

ARROWWOOD NATIONAL WILDLIFE REFUGE

Pingree, North Dakota

ANNUAL NARRATIVE REPORT

Calendar Year 1989

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

REVIEW AND APPROVALS

ARROWWOOD NATIONAL WILDLIFE REFUGE  
Pingree, North Dakota

ANNUAL NARRATIVE REPORT  
Calendar Year 1989

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Refuge Manager Date

Dale Blum 7-27-90  
Refuge Supervisor Date

Paul C. Van Zingen 7-19-90  
Project Leader Date  
*Acting*

Gilbert Ladd 7-30-90  
Reg. Office Approval Date

## INTRODUCTION

Arrowwood National Wildlife Refuge was established by Executive Order No. 7168, dated September 4, 1935 as a refuge and breeding ground for migratory birds and other wildlife. Specific species for which the refuge was acquired include: whistling swan, geese, mallard, pintail, scaup, prairie chicken, sharp-tailed grouse and pheasant.

The refuge is located in the glacial created drift plain of east central North Dakota. It occupies a 14 mile length of the James River Valley in Foster and Stutsman Counties approximately 30 miles north of Jamestown. The 15,934 refuge acres are classified as 8,213 acres native prairie grassland, 3,275 acres seeded grasses, 780 acres cropland, 3,541 acres wetland impoundments (actually naturally occurring riverine lakes), 125 acres natural wetlands, and 118 acres woodlands.

Arrowwood lies on one of the main migration lanes of the Central Flyway. It is an important link in this route used annually by many migratory birds. The refuge makes a significant contribution to the maintenance of these birds.

The refuge provides a large expanse of contiguous nesting uplands in an otherwise highly agriculturally dominated area. Primary nesters include mallards, blue-winged teal, gadwall, wood ducks, hooded mergansers and giant Canada geese. Arrowwood produces significant numbers of each of these species annually.

Arrowwood is home to a variety of resident wildlife species and is a favored area for many wildlife oriented recreationists and enthusiasts.



## TABLE OF CONTENTS

A. HIGHLIGHTS	1
B. CLIMATIC AND HABITAT CONDITIONS	2
C. LAND ACQUISITION	3
1. Fee Title.....	Nothing to Report
2. Easements .....	Nothing to Report
3. Other .....	Nothing to Report
D. PLANNING	
1. Master Plan.....	Nothing to Report
2. Management Plan.....	3
3. Public Participation.....	Nothing to Report
4. Compliance with Environmental Mandates.....	Nothing to Report
5. Research and Investigations.....	4
6. Other.....	Nothing to Report
E. ADMINISTRATION	
1. Personnel.....	4
2. Other Manpower Programs.....	7
3. Volunteer Program.....	8
4. Funding.....	8
5. Safety.....	9
6. Technical Assistance.....	9
7. Other.....	Nothing to Report
F. HABITAT MANAGEMENT	
1. General.....	10
2. Wetlands.....	10
3. Forests.....	11
4. Croplands.....	12
5. Grasslands.....	Nothing to Report
6. Other Habitats.....	14
7. Grazing.....	14
8. Haying.....	16
9. Fire Management.....	17
10. Pest Control.....	19
11. Water Rights.....	21
12. Wilderness and Special Areas.....	Nothing to Report
13. WPA Easement Monitoring.....	Nothing to Report

## G. WILDLIFE

1. Wildlife Diversity.....	22
2. Endangered and/or Threatened Species.....	23
3. Waterfowl.....	24
4. Marsh and Water Birds.....	31
5. Shorebirds, Gulls, Terns and Allied Species.....	31
6. Raptors.....	31
7. Other Migratory Birds.....	Nothing to Report
8. Game Mammals.....	31
9. Marine Mammals.....	32
10. Other Resident Wildlife.....	Nothing to Report
11. Fisheries Resources.....	32
12. Wildlife Propagation.....	33
13. Surplus Animal Disposal.....	Nothing to Report
14. Scientific Collections.....	Nothing to Report
15. Animal Control.....	35
16. Marking and Banding.....	38
17. Disease Prevention and Control.....	Nothing to Report

## H. PUBLIC USE

1. General.....	39
2. Outdoor Classrooms - Students.....	39
3. Outdoor Classrooms - Teachers.....	Nothing to Report
4. Interpretive Foot Trails.....	39
5. Interpretive Tour Routes.....	40
6. Interpretive Exhibits/Demonstrations.....	40
7. Other Interpretive Programs.....	40
8. Hunting.....	40
9. Fishing.....	42
10. Trapping.....	42
11. Wildlife Observation.....	42
12. Other Wildlife Oriented Recreation.....	Nothing to Report
13. Camping.....	Nothing to Report
14. Picnicking.....	43
15. Off-Road Vehicling.....	Nothing to Report
16. Other Non-Wildilfe Oriented Recreation.....	Nothing to Report
17. Law Enforcement.....	43
18. Youth Programs.....	43
19. Cooperating Associations.....	Nothing to Report
20. Concessions.....	Nothing to Report

## I. EQUIPMENT AND FACILITIES

1. New Construction.....	45
2. Rehabilitation.....	46
3. Major Maintenance.....	47
4. Equipment.....	47
5. Interpretive Tour Routes.....	Nothing to Report
6. Computer Systems.....	Nothing to Report
7. Energy Conservation.....	Nothing to Report
8. Other.....	Nothing to Report

## J. OTHER ITEMS

1. Cooperative Programs..... 48
2. Other Economic Uses..... Nothing to Report
3. Items of Interest..... 48
4. Credits..... 48

## K. FEEDBACK

49



A new day begins at Arrowwood. Time again to reflect  
on the year past, and document the events of 1989.  
(PCV/'89)

#### A. HIGHLIGHTS

Very little runoff occurred during the spring of 1989. Although annual precipitation was slightly above long term averages at the refuge weather station, most of the state experienced a second year of extreme drought. Wetland conditions were extremely dry.

Sago production in refuge impoundments was low, despite near ideal water depths.

Prairie chickens (2 booming males) survived! Our egg substitution efforts were finally rewarded as "booming" males were observed in the spring of 1990. These are the first prairie chickens censused on the refuge in 25 years.

Conversion of refuge cropland to non-chemical farming began smoothly. The refuge plan appears to be acceptable for refuge wildlife and for economic returns to cooperators. Biological control of leafy spurge was initiated through the use of grazing sheep.

Short duration, rotational grazing was implemented on refuge grazing units.

Refuge metal cylinder nest cavities were replaced with wooden cedar nestboxes.

Strategies for management of refuge impoundments were developed and action began to correct some of the constraints.

#### B. CLIMATIC AND HABITAT CONDITIONS

A year like 1989 emphasizes the importance of runoff to wildlife, (especially waterfowl) in this region. Despite a total annual precipitation of 19.79 inches, which was 1.43 inches above the long term average; wetlands remained dry. Some large wetlands, which contained water through the drought of the 1930's went dry in 1989.

The above-average precipitation phenomenon experienced at Arrowwood was very localized. Almost all precipitation that occurred was in the form of rain. Little runoff occurred, creating a severe shortage of wetlands. Although the precipitation produced some good crops in the area, it only dented the 8.2 inch precipitation deficit of in 1988 (10.16 inches fell in 1988, creating an 8.2 inch precipitation



deficit). The 1989 precipitation pattern created conditions which resulted in excellent crops on some fields, while adjacent fields experienced disasters. Pairing and nesting waterfowl populations were very low throughout the area.



Impoundment levels were low in 1989.  
Islands began to appear in Jim Lake.  
(PVN/'89)

Refuge impoundments at freeze-up were the lowest since the late 1930's. A small spring runoff raised the level in Arrowwood Lake only 11 inches. The Stoneybrook watershed ran for approximately two weeks, raising the level of Mud Lake approximately four inches. August rains created a limited runoff event increasing the level of Arrowwood Lake 12 inches. Jim Lake and DePuy Marsh received no runoff in 1989. The four refuge impoundments were never connected throughout the year. This is ironic considering the refuge impoundments lie in the bed of the James River.

The weather data compiled at the Arrowwood NWR weather station is summarized below:

Weather Data for Arrowwood NWR, 1989

Month	Precipitation 1989	Precipitation Average	Max. Temp.	Min. Temp.	Average Temp.
January	.90	.41	43	-31	14.5
February	.07	.46	55	-25	14.5
March	.95	.68	56	-18	19.9
April	.66	1.52	77	12	40.7
May	3.62	2.37	84	17	57.0
June	1.38	3.44	89	32	62.7
July	3.19	2.76	102	51	73.8
August	6.14	2.52	98	39	69.0
September	2.35	1.88	89	21	58.3
October	.15	1.32	89	14	43.0
November	.36	.59	62	-05	27.2
December	.02	.41	48	-36	12.1
TOTALS	19.79	18.36	892	71	492.7
AVERAGES	1.65	1.53	74.3	6	41.1

C. Land Acquisition

Nothing to Report

D. Planning

2. Management Plans

The following list of plans were completed in 1989:

- Annual Pesticide Use Plan
- Annual Prescribed Burning Plan
- Annual Water Management Plan
- Long Range Water Management Plan
- Public Use Plan
- Annual Trapping Plan

## 5. Research and Investigations

### A. Bureau of Reclamation Refuge Monitoring Study

The U.S. Bureau of Reclamation continued to conduct James River Refuge Monitoring Studies in 1989. The objectives of the studies are to document baseline refuge conditions prior to development of Garrison Diversion. The BOR collected field data on submergent vegetation (sago), water quality, and fish populations in 1989.

### B. SDSU Carp Biomass Investigation - USBOR study to correlate sampling methods and timing to index refuge roughfish populations.

Due to the massive winterkill experienced during the 1988-89 winter and lack of fish re-entry from downstream, the SDSU biomass studies were not conducted at Arrowwood in 1989. Instead, the crews concentrated their efforts at Sand Lake NWR, where a less extensive winterkill and more reliable fish population was found.

### C. Prairie Chicken Reintroduction Study

A cooperative effort between the refuge, The North Dakota Chapter of The Wildlife Society (Prairie Chicken Committee), and Montana State University was completed to evaluate egg substitution (prairie chicken eggs under sharptailed grouse) as a method of reintroducing prairie chickens entered its second field season. Results are presented under Section G, Part 12, Wildlife Propagation and Stocking.

### E. Administration

#### 1. Personnel

##### A. Permanent

Gloria Kosse retired on January 20, 1989.

Mary Liberda became the Refuge Administrative Assistant effective April 23, 1989.

Jon Kauffeld transferred to the Project Leader position at Rainwater Basin WMD.

Mary Beth Ellingson was hired to fill the clerk/typist position, effective July 24, 1989.



4 8 3 9 7 5 1 6

(CL/'90)

Staffing:

1. Dave Stearns
  2. Jon Kauffeld (not pictured)
  3. Paul VanNingen
  4. Bob Johnson
  5. Jerry Wolsky
  6. Jim Somsen
  7. Mary Liberda
  8. Doris Messmer
  9. Mary Beth Ellingson
- (CL/'90)

B. Temporary Personnel



1 - 2

1. Chad Prosser, GS 404
2. Richard Grosz, GS 404

Chad Prosser and Rick Grosz were hired as summer biological technicians. (PCV/'89)



## 2. Other Manpower Programs

### A. Youth Conservation Corps

Leader - Myron Butterfield, GS-4

Enrollees - Steven Johnson, Carrington  
Gretchen Brumbaugh, Kensal  
Aaron Larson, Bordulac



2

1

3

(RFJ/'89)

#### Enrollees

1. Steven Johnson, Carrington
2. Gretchen Brumbaugh, Kensal
3. Aaron Larson, Bordulac



B. Graduate Assistant from Montana State University for Prairie Chicken Reintroduction Study - Howard Burt. (PCV/'89)

### 3. Volunteer Program

Kathy VanNingen volunteered from July through October as an administrative helper/typist during the absence of the PFT Clerk/Typist.

John Toepfer, professor at Little Hoop Community College volunteered during the spring/summer period to assist with the prairie chicken reintroduction study.

### 4. Funding

Funding for Arrowwood NWR is combined with the rest of Arrowwood Complex, which includes four fee title National Wildlife Refuges, twelve easement refuges, and twelve counties of wetland easements and Waterfowl Production Areas. Complex substations are located

at Arrowwood NWR, Long Lake NWR, and Valley City WMD at the Valley City National Fish Hatchery. In 1989 administration of the Chase Lake Prairie Project, at Woodworth Station, was added to the Complex. Total Complex funding is listed below:

<u>Fiscal Year</u>	<u>Total Available \$</u>
1989	831,000
1988	748,601
1987	611,320
1986	690,700
1985	641,700

## 5. Safety

There were no lost time accidents in 1989.

Safety and defensive driving films are shown as they are received. Monthly Safety Meetings were held covering the following topics:

January -	Professional Driving - Film
February -	Winter Survival - Discussion
March -	All buildings were inspected for unsafe conditions. A list of necessary corrective action was compiled.
April -	Before It Hit Home - Film
May -	An Interest in Safety - Film
June -	Rabies Alert - Video
July -	Medical Screening for Lyme Disease
August -	Seconds Can Save Someone You Love - Film
September -	Groundwater and Agricultural Chemicals: Understanding the Issues - Film
October -	Discussed physical fitness and how to keep in shape.
November -	Pleasure of Hearing - Film
December -	Discussed winter driving safety.

## 6. Technical Assistance

Staff provided technical assistance to a variety of individuals, conservation groups, and other agencies concerning upland management techniques. Wildlife clubs were given advice concerning nesting structures and winter wildlife feeding programs. Refuge staff assisted the Dakota Wildlife Trust's Habitat Program by serving as judges for habitat and food plots.

## F. Habitat Management

### 1. General

Arrowwood NWR was established primarily for waterfowl, other migratory birds and resident wildlife. Habitats are managed to provide optimum conditions for these species. Compatible wildlife oriented recreation is encouraged.

### 2. Wetlands

Lack of snowpack and a deficit of over 8 inches of precipitation from 1988 created a very little runoff in 1989. The U.S. Geological Survey gauge measured 1,760 acre feet of inflow during the calendar year, through the main James River Channel. An additional 4,660.5 acre feet of supply was provided by direct precipitation (for a total of 6,420 acre feet supply).

At capacity, refuge impoundments hold approximately 16,536 acre feet. At the beginning of the year, impoundments held approximately 5,542 acre feet or one-third of capacity. The limited supply barely met the annual evaporation rate. The impoundments at freeze-up held 5,834 acre feet, which is about one-third of capacity.

Fish did not reinvade from downstream, because we had no outflow. Subsequently, all refuge impoundments were essentially fish-free during 1989.

Vegetative response in refuge impoundments was not as pronounced as it was in 1988. Only a small portion of Arrowwood Lake in the headquarters area produced sago in 1989 compared to a full pool stand in 1988. Sago was scattered in Mud Lake, somewhat similar to 1988. On the lower two-thirds of Jim Lake, sago was good, however it was less dense than in 1988. The smartweed growth in lower DePuy Marsh was good, but stunted compared to growth in 1988.

In August, approximately 80 acres of DePuy Marsh cattail was disced. The sediment, which had accumulated above the Jim Lake structure was also removed.



Cattails in DePuy Marsh were disced in August with hopes that spring runoff would be sufficient to flood over and control them. (PCV/'89)

Water management planning both on a long-term and a short-term basis received a lot of attention in 1989. Many constraints to effective water management were identified and action began to alleviate those constraints.

Development of the Garrison Diversion Project has forced us to take a close look at refuge water management. Strategies on how to best manage refuge impoundments were developed. Both the long range and annual water management plans were revised.

### 3. Woodlands

Refuge woodlands occupy 118 acres, comprising two narrow corridors along the James River Valley. They are important migration corridors for migrant woodland birds and add to the diversity of refuge wildlife. Artificial nesting cavities placed in these woodlands have provided a nesting environment for wood ducks and hooded mergansers. Other species, like tree swallows, kestrels, screech owls, and flickers, have benefitted from the nesting cavity program. A total of 260 artificial cavities have been added to refuge woodlands.



The primary tree species included in the refuge's riparian woodlands include: American elm, boxelder, green ash, cottonwood and occasionally a bur oak. Dutch elm disease has taken the majority of the American elm in these woodlands.

#### 4. Croplands

The year 1989 marked the beginning of conversion of refuge cropland to non-chemical farming. Of six refuge cooperators who have been farming on the refuge, only one decided to drop out of the refuge farming program when confronted with the program to eliminate chemicals from refuge farmground. Several welcomed the opportunity to "experiment" with non-chemical farming without jeopardizing large portions of their income (refuge farming is just a sideline for our farming cooperators).

Our program was initiated with the following objectives:

1. Chemical-free farming
2. Economic incentive for the cooperator and adequate food shares for refuge wildlife.
3. Quality upland nesting cover
4. Less money put in for cooperator, less money input for refuge for cover maintenance, and equal or greater net income for cooperator.
5. Avoid degradation of refuge soils and habitat by chemicals, and demonstrate farming can be accomplished economically, without chemicals.

