	2	2

### 2. Youth Programs

The YACC program began the year with six enrollees supervised by refuge staff working on refuge O&M projects. Four enrollees remained until the end when they were terminated on March 23. The final phase of YACC with one small crew and crew leader worked well for the refuge and we missed them once they were gone.

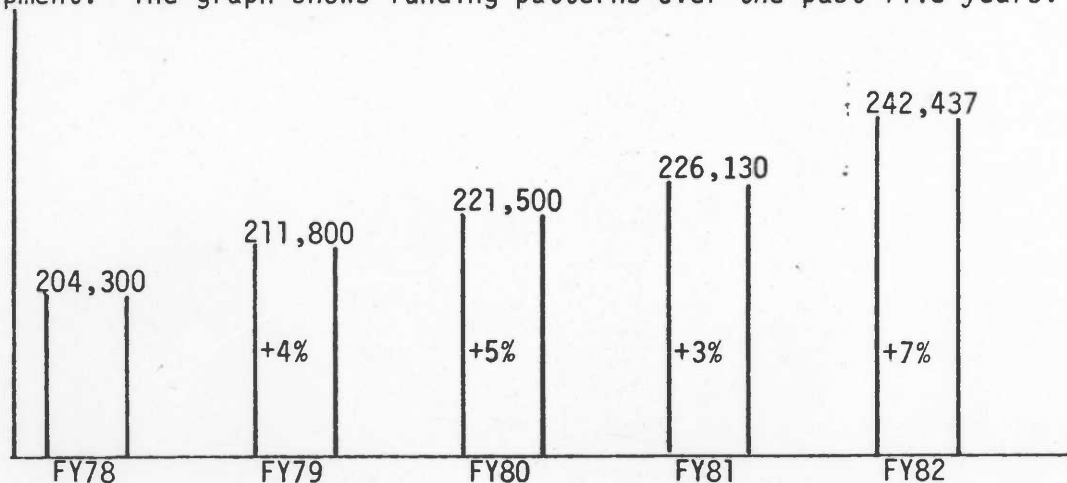
Part of the slack was taken up by a five member YCC crew this summer. Supervised by Douglas Siler, refuge maintenance staff, the YCC crew assumed much of the lawn and trail maintenance. Other projects included recreation area cleanup, landscaping, and construction of a concrete stoplog structure on the pool 8 wade and shoot hunting area. YCC members also repaired the eagle hacking tower and provided fish for the eagle hacking program.

The Job Corps program continued amid rumors of budget cuts and the assault on entitlement programs. With the phase back in youth program activities in the Service, there have been rumors about elimination of individual agency youth program offices and consolidation of activities in the USDI Office of manpower programs. If this happens, all or portions of the center operation could be operated by contract. None of this would benefit the refuge program. Although Job Corps work on the refuge has tapered off over the years, they still contribute significantly to our maintenance and development program.

On center Job Corps projects this year included completion of remodeling of the dispensary and residential living office, and continued progress on a second residence, a new vocational training building, and a 30' x 350' warehouse storage type building. Refuge projects included completion of the roof and floor of the 46' x 27' picnic/environmental education shelter near the Visitor Center parking lot.

## 5. Funding

Refuge funding was adequate during the year to carry out operations and maintenance projects. No funds were available for rehabilitation or expansion. Quarters O&M funds were deleted early in the year. However, an additional \$7,000 was added for a summer YCC program and \$26,500 added at the end of the year for purchase of material (gravel) and equipment. The graph shows funding patterns over the past five years.



In addition, earmarked funds were provided as follows:

FY78	\$ 39,000 (BLHP) (Road rehabilitation)
	39,000 (YCC)
FY79	231,000 (BLHP) (Water control structure)
FY80	127,000 (BLHP) (Moist soil rehab. and equipment purchase)
FY81	144,000 (BLHP) (Equipment purchase)
FY82	26,500 (gravel and equipment purchase)
	7,000 (YCC)

## 6. Safety

Twelve safety meetings were held during the year with assignments for meeting topics rotated among employees. Safety films made available through the regional safety office were used at most meetings and were generally excellent. Safety committee members were Eric Sipco, Audrey Walk, and Howard Shelton.

Station safety inspections were conducted on January 13, April 30, and July 20 by refuge personnel. No major safety or health problems were identified. Audio metric tests were conducted on May 17 with the use of regional safety office equipment. All major refuge equipment, with the exception of the Champion road grader, registered levels high enough to be of concern. The worst items were the two bulldozers, two table saws, and chain saws. Hearing protectors were purchased and provided all employees who have occasion to operate this equipment.

Defensive driving refresher training was presented in Poplar Bluff on March 10 by Sergeant Joe Matthews of the Missouri Highway Patrol. Clawson, Shelton, Charles Walk, Audrey Walk, Sebree, and Siler received the training.

CPR refresher training was received by Sebree and Siler on February 28 and by Clawson on May 13.

The station safety record of calendar work days without a lost time accident was 1095 at the end of the year.

## 7. Technical Assistance

Refuge staff members contributed plans for bird houses and wood duck boxes to interested parties upon request. Requests for construction detail on the boardwalk and picnic shelters were also provided to outside parties. Refuge personnel routinely participate as advisors on wildlife management studies being conducted on the refuge and serve as judges at local high school science fairs.

Tom Bell served as a board member on the newly formed Scenic Rivers Audubon Society Chapter in Poplar Bluff. Refuge Manager Clawson served on property committee of the Cotton Boll Girl Scout Council as advisor on property management and council outdoor activities.

## F. HABITAT MANAGEMENT

### 2. Wetlands

Rockhouse and Monopoly marshes comprising a total of approximately 5,500 acres continue to be managed on an alternate drawdown basis. Monopoly was drawn down this year for the first time since 1978. The purpose is to expose mud flats for moist soil plant production. Water was held in Rockhouse to assure availability in event of a dry fall and for use in reflooding Monopoly if needed. It was not needed. Although some flooding occurred January through March and again in December, water levels were nearly ideal throughout the spring, summer, and fall. Moist soil food production was excellent as was response by waterfowl.

Since Monopoly had held water the past three summers, there was concern a fish kill might occur as has happened in prior years under similar conditions. It did not occur. Fishing was excellent in the ditches coming out of Monopoly throughout most of the summer. A winter drawdown in 1980-81 combined with a spring that was not unusually hot or wet were major factors in the smooth drawdown. Availability of new water control structures on Ditches 5, 6, and 11 were also a factor.

Twelve units (723 acres) of former agricultural land are managed for moist soil production. A part of this effort is to disc or farm the units periodically for control of woody vegetation. Moist soil units 1, 3, 4S, 5, 6, and 11 (311 acres) were farmed in 1982. Moist soil unit 2 (98 acres) was disc as part of a shorebird/moist soil wildlife management study. On the units that were farmed, permittees were required to plant a third of the acreage to Japanese millet. Although the millet was planted early (May/early June) results were generally satisfactory and the units received good waterfowl use when reflooded this fall.

Pumping to reflood the units this fall and to support the University of Missouri shorebird study was as follows:

	<u>Refuge</u>	<u>University of Missouri</u>
Company Farm Pump	100 hours	46 hours
Ditch #2 Pump	0 hours	0 hours
16" Crissifulli Pump	184 hours	99 hours



Development work associated with wetlands management was as follows:

- MS-7 Construction of a pumping site on the south end of the unit adjacent to the Mingo River.
- Pool 8 This 2,000 acre green tree reservoir is being managed cooperatively with the Missouri Department of Conservation for wade and shoot type waterfowl hunting. One foot contour mapping was completed by the Department and some progress made on development planning. An 18-foot concrete stoplog structure was constructed in the west levee near the southwest corner and 210 cubic yards of fill material added to low spots on the west levee between the structure and the southwest corner.

Minor levee repairs was also necessary on some of the moist soil units.

### 3. Forests

A firewood policy was initiated this year and five special use permits issued. The permits are good for one year and/or three pickup loads of wood. Down trees only may be salvaged. No cutting is permitted in the wilderness area. A nominal fee of five dollars was charged for each permit.

Flooding was initiated on Pool 8, the 2,000-acre green tree reservoir, on October 19 by diversion of water from Duck Creek's pool 1. When development at this pool is complete, management level will be 339.5. However, under current conditions, the maximum controllable level is 338.7. By a combination of diversion and pumping from Ditch 2, a level of 338.0 was reached on October 31 and 338.4 on November 27. Major flooding occurred in December and levees were overtopped. Minor damage occurred including a washing out of the temporary control culvert on the south end of the pool.

December flooding covered nearly all of the lowland forested areas on the refuge and filled Pool 5, a 600-acre green tree reservoir. Mallard response was excellent to flooded timber conditions.

### 4. Croplands

The 1982 crop year was excellent. Rainfalls were abundant and adequately spaced to produce what may have been record yields. Corn yields averaged 100 bushel/acre and soybeans 25 bushel/acre on the better units. A total of 958 acres were farmed in 1982 - mostly by permittees. This included 315 acres of moist soil units where cultivation is used as a method of control for woody vegetation.

Most farming is by permittee with a standard agreement calling for 50% corn and 50% soybeans and fields rotated each year. The refuge receives one-third of the corn left standing in the field and has two bushels of wheat per acre sowed for-browse following the soybeans harvest. Fertilizer is applied in accordance with soil tests. The farming program provides food for migratory waterfowl and resident wildlife, reduces crop depredations, and provides economic benefits to the local community.

The following table shows crop acres by units for 1982.

Unit	Permittee	Total	Corn	Milo	Beans	Wheat Planted	Wheat Harvested	Japanese Millet
FU-1	Sifford	29		12	17			
FU-2	W. Payne	100	43		57	57		
FU-3	Walk	60			45	45		
FU-4	G. Payne	100	50		50	50		
FU-5	Walk	60	45					
FU-6	G. Payne	105	50		55	55		
FU-8	G. Payne	94	49		45	45		
FU-10	Cookson	40			20			10
FU-12	Sifford	34			18	18	16	
FU-13	Berrong	90	15		45			30
FU-25-2,3	(Refuge)					21		
MS-1	Cookson	46			35			11
MS-3	Cookson	48		36				12
MS-4S	Cookson	72		27	27			18
MS-5	Cookson	31			23			8
MS-6	Cookson	<u>28</u>	<u>—</u>	<u>—</u>	<u>21</u>	<u>—</u>	<u>—</u>	<u>7</u>
Totals		958	252	75	458	291	16	96

## 5. Grasslands

The refuge has 751 acres of grasslands in seventeen management units. This includes both bottomland and upland pastures. Haying and grazing are used as management tools in these units to maintain the areas as grasslands. These units would eventually revert back to woodlands if no management occurred. The grassland units provide excellent browse for geese in support of refuge waterfowl use objectives. They also provide food and cover for a variety of other species, habitat diversity, economic benefits to the local community, and offer refuge visitors excellent viewing areas to see wildlife.

## 7. Grazing

Grazing was permitted on nine units totaling 557 acres. There were a total of seven permittees. All grazing units and permittees were the same as last year.

The grazing season extended from April 1 through October 15. The grazing rate fee for 1982 was \$5.87/AUM, compared to the \$5.21 rate last year. The grazing rate is calculated each year using the average beef price formula described in the Refuge Manual and data furnished by the Missouri Department of Agriculture. No adverse reaction was received from any permittee as a result of the rate increase. The rates in previous years were held below what they would have been due to mandatory price control guidelines in effect at the time. AUM rates and refuge receipts from the grazing program are shown in the following table:

<u>Unit #</u>	<u>Acres</u>	<u>AUM'S</u>	<u>Receipts</u>
GU - 7	38	139.75	\$ 410.17
GU - 11	45	183.63	538.95
GU - 15&16	123	133.25	391.09
GU - 17	57	126.75	372.01
GU - 18	117	273.00	801.26
GU - 19	85	250.00	733.75
GU - 21&22	<u>92</u>	<u>162.50</u>	<u>476.94</u>
Totals	557	1,268.88	\$3,724.17

Internal fence maintenance on each grazing unit was the responsibility of the individual permittee. The refuge provided any needed materials. Boundary line fences which bordered on a grazing unit were maintained by the refuge. Very little fence repair was required during the year.

Each permittee was required to top dress a portion of his unit with fertilizer or limestone in accordance with soil sample recommendations. The permittee's grazing fees were reduced by one-half to cover the cost of purchasing and applying these soil amendments. Permittees were also required to mow their entire unit at the end of the grazing period to facilitate wildlife use.

#### 8. Haying

Haying is usually confined to units where grazing is not feasible due to a lack of water or inadequate fencing. However, some of the grazing units with an excess of forage are usually available for haying also. Haying privileges on each individual unit are allocated on a sealed bid basis. Seven units were put up for bid this year. Bids were received on five of the units and ranged from a high of \$5.00/ton to a low of \$2.00. All bids were accepted and the units hayed beginning July 1. The last date for haying was set to give some protection to nesting birds.

Forage quality and yields were about the same as last year for those units hayed both years. None of the units provided a second cutting.

The demand for hay in this area has decreased over the past few years as reflected by fewer people bidding, much lower bids, and more selective bidding. There were no bids at all on three units. One negotiated permit was issued for GU-20 which gave the permittee the hay in return for mowing the unit. Specific information on the haying program is shown in the following table:

<u>Unit</u>	<u>Acres</u>	<u>Bid/Ton</u>	<u>Total Tons</u>	<u>Receipts</u>
GU-18*	100	\$3.00	72.38	\$217.14
GU-19*	50	3.00	38.00	114.00
GU-20	30	No Bid	14.50	No Charge
GU-21*	25	5.00	32.70	163.50
GU-22	15	No Bid	---	---
GU-25-1	8	2.00	9.00	18.00
GU-25-4	9	No Bid	---	---
		Totals	166.58	\$512.64

\* Units also grazed



In addition to the permittee haying, the refuge mowed grassland unit GU-17 totaling 45 acres earlier in the year to release a good stand of clover.

A total of seventeen acres in units GU-25-3&4 were disced and planted to clover to improve the quality of the pasture forage.

#### 9. Fire Management

There were no prescribed burns on the refuge during the year. The only wildfire during the year occurred on March 29, in the refuge's eight-acre stand of native warm season grasses. The fire burned the entire area but was kept from spreading by two refuge employees and the Puxico Fire Department. The native grass area borders a state highway and seems prone to fires probably started by cigarettes thrown from passing vehicles. This same area accounted for our only fire in 1981 when it burned on January 25.

The native grass area is the only grassland area on the refuge that calls for prescribed burning every three years. However, it seems doubtful we will ever get to burn it as planned.

Refuge Manager Clawson, Assistant Refuge Manager Sipco, and Maintenanceman Siler attended twenty-four hours of fire training presented by the USFS at the Winona Ranger District on October 12-14. Three basic training courses (S-110, S-130, S-190) were successfully completed.

#### 10. Pest Control

The main form of pest control on the refuge involves the use of herbicides by cooperative farmers to reduce crop competition. Farmers were only permitted to use those herbicides submitted on a pesticide use proposal and approved by the Regional Office. No insecticides or EPA restricted use herbicides were used on the refuge during the year. The following table shows the chemicals used, acreage involved, and the amount of active ingredients applied on the refuge.

<u>Herbicide</u>	<u>Acres</u>	<u>Pounds AI</u>
Alachlor	473	680.5
Atrazine	265	350
Bentazon	403	236
Trifluralin	57	57

Some manual control of vegetation along roadsides was accomplished by the YCC crew during the summer.

In accordance with Regional Office policy, one staff member is certified by the State of Missouri as a Public Operator for restricted use pesticides. Three additional staff members took the certification test during the year but did not receive a passing score.

## G. WILDLIFE

### 1. Wildlife Diversity

Mingo National Wildlife Refuge contains the most diverse wildlife populations in Missouri. The combination of lowland hardwoods, open marsh, croplands, pasture, moist soil units, old fields, Ozark upland forest and Crowleys Ridge is a complex not found any where else in Missouri. The almost total destruction of the lowland hardwood forest in the rest of Missouri's bootheel has created an island of wildlife habitat in a sea of soybeans.

In all, Mingo is known to host over 240 species of birds, 38 mammals, 60 reptiles and amphibians and 49 species of fish. Some of these, such as river otters and red-shouldered hawks, are uncommon in the rest of Missouri but abundant at Mingo. Others, such as green water snakes and bantam sunfish are not known to occur anywhere else in Missouri at the present time.

Preservation and management of the diverse habitats at Mingo are the key to maintaining the diverse and abundant wildlife populations.

### 2. Endangered Species

The bald eagle and peregrine falcon are the only federally listed endangered species known to occur at Mingo National Wildlife Refuge. Bald eagles begin to arrive as early as October but most show up in early December, concurrent with the arrival of peak waterfowl populations. During the one-day mid-winter waterfowl and eagle survey done in January 1982 a total of seventeen bald eagles were counted on the Mingo-Duck Creek-Wappapello Area. The unusually low figure was probably due to the massive flooding of the entire bootheel. Eagles were widely dispersed and difficult to count.

No peregrine falcons were observed on Mingo in 1982. Peregrines are normally seen on Mingo once or twice each winter.