A thorough study of refuge soil types, wildlife needs, cooperator crop acceptance, local market availability and rotations was done to identify potential rotations which might work. The final rotations, which appear to be acceptable from the cooperator's and a wildlife standpoint are as follows:

#### Rotation to Benefit Waterfowl

Year 1 - Alfalfa (cover), plowed after July 15 followed by fall-seeded winterwheat (goose browse).

Year 2 - Winterwheat or Spring Wheat (SW if WW freezes out).

Year 3 - Rye or Buckwheat (drill rye into stubble or seed in a clean bed depending on weed competition; seeded in fall of year 2 as a year 3 crop).

As an alternative to rye, buckwheat could be spring seeded in year 3. Buckwheat is seeded later which will allow for mechanical weed control early in the year if necessary. A good buckwheat stand will shade the ground and help control weeds. The choice also allows cooperator to take advantage of commodity markets while seeding a crop to compete with weeds.

Year 4 - Barley, flax or oats as a companion with alfalfa (barley is preferred in our rotation because 1/3 of the crop is refuge share for migrating waterfowl. (1/3 refuge, 2/3 cooperator). Barley could also be baled for winter feeding. If flaxstraw is needed for nesting bales etc., flax may be a desired crop. Oats is an alternative if market is high and/or cooperator would trade for wheat/winter wheat acres on another field.

Year 5, 6, 7, 8, 9 - Cooperators plan to buy the alfalfa seed in return for 2 cuttings of alfalfa during the next five years. The stipulation is that no cuttings will occur before July 15. If the stand produces seed by freeze-up, a post-hay seed harvest may be permitted during the years haying occurs. (If weeds are a concern, first year haying of alfalfa may be advised). The three cover years will retain 60% of the alfalfa acreage as winter cover. A manager could use these three years to supplement cooperator shares if crop/hay failures have been experienced.

#### Rotation for Resident Wildlife (food plot rotation)

We plan to use the same rotation, except: Following the rye or buckwheat crop we will have a corn or sunflower crop. This crop is seeded later and with the crowding effects of the previous crop and additional time for mechanical control, plus cultivating rows, we should be able to control weeds. (The row crop will be split 50/50 between the cooperator and the refuge.)

In 1989 we began the conversion by breaking out some of the older dense nesting cover fields. In 1990 our cooperators will begin to seed back alfalfa. As new ground is broken, a stipulation is being made that no chemicals can be used. When the last field currently farmed is seeded to alfalfa, (3 to 4 years), we will be weaned of chemical use on refuge cropland.

It is our intent to remain flexible with our cooperators in implementing our new system. It will be a learning process for all of us. The goals we are reaching for are to be chemical

independent, to continue to provide a quality and abundance of food shares for refuge wildlife, plus an acceptable profit margin for cooperators. If we do not lead, no one will follow!

## 6. Grasslands

Refuge uplands occupy over 8,000 acres. Three major classes of grassland exist: native grasslands, "go back" areas, and introduced tamegrass or dense nesting cover. Go back areas are small areas which were broken out prior to refuge establishment and were allowed to revert to their own characteristic vegetation (primarily brome and western snowberry). Native, mixed-grass prairies have dominant species of western wheatgrass, green needlegrass, big and little bluestem, blue grama, and switchgrass. These areas are invaded by Kentucky bluegrass, and smooth brome. Tamegrass areas consist of tall and intermediate wheatgrass, sweetclover, and alfalfa.

Much of the tamegrass on the refuge was seeded in the late 60's and early 70's. Most tamegrass fields will be absorbed into our non-chemical farming/tamegrass management. The tamegrass areas will be then converted to alfalfa (see cropland section).

## 7. Grazing

During 1989 the refuge grazing program underwent some major changes. The major objectives of initiating the new grazing program were:

- Improve utilization of native uplands by nesting waterfowl, upland gamebirds and other ground nesting birds by delaying turn-in dates. (Previously, cattle were turned in as early in the spring as possible and grazed through June 15).

- Minimize overgrazing and selective grazing.

- Promote vigorous plant growth, reduce over accumulation of dead plant material; (i.e. lodging). Improve cover of native grasslands by improving plant vigor, density and height.

- Maintain a brush/grass mosaic to provide a diversity of habitats.

The program also had to be acceptable to local livestock men. The program changes required higher stock densities, shorter duration within a pasture (requiring cross fencing), and later turn-in dates.

A compromise was reached to split current pastures into four units, stock pastures at 2.0 to 2.5 animals/acre, (compared to

1.0 animals/acre in the past), and to reduce the grazing duration from 50 to 15 days. We also delayed cattle entry from an average of March 15 to June 1 or 15, to increase the acreage for nesting utilization in native pastures.

In return, our cooperators received 60 days of grazing, instead of 50 and could increase their cattle numbers. (Our intent was to treat the pasture quickly and remove the cattle to allow quick plant recovery, and reduce plant exposure to prevent being grazed again and again.)

The visual response of the new system was excellent. Many of the grazing cooperators commented that they would have liked a second graze on the early pastures. (Something that probably got them thinking about grazing management on their own pastures). Below average precipitation in June and early July delayed recovery of early grazed pastures, however, by fall the pastures showed vigorous regrowth.

The cattle did an excellent job of consuming cattail and other marsh vegetation in the June 15-30 and July 1-15 pastures. Switchgrass began to grow in a wetland basin where dense cattail had prevailed before the graze. We were able to contain the cattle with a single strand electrified barbed wire.

Cooperators were given adjustments to their grazing bill as follows: \$100/mile of single strand electric fence constructed and \$50 per cattle move.

Because of limited rainfall, water became a problem on some grazing units. Pumping of water from Jim Lake twice a day was required to keep one rotation going. Additional adjustments were required for this permittee's grazing fees.

We also found that with the densities used, (2.0 - 2.5 aum/acre), almost all nesting within the first two pastures in probably compromised. By July 1 almost no cover existed at this density. A radioed sharptailed grouse's nest was trampled in one June 15 - 30 grazing unit. Since most of the initial nests are hatched by mid-July, the first two pastures in the rotation may experience the cattle affects on nesting. (Prescribed burning would eliminate initial nesting from all four). We could back our entry dates until July 1 or 15, however, in this area early June grazing is desired to put pressure on invading Kentucky Bluegrass.

A similar approach was used on one rotation (set of four pastures), which was late summer/fall grazed. The 1989 grazing summary appears below:

Grazing Unit	Initiation	Termination	Stocking Rate (Animals/Acre)
G-1	June 15	August 14	1.78
G-3	June 07	August 01	2.30
G-18	May 31	July 31	2.04
G-21	May 31	July 30	2.45
G-23	August 1	September 17	1.75

Acres	Aums Removed	Aums Removed (per acre)	Total Receipts
173	154	.89	1136.10
146	168.1	1.15	1165.67
446	454.7	1.02	4059.85
357	438.6	1.23	3432.10
198	173.6	.88	1165.24
TOTALS 1,320	1,389.0	5.17	10,958.96

We can probably improve upon this grazing system to select towards/against various species compositions desired. The system is a vast improvement over past grazing practices. Cooperators have noticed the visual improvements and there may be some spin off benefits on private lands in this area. We plan to continue to monitor this system and fine tune it to meet individual pasture needs. One thing I like about the system is the diversity of 4 native areas at four different heights and compositions on the unit, (Creating a diversity of cover types for a diversity of wildlife).

#### 8. Haying

Because of the drought, interest in "wildlife hay" was high in 1989. Area farmers appear to rely on "wildlife hay" to supplement their operations, not only when moisture is inadequate, but also expect hay when moisture is adequate. Precipitation during the growing season was at or above normal in 1989, yet most counties declared a haying emergency.



The stipulations required by the refuge program are:

1. Hay must be for permittee use only (must own livestock) - not for resale.
2. Permittee must own or operate land within a township which adjoins the refuge.
3. No hay is cut before July 15. All hay must be removed by August 15.

Currently Arrowwood NWR has approximately 3,275 acres of seeded tamegrass, most of which is dense nesting cover. The refuge haying program targets haying on tamegrass every 4-5 years to maintain stand vigor and to clean out the accumulation of litter (which chokes out the stand if not removed in a timely manner). This means that between 655 and 819 acres of hay should be available annually.

In 1989, twenty four permittees hayed 730.4 acres of refuge tamegrass. A flat rate of \$10.00 per acre was charged for the hay. When interest is high, the planned hay release is divided into parcels which will allow all applicants some hay. When interest is low, the permittees receive larger haying units.

The Mud Lake Island, which was a prairie chicken booming area prior to the establishment of the refuge was prescribed burned on April 25 and hayed after July 15. Approximately 120 acres were hayed in four parcels on the island.

#### 9. Prescribed Burning

Three prescribed burns were completed in 1989.

1. Mud Lake Island	550 acres
2. Native Grass Seedings	54 acres
3. Headquarters shoreline	40 acres

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TOTAL      644 acres

Several fall prescribed burns were planned but were not completed because the governor declared a statewide burning ban, which lasted through most of the late summer and fall.



The Mud Lake Island (a 550 acre unit) was prescribed burned in April. Cattail provided the fuel for 25-30 ft. flames. (RFJ/'89)



Heavy pillows of smoke blocked the sun during the burn. (RFJ/'89)

## 10. Pest Control

Leafy Spurge, (*Euphorbia esula*) continues to be the primary pest plant on the refuge. Approximately 350 acres of the refuge is infested with this noxious weed.



Leafy Spurge - The #1 Threat to Refuge Upland Habitat  
(PCV/'89)

Arrowwood is a riverine refuge. Since leafy spurge is not controlled well everywhere in the James River watershed, there is a constant supply of seed entering the refuge. Riparian woodlands flank the river channel and impoundments for most of the length of the refuge. Treatment of leafy spurge within the riparian zone is difficult. Probably the only sensible treatment in this zone is to use livestock grazing to prevent seed formation.

Our primary goal in the past was to spray spurge, with 2-4D from the riparian zone into the open refuge uplands. Despite annual spraying, leafy spurge acreage on the refuge has continued to expand.

Eradication of the plant is now considered impossible. "Control" is the word now used when considering management of this pest. In addition to the threat this plant poses to our native uplands, the dollars spent for controlling this plant are diverted away from active wildlife management programs.



In 1989 we began a new approach to managing leafy spurge on the worst infestations on the refuge. Sheep grazing was initiated on a rotational schedule to cover the largest area practical. The objective was to begin a long term project of leafy spurge consumption on the worst area to prevent spurge from setting seed. Over the long term we hope continued grazing pressure on the plant will reduce the infestation. Additional benefits of the program are a reduction in refuge weed control costs, a reduction in chemical contamination of refuge grasslands, and economic use of the problem plant for our cooperator.

We advertized for potential cooperators and had only two sheepmen interested in the free grazing. They assisted in constructing a four strand electric fence to enclose the units to be treated. The two cooperators had different sheep breeds; one had primarily Suffolks, and the other had Columbia/Rambolais and various crosses of the two breeds.

The unit with the Suffolks was a disaster. After two weeks of revamping the fences and chasing sheep across the county, we decided to remove the herd. Experience taught us the hard way that Suffolk sheep are not adaptable to the management we had intended.



A new approach to controlling leafy spurge.  
(JK/'89)



After constant problems with sheep escaping, we added a new category to everyone's PD in 1989.

- Must possess shephard skills! (PCV/'89)

The other rotation, which had Columbian/Rambolias sheep adapted to the system pretty well. Portions of the herd escaped at times, however, we did not have the constant problems experienced with the Suffolks. Within the three pastures, few if any spurge plants went to seed. We plan to continue the program in 1990 with some fencing adjustments. We would like to use angora goats in the vacated rotation.

On other areas of the refuge we plan to mow leafy spurge in summer and fall where terrain allows and monitor "control" with this approach. As funds and cooperators allow, we plan to pursue grazing on our heaviest infestation areas. Where terrain and no other non-chemical approach is available, leafy spurge will be "controlled" with summer and fall treatment with 2-4 D.

## II. Water Rights

Arrowwood has a water right for 16,000 acre feet to fill its impoundments and 10,000 acre feet to maintain levels, established September 1, 1934. The water is available from the James River and any tributaries that enter the refuge. The water is used in Arrowwood, Mud, and Jim Lakes and DePuy Marsh to provide benefits for waterfowl and other wildlife.

The Annual Operating Plan for Arrowwood's Impoundments received some close scrutiny from the North Dakota State Engineer in 1989. Possibly because of the drought and the need for water supply to

the Oakes Test Area for irrigation, all water rights along the James River were scrutinized. The State Engineer concluded that Arrowwood NWR was allocated more water than it could hold in its impoundments. Although some siltation has undoubtedly occurred since 1934, the right to fill and maintain water spillway elevations should remain in force. A recent survey has indicated a 1.1 foot error in area/capacity curves. This could explain conflicting data concerning refuge capacities.

## G. WILDLIFE

### 1. Wildlife Diversity

Wildlife use of the northern prairie is dynamic. A wide diversity of wildlife is attracted to the wetland/grassland environment during the spring, summer, and fall. Many of these species are forced to migrate to escape the harsh winter environment. Consequently, winter Christmas bird counts often reflect less than 15 species. Many resident species become dormant for periods during the winter to cope with winter weather. Many humans wish they had similar opportunities to escape too.



Refuge programs are designed to provide for a wide diversity of wildlife. This nestbox designed to attract nesting bluebirds was occupied by a tree swallow. (PCV/'89)

## 2. Endangered and/or Threatened Species

Bald Eagles are observed regularly on Arrowwood during spring and fall migrations. The following observations were noted:

<u>Date</u>	<u>Number</u>	<u>Date</u>	<u>Number</u>
3/25	1	11/5	1
3/26	1	11/6	3
3/27	3	11/8	1
3/30	1	11/16	1
3/31	1	11/19	2
4/04	1	11/22	2
4/05	3		
4/10	5		
4/11	6		
4/15	24		

Refuge eagle numbers are higher in years of fishkills in impoundments. During spring migration, many eagles utilize the winterkill fish as a food source.

Observations of golden eagles at Arrowwood are less common than those of bald eagles. Spring observations during 1989 were higher than normal. No goldens were observed during the fall migration.

<u>Date</u>	<u>Number</u>
4/04	4
4/10	3
4/11	3
5/02	1





Golden Eagle sightings were common in the Spring of 1989.  
(PCV/'89)

### 3. Waterfowl

#### Spring Migration:

Spring migration arrivals averaged about a week later in 1989 than 1988. The first observation dates for the various waterfowl species are listed below.

<u>Species</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Mallard	3/06	3/09	3/26
Pintail	3/24	3/25	3/26
Wood Duck	3/27	3/22	4/10
G-W Teal	4/07	3/22	4/02
B-W Teal	4/07	4/10	4/14
Gadwall	4/06	3/25	4/02
Am. Widgeon	4/04	3/25	3/30
Canvasback	4/06	4/16	4/07
Redhead	3/21	4/16	4/10
L. Scaup	3/20	3/24	3/27
C. Goldeneye	3/06	3/24	3/27
Bufflehead	3/22	3/28	3/27
H. Merganser	3/23	3/24	4/05
C. Merganser	3/06	3/24	3/25
Ruddy	4/26	4/16	4/27
Snow Geese	4/04 to 4/08	4/01 to 4/07	3/31 to 4/03
Local Giant Canadas	3/06	3/09	3/25

### Fall Migration:

The most notable fall waterfowl concentration on the refuge was the number of tundra swans. Approximately 3,500 swans utilized the refuge from early October through mid-November. The majority of the swans utilized the exposed islands in Jim Lake.

The abundance of exposed shores and islands also attracted an abundance of other waterfowl. The following peak populations were estimated.

Widgeon	1,500
Gadwall	1,000
Mallard	12,000
Canvasback	4,000
Other Divers	3,000
Wood Duck	700
BWT	2,000
Other Misc. Ducks	<u>2,000</u>

TOTAL DUCKS	26,200
-------------	--------

Snow Geese	7,000
Small Canadas	10,000
G. Canadas	600
Whitefronts	<u>100</u>

17,700

Freeze up occurred in November, forcing all remaining birds southward.

Production:

A. Ducks



The drought reduced the number of nesting BWT in the refuge area in 1989. (PCV/'89)

Pair counts were conducted this year following the Cowardin Four Square Mile system. Portions of two plots included refuge wetlands. Sampling under this system was insufficient to obtain accurate pair data for the refuge. The Arrowwood NWR manager has been designated as the flight coordinator for four-square mile video taping of pair count plots for the Valley City, Arrowwood, Long Lake, Tewaukon, and Kulm Wetland Management Districts. Because of the time 'crunch' during the pairing period, no formal refuge pair counts were conducted.

Breeding populations and production on the refuge was calculated using data obtained from counts on Waterfowl Production Areas in Arrowwood Wetland Management District. Although habitat on Arrowwood NWR and Arrowwood WMD are distinctly different, the data is the best available. Calculations were made using pairs/square mile area and recruits/square mile area for federal land from four square mile data. Production in 1989 was calculated for only the six major nesting species. Production for other duck species was not calculated because the Cowardin System does not have an adequate data base for figuring overwater

nest production. Production for wood ducks and hooded mergansers was obtained by conducting nestbox checks. Adjustments for brood survival were made based on survival rates suggested by Frank Bellrose.

Total Species	Sq. Miles	Pairs/Sq.		Total Recruits/Sq.	
	<u>Refuge Area</u>	<u>Mile Area</u>	<u>Pairs</u>	<u>Mile Area</u>	<u>Recruits</u>
Mallard	24.1424	15.76	380	9.68	233
Gadwall	24.1424	19.13	462	13.69	331
B.W. Teal	24.1424	21.63	522	13.33	322
Shoveler	24.1424	5.60	135	3.69	89
Pintail	24.1424	.84	20	.46	11
Wigeon	24.1424	1.93	47	*	*
G.W. Teal	24.1424	1.63	39	*	*
Redhead	24.1424	7.75	187	*	*
Canvasback	24.1424	2.86	69	*	*
L. Scaup	24.1424	5.14	124	*	*
Ringneck	24.1424	1.10	27	*	*
Ruddy	24.1424	6.26	151	*	*
Wood Duck		** .43	(323 x .5) = 162		
H. Merganser		** .94	(628 x .48) = 301		

1,449

\*Data not available. Cowardin System does not predict production for overwater nesting species.

\*\*Pairs = # nests initiated. Recruits based on survival rates suggested by Bellrose in Ducks, Geese, and Swans of North America, 1981.

#### Nest Structures

The following nest structure data was compiled for the 1989 nesting season:

Nest Structure Type	# Available	# Usable	# Used		Nest Success	
			Ducks	Geese	Ducks	Geese
Culverts	10	10	1	1	100%	100%
Duck Baskets	15	12	2	2	50%	100%
Goose Tubs	20	19	1	9	100%	78%
TOTALS	45	41	4	12	83%	75%
83%						

Overall, 16 of 41 structures were used for 39% occupancy. This is slightly below average use experienced over the past few years and may be a reflection of the 1989 drought conditions.

Artificial nesting cavities experienced approximately 49% occupancy by waterfowl in 1989 (123 of 252 structures). The YCC crew built 220 single nestboxes in the summer of 1989 and replaced a large portion of the metal cylinder cavities.



Bellrose metal cylinders were replaced with wooden cedar nestboxes constructed by the YCC crew. (PCV/'89)



A total of 252 wood duck nest boxes were available in 1989. A summary of waterfowl use in nest boxes is listed below:

	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Number of Boxes Inspected	248	244	263	262	237	252
Number of Boxes Used By WD Alone	25	22	15	25	27	29
Number of Boxes Used By HM Alone	40	39	61	90	64	80
Number of Boxes Used By Both Species	13	18	11	14	22	14
Number of WD Eggs Laid	344	288	235	398	341	391
Number of WD Eggs Hatched	253	185	182	332	208	323
Number of HM Eggs Laid	531	483	714	829	821	947
Number of HM Eggs Hatched	355	350	489	496	312	628

#### B. Geese

Nesting populations of giant Canada Geese returned to Arrowwood on March 25. This flock continues to expand on the refuge and in the local area. The refuge flock is "tuned in" to nesting on tubs and baskets. An estimated 150 geese were produced on the refuge in 1989.





This is an interesting bird. It was collared and banded as an adult male in 1985 in Kansas. It produced five goslings at Arrowwood in 1989. (RFJ/'89)



Geese and ducks do nest on structures in dry wetlands. Both this goose and a mallard on another basket successfully hatched clutches on a wetland which contained no water all year. It is approximately 1/2 mile to the nearest permanent water from this wetland. (RFJ/'89)

#### 4. Marsh and Water Birds

Because of the major fish winterkill during the 1988-89 winter and lack of fish reinvasion from downstream, forage for marsh and waterbirds was low in 1989, and hence refuge use by pelicans, cormorants, and herons was low. Occasionally, concentrations of 30 - 50 cormorants and/or pelicans were observed for a short time. Concentrations rarely remained for more than half a day and the birds spent more time loafing and resting than foraging.

Great blue herons and black crowned night herons were observed occasionally throughout the summer and fall.

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

The number of shorebirds, etc. using the refuge in 1989 was lower than 1988. Although dowitchers, yellowlegs, willets, avocets, and sandpipers were present during spring and fall, rarely did observations exceed 50-100 individuals in any area. The number of gulls and terns observed was also lower than average throughout 1989.

#### 6. Raptors

The riparian woodland/prairie habitat of Arrowwood attracts a variety of raptor species during migration and for nesting. Nests of kestrels, screech owls, northern harriers, Swainson's hawks, red-tailed hawks, short-eared owls, and great-horned owls were observed in 1988.

Migrational raptors observed in 1988 included bald and golden eagles, goshawks, roughlegged hawks, sharpshinned hawks, prairie falcons, and merlins.

#### 8. Game Mammals

During the 1989 - 90 winter, snow did not materialize in sufficient quantity to conduct wintering counts on the refuge census area. Deer in the area did not concentrate to any appreciable extent. The open conditions provided for excellent health and survival of the herd.

## 9. Other Resident Wildlife

### A. Upland Game Birds

In 1989, a total of 135 male sharp-tailed grouse were observed on 11 leks. The survey indicated a 37% decrease in the refuge sharptail population from 1988 to 1989. The drought of 1988 was probably a major factor in the sharptail decline.

During the display period sharptail hens were captured on three leks and fitted with radios as part of a prairie chicken egg substitution reintroduction project. In addition, all males captured were banded and marked with color coded leg bands. A study to determine survival rates of male sharptails and differential affects of telemetry packages was initiated by John Toepfer of Little Hoop Community College. John intends to determine what (if any) affect antennas of different lengths have on survival and wear on the birds. Color marking with leg bands was used to identify individual birds without the need for recapturing. Results of the study will be compiled in the spring of 1990.

The drought probably had a similar affect on ringnecked pheasant production. Few broods were observed throughout the summer - late fall period.

Hungarian partridge numbers were down slightly with 1 pair/1.5 miles of refuge trail compared to 1 pair/1.25 miles in 1988.

### B. Furbearers and Predators

The 1988 and 89 drought have adversely affected on refuge furbearer populations especially muskrat and beaver. By the winter of 1989, only three active beaver lodges were known to remain. Nearly all impoundments froze to within several inches of the bottom. DePuy marsh was completely dry, and most of the river channels in Mud Lake and upper Jim Lake were dry. Chances for muskrat survival on the entire refuge were slim. Mink populations probably responded negatively also.

Coyote populations appeared to have increased in 1989. Sightings were more common on nearly all units and during all seasons. Correspondingly, fox sightings were considerably lower than in the recent past.

## 11. Fishery Resources

Despite near complete winterkill in all impoundments during the 1988 -89 winter, some unconfirmed reports of fishermen taking

northerns from Jim Lake were received in May. No fishing use was detected throughout the year during routine refuge patrols and activities.

Refuge monitoring crews discovered a limited fish resource which survived the 1988 - 89 winterkill during test netting efforts. Small pockets of fish probably held over in springs and seep areas in Jim Lake.

## 12. Wildlife Propagation and Stocking

This was the second year of the prairie chicken reintroduction/study. Methods were changed in 1989. Prairie chicken eggs were incubated and switched under sharp-tails at the pipped stage. (In 1988, fresh eggs were substituted, which prolonged nest exposure to predation).



Radioed sharp-tailed grouse hen captured on the lek. Nests were located using telemetry and used for prairie chicken egg substitutions. (PCV/'89)

A majority of the hens used were captured on leks in April and transmitters were attached. Nests were located in May and approximate dates of hatching determined. Prairie chicken eggs (from the captive NDCTWS - Prairie Chicken Committee), were set in the incubator. Substitutions were coordinated into the wild sharp-tail nest at the pipped stage of the prairie chicken eggs. This decreased incubation time and the rate of predation. In addition to captive flock eggs, two wild nests salvaged from the Sheyenne National Grasslands were used for substitutions.



Surprisingly, two sharptail hens, which were radioed in the spring of 1988 were captured in the spring of 1989 on the leks. Another hen was shot during December of 1988. This documents fair survival of our radioed birds. One of the 1989 hens captured on the leks was shot in October just southwest of the refuge.

Another hen, which was radioed during the spring of 1989 was located by Northern Prairie Wildlife Research Center crews working with radioed mallards near Cooperstown. Cooperstown is nearly 50 flight miles from the lek on Arrowwood, where the radio was affixed to the sharptail.

By early August, only two small broods remained alive (one brood of six and one of two.) By mid-August, only one bird was documented alive, and behavior of remaining study hens suggested that they had lost their broods.

In the spring of 1990, on April 4, two booming male prairie chickens were located on lek #9. This is one of the leks where hens were captured and radioed in 1988 - 89. In addition to the males, 24 sharptails occupied the lek in 1990. Although not abundant, this observation gives some validity to egg substitution methods. There is a long way to go in reestablishing a viable population, but for the moment Arrowwood has heard its first "booming" since the early '60's.



Prairie Chickens which are the result of egg substitution method of reintroduction. (RB/'90)

## 15. Animal Control

The approval to conduct predator management on the refuge expired in 1987 after three years of a management study to determine the affects of the removal of major nest predators. To enhance chances for the prairie chicken reintroduction, the predator control effort was extended into 1988. No predator control was conducted during the spring of 1989. We analyzed the results of the predator control efforts during the three year study period and were pleased with the results. The results of predator management at Arrowwood NWR during the study period were as follows:

### RESULTS OF ARROWWOOD NWR PREDATOR MANAGEMENT STUDY - 1985-88

#### Predators Removed:

Species	1985	1986	1987	1988
Skunk	33	35	25	10
Raccoon	38	15	20	40
Cat	2	2	1	2
Fox	8	8	0	33
Mink	2	2	11	4
Franklin GS	43	4	10	10
<hr/>				
TOTALS	118	66	67	99

Concentrated efforts were made to evaluate the affects that predator management had on ground nesting birds during the first two years (1985 - 86).

A limited effort was made to monitor the affects of predator management in 1987 - 88 because of a change in the focus of nest dragging. In 1987 & 88, nest dragging was done to find sharptailed grouse nests for reintroducing prairie chickens to the refuge through the substitution of eggs (Prairie chicken into sharptail nests). Some limited data was kept on nest success in these years and is presented below.



## MONITORING

<u>1985</u>	<u>Pred. Control</u>	<u>No. Pred. Control</u>
Acres dragged	250	250
Ducks		
nests found	14	11
usable nests	14	11
predated	2	7
abandoned	0	0
successful	12	4
Mayfield %	66.8%	14.2%
Other Species		
Nests found	17	2
successful	12	1

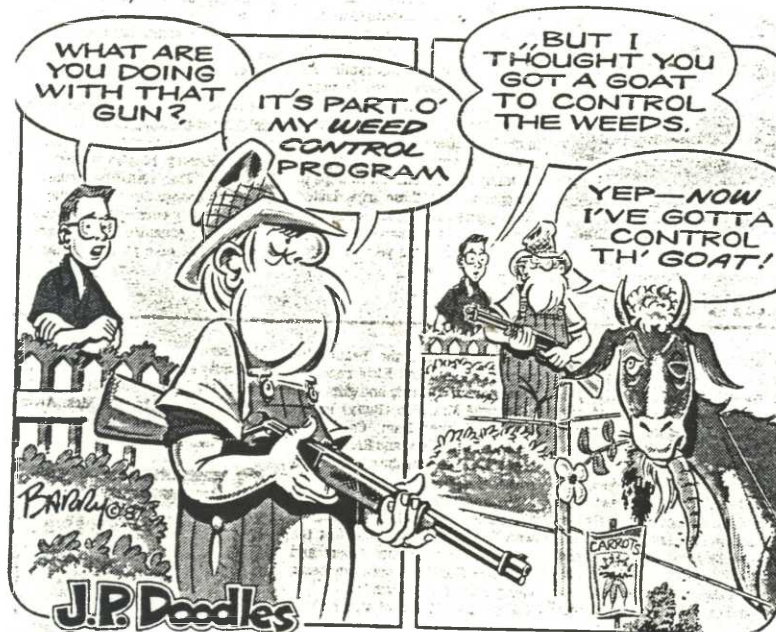
<u>1986</u>	<u>Pred. Control</u>	<u>No. Pred. Control</u>
Acres dragged	150	150
Ducks		
nests found	40	3
usable nests	40	3
predated	13	2
abandoned	0	0
successful	26	1
Mayfield%	64.8%	21.6%
Other Species		
nests found	7	0
successful	5	-

<u>1987</u>	<u>Pred.</u> <u>Control</u>
Acres dragged	100
Ducks	
nests found	11
usable nests	11
predated	3
abandoned	0
successful	8
Mayfield %	72.7% apparrent
Other Species	
nests found	No Data
successful	

<u>1988</u>	<u>Pred.</u> <u>Control</u>
Acres dragged	300
Ducks	
nests found	20
usable nests	20
predated	10
abandoned	0
successful	10
Mayfield%	50% apparent
Other Species	
nests found	24
successful	10*

\*Prairie Chicken  
Study

We usually have very few problems controlling the wild critters. It is the domestic critters that give us fits. (See Section F-10 for explanation). Sometimes we feel like the fella below:



(Source Unknown)

#### 16. Marking and Banding

All sharptailed grouse captured during spring trapping efforts were banded with State of North Dakota Game & Fish Department bands. A total of 27 males and 20 females were banded. John Toepfer also individually marked males with colored pigeon bands. He planned to pursue a study of survival of sharptails with different radio packages. The objective of the study will be to determine if antennas of various lengths have any influence on survival of the birds.



Howard Burt with Sharptail Male coded with pigeon bands. (PCV/'89)

In the fall, two rocket net shots were taken to band wood ducks. A total of 131 birds were banded including 69 wood ducks, 48 blue-winged teal, and 14 mallards. The breakdown of species and age groups follows.

Species	AD Female	YOY Female	AD Male	YOY Male	TOTAL
Wood Duck	10	10	36	13	69
Blue-Winged Teal	1	31	2	14	48
Mallard	3	4	0	7	14
					131

#### H. PUBLIC USE

##### 1. General

The refuge provides a variety of recreational opportunities to the public. Nonconsumptive uses include wildlife observation, photography, picnicking, canoeing, and cross country skiing. Consumptive uses include fishing, berry picking, and hunting for deer, fox and upland gamebirds. Group sponsored camping is allowed in the picnic area by special request. The staff provided technical assistance and educational material to various public groups. They also volunteered their talents to assist in local wildlife club activities and hunter safety programs. Programs and displays were provided at various public events.

##### 2. Outdoor Classrooms - Students

The Valley City State College ornithology classes reserved the sharp-tailed grouse blind in April and utilized the refuge for birding activities. The Kensal High School biology class also reserved the sharptail blind for outdoor classroom activities.

Approximately 50 third graders from the Carrington Public School used the refuge in October for outdoor classroom activities. Several "Project Wild" activities were incorporated into their lessons.

##### 4. Interpretive Foot Trails

An interpretive foot trail is planned for the picnic area to further wildlife education and awareness. It is hoped picnickers will be drawn to the trail and learn more about the refuge and its wildlife.

## 5. Interpretive Tour Routes

The 5.5 mile interpretive auto tour route is the focal point for wildlife oriented activities. It is also a demonstration area for refuge programs as well as a productive wildlife area. A predator enclosure fence provided by Ducks Unlimited Inc. serves both management and educational functions. In 1989 a 100 percent nest success rate for 20 nests was achieved in the enclosure. Refuge tourists who view the fence are educated to the nest predation problems and shown new techniques for intensively managing upland habitats for nesting.

Other opportunities in the auto tour area include an observation blind on an active sharptailed grouse lek, berry picking in late June and early July, and a canoe trail.

An estimated 1,700 visitors used the auto tour in 1989.

## 6. Interpretive Exhibits/Demonstrations

Refuge staff attended FWS exhibit booths during Conservation Days at the West Acres Mall in Fargo and at the Stutsman County Wildlife Federation's Annual Meeting.

## 7. Other Interpretive Programs

Staff presented programs, talks, and/or tours to various schools and organizations including 4-H, Lions, Kiwanis Clubs, local wildlife clubs, church groups, and sportsmen's organizations. Staff also assisted with a wood duck workshop at Valley City WMD and developed a slide series on nestboxes, which will be used at several refuges in North Dakota.

## 8. Hunting

Hunting is permitted on Arrowwood NWR for deer (both archery and firearm), upland game and fox.

### A) Archery Deer Hunting

Archery deer hunters tallied 315 refuge visits and 1220 activity hours during the 1988 refuge season. An estimated 10 deer were taken by archery hunters.