Other species listed on Missouri's State Endangered Species list that occur on Mingo are: sharp-shinned hawk, Cooper's hawk, marsh hawk, red-shouldered hawk, barn owl, Swainson's warbler, river otter and green water snake.

A program begun in 1981 designed to re-introduce bald eagles as a nesting species in Missouri was continued in 1982 with the hacking of three eagles. Two of the eagles were obtained from Minnesota and the other came from Truman Reservoir in West Central Missouri. The Missouri eagle came from the first "successful" nesting recorded in Missouri since 1938. The young eagle was abandoned by first one parent and eventually both, probably due to disturbance from boaters, fishermen and eagle watchers.



Eagles on Hacking Tower.

When it became apparent the eagle was abandoned, personnel from the Dickerson Park Zoo in Springfield, cooperating with the Missouri Department of Conservation, climbed the nest tree and captured the nestling. After a short stay at the Zoo Raptor Rehabilitation Center, the young eagle was brought to Mingo and placed in the hacking tower with the Minnesota eagles.

Monitoring and feeding of the young eagles was carried out primarily by Gwyn McKee of the Missouri Department of Conservation. Staff from Mingo and Dickerson Park Zoo filled in when Gwyn could not be there. As in 1981, human contact was kept to a minimum. Feeding was done through a blind lock. The young eagles were monitored from a blind in a tree about 100 yards away.

All three eagles were fitted with radio transmitters prior to release on August 11. The last positive sightings of the birds was on September 1. Hopefully they will survive and eventually return to Southeast Missouri to breed. Plans call for hacking two to four more eagles in 1983.

For the second straight year, a pair of mature bald eagles utilized the nest in the south end of Monopoly Lake. This year one of the birds was observed actually sitting on the nest for a period of at least three weeks in late April-early May. Apparently no chicks hatched, however, and later flights over the nest indicated no eggs. Again both birds apparently remained in the refuge vicinity all summer. In addition, an immature eagle was spotted on the refuge on MS-2 in mid-August prior to dispersal of this year's hacked birds. This lead to speculation it might have been a bird from last year's hacking program.

### 3. Waterfowl

Peak waterfowl populations for the past five years are shown in the table below.

<u>Year</u>	<u>Canada Geese*</u>	<u>Ducks**</u>
1978	12,500	90,000
1979	29,975	48,000
1980	19,000	42,000
1981	14,000	54,000
1982	50,000	98,200

\* Figures are for winter period January - March

\*\* Figures are for fall period October - December

Peak numbers for ducks usually occur in November or December while Canada geese numbers usually peak in January or February. This past year waterfowl numbers were exceptionally high, due as much to better census techniques as anything. Ground counts by graduate students and personnel from Gaylord Wildlife Laboratory were coordinated with aerial counts to reach the totals. Large numbers of ducks in flooded timber normally overlooked from the air were recorded with this year's census technique.

Use days for ducks and geese increased in 1982 over figures obtained in 1981. The following charts show duck and goose use trends since 1960.

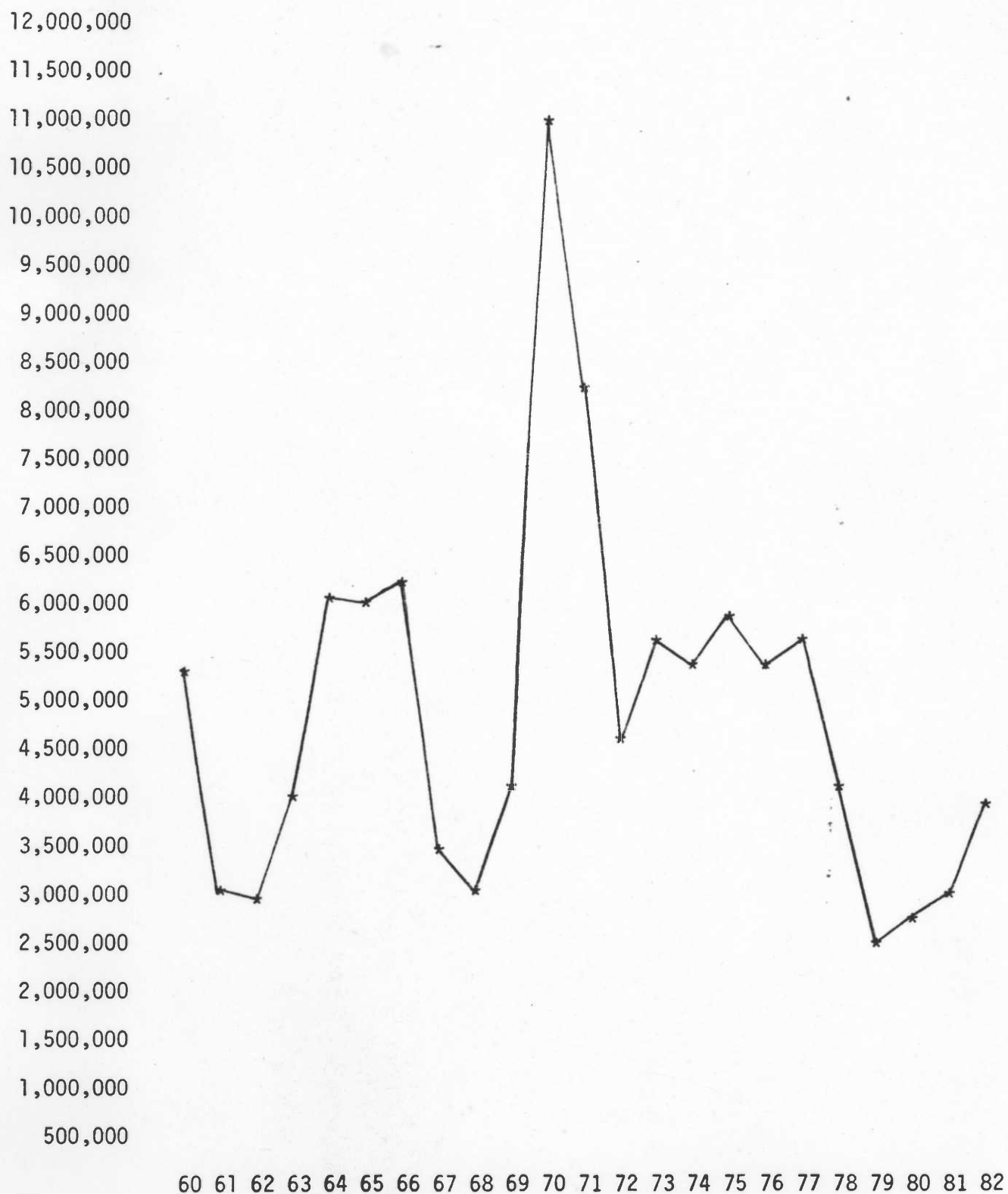




Wood ducks on Mingo National Wildlife Refuge.

GOOSE USE DAYS  
1960-1982



DUCK USE DAYS  
1960-1982

Mallards are the most common ducks at Mingo usually comprising at least 50% and sometimes as much as 90% of the ducks found at Mingo. Other ducks occurring on Mingo are gadwall, pintail, blue wing teal, green wing teal, wigeon, northern shoveler, wood duck, and ring-necked duck.

Canada geese make up the vast majority of all geese found at Mingo. In the fall of 1982 a flock of several hundred snow geese and about three dozen white-fronted geese were periodically observed. Most of these birds were gone by December 1. A few snow geese apparently settled in for the winter.

Nesting waterfowl include wood ducks, hooded mergansers, and a few Canada geese. To supplement wood duck production from natural cavities, Mingo has a wood duck box program. Boxes are checked each winter to determine box use the previous year, make repairs and to add fresh wood chips. Results from the previous six years are listed in the table below.

<u>Year</u>	<u># Hatches</u>	<u># Unsuccessful Attempts</u>	<u># No Use</u>	<u># Total Boxes</u>
1977	34 (34%)	26 (26%)	41	101
1978	39 (46%)	17 (20%)	28	84
1979	39 (38%)	20 (19%)	44	103
1980	54 (58%)	12 (13%)	27	93
1981	42 (44%)	7 ( 7%)	46	95
1982	42 (42%)	12 (12%)	47	101

A few Canada geese, spillovers from the resident flock of giant Canada geese at Duck Creek State Wildlife Area, nest on Mingo each year. Goslings were observed in Gum Stump Pool. No goslings were seen in Red Mill Pond in 1982, although a pair of geese apparently attempted to nest there.

A project designed to reestablish trumpeter swans in Southeast Missouri as wintering birds was initiated in 1982. Trumpeter swans historically wintered in the lower Mississippi Valley but have not done so in a long while. Currently, most trumpeter swans in the lower 48 overwinter in their breeding range and are supported by artificial feeding programs.

A family of five swans, two adults and three cygnets, was trapped at LaCreek National Wildlife Refuge and flown to Mingo on August 31 by Missouri Department of Conservation personnel. Upon arrival at Mingo, they were held two nights in a holding pen on Rockhouse Marsh prior to release. All of the swans were banded and fitted with neck collars. Two of the cygnets were equipped with radio transmitters. The swans' movements have been carefully monitored by Missouri Department of Conservation and Mingo personnel.





Trumpeter swans in holding pen at Mingo.



Trumpeter swans in Ditch 11 in November.

One of the cygnets was found dead on Mingo's Red Mill Pond on December 4. Initially it appeared the bird had been shot in the neck with either a .22 caliber bullet or a single shotgun pellet. An autopsy revealed that the wound was most likely caused by a dog or coyote size predator. The dead cygnet otherwise appeared to be in a healthy condition, weighing 24 1/2 pounds and possessing a large amount of body fat. Fortunately, this was the cygnet without a radio.

A storm on December 25 apparently scattered the birds. The adults were located in Rockhouse Marsh, the male cygnet was found on Moist Soil Unit 4 (about two miles from the adults), and the female cygnet was found sitting between two white five-gallon cans in a flooded field adjacent to Highway 51 about five miles away from the adults. Subsequently the female cygnet moved to Duck Creek Wildlife Area adjacent to Mingo and then disappeared. Aerial searches with telemetry equipment and several spotters have failed to turn up the female cygnet as of this writing. The male cygnet remained separated from the adults.

We hope that the cygnets will imprint on Mingo as a wintering area and return to this area each year, perhaps leading their offspring and other trumpeters with them. Since a project of this type has never been tried before results are uncertain. The adult birds may stay at Mingo and breed rather than migrate back to LaCreek.

Plans call for relocating several more family groups over the next two years. We should then be able to judge whether or not we have been successful in reactivating a migratory instinct in these magnificent birds.

#### 4. Marsh and Water Birds

The most commonly observed birds in this category ranked in order of abundance were little blue heron, green heron, great blue heron, yellow-crowned night heron, American bittern, pied-billed grebe, cattle egret, sora rail, Virginia rail, great egret, and black-crowned night heron. Rare appearances by yellow rails and least bitterns were put in during the spring. Total use days reported for this group was 1,048,030 in 1982





Yellow-crowned night heron in Moist Soil Unit 3.

#### 5. Shorebirds, Gulls, Terns, and Allied Species

The diversity and number of shorebirds on Mingo is greater than realized several years ago. The ongoing study of moist soil management on Mingo has revealed large numbers of shorebirds and the fact that a wide variety of species are very responsive to management. The more commonly seen shorebirds are common snipe, pectoral sandpiper, lesser yellowlegs, killdeer, least sandpiper, solitary sandpiper, spotted sandpiper, semipalmated sandpiper, and greater yellowlegs. A number of other species were observed in small numbers. Total reported use days for this group in 1982 was 136,250 similar to the 133,900 reported use days for 1981. It is possible that use of better census techniques would reveal much larger numbers of birds if time and personnel constrictions allowed it.

#### 6. Raptors

Raptors are a common sight on Mingo, especially in late fall, winter, and early spring. Commonly seen or heard on Mingo include red-tailed hawk, red-shouldered hawk, marsh hawk, American kestrel, bald eagle, turkey vulture, black vulture, barred owl, great horned owl, and

screech owl. Raptors that are seen yearly but not in large numbers include osprey, rough legged hawk, broad winged hawk, Cooper's hawk, sharp shinned hawk, peregrine falcon, saw whet owl, barn owl, and short eared owl. Total reported use days for 1982 were 111,150.

Raptors that are known to nest on Mingo include red-tailed hawk, red-shouldered hawk, Cooper's hawk, American kestrel, screech owl, barred owl, great horned owl, turkey vulture, and black vulture.



Two young black vultures in cave on Mingo's west side bluffs.

Three black vulture nests were observed on Mingo by refuge staff in 1982, one more than in 1981. Black vultures had never been recorded as nesting in Missouri until the discovery of the two nests on Mingo in 1981. In 1982 one nest fledged two birds while the other two nests fledged one bird each. All three sites as well as other potential nesting sites will be monitored in 1983.

#### 7. Other Migratory Birds

Two mourning dove coo count surveys were again conducted by refuge staff in spring 1982. Dove numbers continue to be below population numbers of a few years ago. The continued loss of habitat, both for nesting and migrating doves, is a problem in Missouri's bootheel region. Results of the last five surveys are shown below.



<u>Route #0050 (Butler/Stoddard Counties)</u>			<u>Route #0070 (New Madrid County)</u>	
<u>Year</u>	<u>Doves Seen</u>	<u>Total Calls</u>	<u>Doves Seen</u>	<u>Total Calls</u>
1978	41	202	39	193
1979	40	151	24	140
1980	33	165	61	129
1981	52	83	49	197
1982	37	215	30	181

The annual Mingo Christmas Bird Count was held on December 18. A total of 79 species were recorded by the thirteen birders. This total, down nine from 1981, was disappointing considering we missed eleven species that we know were in the count area during the week. Still, the 79 species recorded was the highest number for any Christmas Bird Count in Missouri again.

Refuge staff ran a breeding bird survey route again this past June. A total of 44 species were recorded, a decrease of ten from 1981. Although this route is more than fifty miles from the refuge, it only has to be ran once a year so refuge staff will continue to do it in the foreseeable future.

#### 8. Game Mammals

Mingo National Wildlife Refuge is host to a large variety of Missouri game mammals, including white-tailed deer, fox squirrel, gray squirrel, cottontail rabbit, swamp rabbit, bobcat, raccoon, mink, gray fox, red fox, coyote, and beaver. Some of these occur in low numbers on the refuge due to the type of habitat found on Mingo. Red fox, for instance, are fairly common in Missouri and do occur on Mingo but are in low numbers because of the type of habitat.

White-tailed deer are the most conspicuous game mammal on Mingo. The herd appears to be in good shape based on the number of observations by staff and visitors and the condition of deer taken by bow-hunters. No formal census work is done on white-tailed deer but the herd is estimated to be about 500 animals based on types and amount of habitat.



White-tailed deer doe and two fawns crossing refuge road.

Squirrel populations appeared to be in good shape on Mingo in 1982. Squirrel populations were estimated to be higher all over Southeast Missouri in 1982 than they had been for the previous two years.

Mingo Refuge is one of the few places in Southeast Missouri where swamp rabbits can still be seen. The almost total loss of swamp rabbit habitat to drainage, channelization, clearing and leveling of bottomlands has reduced and continues to reduce habitat at an alarming rate. In a very short while the only remaining swamp rabbit habitat will be on public lands.

Raccoons are very abundant on Mingo. During high water they concentrate along dikes and roads and are easily seen during the day. Coon dogs coming onto the refuge (both in and out of raccoon season) from private lands are still a problem. The dogs are often lost for a number of days and chase deer, turkey and other animals in addition to raccoons.



Family of Raccoons in Moist Soil Unit 2.



Large diamondback watersnake sunning on willow log.



## 10. Other Resident Wildlife

Mingo is home to a very diverse and large population of herps. A wider variety of reptiles and amphibians occurs on Mingo than any other area in Missouri. The din from singing frogs in the spring can be almost deafening. Snakes, lizards, and especially turtles are common sights to visitors whenever the temperature is conducive to herp activity. Three species of venomous snakes occur on Mingo; the eastern cottonmouth, timber (canebrake) rattlesnake, and southern copperhead. In all, sixty-two species of herps are known to occur on Mingo.

River otter appear to be increasing in numbers. Sightings have become so frequent as to not merit mention among staff. If the river otter ever becomes this abundant statewide it will probably be added back to the list of game mammals.

Turkey populations continue to be high at Mingo. Large flocks of turkeys are commonly seen on the refuge in fall and winter months. Hunting programs for turkeys are discussed under Section H, Public Use.

## 11. Fisheries Resource

Although Mingo Swamp is a large fishery, very little active management of the resource takes place due to overflow characteristics of the flood plain. The cyclical water management at Mingo aimed at providing waterfowl habitat and preserving the lowland hardwood ecosystem also provides for a good fishery, however.

Regulation is the primary tool used to manage the swamp fishery. Fishermen are allowed to use commercial methods (nets and seines) to take rough fish for personal use. This allows large numbers of carp and buffalo to be harvested that would otherwise be lost when water levels are manipulated for waterfowl.