### B) Firearm Deer Hunting

The state firearm deer season ran November 10 - November 26. Refuge hunters were required to have special refuge permits for the first 1 1/2 days of the season. Hunters logged 310 refuge visits and a total of 1240 recreational hours during the firearm deer season. A total of 77 deer were harvested; 34 antlered and 43 antlerless.





One of the nice bucks harvested on the refuge by firearm deer hunters. (PCV/'89)

The Jamestown Sun wrote two feature articles concerning the refuge firearm deer hunt. The articles provided some good exposure, explaining some refuge goals, objectives, and management programs. (Photocopies of the articles are attached at the end of this report.)

#### C) Upland Game Birds

The refuge upland game bird season ran December 1-30. Upland game birds provided 250 refuge visits and 1250 activity hours to refuge hunters. An opening day check station found 39 hunters on the North 1/2 of the refuge. Only .5 birds per hunter day were checked through. Although the refuge is open to hunting of sharptails, hens, and pheasants, only pheasants were found in the bag on opening day.

#### D) Fox

Low pelt prices yielded extremely low hunting pressure on refuge fox populations. One fox was harvested during the firearm deer season. No hunting activity was observed during the regular refuge fox season, which began December 1.



## 9. Fishing

Due to the massive fishkill during the 1988-89 winter and absence of fish reinvasion in the spring of '89, fishing use was not detected during the year. Unconfirmed reports of a few small northern pike caught in Jim Lake were received in late May.

## 10. Trapping

Trapping interest was extremely low in 1989 due to a depressed fur market. Refuge trappers trapped for about a two week period and were required to pull traps during the firearm deer season. The trapper harvest for 1989 and comparison for the past five years is presented below:

<u>Species</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Fox	34	31	24	30	20
Skunk	44	35	16	22	3
Raccoon	51	47	48	28	10
Coyote	5	3	12	3	5
Badger	3	5	6	2	2
Mink	6	16	22	8	0
Muskrat	26	68	94	0	0
Beaver	11	3	30	2	0

## 11. Wildlife Observation

Most of the public use on the refuge is done by local people. The tour route and county roads which bisect the refuge provide excellent viewing routes. In marshland areas, visitors can generally observe waterfowl, herons, pelicans, muskrats and occasionally mink, beaver, and other wildlife species. Visitors usually arrive toward evening and stop by the prairie dog town to observe the "dogs." They then follow the route toward dusk when most refuge wildlife becomes active.

Arrowwood also attracts a number of visitors who are on vacation or just passing through the area. Some stop just to use the picnic facilities, while others come with the expressed intent of seeing prairie bird species like the Bird's sparrow or sharp-tailed grouse.

#### 14. Picnicking

The picturesque picnic grounds on the east side of Arrowwood Lake continues to be a popular recreational area for local people. The quiet serenity of the refuge is enjoyed by most of the people who use the area. It provides a shaded place to reflect and enjoy some of the refuge inhabitants.

#### 17. Law Enforcement

LE patrols are made during the waterfowl and big game seasons. Weekends are worked by at least one officer. All officers work the opening weekends. We coordinate our activities closely with the state wardens and many cases are turned over to them for prosecution.

Citations issued in the WMD during 1989.

<u>Date</u>	<u>Violation</u>	<u>Case Disposition</u>
9/23	Take pheasant during closed season	State
10/7	Hunting waterfowl w/o duck stamp	\$50 bond paid
10/14	Take canvasback during closed season	\$100 bond paid
11/14	Late shooting, 19 min. late and hunting big game in a closed area.	(juvenile, referred to state)
11/22	Hunting big game in a closed area.	\$100 bond paid

#### 18. Youth Programs

##### YCC Enrollees

The Arrowwood NWR Youth Conservation Corps program was initiated on June 5, 1989 and terminated on July 28, 1989. The crew consisted of a work leader, two male enrollees, and one female enrollee. Enrollees were selected from the nearby communities of Kensal, Bordulac, and Carrington. Again the selection allowed us to extend a general knowledge of refuge activities, operations and goals to nearby communities. The crew was an adequate size for the jobs anticipated. The work leader again was as asset to our program, having served as a work leader on three previous occasions.

### Environmental Awareness

Enrollees were given a general refuge orientation by showing the video tapes:

- "Its In Your Hands" Employee Orientation USFWS
- "Waterfowl for the Future" (The North American Waterfowl Plan)
- "Take Pride In America" Commonwealth Films Inc.

We also went over our standard orientation material for new employees, including information on safety and policies. The crew was then give a tour of the refuge and all facilities.

The enrollees were exposed to approximately one day (8 hours) per week of environmental awareness projects or field tours. Field trips were taken to Valley City National Fish Hatchery, Dakota Wildlife Trust propagation facilities, and to Sullys Hill Game Preserve. Enrollees assisted with wood duck nestbox checks, nest dragging operations, radio equipping sharp-tailed grouse and switching prairie chicken eggs in sharp-tail nests.

The crew received an extensive refuge tour in which we explained the refuges mission, goals, and how we attempt to integrate wildlife needs with public needs for wildlife recreation.

### Safety

The work leader was provided with approved Job Hazard Analysis sheets prior to initiating each job. Correct procedures were discussed with enrollees. Enrollees were given the option to have medical tests for Lyme disease exposure at the beginning of their appointment and at the end. All enrollees had the tests done. The enrollees watched monthly safety films along with the regular staff and participated in safety meetings. The work year was completed with no accidents or safety related incidents.

### Work Projects

The Arrowwood YCC accomplished a variety of work projects. Some of the projects were structural improvements, while others were facilities maintenance projects. The crew exhibited enthusiasm and pride in their work. The refuge benefitted with some quality improvements. The following is a list of projects completed by the YCC crew.

- 1) Grounds maintenance and tree/brush removal.
- 2) Constructed split-rail fence in picnic area.
- 3) Formed and poured concrete slab base for new oil and paint building.
- 4) Assisted construction of major entrance sign.
- 5) Completed boundary posting and signing along major roads bisecting and flanking refuge boundaries.
- 6) Built and erected 200 wooden cedar wood duck nestboxes and removed aluminum can nestboxes.
- 7) Built two purple martin birdhouses and twelve bluebird boxes.
- 8) Sided new entrance to refuge pumphouse.
- 9) Framed and erected major identification signs for Chase Lake NWR.
- 10) Assisted with RIP card files (replacing photos, etc.).
- 11) Assisted with nest dragging.
- 12) Assisted with electric fence on sheep fencing project.
- 13) Assisted with radio equipping grouse.
- 14) Assisted with banding ducks.
- 15) Built two observation blinds for grouse observation.

### Costs/benefits

Total Arrowwood Youth Conservation Corps costs in 1989 were \$10,729.56. The appraised value of the program was \$15,957.00. In addition to the work benefits received by the refuge, the YCC program provided an opportunity to convey an understanding of refuge goals, programs, and missions to three communities surrounding the refuge. Enrollees earned some money for their work and gained some valuable work experience. They were taught safe working habits and hopefully gained some insight into wildlife management practices and principles.

#### I. Equipment and Facilities

##### 1. New Construction

A new refuge entrance sign was completed identifying the entrance to refuge headquarters.



New Refuge Entrance Sign. (RFJ/'89)

After completing necessary planning, engineering, and site preparation for a new refuge oil and paint shed, bids were solicited. The bids were released under the minority contract clause and a bid of over \$25,000 was received for a 16 x 24' shed. A prefab building could be purchased for under \$10,000 locally so the project was scrapped in 1989.

The YCC crew completed construction of a split-rail fence in the refuge picnic area.

## 2. Rehabilitation

A total of 200 wooden cedar nestboxes were constructed by the YCC crew. The crew and two temporaries replaced most of the metal cylinder cavities with the new structures. The crew put new steel siding on the entrance to the pumphouse.

The YCC crew replaced all boundary signs and posts on the Highway #9, Edmunds-Kensal Road, and the Pingree road right-of-ways.

New equipment gates were installed for refuge cooperators on refuge farming areas.

### 3. Major Maintenance

The radiator on the refuge TD-24 cat was replaced and the valves were ground. The overheating problem was solved.

The clutch in the jeep scrambler was replaced.

We poured a concrete floor for the oil and paint shed, which was a project cancelled in 1989.

Kulm WMD loaned us their D-4 cat and the siltation above the Jim Lake water control structure was removed.

After loaning our haybuster no-till drill to a cooperator, some abuse repairs were needed. Needless to say, that cooperator will not be loaned refuge equipment again.

### 4. Equipment Utilization and Replacement

A Yamaha 4X4 four-wheeler was purchased.

New tires were purchased for the John Deere 40/40 tractor.

Central air conditioning units were installed in refuge residences.

### Computer Systems

A Compaq 286 computer was received on September 27, 1988 and the software was installed in October. Problems arose from the start. The problems were not constant, but consisted of intermittent function failure on command keys. The computer was shipped to the RO in the spring of 1989 for corrective action. There were still numerous problems when the machine was returned. In December of 1989, while at the budget tracking workshop in Bismarck, the computer had major problems. A new A-drive was installed. After many tiring hours on the phone with Vicki Tilden in the RO trying to get our budget program up and running we decided that the computer was still not functioning properly. We shipped it back to the RO in exchange for one of their loaners.

Our computer has been a royal pain. We have spent a great deal of money on repairs, not to mention the wasted staff hours. We certainly hope that things get significantly better.



## J. OTHER ITEMS

### 1. Cooperative Programs

Refuge staff assisted with : Official Weather Station, Mourning Dove Coo Counts, Preseason Banding, Mid-winter Waterfowl Inventory, Annual Eagle Count, Christmas Bird Count, Breeding Bird Survey, and Great Plains Bird Observations.

### 3. Items of Interest

Mary Liberda received a performance award for acting in the Refuge Assistant position for 4 months.

Jon Kauffeld received a special achievement award for complete reorganization of the refuge filing system.

Jim Somsen received a performance award for quality performance under a heavy fall schedule of heavy equipment operation associated with wetland restoration on private land.

### 4. Credits

Paul VanNingen wrote the report. Sections which merge with Wetland Management District activities were provided by Bob Johnson, Arrowwood WMD Manager. Mary Beth Ellingson typed and edited the report.

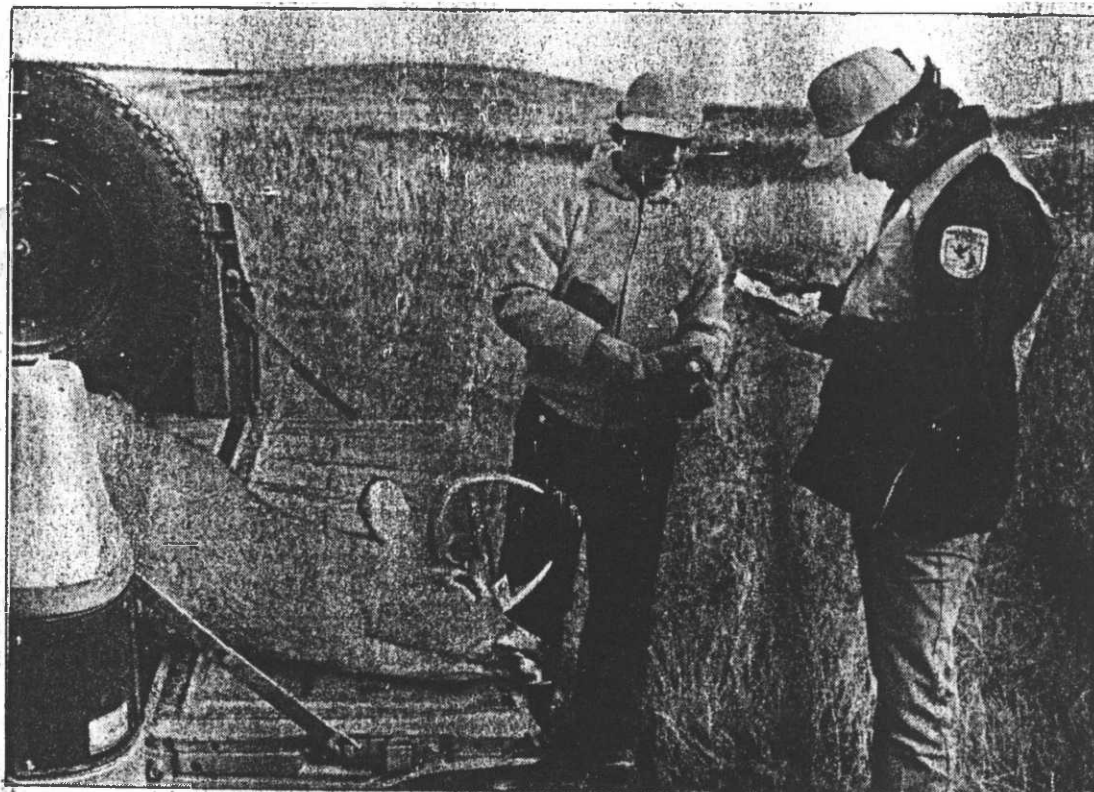
Photo credits as follows:

PCV - Paul VanNingen  
RFJ - Bob Johnson  
CL - Carmen Luna  
RB - Rick Bohn  
JK - Jon Kauffeld

## K. FEEDBACK

It is very important that the Fish and Wildlife Service project is a positive image to the public. The North Dakota Wildlife Extension program is an excellent way to project our image to many farmers, who have been our strongest opponents on many wildlife issues. But our image extends far beyond those farmers to those who use our lands for recreation, relaxation, and pursuit of a wildlife experience. While funds seem limited for the required O & M to maintain the status quo on refuges and WPAs (in many cases we are not maintaining the status quo), funds appear to be abundant if not hard to spend for extension and off refuge programs. It seems ironic that there are some working to find large projects to spend money on when on our own lands "our houses are not entirely in order." I do not mean to detract from the value of extension and off refuge programs, these efforts are necessary. I just believe a more even focus of attention should be made to focus on our own areas. How can we justify acquiring more land if we pay only token attention to our fee areas through funding and management?

The focus of recruitment of personnel to work for the Fish and Wildlife Service to me appears to have flaws. Many of us remember the pain and toil we went through to join this elite group of land managers. Many of us entered this profession because of a deep concern and appreciation for our nation's wildlife. To us, wildlife was a major portion of our lives. It seems recently we have been forced to go looking for employees - not those for whom wildlife is a way of life; nor even those who have a deep concern; just those who meet certain criteria unrelated to skills, abilities, or interests. "Through toil we gain appreciation, through ease much less so. I question if the direction we are headed is where we really want to go."



## License check

SUN PHOTO BY MICHAEL J. BREEN

Arrowwood National Wildlife Refuge manager Paul VanNingen, right, checks Rick Nysted's hunting license and permit Friday afternoon on the refuge grounds. Nysted, a Carrington resident, shot a buck on the opening day of firearm deer season.

## In the Sunlight

# Watching over refuge wildlife

By MICHAEL J. BREEN  
Sun Staff Writer

PINGREE — The U.S. Fish and Wildlife Service four-wheel-drive pickup bounced across the Arrowwood National Wildlife Refuge Friday afternoon on rocky, potholed trails. Adorned in the prescribed orange cap and vest, Paul VanNingen patrolled the area in search of hunters.

When VanNingen spotted a successful sportsman, he made his way to the location. First order of business was to check the hunter's license, then load up the deer and hunter, and transport them to their vehicle — often parked as far as three miles away.

The past weekend was the opening of the firearm deer hunting season. That meant VanNingen was constantly on the go. The 150 people who obtained permits to hunt on the refuge, not only look forward to seeing VanNingen each opener — they can count on it. The sanctuary's manager

takes pride in serving interests of the public as well as those of the wildlife.

"Foremost, my job is being an adequate land manager, to provide an abundance and wide variety of wildlife to the area," VanNingen said. He noted that he was hired as a public servant to provide for those who enjoy wildlife, in both a consumptive and non-consumptive manner.

The Sioux Falls, S.D., native has been the manager for six of the eight years he has spent at Arrowwood. He also spent three summers at the Fish and Wildlife post during college.

VanNingen received his degree in fish and wildlife management from South Dakota State University. After college, he spent five years with the fisheries in Spearfish, S.D.

The first two years were spent as a spawner for a rainbow trout genetics program. The following three years he worked on

See MANAGER on next page

## •MANAGER

Continued from page 1  
research in nutrition and diet trials for the hatchery system.

"I enjoyed the fisheries, but my heart has always been in managing wildlife and the land. I always wanted to work in a refuge," VanNingen admitted.

Events such as the deer opener are what give the Fish and Wildlife official the most joy from his job. His personal motivation comes from bringing the people and the land together, whether it be by hunting or a picnic on the shore of a refuge lake.

"The greatest satisfaction is seeing the public involved the programs designed for them," VanNingen said. "I enjoy being connected to the land this way so I don't know if I will ever get into an administration position behind a desk."

In recent years, the Arrowwood manager has found himself in the spotlight due to his chosen career. He acknowledged that wildlife and conservation issues have become increasingly popular with politicians as well as the general public.

According to VanNingen, he has seen the most noticeable changes through legislation. He said the added attention has come mostly in the form of wetlands conservation. He also noted a change with increased cooperation between landowners and wildlife groups.

"If there are no changes in attitudes, then the no-net-loss program is not possible," the Arrowwood manager said. "There is more a spirit now of cooperation to solve the growing numbers of problems."

VanNingen's work on the wildlife grounds is controlled by the regulations that govern Arrowwood. The national gameland was given certain goals when Congress set it aside as a refuge. According to VanNingen, the 16,000 acres are to be used as a breeding ground and a shelter for all wildlife within its borders.

The most noted effort regarding population assistance has been with waterfowl. However, refuge officials are also working on re-establishing numbers of prairie chickens, sharp-tail grouse, and pheasants.

"It seems like a refuge manager wears 100 different types of hats," VanNingen said. He noted among his responsibilities he must be a land manager, a law enforcement official, an outdoor recreation manager, a coordinator with growing and grazing agricultural products on the land, a biologist, and a communicator and educator.

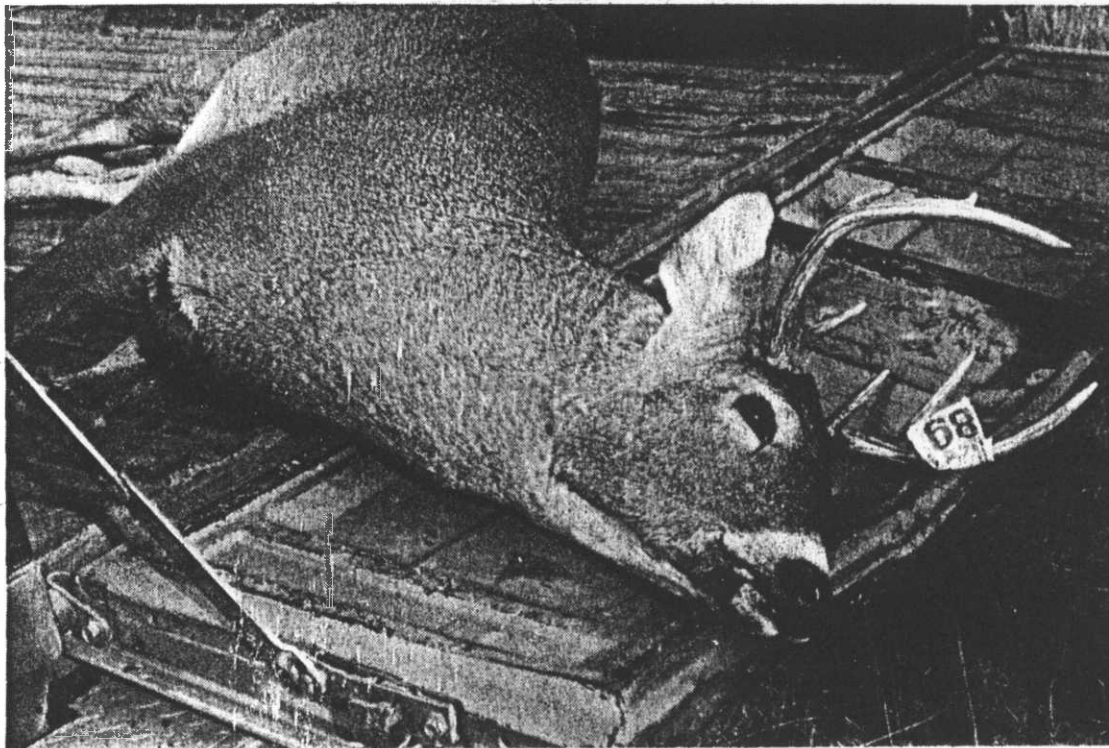
VanNingen takes much stock in the latter of his functions. He said it is increasingly important to educate people, especially children, on the issues pertaining to wildlife. Arrowwood officials work with school students and teachers, as well as civic organizations, to help people make educated decisions on wildlife issues.

Personal goals for the conservationist include work as a special project manager. Aside from that, his aspirations reflect those of Arrowwood.

"We would like to get the prairie chicken re-established," the North Dakota chapter of the Wildlife Society's Prairie Chicken Committee member said. "Also, we would like to produce more waterfowl and attract more birds here during the migration."

VanNingen is confident what he is doing with wildlife and cooperation of the public has made a difference. During the ongoing days of the hunting season, he will jump into his pickup and patrol the grounds frequently. He does it partly because the hunters expect and count on seeing him — but mostly because he has a job doing that he loves to do.

"It looks like we are on a progressive arrow here," the Arrowwood manager said. "The future looks very bright."



SUN PHOTO BY MICHAEL J. BREEN

## Successful opening day

Scenes like this of tagged deer in the back end of a pickup are commonplace across much of the state now as the deer season opened last Friday. This buck, about two-and-a-half years old, was shot on the Arrowwood National Wildlife Refuge only a couple hours after the opening of the firearm season.

# Deer hunting is form of management tool

By MICHAEL J. BREEN  
Sun Staff Writer

The thought of a beautiful deer standing poised in a slough, ears pulled back, neck stretched up in an elegant manner more captivating than a watercolor painting, is easily conceived.

For many people, it is then difficult to understand how a person could set the sight of their rifle on the magnificent creature. How could they, with the simple twitch of a muscle, drop it lifeless to the earth's floor?

The firearm deer hunting season opened at noon last Friday. The Arrowwood National Wildlife Refuge became spotted with walking orange caps and jackets. Walking across the open acres of protected land, one could here frequent thuds of discharged ammunition from all directions.

Only 150 permits are issued on the refuge each year for the first day and a half of firearm hunting. The relatively low number was set to "maintain safe hunting" for those fortunate enough to be allowed access to Arrowwood.

The refuge sits on about 16,000 total acres. According to Arrowwood manager Paul VanNingen, only 11,000 acres are opened for the deer hunters. The remaining land is reserved for protection of late-remaining waterfowl.

VanNingen explained that, while it may seem odd, the harvest of deer each fall is part of the management tool with these animals. Last winter, the refuge count on deer was 900. Counts in the recent past have totaled as high as 1,200 head.

"The CRP land has held some migration back so we aren't seeing the real big numbers," the wildlife manager said. "But we have excellent deer habitat on the refuge with wooded areas that provide good cover."

VanNingen would seem to hold a position of contradiction. He is

responsible for conserving wildlife and at the same time helps in the deer harvest. He explained that there is not only a want to harvest the deer by eager hunters, but it is a must for several reasons.

"There is still a contingency of the public that doesn't understand the need to harvest deer yearly," VanNingen said. He noted that before man, nature intervened with large predators to control the population. "With what has been done to the land there is no control like that anymore."

The hunter is now the main management tool in controlling deer numbers. The Arrowwood manager warned if the population is left unchecked there would be a lot of damage to agriculture. Also, a population crash would have to occur at some point via mass starvation due to overcrowding.

The U.S. Fish and Wildlife refuge works with the state Game and Fish Department on the control of the deer populations. Both departments receive seasonal calls about deer damage to crops. Little can be done except control through number of hunting permits.

Last year on Arrowwood, there were over 1,250 visits to the refuge with intent to hunt deer. VanNingen calculated that more than 5,000 activity hours were spent in quest of four-legged game.

Hunters at Arrowwood can't hunt from their trucks. Hunters must walk the grasslands, often up to three miles away. When they get their deer, they haul it to a trail where a refuge official will check licenses and transport the hunter to his vehicle.

VanNingen said that on an average year, 60 to 70 percent of

hunters on the first day and a half of the season get a shot at a deer. For this year, he is optimistic the chances may be slightly better.

"Looks like the population isn't at its highest peak ever but it is a healthy level," VanNingen said. "I would say it is an above average year."

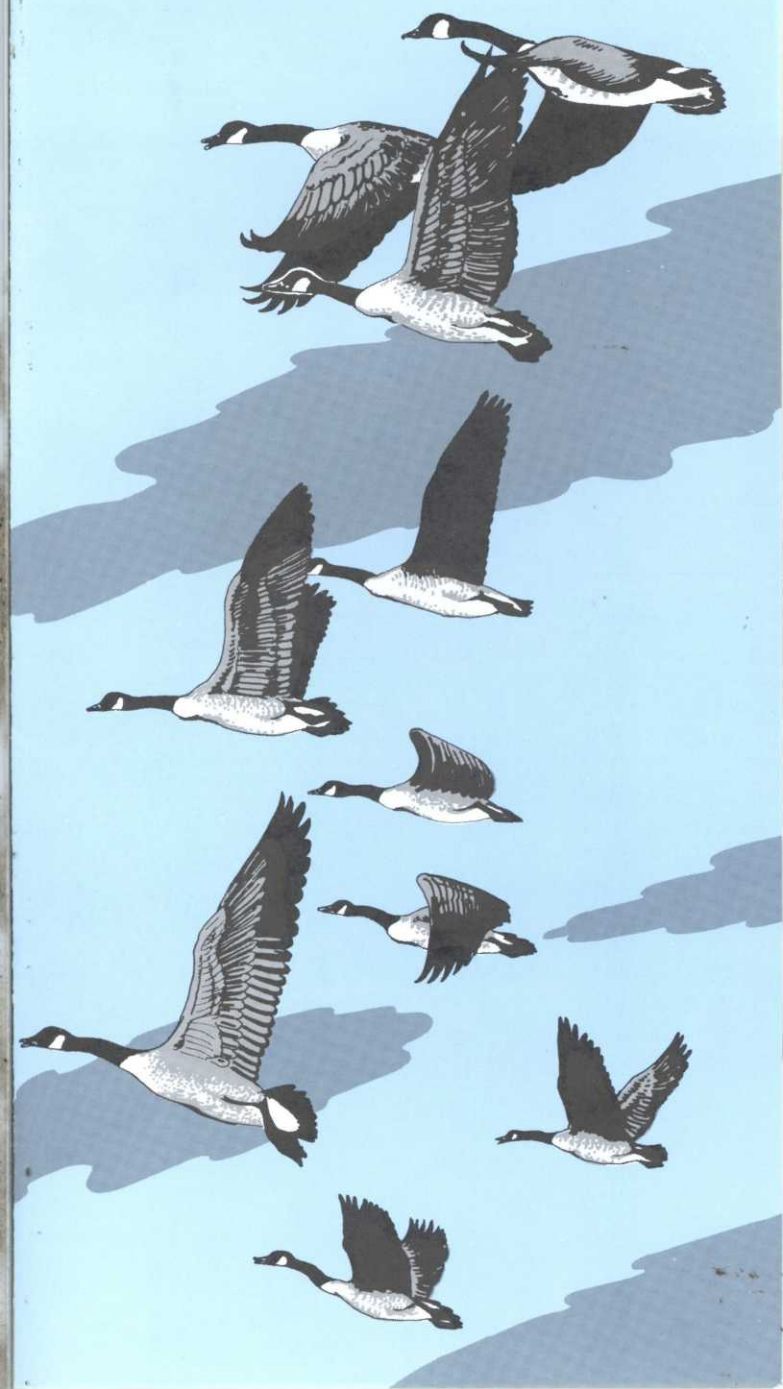






# ARROWWOOD

National Wildlife Refuge



"Suddenly out of the north came the sound I had been waiting for, a soft, melodious gabbling that swelled and died and increased in volume until all other sounds were engulfed by its clamor. Far in the blue I saw them, a long skein of dots undulating like a floating ribbon pulled toward the south by an invisible cord tied to the point of its V."

— Sigurd F. Olson



Canada goose on nest.

C.J. Henry, USFWS photo

## A WHISPER OF WILDNESS

Geese arrive at Arrowwood on a southward wind, flocking to the ponds and potholes, sharing their marshy habitat with mallards, canvasbacks, and various shorebirds during their spring and fall migrations along the Central Flyway.

Located along the meandering James River in east central North Dakota, Arrowwood National Wildlife Refuge is a land of watery marsh, prairie grasslands, cultivated fields and wooded ravines. Established in 1935, and administered by the U.S. Fish and Wildlife Service, the refuge is an important link in a chain of refuges extending from the prairie lands of the Canadian border to the Gulf of Mexico.

As the James River winds its way across the flat, rich grasslands, it passes through four main water areas — Arrowwood, Mud, and Jim Lakes, and De Puy Marsh. Prime nesting habitat for waterfowl surrounds these lakes. There in the quiet of Arrowwood's 15,934 acres, blue-winged teal, mallards, woodducks and gadwalls raise their broods through cool springs and hot summer days.

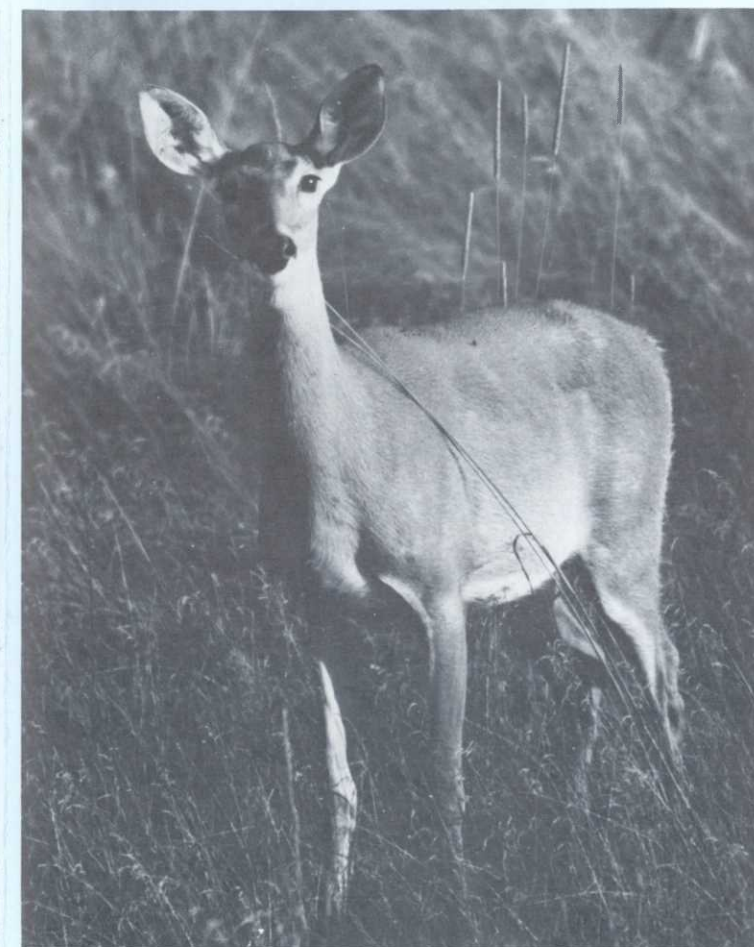
September brings chilly evenings and a quickening in the pace of life at Arrowwood. Birds begin drifting in from the north and the gabbling of snow and Canada geese fills the air. In the uplands, the grasses turn golden-brown and sharp-tailed grouse seek out seeds and berries. Hungarian partridges burst from cover, startled by the presence of a red-tailed hawk. Dense nesting cover plantings shelter pheasants and songbirds alike.

White-tailed deer browse in the wooded ravines found along the river valley. These sheltered woods provide hidden fawning areas in the spring, and offer protection from the stinging winds and blowing snows of winter. The heavy cover of the ravines contributes to maintaining a healthy population of whitetails at Arrowwood.



Face to face with a raccoon.

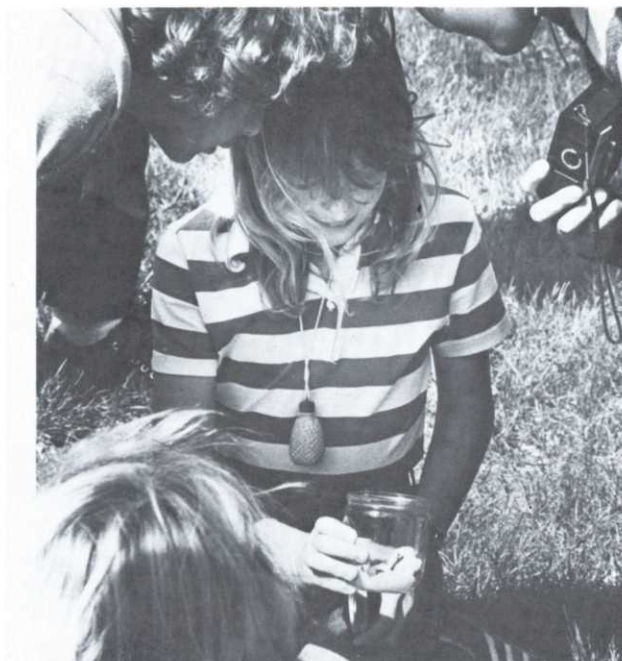
USFWS photo



White-tailed doe in grassland habitat.