More intensive management occurs on two Job Corps constructed ponds on Mingo, Fox Pond and May Pond.

### Fox Pond

Fox Pond, roughly twelve acres in size, was constructed by Job Corps in 1974. It has been stocked several times with bass, bluegill, and channel catfish by the Missouri Department of Conservation at no cost to the refuge. The fishery at Fox Pond has never developed as hoped.



Survey results continue to show that Fox Pond suffers from:

- (1) very high turbidity
- (2) a large population of stunted bluegill, only 3% of which are catchable size
- (3) a small bass population of older fish

Solutions to the above problems that have been discussed include draining Fox Pond and starting over. Before that is attempted though we would have to decide whether it is really worth the considerable investment in manpower and dollars that this would require, particularly when there is no guarantee of long term success. Other factors to consider are the poor access to this pond and the fact that Fox Pond has been closed to fishing the biggest part of the last two summers because our bald eagles hacking project is located in a tower overlooking Fox Pond.

Current management consists of the introduction of 165 pounds of adult large mouth bass ranging in size from two to five pounds each and a temporary closure to all fishing. The Fisheries Assistance Officer for our area has indicated this may go a long way towards solving our stunted bluegill problem. Surveys done in the fall of 1983 should tell the tale.

#### May Pond

May Pond, roughly twenty-two acres in size, was constructed by Job Corps in 1976. It was stocked with bass, bluegill, red ear sunfish, and channel catfish and in addition contains significant numbers of warmouth, green sunfish, bullheads, and golden shiners.

May Pond has good water clarity and a twelve-inch length limit on bass which has produced the following situations:

- (1) a large population of bass in the 8-11-inch size class
- (2) a good population of large bluegill, green sunfish, and warmouth

Most bass that reach the twelve-inch minimum limit are being harvested almost immediately. We will probably maintain this structure in the fish populations for several reasons. May Pond receives a lot of fishing pressure, primarily from older local residents and family groups. We feel that we can provide more opportunities to catch fish by concentrating on harvesting bluegill and catfish while utilizing bass as a mostly fishing for fun species. In a pond of only twenty-two acres receiving heavy fishing pressure, it would be easy to over harvest bass without the twelve-inch length restriction.

We have considered the options of adding either threadfin or gizzard shad to May and Fox Ponds to provide more forage for the bass. This may be done in 1983, if a good source of shad can be found.

Stockings for 1982 are shown in the table below.

<u>Species</u>	<u>Amount</u>	<u>Date</u>	<u>Location</u>
Large mouth bass	85 lbs. (Adults)	10/25/82	Fox Pond
Large mouth bass	80 lbs. (Adults)	10/27/82	Fox Pond
Channel catfish	1,000 ea. (8 inches)	11/04/82	Mingo River
Channel catfish	250 ea. (8 inches)	11/04/82	May Pond
Red ear sunfish	6,000 ea. (fingerlings)	11/04/82	May Pond

Special regulations that apply to May and Fox Ponds are:

- (1) fishing by pole and line only - no trotlines
- (2) aggregate limit of twenty fish per day
- (3) a twelve-inch minimum length limit on bass

#### 12. Wildlife Propagation and Stocking

Bald eagles are discussed under Endangered Species, Section 2 (Wildlife).

The trumpeter swan restoration project is discussed under Waterfowl, Section 3 (Wildlife).

#### 14. Scientific Collections

Ph.D. candidate Mickey Heitmeyer continued his study in 1982 on the wintering strategies of mallards. Heitmeyer collected 114 mallards in 1982. Heitmeyer's study will be wrapped up in 1983.

Tom Johnson, state herpetologist with the Missouri Department of Conservation attempted to collect amphiuma on Mingo again in 1982. Tom still has not had any success but will probably be back in 1983.

Refuge staff collected 70 red-wing blackbirds in June in conjunction with a distribution study. A huge roost in Northwest Missouri was aerially sprayed with ultraviolet sensitive marking liquid. Collection of red-wing blackbirds around the Midwest was then initiated to determine the distribution of this particular flock. Apparently a large number of marked birds showed up in the Mingo sample.

Refuge staff collected fourteen starlings for ECE in Region 3 office for pesticide analysis. This is an ongoing project.

Various college classes are routinely given permits to collect fish, reptiles, and amphibians for identification and release in conjunction with field trips to Mingo.

#### 15. Animal Control

Beaver continue to be a major nuisance on Mingo by plugging water control structures, tunneling through dikes and roads, girdling large trees of all kinds, and flooding green timber reservoirs in summer. The beaver causes similar problems to farmers and other land owners statewide. Several years ago the beaver replaced the coyote as the number one nuisance animal in Missouri based upon the number of complaints the State Wildlife Department received. In response, the trapping season was extended from forty-six to seventy-seven days in 1979.

The refuge issued permits to two trappers in 1982 to trap beaver on Mingo. The refuge was divided into two units and each trapper was to work in his assigned area only. One trapper failed to show up, so the other trapper was given the entire refuge to trap. The trapper working on Mingo during the 1982-83 season is the same fellow who has been working Mingo since the 1977-78 season. He does not have much competition for the beaver-only trapping slots on Mingo. The reasons for this are: (1) beaver trapping is extremely hard work, especially in the dense refuge habitat and (2) beaver pelt prices are still low. Beaver harvest for the past six seasons is given below.

<u>Season</u>	<u>Beaver Taken</u>
12/01/77 - 01/15/78	221
12/01/78 - 01/15/79	310
12/01/79 - 02/15/80	498
12/01/80 - 02/15/81	639
12/01/81 - 02/15/82	627
12/01/82 - 02/15/83	560

The harvest appears to be helping some with our problems; but certainly it does not appear to be lowering beaver numbers by much. Our trapper works our "problem areas" the hardest. It appears that a beaver trapping program of one kind or another lies in the foreseeable future for Mingo.



Beaver trapper Galen Martin (right) and assistant Bill Metcalf with a few of the quarry.

Depredation complaints at Mingo were low in 1982, as usual. Propane exploding guns were loaned twice to local farmers in response to complaints about blackbirds in milo. No depredation complaints were received concerning waterfowl or deer in 1982.

#### 16. Marking and Banding

Banding efforts in 1982 were first aided, then hindered by an exceptionally cold stretch of weather in January. The bitter cold made the corn bait more attractive to mallards at first but eventually drove most of our birds south.

Geese in particular were uncooperative in 1982, showing no interest in bait and grit placed at two cannon net sites. Banding quotas and results are listed below.

	<u>Quota</u>	<u>Banded</u>
Canada Geese	1,000	None
Mallards	500	649*

\* We received permission to band over our quota to make up for some other areas that were experiencing difficulty.



## H. PUBLIC USE

### 1. General

Annual visitation to Mingo National Wildlife Refuge broke the 200,000 level for the third time when 208,936 visitors came to Mingo in 1982. The high annual visitation mark was recorded in 1981 when 231,337 people visited Mingo.

Below are listed visitation figures for the past ten years.

<u>Year</u>	<u>Total Visits</u>
1982	208,936
1981	231,337
1980	182,089
1979	175,786
1978	225,140
1977	133,338
1976	153,294
1975	164,540
1974	138,810
1973	140,307

Heaviest use of the refuge occurs in spring and early fall (late September through early November). The lowest period of public use occurs in the winter months of January and February. The months of April and May accounted for 68,082 visits or 33% of all visits in 1982. The excellent weather conditions of 1982 - mild winter and cool summer - may have had a lot to do with the high visitation.

### 2. Outdoor Classroom - Students

The outdoor classroom programs for students is a high emphasis program at Mingo National Wildlife Refuge. The refuge encourages school groups, scouts, church groups, and other youth groups to come to Mingo and participate in the environmental education programs offered.

The refuge provides environmental education materials, supplies, equipment, and environmental education sites to the visiting groups. The teachers or leaders are expected to actually run the environmental education activity. A normal environmental education field trip begins with a teacher or principal contacting the refuge staff to arrange a field trip. The educator is made aware of the environmental education activities available at the refuge and sent a list of materials and some sample lesson plans and activity sheets. The

educator will then usually pick an activity to conduct at Mingo. Refuge staff respond by sending copies of that particular lesson plan, activity sheets, material lists, and previsit activities. Upon arrival the school or youth group is greeted and introduced to the refuge by a staff member. The teachers are given the necessary supplies and equipment and directed to the study area.

The refuge visitor center is equipped with a large classroom in the basement for write ups, presentations and discussions. A combination outdoor environmental education shelter and picnic shelter next to the school bus parking slots should be completed in 1983. This is a much needed addition which will allow school groups to do their write ups outside but under a roof. It will also provide a badly needed place for groups to eat lunch. Previously groups either ate on the Visitor Center porch or drove five miles to picnic tables at Flatbanks. The new shelter will save a lot of windshield time.

In 1982, 1,603 students spent 5,602 hours engaged in environmental education activities at Mingo. Considering that Mingo is rather isolated and that school budgets are so tight as to eliminate many field trips we feel rather proud of our outdoor classroom program at Mingo.

### 3. Outdoor Classroom - Teachers

A three-day teachers workshop was held on Mingo the weekend of May 14-16. Twenty-three teachers attended the workshop to study environmental education techniques in biology, history, social sciences, English and art. One hour of graduate credit was offered for the course from Southeast Missouri State University. The workshop was a joint effort of Mingo staff, Missouri Department of Conservation personnel and Southeast Missouri State University.

Teachers and future teachers taking courses in nature study and environmental education at Southeast Missouri State University made three field trips to Mingo in 1982. The teachers participate in a lesson plan or two, tour the refuge, and become familiar with the refuge education facilities and programs. Many contacts made this way lead to future visits by these teachers with their students.

Another group of teachers visited Mingo for a day as part of a two-week long mobile workshop where the idea is to expose teachers to as many sources and types of environmental education as possible. This workshop is put on annually by the Missouri Department of Conservation and is literally held on a Greyhound bus and in motel rooms. The stop at Mingo is looked forward to by refuge staff and participants alike.

In all, 266 outdoor classroom teacher contacts were made resulting in 2,184 activity hours. Plans in 1983 call for similar refuge involvement in teacher training.

#### 4. Interpretive Foot Trails

There are two interpretive foot trails at Mingo - the Boardwalk Nature Trail and the Red Mill Observation Blind Trail. Both trails are constructed of raised boardwalks in low lying areas and are equipped with self guiding interpretive brochures and numbered stops along the way.

The Boardwalk Nature Trail is a .8-mile loop with a .2 of a mile spur leading to a tower built in the middle of Rockhouse Marsh. The Boardwalk Nature Trail is connected to the Mingo Visitor Center via another hiking trail, Bluff Trail. The interpretive brochure deals with the ecology of lowland hardwood ecosystems and was first written in 1974 and revised in 1980. An air hose counter on the boardwalk recorded 24,060 hikers on this trail. This is probably low due to the fact that there are two points of access to the trail at all times and several more when water levels are low. Not all hikers walk the complete loop. In April 1981, Secretary Watt signed a proclamation adding Mingo's Boardwalk Nature Trail to the National Trail System.

Several newspaper articles about Mingo in general, and the boardwalk specifically, generated increased use of the boardwalk in 1982. The increased use coupled with the realization on our part that the counter was only recording about 1/2 of those that passed over it led to the large increase in recorded use.

The interpretive leaflet for the boardwalk is in the process of being revised and readied for printing. Up until now we had been making our own copies on a photo copier.

The Red Mill Observation Blind Trail is a 1/8-mile boardwalk spur just off Red Mill drive which terminates at an observation blind overlooking Red Mill Pond. Birdwatchers and photographers can make excellent use of this blind when water conditions are right. A seven-stop interpretive brochure discusses wood duck nesting requirements and the various models of wood duck houses, several examples of which are mounted along the way.

No use figures are kept for the Red Mill Observation Blind Trail.

#### 5. Interpretive Tour Routes

The auto tour route is open each Sunday in October and November to facilitate public viewing of waterfowl, resident game and autumn colors. A self-guiding brochure with sixteen stops is available at the Visitor

Center and from a dispenser at the beginning of the tour route. In 1982, 5,208 visitors drove around the tour route in the fall for a total of 10,416 activity hours. These figures are considerably higher than last year (3,633 visitors).

The same tour is open the first two Sundays in April, weather and road conditions permitting, for a spring wildflower tour. The flowers along the bluffs bordering the swamp can be truly breathtaking. This past year 1,746 people spent 3,492 activity hours on the spring tour.

#### 6. Interpretive Exhibits/Demonstrations

The Visitor Center continues to be the hub of the interpretive program at Mingo. Exhibits, dioramas, audiovisual shows, and displays that deal with wildlife management, swamp ecology, archaeology, geology, and history at Mingo are all housed here. The past year 14,273 visitors took advantage of the interpretive offerings available at the Mingo Visitor Center. This is the highest recorded number of visits since it opened in 1976.



Young visitor at the Mingo Visitor Center using the computer.



Remodeling of the Visitor Center reception and book sales area was planned in 1982. There has been a traffic problem that the new arrangement should eliminate. The work will be completed early in 1983, before our busy public use season begins.

National Wildlife Week was celebrated at the Visitor Center with talks by staff and wildlife films.

National Hunting and Fishing Day was held on September 25 this past year. For the fourth year in a row Mingo sponsored poster contests with excellent results. Students from Puxico High School and Greenville High School competed for the right to enter the National Contest held in Riverside, Connecticut.



A visitor inspecting National Hunting and Fishing Day posters at Lake Wappapello outdoor exhibit.

The posters were judged by Outdoor Recreation Planner Bell and two local artists and then displayed in the Visitor Center for a week. The top three winners in the two age divisions were then sent to National Hunting and Fishing Day headquarters at the National Shooting Sports Foundation in Connecticut for entry into the national contest.



Although only one of the entries from the two contests Mingo sponsored won a cash prize, it brought the total of cash prizes won in the past four years to ten. This is the best of any group of entries according to National Hunting and Fishing Day coordinator Bob Davis.

Other activities conducted by the refuge for National Hunting and Fishing Day included a manned booth at the Lake Wappapello - U.S. Army Corps of Engineers sponsored festivities, a manned display and slide show at the West Park Mall in Cape Girardeau and the distribution of wild game recipes and showing of wildlife films at the Visitor Center. All in all, National Hunting and Fishing Day is one of the busiest of the year for refuge staff. We are stretched about as thin as we can get.

#### 7. Other Interpretive Programs

Around the perimeter of the swamp are several overlook towers and pull-offs. Two of these have interpretive panels constructed of photo engraved metal framed in wood. These towers are popular with the public. Since so much of Mingo's visitation is of the "drive through" variety (see Wildlife Observation, Section 11, Public Use) two more overlooks along roads are scheduled to have interpretive exhibits designed in 1983.

#### 8. Hunting

##### A. Squirrels

The August 1 to September 30 squirrel season resulted in a harvest of 752 squirrels. Six hundred thirty hunters spent a total of 1,924 hours in the woods chasing bushy tails. A good mast crop in 1982 bodes well for the squirrels and squirrel hunters next year.

Harvest figures for the past six years are shown below.

<u>Year</u>	<u>Harvest</u>	<u>Season</u>
1982	752	2 months (August-September)
1981	1,004	2 months (August-September)
1980	461	2 months (August-September)
1979	240	2 months (August-September)
1978	1,034	2 months (August-September)
1977	786	4 months (June-September)

##### B. Deer

The archery deer season ran from October 1 through December 31 and resulted in sixty-two deer being taken. This is a decrease from last year at Mingo when 75 deer were taken by archers. Since bow hunters are no longer required to check in deer, all records are

from check stations at Mingo and Duck Creek which probably did not account for all deer taken since some hunters wait until returning to their home counties before checking their kill. Seventeen deer (9m, 8f) were recorded as hit but not recovered by Mingo bow hunters.

#### TOTAL DEER HARVESTED 1977-1982

<u>Year</u>	<u># Deer Harvested</u>	<u>Hunter Visits</u>
1982	62 (41 bucks, 21 does)	5,513
1981	75 (35 bucks, 40 does)	6,655
1980	70 (35 bucks, 35 does)	6,432
1979	39 (23 bucks, 16 does)	5,184
1978	59 (30 bucks, 29 does)	5,635
1977	51 (29 bucks, 22 does)	5,635

#### 1982 DEER HARVESTED BY MONTH

<u>Month</u>	<u>Deer Harvested</u>	<u>Hunter Activity Hours</u>
October	25 (21M, 4F)	12,761
November	23 (12M, 11F)	8,738
December	14 (8M, 6F)	6,169

The deer hunting program emphasizes quality at Mingo. Our hunters often have a two or three-mile walk to their stands, frequently through water. Some hunters use hip boots, take canoes, or just get wet. We receive very few complaints and a lot of positive comments on the number of deer seen, the chance to hunt in solitude and the beauty and abundance of other wildlife seen.

Deer hunter activity hours totaled 27,668 for 1982. This is a lot of time spent on uncomfortable tree stands but the hunters appear to feel it is well worth it. As a group, the archery hunters at Mingo are an enthusiastic, knowledgeable bunch of sportsmen and a real pleasure to work with.