Bob Downing, USFWS photo





Exploring the outdoor classroom. Ival Lauhon, USFWS photo

## INVITATION TO ARROWWOOD

Arrowwood National Wildlife Refuge invites the visitor to a world of quiet observations. Here, outdoor enthusiasts will find many opportunities to observe and photograph a wild array of wildlife in natural setting.

Refuge lakes, though shallow and subject to winter kill, offer limited fishing for northern pike and other game fish. Jim Lake provides the most fishing success to anglers, who may fish in designated areas on the refuge during open fishing seasons.

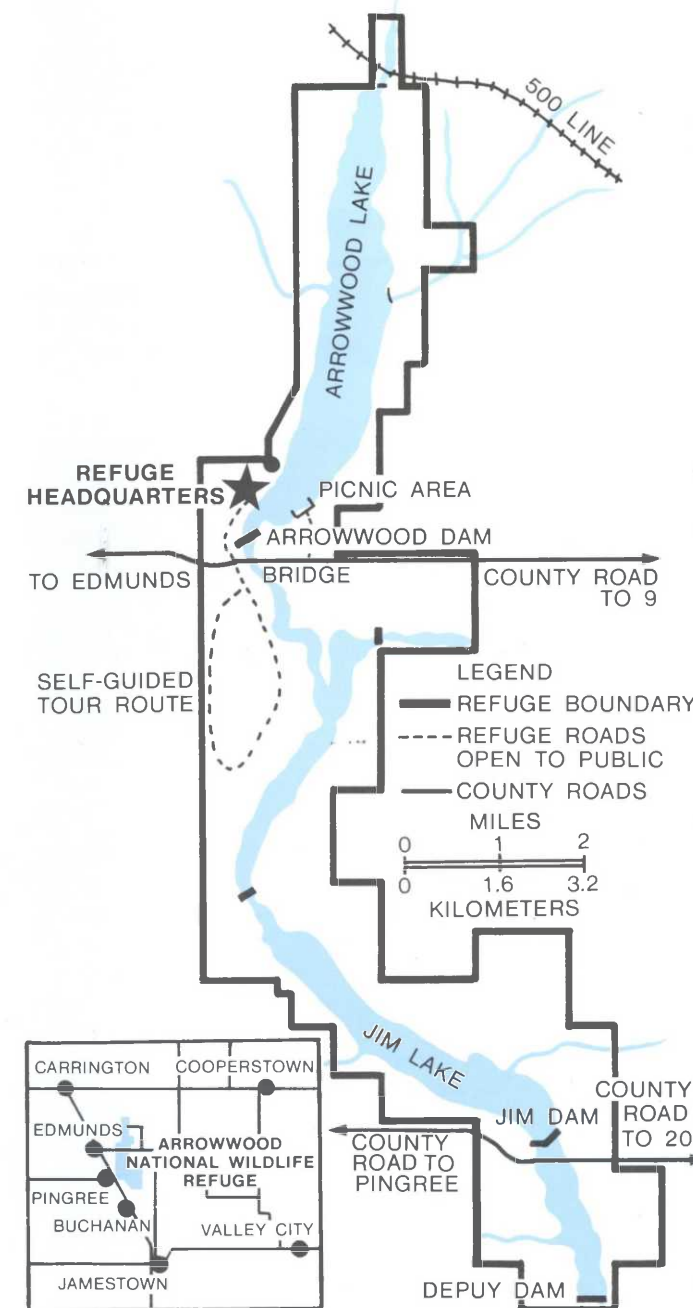
Hunting is allowed on the refuge for upland game birds and deer. Regulations concerning the hunting seasons may be obtained from the Refuge Manager.

Visitors to Arrowwood may picnic on the east side of Arrowwood Lake, an excellent spot to view shorebirds while eating lunch. For those who wish to explore the refuge, a 5.5 mile self-guided auto tour south of the headquarters winds through prairie and marsh, allowing the visitor a glimpse of small mammals, Canada geese and various other waterfowl. Recreational areas are open from April through September during daylight hours only. No camping is permitted on the refuge.

Arrowwood Refuge is the administrative center for the Arrowwood Refuge Complex. The complex includes approximately 115,000 acres of U.S. Fish and Wildlife Service lands in a 12 county area of central and eastern North Dakota. In addition to Arrowwood the following areas are a part of the complex: Long Lake, Slade and Chase Lake National Wildlife Refuges and Valley City, Arrowwood and Long Lake Wetland Management Districts. Refuge Headquarters is located 26 miles north of Jamestown on U.S. 281 and 6 miles east of Edmunds, North Dakota.

Further information is available from the Refuge Manager, Arrowwood National Wildlife Refuge, Pingree, North Dakota 58476. Telephone: 701-285-3341.

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



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



RF6-62510



Printed May 1984

**Recreational  
Opportunities**



**ARROWWOOD**

**National  
Wildlife  
Refuge**

**Pingree, N. Dakota**



## Welcome to Arrowwood National Wildlife Refuge

Arrowwood National Wildlife Refuge is a popular recreation area that annually hosts thousands of visitors. This leaflet is to alert the refuge visitor to the various activities permitted on the refuge and point out activities which are prohibited.

**Activities not expressly permitted are prohibited.** If you have questions about permitted activities, please check with the refuge staff.



### SPRING AND SUMMER ACTIVITIES—Permitted Activities

**Bird-watching:** Opportunities for bird-watching are excellent at Arrowwood. A bird list is available at refuge headquarters identifying 250 species of birds found on the refuge. The lakeshore around the picnic grounds and the tour route road are two popular birding areas. Visitors may walk into other parts of the refuge during the summer months.

**Berry Picking:** Berry pickers can find junberries, chokecherries, and other fruits in the steep, wooded coulees of the refuge. Picking of these fruits or berries for personal use is permitted.

**Fishing:** The refuge lakes are shallow and generally provide only fair fishing for northern pike, bullhead, and other fish. Occasional floods permit fish to move upstream into the refuge from Jamestown Reservoir. When this happens, good fishing conditions exist on the refuge for several years after the flooding. Fishing on the refuge opens with the State season in May and closes in late September. Check refuge signs for opening and closing dates.

**Boating and Canoeing:** All refuge waters are open to nonmotorized boating and canoeing during the same time that fishing is permitted. On Arrowwood and Jim Lakes only, outboards up to 25 hp are allowed during this same period.

**Picnicking:** Warm days of spring and summer see many people enjoying the refuge's picnic area on the southeast end of Arrowwood Lake. The picnic grounds are open during daylight hours only. Restrooms, picnic tables, and grills are provided. Please do not leave fires unattended and help keep the area looking clean by placing litter in proper containers.

**Self-Guiding Tour Route:** This 5.5-mile road and the entrance road to the picnic area are the only roads open for public travel into interior portions of the refuge. At the tour route entrance, a leaflet is available that provides a description of various points of interest along the route. The route is also a good place to see some of the varied wildlife found on the refuge. Early morning and evening visits are best for viewing wildlife. The tour route is closed during the waterfowl season but may be reopened after freezeup.

### FALL AND WINTER ACTIVITIES—Permitted Activities

**Hunting:** Because of annual variations in season lengths, bag limits, etc., hunters should check with the refuge manager prior to hunting on the refuge.

**Archery Deer Hunting:** This activity is permitted on all of Arrowwood Refuge from the opening of the State season, about September 1, to the day before the waterfowl season opens. The season is then closed until the State archery season reopens. This is generally the day after the firearms season closes in November. The late archery deer season remains open until the close of the State season.

**Firearms Deer Season:** The refuge from the county road on the south end of Arrowwood Lake north is closed to all entry during the firearms deer season.

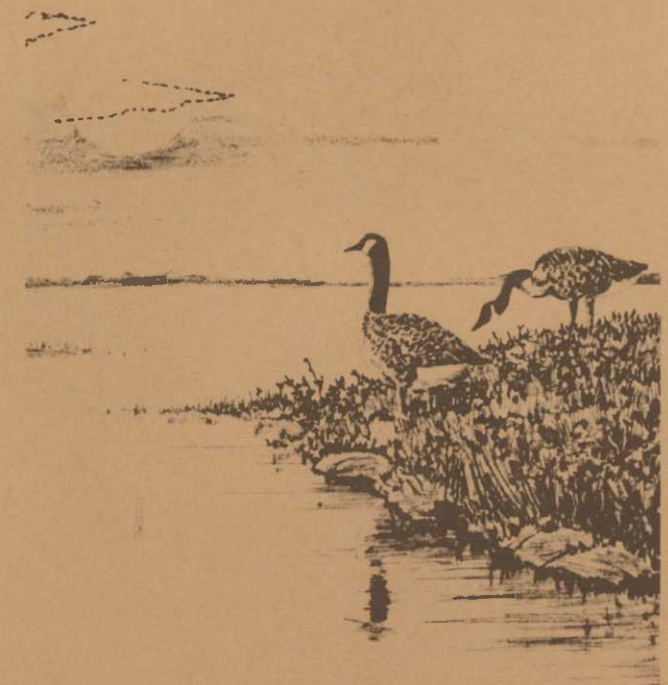
The remaining areas of the refuge are open to deer hunting during the State-proclaimed season with the following restrictions: During the first 2-1/2 days of the season only those people holding special refuge permits may hunt on the refuge. After this period, people holding permits to hunt the zone in which Arrowwood Refuge lies may also hunt the refuge.

**Upland Bird Season:** A late upland bird season is normally held on the refuge in accordance with State regulations. The season opens after the close of the firearms deer season and permits hunting for ring-necked pheasants, Hungarian partridge, and sharp-tailed grouse. Season dates and species open to hunting vary from year-to-year, so check current refuge regulations before hunting.

**Fox Hunting:** Fox hunting is permitted on the open portions of the refuge beginning with the opening of the firearms deer season. During the deer season only those hunters with valid deer licenses and unused deer tags can take fox. Following the deer season the entire refuge is open to fox hunting. The season closes in accordance with State regulations.

**Caution:** Raccoon, coyotes, and other animals may not be hunted.

**Ice Fishing:** Ice fishing is permitted on all refuge waters after the firearms deer season and as soon as



ice conditions are safe. Ice shanties may be put on the lakes.

**Note:** With the exception of snowmobiles, which are prohibited, motor vehicles may be used on refuge lakes for ice fishing activities.

**Skiing:** While no trails are specifically groomed or maintained for cross-country skiing, the refuge is open to this growing winter recreational activity. During unusually hard winters, large numbers of deer may concentrate on portions of the refuge. When these conditions occur, deer concentration areas will be closed to public use. Contact the refuge manager for current information.

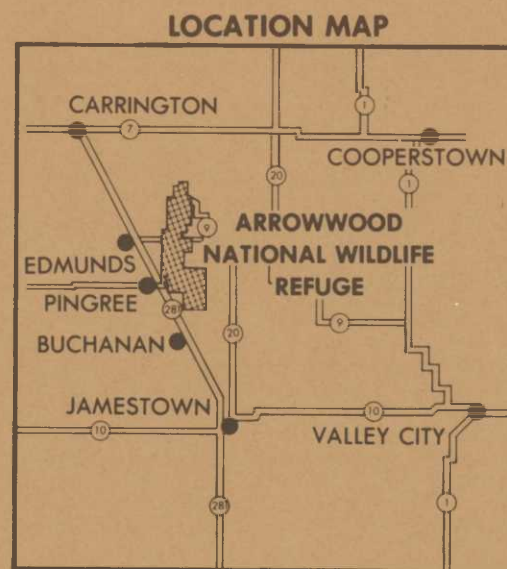
**Other Vehicle Use:** Roads within the refuge which are usually open to conventional vehicles are the tour route road, the entrance to the picnic area, fishing access on the north end of Arrowwood Lake, and the entrance road to refuge headquarters. These roads may be traveled when gates are open. All other roads are closed to the public.



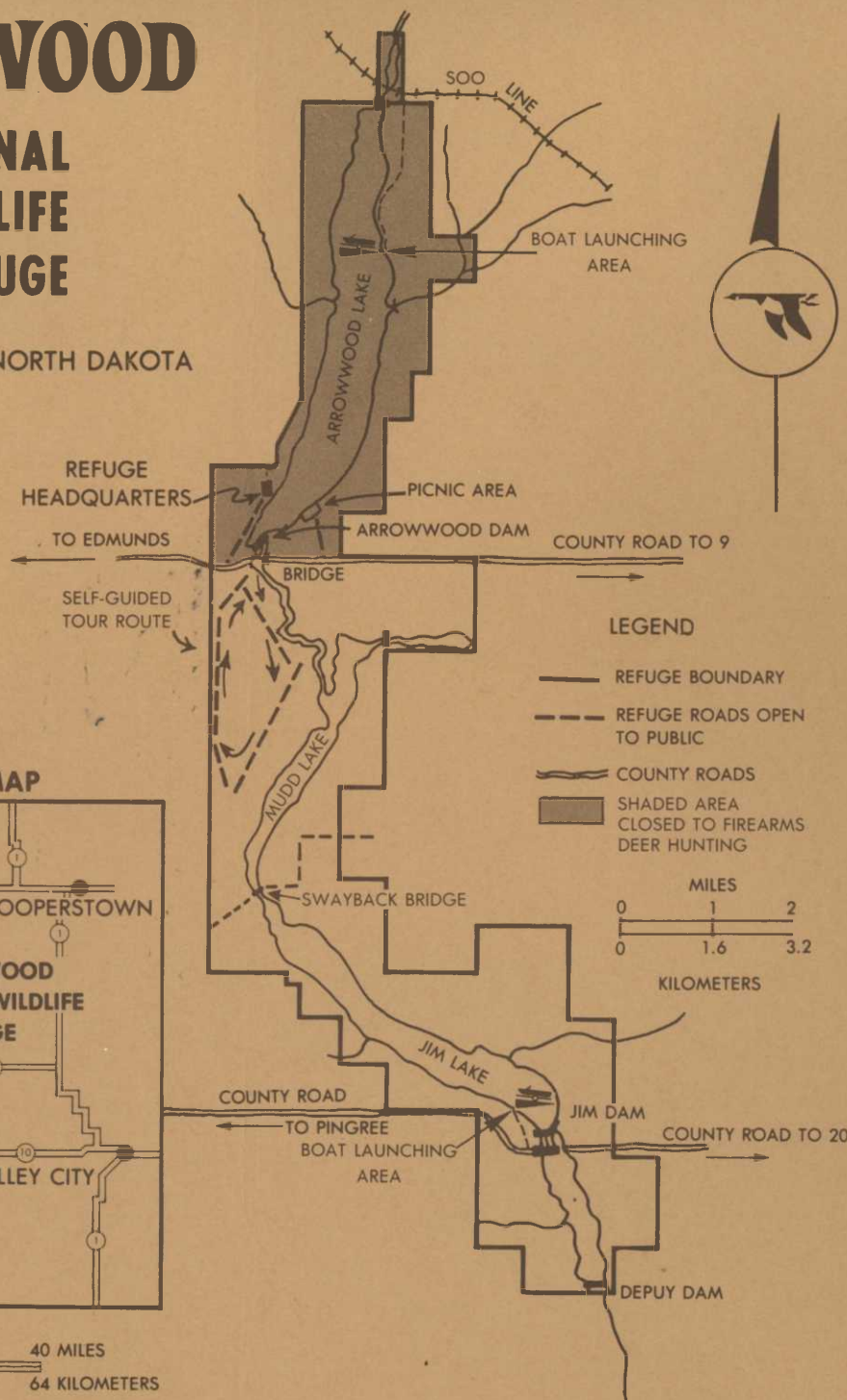
# ARROWWOOD

## NATIONAL WILDLIFE REFUGE

PINGREE, NORTH DAKOTA



SCALE  
0 5 10 20 30 40 MILES  
0 8 16 32 48 64 KILOMETERS



### Prohibited Activities—All Seasons

**Waterskiing:** Prohibited on the entire refuge.

**Artifacts Collecting:** The searching for and collecting of arrowheads and other artifacts is a violation of the Antiquities Act and is prohibited.

**Camping:** General camping is prohibited. However, permission is sometimes given for group camping by organizations. Arrangements must be made in advance. Check with the refuge manager for further information.

**Snowmobiling:** Snowmobiling is prohibited on the entire refuge.

Permitted and prohibited activities are necessary to management of the refuge and to provide the visitor with a safe and enjoyable experience. The refuge staff at Arrowwood welcomes you to the area and is available to answer any questions you may have concerning your visit.

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

For further information, write:

Refuge Manager  
Arrowwood National  
Wildlife Refuge  
Pingree, North Dakota 58476

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



RF6-62510-9



GPO 834-966

April 1982

# **ARROW WOOD**

**NATIONAL  
WILDLIFE  
REFUGE**



**FISHING INFORMATION**



**WELCOME TO ARROWWOOD NATIONAL WILDLIFE REFUGE!** Refuge fisheries are temporary and sporadic in nature. Therefore, the refuge fishing program is designed to allow fishermen access when the fisheries develop.

Fish occur in refuge impoundments largely as a result of Jamestown Reservoir. They enter the refuge when water levels are high.

Impoundments are shallow and very productive. Fish grow rapidly. Unfortunately, shallow impoundments are also subject to winterkill, terminating refuge fisheries rapidly. When winterkill occurs, fish may reinvade quickly or it may be several years before refuge waters again provide a fishery.

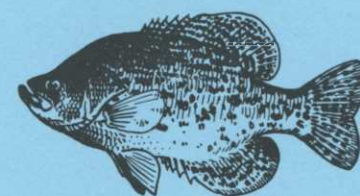
Fish present include northern pike, walleye, yellow perch, crappie, yellow bullhead, white sucker, big-mouth buffalo, and carp. Several nongame minnow species also inhabit refuge waters.

Regulations are set by the North Dakota Game and Fish Department and must be observed in all refuge fishing areas.

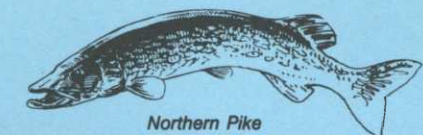
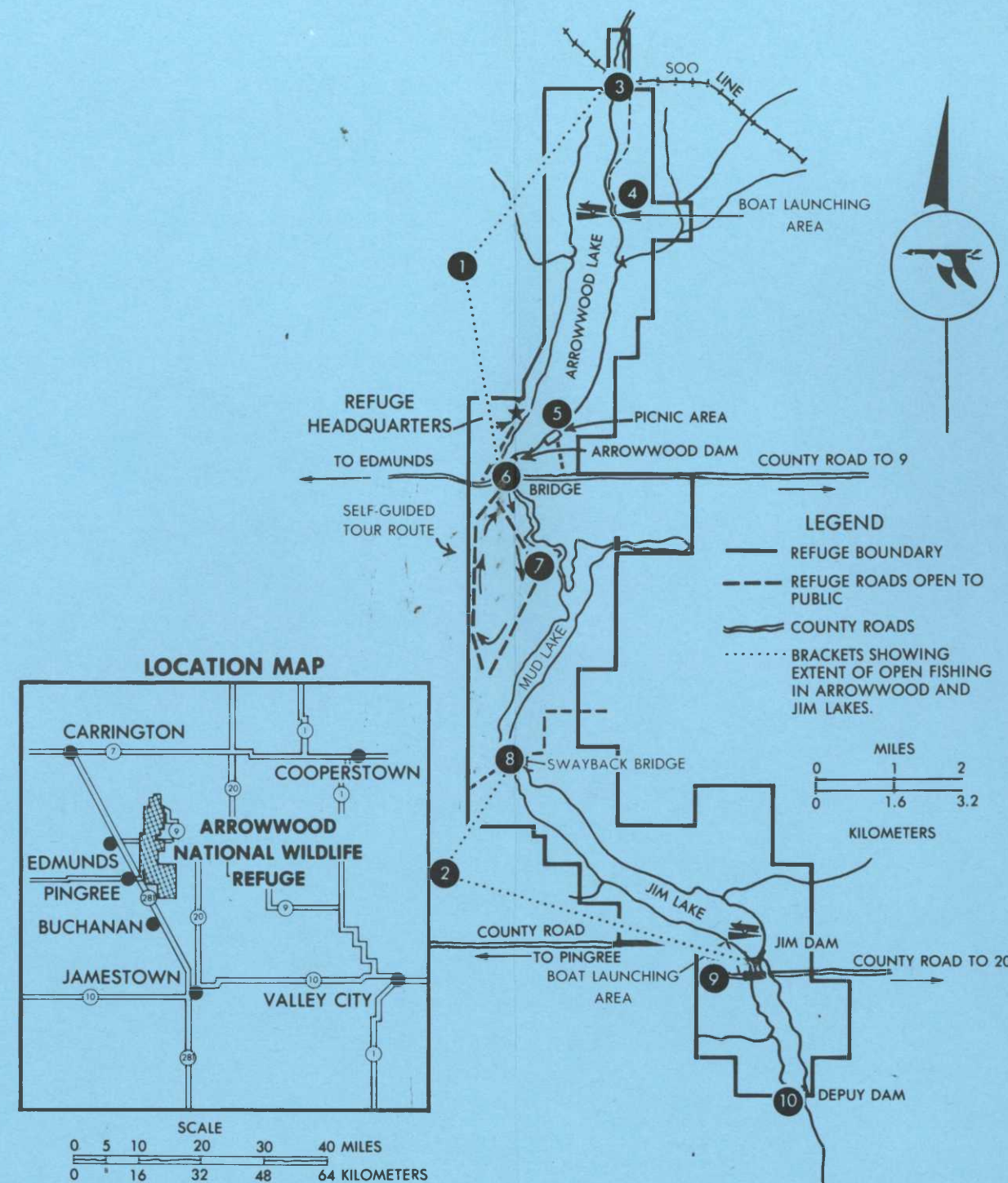
#### BOAT FISHING REGULATIONS

Boats are restricted to a maximum of 25 horsepower.

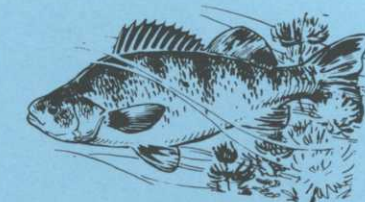
Boats are restricted to Arrowwood and Jim Lakes and are allowed from the opening day of the North Dakota State Fishing Season through the third Friday in September. (Check current state fishing regulations for dates which apply)



Crappie



Northern Pike



Yellow Perch

#### DESCRIPTION OF BOAT FISHING AREAS

1. Arrowwood Lake Boat Fishing Area—extends from the inlet channel on the north to the water control structure on the south. A primitive boat launch area is available at map point #4. Restroom facilities and picnic tables are available in the picnic area on the southeast shore.
2. Jim Lake Boat Fishing Area—extends from the Swayback Bridge road on the north to the water control structure on the south. An improved boat launch area is available at map point #9. No facilities.



## BANK FISHING REGULATIONS

Bank fishing is permitted along the major road rights-of-way during the entire North Dakota State Fishing Season. These areas appear on the map at locations 3, 6, 8, and 9.

Bank fishing on interior portions of the refuge is permitted from the beginning on the North Dakota State Fishing Season **through the day preceeding** the Waterfowl Season. These areas appear on the map at locations 4, 5, 7, and 10.

## DESCRIPTION OF BANK FISHING AREAS

3. Highway #9 Bank Fishing Area—extends from the railroad crossing on the north to the south Highway #9 right-of-way boundary. No facilities.
4. North Arrowwood Lake Bank Fishing Area—extends from the gate where the access trail flanks the lake to the crossfence at the south end of the access trail. A primitive boat launch is available. No other facilities.
5. South Arrowwood Lake Picnic Area—bank fishing is permitted in the picnic area. Restrooms, picnic tables and trash receptacles are available.  
**DAY USE ONLY!**
6. Edmunds-Kensal Road Right-Of-Way—fishing is permitted along the right-of-way and walk-in fishing access is permitted to the Arrowwood Lake Dam. No facilities.
7. Auto Tour Fishing Access—fishing is permitted from the bank at designated points along the Mud Lake river channel. No facilities.
8. Swayback Bridge Right-Of-Way—fishing is permitted along the right-of-way. No facilities.
9. South Jim Lake Bank Fishing Area—fishing is permitted from the Pingree Road right-of-way on the south to the end of the access trail on the north. An improved boat launch is available. No other facilities.
10. Depuy Marsh Dam—fishing is permitted along the east and west banks of the dam. Access is by walk-in only. No facilities.

## WINTER FISHING ACCESS

Areas 1 and 2 illustrated on the map are open to winter fishing.

Fish houses and vehicles are permitted on the ice as conditions allow. Fish houses must be removed no later than March 1. Portable ice houses can be removed daily. **No snowmobiles or ATV's are permitted.**

## SPECIAL REGULATIONS

Bank and boat fishing shall be in accordance with all state laws and the following refuge requirements.

1. Boats (25 HP maximum) are permitted on Arrowwood and Jim Lakes from the beginning of the North Dakota State Fishing Season through the third Friday in September.
2. Refuge fishing areas are open to fishing during daylight hours only. (Daylight is considered to be 5:00 a.m. to 10:00 p.m.)
3. All fishing tournaments or derbys will be registered through the Refuge Manager and approved with a Special Use Permit.

## PROHIBITED

1. Litter. "Pack Your Trash Home" is in effect. Please take all of your litter home.
2. Camping, swimming, sailing, water skiing and other boat pulling activity, off road vehicle travel, fireworks, firearms and unleashed pets.
3. Open fires on the ground or ice.
4. Fishing on the canoe route in the channel of Mud Lake.

## ADMINISTRATION AND LOCATION

The refuge is administered and managed by the U.S. Fish and Wildlife Service, Department of the Interior. Headquarters are located in the James River Valley on the southwest shore of Arrowwood Lake and can be reached by traveling on Highway 281 to Edmunds, ND and then east on the Edmunds-Kensal Road for 5 miles.

Office hours are 7:30 a.m. to 4:00 p.m., Monday through Friday.

Inquiries should be made to Refuge Manager, Arrowwood National Wildlife Refuge, RR #1, Pingree, N.D. 58476. Phone (701) 285-3341.

U.S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE



GPO 856-627



# **ARROW WOOD**

**National  
Wildlife  
Refuge**



**HUNTING MAP  
AND  
REGULATIONS**



# ARROWWOOD NATIONAL WILDLIFE REFUGE

Wetlands, grasslands, and woodlands on the Arrowwood National Wildlife Refuge provide a diverse environment for wildlife. Recreational hunting programs have been designed to provide the public with a variety of wildlife harvest opportunities while allowing birds and mammals places to rest and rear their young. Ducks, geese, pheasants, gray partridge, sharp-tailed grouse, and furbearers all find places to live in the refuge.

Hunting is permitted for archery, firearm, and muzzleloader deer, late season upland gamebird, fox, and cottontail rabbit.

Upon declaration by the Refuge Manager, a **Special Permit** harvest of coyotes is allowed. Hunting of coyotes is permitted only when high populations present undue stress on livestock and on refuge wildlife. **All other refuge wildlife is protected.**

Regulations established by the refuge and the North Dakota Game and Fish Department must be observed in all refuge hunting areas. Become familiar with all special regulations and the boundaries of hunting units before going afield.

## SPECIAL REGULATIONS

Hunting is permitted in accordance with all Federal and State laws. The following special regulations apply.

### ALL HUNTING

1. Vehicle travel is restricted to public roads and public access trails within the refuge. Interior access trails are designated as A, B, C, and D on the map. Off road vehicle travel is strictly prohibited. All interior access trails are closed during the firearm deer season. Trails may be temporarily closed due to bad weather during portions of other hunting seasons.
2. Blocking refuge gates with parked vehicles is not allowed.
3. Hunters must possess appropriate Federal and State licenses.
4. It is unlawful to carry a loaded firearm in any vehicle on refuge roads or trails.
5. No open fires or camping are permitted.
6. The area surrounding refuge headquarters and housing is posted CLOSED TO HUNTING.

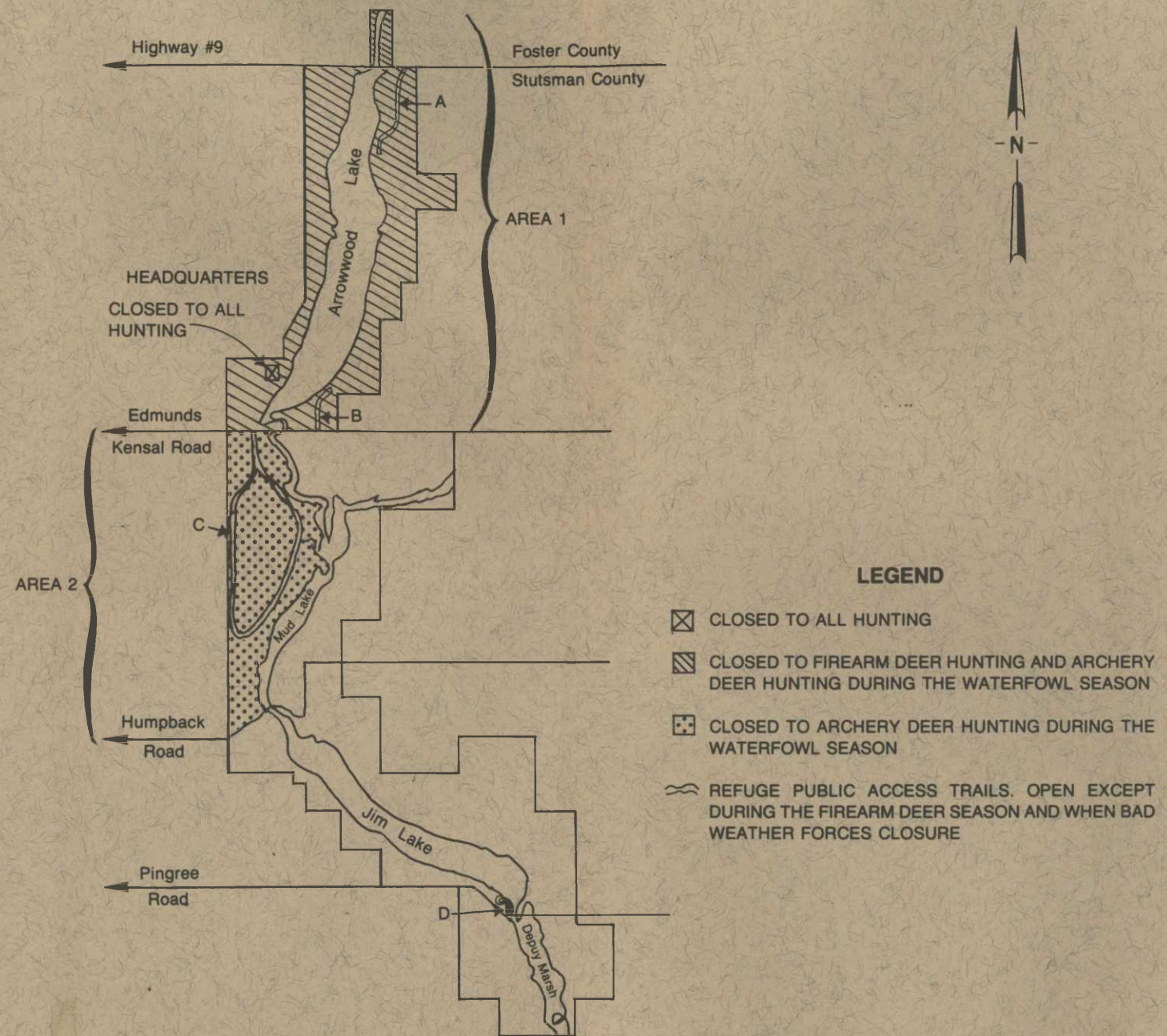
### ARCHERY DEER HUNTING.

Archery deer hunting is permitted on the entire refuge from the opening of the Archery Season until sunset the day before the Waterfowl Season.

During the Waterfowl Season, Area 1 and Area 2 (see map) are closed to archery deer hunting.

The entire refuge reopens during the late Archery Deer Season following the Firearm Deer Season.

# ARROWWOOD NATIONAL WILDLIFE REFUGE HUNTING MAP





During the Firearm Deer Season, archery deer hunting is permitted only in those areas open to firearm deer hunting.

Treestands are permitted but may not be erected until the beginning of the State Archery Season and must be removed on the last day of the season. Stands may be clamped, roped, or chained to trees, but MAY NOT BE NAILED directly to the tree.

## **FIREARM DEER HUNTING**

Area 1 on the map is closed to firearm deer hunting.

A special Refuge Permit is required for the first 1½ days of the Firearm Deer Season.

Vehicle use is prohibited during the firearm deer season. Trails are patrolled to check and remove harvested deer. Refuge personnel are available to assist in removing harvested deer.

Hunters may not enter the refuge before legal shooting hours on the first day of the season. Thereafter, they may enter, but not shoot before legal hours.

Hunters may not reenter the refuge after harvesting their deer unless unarmed.

Hunters with the appropriate state license may hunt deer in the refuge after the 1½ day Special Permit period.

## **MUZZLELOADER DEER**

Area 1 is closed to muzzleloader deer hunting during established seasons. The remainder of the refuge is open to muzzleloader hunting.

## **UPLAND GAMEBIRDS**

The entire refuge is open to upland gamebird hunting during the late season. Pheasant, sharp-tailed grouse, and gray partridge may be hunted. Prairie chickens have been established on several refuge areas and are protected. If you cannot confirm a grouse is a sharptail, DO NOT SHOOT!

## **FOX**

The entire refuge is open to fox hunting following the firearm deer season.

During the firearm deer season, fox may be harvested by hunters who possess the appropriate State licenses and unfilled deer tags.