#### C. Turkey

Mingo's first archery turkey season in 1979 was greeted with great anticipation by local bow hunters. Veteran deer hunters recalled seeing turkeys almost every time out on Mingo. Veterans and novices alike drooled at the thought of hunting turkeys where they were numerous and had never been hunted before. Those "dumb" birds would surely be easy prey to skilled bowmen.

Well, four seasons have come and gone and the enthusiasm remains high among hunters but it is tempered by the knowledge that a grand total of seventeen turkeys have been harvested in four years. Figures are given below.

<u>Year</u>	<u>Turkeys Harvested</u>
1982	2
1981	3
1980	6
1979	6

It appears everyone was right - hunting was easier the first couple of years before the birds wised up!

A spring firearms turkey season was held on Mingo for the first time in 1982. Hunter numbers were restricted to thirty per day to avoid the possibility of opening day crowding and safety problems. Turkey hunting has become by far the most dangerous type of hunting in Missouri with 25-30 shooting accidents (several fatal) each year. Most of these fall into the "mistaken for game category", an inexcusable, but all too frequent blunder.

The large increase in hunters and hunter accidents in the woods during turkey season has prompted Missouri officials to look into some type of blaze orange requirement. Proposals range from sashes worn while moving and tied around trees when not, to orange hats and vests made in a camouflage pattern.

Since response was lower than expected at Mingo to the inaugural season, we will not limit hunter numbers in 1983. Hunters will be required to sign in and out of the hunting area and check their kill at either Mingo or Duck Creek check stations. Data for the 1982 season are given below.

<u>Hunter Visits</u>	<u>Hunter Activity Hours</u>	<u>Harvested</u>	<u>Crippled</u>
340	1,105	25	5



A happy Mingo turkey hunter with his trophy.

#### D. Waterfowl

Mingo's wade and shoot waterfowl hunting program experienced another good but spotty year. It seemed as if the wade and shoot area either had all or none of the area mallards from week to week. The average of .83 ducks harvested per hunter was considerably lower than last year's average of 1.48 ducks/hunter.

Duck hunting suffered all over Southeast Missouri due to flooding and dispersal of waterfowl to virtually any field that took their fancy. In all, 378 hunters harvested 315 ducks, mostly mallards from the wade and shoot area.

Figures for the past five years are given below.

#### WATERFOWL HARVEST FROM WADE AND SHOOT AREA

<u>Year</u>	<u># Ducks Harvested</u>	<u># Geese Harvested</u>	<u># Hunters</u>
1982	315	0	378
1981	847	0	572
1980	4	0	21
1979	191	6	199
1978	36	10	61



## 9. Fishing

Fishing is one of the most popular activities at Mingo. In 1982, 71,261 fishing visits and 238,272 fishing activity hours were recorded on the refuge. The majority of this use is from local people who make repeat visits as long as the weather is tolerable. A few fishermen came from Illinois or St. Louis to canoe the Mingo Wilderness Area in search of solitude and a good stringer of bass, bluegill, catfish, or pickerel.



A family fishing in one of the refuge drainage ditches.

## 10. Trapping

Beaver trapping is covered under Animal Control, Section 15 (Wildlife).

## 11. Wildlife Observation

Wildlife observation is the single most popular activity. In 1982, 73,832 visits and 115,370 activity hours were recorded for this activity. Most wildlife observation that takes place on Mingo is of the casual, drive through variety but some groups do come considerable distances to birdwatch or look at Mingo's herps. Other groups come to see the Mingo Wilderness Area and associated wildlife. Two

examples of this in the past year were trips by the Ozark Society into Mingo's Wilderness Area and the inaugural meeting of the Scenic Rivers Audubon Society which was held at Mingo over a weekend in May to take advantage of the excellent birding available.

#### 12. Other Wildlife Oriented Recreation

Collection of blackberries, mushrooms and to a lesser extent, nuts occurs on Mingo. There are never large numbers of people involved but a few blackberry pickers can usually be found when the berries are ripe. The same is true of the mushroom hunters - although a morel mushroom hunter is just about as secretive a creature as exists at Mingo.

Wildlife photography is also a form of wildlife oriented recreation practiced on Mingo by a relatively small but constant number of participants. Visitors with good camera equipment and apparently the expertise to use it, are most abundant in spring and fall. Occasionally a special use permit is granted to a photographer wanting access to closed portions of the refuge or wanting to construct a temporary blind.

#### 14. Picnicking

A few picnic tables are provided at May Pond and the Flatbanks Area, both very popular fishing spots. Occasionally a few non-fishermen stop to have a picnic at these sites but the vast majority of use is from fishermen looking for a place to eat their lunch. Since several much nicer and complete picnic facilities are provided by other Federal and State agencies within the area (only seven miles away in one case) we do not expect to ever have a problem with a large influx of people looking for picnic grounds.

#### 17. Law Enforcement

Enforcement efforts centered around daylight activities on the refuge and migratory waterfowl hunting nearby. Forty-five cases were made on Mingo and nearby this year.

All cases except one were handled by the FOC system. One individual decided to ignore his notices and subsequent letters. Eventually the Federal magistrate issued an arrest warrant and refuge officers and Special Agent Hartman made the arrest. Below is a summary of cases made in 1982.

<u>Violation</u>	<u># of Cases</u>	<u>Individual Fine Paid</u>
Fishing without license	5	\$50.00 FOC
Fishing without license	4	\$37.00 (State Court)
Fishing without license	5	Pending (State Court)
No flotation device in boat	5	\$25.00 FOC
Possession of loaded firearm	4	\$35.00 FOC
Taking game fish under minimum length	3	\$50.00 FOC
Fishing in closed area	2	\$50.00 FOC
Trespass after hours	3	\$25.00 FOC
Trespass closed area	1	\$25.00 FOC
Unauthorized possession of boat motor	3	\$25.00 FOC
Possession of lead shot in steel shot area	2	Pending (State Court)
Attempting to take waterfowl with unplugged gun	2	Pending (State Court)
Attempt to take fish in violation of special regs.	1	\$25.00 FOC
Unauthorized possession of game fish while using nets	1	\$50.00 FOC
Snagging in closed season	1	\$36.00 (State Court)
Hunting on a NWR without a state permit	1	\$50.00 FOC
Operating a vehicle without license	1	\$25.00 FOC
Operating a vehicle in closed area	1	\$25.00 FOC

Attempts to cooperate more closely with the State Conservation Agents were made in 1982 without a great deal of success. Apparently since several of the refuge staff have law enforcement authority and two of the staff at Duck Creek Wildlife Area have law enforcement authority, the State agents in this area feel that the Mingo-Duck Creek area is sufficiently covered. For a period of about six months, cases we made on the refuge that could be prosecuted in state court were turned over to the state agents. This proved to be cumbersome and resulted in some cases being lost, neglected and dragged out for eight to ten months or more. Some of the cases listed as pending in the preceding table are ten months old as of this writing. We are currently back to issuing FOCs for everything, a much smoother process.

#### 18. Cooperating Associations

In 1982 Mingo transferred cooperating associations from Eastern National Parks and Monuments Association to Midwest Interpretive Association. Compared to the massive sales at DeSoto National Wildlife Refuge, we are definitely small change to Midwest's operation. The transfer went smoothly and Midwest Interpretive Association is a pleasure to work with.

We expanded our line of interpretive items to include more prints, some wildlife motif stationary and decoy painting kits. A remodeling sales area has been constructed to handle the larger inventory. A total of 57 different items was offered for sale in 1982. Sales of 729 items amounted to \$2,118.93 in 1982.

The reaction of the public to the sales area and items continues to be positive. Before we opened the outlet at Mingo the closest place to purchase items of this type was the University Book Store in Cape Girardeau, about fifty miles away. Even at the University many of the books we offer are not available. We feel this is a valuable interpretive service to the public.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

The only major construction project on the refuge was a 27x46-foot picnic shelter started by Job Corps in 1981. The concrete support posts and framework were completed that year and we expected the entire shelter to be finished this summer in time for the heavy public visitation. Job Corps did complete the cypress shake roof and pour the concrete floor and fireplace pad, however, the fireplace and rock veneer work still need to be completed. Job Corps had several construction projects on center which are described under Youth Programs, Section 2 (Administration).

The refuge constructed a fifty-foot concrete spillway with three six-foot bays in a portion of the southwest dike of pool 8 that was subject to washouts. The spillway will reduce erosion and help regulate water levels in the green tree hunting area. Future construction of major radial gate structures to manipulate water levels in pool 8 in conjunction with pool 1 on Duck Creek is planned for next year by the Missouri Department of Conservation. This work would be permitted under a cooperative agreement between the Fish and Wildlife Service and the State for management of the waterfowl hunting area on the refuge. Survey work for extension of the east side dike along Ditch 1 was completed by the Missouri Department of Conservation during the summer.





New water control structure in pool 8.

An additional cattle pond was constructed in grazing unit 18 (Elledge pasture) to facilitate better utilization of the pasture.

A 50x30-foot wire pen was built in Rockhouse Marsh as a holding facility for acclimation of the trumpeter swan family relocated to the refuge from South Dakota in August. The pen will be left in place for future swan relocations.

## 2. Rehabilitation

The refuge inherited a 75x80-foot metal storage building from the YACC program and has spent considerable time and effort converting it to a refuge shop. This work included inside partitioning, insulating the rooms, installing a water system, completely wiring and installation of a lighting and heating system and relocating a propane tank. All work was accomplished by the refuge staff and was near completion by the end of the year. The new shop should be fully functional early next year when all tools and other equipment are moved in. A portion of the old shop will be used as a carpentry shop and the rest returned to its original function as an equipment storage building.

The low water crossing on the Ditch 3 road was cleaned out, widened, and stabilized with new rip-rap. The improvement should help to reduce flooding over the Ditch 2-3 lateral road during periods of high water.

The guttering system at the Visitor Center was resealed to prevent leaking, rotten boards under the guttering were replaced, and the entire area restained.

The dike at the Lukin Farm unit was reseeded to reduce erosion.

A new larger culvert was installed in the road at grazing unit 17 (Bowling pasture) to help reduce flooding in the pasture.

A total of 240 cubic yards of gravel were removed from the former YACC parking lot near the YACC shop headquarters. The pasture was then reseeded to clover and fescue and the gravel used for road repairs.

### 3. Major Maintenance

Refuge roads and dikes are usually a major maintenance item and this year was no exception. The roads had to be graded throughout the year to accommodate the heavy public use. All dikes and road shoulders were mowed as a safety measure and to prevent brush encroachment. Unusually heavy rainstorms at various times caused headwater flooding over the roads in several places resulting in a loss of surface gravel material. Sixteen hundred tons of crushed limestone were purchased at the end of the fiscal year with \$9,920 of Regional Office funds to replace lost gravel.

New wood chips were spread on all refuge trails.

Overhanging tree limbs were trimmed along roadsides by the summer YCC crew.

Log jams and other debris were removed from road bridges and water control structures.

The refuge boardwalk trails were checked regularly and repaired as needed.

All self-guiding auto tour signs were repaired and repainted.

### 4. Equipment Utilization and Replacement

The refuge was fortunate again this year in being able to replace and purchase major pieces of equipment. Also, delivery was taken during the year of three vehicles ordered under the refuge's last BLHP project. In February we received an International 4x2 combination grain/dump truck with a 24,000 pound gross vehicle weight rating. The truck replaced a 1957 Ford stake truck.



New refuge International grain/dump truck.

In April we got a Jeep CJ-7 4x4 to replace our 1966 Jeep.

Finally in May we received a Chevrolet 4x2 long wheel base pickup to replace a 1973 International pickup.

In addition to the new vehicles, two 1979 Dodge pickups were transferred to the refuge in February from the property records of the Bombay Hook YACC. One of these vehicles, a dual rear wheel crew cab, proved invaluable for use in the summer YCC program. The other regular pickup plus a refuge 1979 Dodge pickup were transferred to Clarence Cannon refuge in August.

In November we received a Motrim model 100-21 rotary cutter. The cutter boom has a 20.5-foot reach and can mow at any angle within a 270 degree rotation range. The mower was purchased with special end-of-the-year funds from the Regional Office. The mower will fill the void left in our tree trimming program by the termination of YACC.





Motrim model 100-21 rotary cutter.

Also purchased with special end of the year funds were 1,600 gallons of gasoline and 500 gallons of diesel fuel. The gas purchase was possible thanks to a empty 2,000 gallon tank inherited from YACC.

A compact sedan delivery was also ordered with these funds for delivery in 1983. This vehicle will replace a 1977 AMC Matador.

There were no problems with any of the refuge's heavy equipment during the year and our overall vehicle/equipment situation is probably better than it has ever been.

#### 5. Communication Systems

An extension phone was installed in the new refuge shop with a local intercom connection to the Visitor Center headquarters.

#### 6. Energy Conservation

Most of the refuge's energy conservation measures involving retrofitting and program changes were implemented last year. This year in converting the YACC building to a refuge shop, energy saving measures were incorporated.



Purchases of smaller and more fuel efficient vehicles reduced the amount of fuel used compared to last year even though more miles were driven.

#### 7. Other

The appearance of the Visitor Center offices and conference room was greatly improved during the year with the addition of some needed furniture. However, this benefit was the result of the closure of two other offices. All gray metal desks and a variety of assorted tables were replaced with wooden desks and tables from the Office of Surface Mining in Kansas City.

Upon closure of the Kansas City Area Office, the refuge acquired a fifteen-foot conference table, twenty-five chairs, a lecture podium, 16 mm projector, a twelve-foot blackboard, four bulletin boards, and an overhead projector.

Other property acquired for free during the year included numerous electrical items and wire left over from the Crab Orchard YACC program. These items were used in the new refuge shop.

### J. OTHER ITEMS

#### 1. Cooperative Programs

Cooperative programs with the Missouri Department of Conservation on hunting, eagle and swan restoration are covered elsewhere in this report. University of Missouri cooperative programs are discussed under Research and Investigations, Section 5 (Planning).

#### 2. Items of Interest

Refuge revenue sharing checks to the counties increased significantly this year. Stoddard County received \$33,768 (up from \$9,672 in 1981) and Wayne County received \$26,426 (up from \$7,292). The increases were due to an adjustment of land values and still only represented 87.6% of the total amount due each county.

Meetings of special interest during the year were as follows:

- 2/8-10 Wildlife resources programatic in Minneapolis attended by Refuge Manager.
- 2/27 Trumpeter Swan Society board meeting held at refuge attended by board members Harold Burgess, Frank Belrose, Don Hammer, and Dave Weaver along with refuge and Duck Creek staff.

- 4/14-16 A workshop on the ecology of wintering waterfowl was held at the refuge. It was sponsored by the Delta Waterfowl Research Station, in cooperation with the University of Missouri and Missouri Department of Conservation. Forty participants working on waterfowl research throughout the United States and Canada attended.
- 5/10-11 A federal-state coordination meeting at Missouri Department of Conservation headquarters in Jefferson City was attended by the Refuge Manager.
- 5/21 Advisory committee to the School of Forestry, Fisheries, and Wildlife, University of Missouri, met at the refuge.
- 8/16-17 Annual work plan meeting at DeSoto National Wildlife Refuge attended by the Refuge Manager.

Training received during the year was as follows:

- small purchase correspondence course - Department of Defense - Clawson, Sipco, Shelton
- 40-hour law enforcement refresher training - Clawson, Sipco, Bell
- fire training courses S-110, S-130, S-190 - USFS at Winona - Clawson, Sipco, Siler
- 8-hour pesticide applicator training - Sebree, Siler, C. Walk
- 40-hour supervisory training "Supervision and Group Performance" - Bell
- 24-hour supervisory training "Leadership and Supervisory Institute" - Sipco

Two special assignments during the year for Assistant Manager Sipco are worthy of note. The first for two weeks in early June to Churchill, Manitoba to assist with the Canada goose breeding ground study, and the second to Horicon National Wildlife Refuge in October for ten days to assist with law enforcement activities.

A special assignment for Tom Bell was especially noteworthy. Tom spent three weeks in India in late June-early July as part of a task force working with the Indian Government on development of tourism and environmental education programs.

Length of service awards during the year went to Audrey Walk for thirty years service and to Charles "Ab" Walk for twenty years. Audrey also received a special achievement award in the amount of \$500 for outstanding performance.



Area Office staff member Lyle Stemmerman during refuge inspection visit May 17-20. Talk about close scrutiny!

### 3. Credits

Section E,F,I-4,J,K, and editing - Clawson  
Section A,B,C,D,F5-12,I - Sipco  
Section G,H - Bell

### K. FEED BACK

There has been considerable speculation regarding moving the administration of Job Corps Centers out of the individual agencies and into the centralized Departmental manpower programs office. Divestiture of Job Corps from agency to departmental control will not be in the best interest of this refuge. Working within the same agency over the years has meant close

cooperation with the refuge being primary benefactor of Job Corps Services. Development has tapered off and we do not have the ongoing refuge projects of past years. However, projects such as construction of the picnic shelter, painting of refuge buildings, shop remodeling, etc. will continue to be services we receive for years to come. It will behoove the Service to maintain control of this program as long as it is possible to do so.