## **COTTONTAIL RABBITS**

Cottontail rabbits may be harvested during the late Upland Gamebird Season.

## **COYOTE**

On an irregular basis the Refuge Manager may permit the harvest of coyote on the refuge. If a harvest is necessary, Special Refuge Coyote Permits will be issued on a first come first served basis to achieve the necessary reduction.

## **ADMINISTRATION AND LOCATION**

The refuge is administered and managed by the U.S. Fish and Wildlife Service, Department of the Interior. Headquarters are located in the Jim River Valley on the southwest shore of Arrowwood Lake and can be reached via Highway 281 from Edmunds, ND by going east on the Edmunds-Kensal Road for 5 miles. Office hours are 7:30 a.m. to 4:00 p.m., Monday through Friday.

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U.S. DEPARTMENT OF THE INTERIOR  
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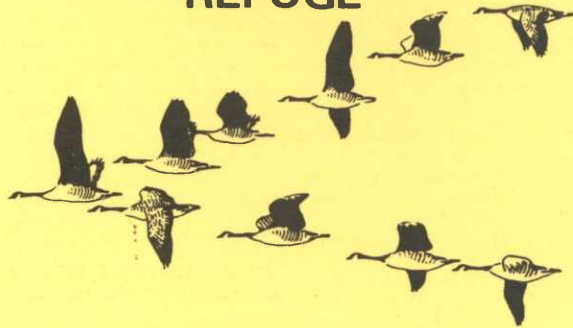


GPO 857-536

# BIRDS

OF THE

## ARROWWOOD NATIONAL WILDLIFE REFUGE



### Good Luck!

Your visit today can be the beginning or the extension of a very satisfying learning experience. We sincerely hope your adventures are successful and rewarding.

LOONS - GREBES - PELICANS - CORMORANTS - HERONS  
& BITTERNS - SWANS, GEESE & DUCKS - VULTURES

HAWKS - OSPREYS - FALCONS - GROUSE - PHEASANTS -  
CRANES - RAILS & COOTS - PLOVERS & TURNSTONES - SNIPE &  
SANDPIPERS - AVOCETS - PHALAROPES

GULLS AND TERNS - DOVES - CUCKOOS - OWLS - GOAT-  
SUCKERS - SWIFTS - HUMMINGBIRDS - KINGFISHERS -  
WOODPECKERS - TYRANT FLYCATCHERS - LARKS -  
SWALLOWS - JAYS, MAGPIES & CROWS - CHICKADEES -  
NUTHATCHES - CREEPERS - WRENS - THRASHERS - THRUSHES,  
SOLITAIRES & BLUEBIRDS - GNATCATCHERS & KINGLETS -  
PIPITS

WAXWINGS - SHRIKES - STARLINGS - VIREOS - WOOD  
WARBLERS - WEAVER FINCHES - MEADOWLARKS, BLACKBIRDS  
& TROUPIALS - TANAGERS - GROSBEAKS, SPARROWS, FINCHES  
& BUNTINGS



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& BUNTINGS

**BIRDS OF THE ARROWWOOD  
NATIONAL WILDLIFE REFUGE**

**Welcome to Arrowwood and your National Wildlife Refuge System!**

Watching birds may be a brand new experience for you today, or you may be a seasoned "birder". Either way, we want you to enjoy yourself, and to help you do that we've created this informative leaflet. It's just the right size for pocket or purse!

**"Birding" is sweeping the Nation!**

Each day people like you are discovering with amusement and fascination the behavior and sheer beauty of birds. You will be surprised at the ease with which your knowledge and recognition of birds develops. A "life-list" record of birds you've seen and learned will be a source of satisfaction as you progress. If you are fortunate enough to sight a bird not found on our checklist, or one listed as "rare," please let us know at Refuge Headquarters. We'll appreciate this help in keeping our records up-to-date.

**How to use your checklist.**

To be sure of correct identification, most birders rely heavily on one of the popular "field guides" to birds, such as those sponsored by the National Audubon Society. These guides usually have colored illustrations, interesting facts and descriptions of all species presented. The order in which the descriptions appear is generally the same as that used in this leaflet.

**Seasonal appearance of each bird** at Arrowwood during Spring, Summer, Fall or Winter is indicated by the shaded columns of the checklist, labelled S.S.F.W.

**The abundance of each bird** is designated in the shaded areas by the letters C, U, R,—common, uncommon or rare.

**Birds sighted on Arrowwood National Wildlife Refuge** are named in capital letters.

**Those known to occur in the vicinity**, but not actually sighted on the refuge, are in lower-case letters. Watch for these!

**Birds which are known to nest** at Arrowwood are designated by a ● in the margin of the leaflet.

**Species considered to be rare** or in danger of extinction are marked by an ✕.

**About our birds!**

Arrowwood National Wildlife Refuge was established primarily to attract waterfowl during migration periods, but good nesting habitat has been developed for ducks, geese, grebes and shorebirds.

Canada geese usually arrive at Arrowwood beginning in mid-March. Pintails and mallards follow shortly thereafter, while flights of blue and snow geese usually reach their peak by mid-April. The extensive beds of sago pondweed on Arrowwood lakes have made these areas very attractive to diving ducks during migration. The grasslands adjoining the water areas provide nesting sites for several species of puddle ducks, sharp-tailed grouse, upland plovers, marbled godwits, and numerous upland songbirds. This area also contains nesting habitat for the rapidly disappearing prairie chickens. Cultivated fields provide additional food for waterfowl and upland gamebirds.

**Good Luck!**

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& BUNTINGS**





	S	S	F	
— COMMON LOON .....	R		R	
● PIED-BILLED GREBE .....	C	C	C	
● HORNED GREBE .....	U	U	U	
● RED-NECKED GREBE .....	R	R	R	
● EARED GREBE .....	C	C	C	
● WESTERN GREBE .....	C	C	C	
— AMERICAN WHITE PELICAN .....	C	C	C	
— DOUBLE-CRESTED DORMORANT .....	C	C	C	
● AMERICAN BITTERN .....	C	C	C	
— LEAST BITTERN .....	R	R	R	
— GREAT BLUE HERON .....	U	U	U	
— GREAT EGRET .....		R		
— SNOWY EGRET .....	R	R		
— LITTLE BLUE HERON .....	R	R	R	
● GREEN-BACKED HERON .....	R	R	R	
● BLACK-CROWNED NIGHT-HERON .....	C	R	C	
— TUNDRA SWAN .....	U		C	
— GREATER WHITE-FRONTED GOOSE .....	R		C	
— SNOW GOOSE .....	U		C	
— ROSS' GOOSE .....			R	
— BRANT .....			R	
● CANADA GOOSE .....	C	C	C	
● WOOD DUCK .....	C	C	C	
● GREEN-WINGED TEAL .....	U	U	C	
● AMERICAN BLACK DUCK .....	U	U	U	
● MALLARD .....	C	C	C	
● NORTHERN PINTAIL .....	C	C	C	
● BLUE-WINGED TEAL .....	C	C	C	
● CINNAMON TEAL .....	R	R	R	
● NORTHERN SHOVELER .....	C	C	C	
● GADWALL .....	C	C	C	
● AMERICAN WIGEON .....	C	C	C	
● CANVASBACK .....	U	U	C	
● REDHEAD .....	U	U	C	
● RING-NECKED DUCK .....	U	R	U	
— GREATER SCAUP .....	R		U	
● LESSER SCAUP .....	C	R	C	
— WHITE-WINGED SCOTER .....			R	
— COMMON GOLDENEYE .....	U		U	
— BUFFLEHEAD .....	U		U	
— HOODED MERGANSER .....	C	C	C	
— COMMON MERGANSER .....	C		U	
— RED-BREASTED MERGANSER .....	U			
● RUDDY DUCK .....	U	U	C	
— Turkey Vulture .....	R			

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	S	S	F	W
* OSPREY .....	R			
* BALD EAGLE .....	U		R	R
● NORTHERN HARRIER .....	C	C	C	R
— SHARP-SHINNED HAWK .....	U		U	
— COOPER'S HAWK .....	R		R	
— NORTHERN GOSHAWK .....	R		R	R
— BROAD-WINGED HAWK .....	R		R	
● SWAINSON'S HAWK .....	C	C	C	
● RED-TAILED HAWK .....	C	C	C	
— FERRUGINOUS HAWK .....	U	R	U	
— ROUGH-LEGGED HAWK .....	U		U	
— GOLDEN EAGLE .....	R		U	U
● AMERICAN KESTREL .....	C	R	C	
— MERLIN .....	U		U	
* PEREGRINE FALCON .....	R		R	
— PRAIRIE FALCON .....	U	R	U	R
● GRAY PARTRIDGE .....	C	C	C	C
● RING-NECKED PHEASANT .....	C	C	C	C
● * GREATER PRAIRIE-CHICKEN .....	R	R	R	R
● SHARP-TAILED GROUSE .....	C	C	C	C
— King Rail .....	R	R	R	
● VIRGINIA RAIL .....	U	U	U	
● SORA .....	C	C	C	
● AMERICAN COOT .....	C	C	C	
* SANDHILL CRANE .....	R		U	
— BLACK-BELLIED PLOVER .....	R		U	
— LESSER-GOLDEN PLOVER .....	U		R	
— SEMI-PALMATED PLOVER .....	U		U	
— PIPING PLOVER .....	U	U	U	
● KILLDEER .....	U	U	U	
● AMERICAN AVOCET .....	U	U	U	
— GREATER YELLOWLEGS .....	U		U	
— LESSER YELLOWLEGS .....	U		C	
— SOLITARY SANDPIPER .....	U		U	
● WILLET .....	U	U	U	
● SPOTTED SANDPIPER .....	U	U	U	
● UPLAND SANDPIPER .....	U	U		
* HUDSONIAN GODWIT .....	R			
● MARBLED GODWIT .....	U	U		
— SANDERLING .....	R		R	
— SEMIPALMATED SANDPIPER .....	U		R	
— WESTERN SANDPIPER .....	U		R	
— LEAST SANDPIPER .....	U		U	
— WHITE-RUMPED SANDPIPER .....	U		R	
— BAIRD'S SANDPIPER .....	U		U	
— PECTORAL SANDPIPER .....	U		U	
— Dunlin .....	R		R	
— STILT SANDPIPER .....	U		U	
— Buff-breasted Sandpiper .....	R			
— Short-billed Dowitcher .....	R			
— LONG-BILLED DOWITCHER .....	U		U	
● COMMON SNIFE .....	U	U	U	
● WILSON'S PHALAROPE .....	U	U		
— RED-NECKED PHALAROPE .....	U		U	
— FRANKLIN'S GULL .....	U	U	C	
— BONAPARTE'S GULL .....	U		U	
— RING-BILLED GULL .....	C	C	C	
— CALIFORNIA GULL .....	C		C	

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	S	S	F	W
— HERRING GULL .....	R			
— Caspian Tern .....	R		R	
— COMMON TERN .....	U		U	
● FORSTER'S TERN .....	U	U		
● BLACK TERN .....	U	U	U	
● ROCK DOVE .....	U	U	U	
● MOURNING DOVE .....	C	C	C	
● BLACK-BILLED CUCKOO .....	U	U	U	
— YELLOW-BILLED CUCKOO .....	R			
— EASTERN SCREECH-OWL .....	R	R	R	R
— GREAT-HORNED OWL .....	U	U	U	U
— SNOWY OWL .....			U	U
— BURROWING OWL .....		R		
● LONG-EARED OWL .....	R		R	
— SHORT-EARED OWL .....	U	U	U	U
— NORTHERN SAW-WHET OWL .....				R
— COMMON NIGHTHAWK .....	U	U	U	
— Whip-poor-will .....	R			
— Chimney Swift .....	R		R	
— RUBY-THROATED HUMMINGBIRD .....		R		
— BELTED KINGFISHER .....	U	U	U	
● RED-HEADED WOODPECKER .....	R	R	R	
— YELLOW-BELLIED SAPSUCKER .....	U		U	
● DOWNY WOODPECKER .....	C	C	C	C
— HAIRY WOODPECKER .....	U	U	U	U
● NORTHERN FLICKER .....	C	C	C	U
— Olive-sided Flycatcher .....	R		R	
● EASTERN WOOD-PEEWEE .....	U	U	U	
— Yellow-bellied Flycatcher .....	R			
— Alder Flycatcher .....				
● WILLOW FLYCATCHER .....	U	U	U	
● LEAST FLYCATCHER .....	U	U		
— EASTERN PHOEBE .....	U	R	U	
● SAY'S PHOEBE .....	U	U	U	
— Great-crested Flycatcher .....	R	C	C	
● WESTERN KINGBIRD .....	C	C	C	
● EASTERN KINGBIRD .....	C	C	C	
● HORNED LARK .....	C	C	C	U
● PURPLE MARTIN .....	U	U		
● TREE SWALLOW .....	U	U	U	
● NORTHERN ROUGH-WINGED SWALLOW .....	U	U	U	
● BANK SWALLOW .....	C	C	U	
● CLIFF SWALLOW .....	C	C	R	
● BARN SWALLOW .....	C	C	U	
— BLUE JAY .....	U	U	R	R
● BLACK-BILLED MAGPIE .....	U	U	U	U
● AMERICAN CROW .....	C	U	C	
● BLACK-CAPPED CHICKADEE .....	C	C	C	C
— RED-BREASTED NUTHATCH .....	R		R	R
— WHITE-BREASTED NUTHATCH .....				U
— BROWN CREEPER .....	U		U	U
● HOUSE WREN .....	U	U	U	
● SEDGE WREN .....	U	U	R	
● MARSH WREN .....	U	U	U	
— GOLDEN-CROWNED KINGLET .....	R		R	
— RUBY-CROWNED KINGLET .....	U		U	
● EASTERN BLUEBIRD .....	R	R	R	
— MOUNTAIN BLUEBIRD .....	R		R	
— VEERY .....	U		U	
● GRAY-CHEEKED THRUSH .....	U		U	
— SWAINSON'S THRUSH .....	U		U	
— HERMIT THRUSH .....	U		R	
● AMERICAN ROBIN .....	C	C	U	R
● GRAY CATBIRD .....	C	C	U	
● BROWN THRASHER .....	C	C	U	
— Water Pipit .....	C	C	C	
● SPRAGUE'S PIPIT .....	U	U	U	
— BOHEMIAN WAXWING .....				U

GULLS AND TERNS - DOVES - CUCKOOS - OWLS - GOAT-SUCKERS - SWIFTS - HUMMINGBIRDS - KINGFISHERS - WOODPECKERS - TYRANT FLYCATCHERS - LARKS - SWALLOWS - JAYS, MAGPIES & CROWS - CHICKADEES - NUTHATCHES - CREEPERS - WRENS - THRASHERS - THRUSHES, SOLITAIRE & BLUEBIRDS - GNATCATCHERS & KINGLETS - PIPITS

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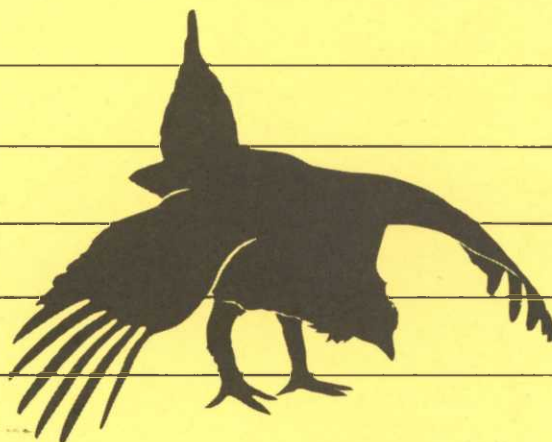


	S	S	F	W
● CEDAR WAXWING .....	U	U	U	U
— NORTHERN SHRIKE .....	U		U	U
● LOGGERHEAD SHRIKE .....	R	R	R	
● European Starling .....	R	R	R	U
— Solitary Vireo .....	R		R	
— Yellow-throated Vireo .....	R		R	
● WARBLING VIREO .....	U	U	U	
— Philadelphia Vireo .....	R		R	
— RED-EYED VIREO .....	U	U	U	
— Golden-winged Warbler .....	R			
— TENNESSEE WARBLER .....	C		U	
— ORANGE-CROWNED WARBLER .....	U		U	
— Nashville Warbler .....	R		U	
● YELLOW WARBLER .....	C	C	U	
— MAGNOLIA WARBLER .....	U		U	
— Cape May Warbler .....	R		R	
— YELLOW-RUMPED WARBLER .....	C		C	
— BLACK-THROATED GREEN WARBLER .....	R		R	
— Blackburnian Warbler .....	R		R	
— Palm Warbler .....	U		U	
— Bay-breasted Warbler .....	R		U	
— BLACKPOLL WARBLER .....	U		U	
— BLACK-AND-WHITE WARBLER .....	U		U	
— AMERICAN REDSTART .....	U	R	U	
— OVENBIRD .....	U		U	
— NORTHERN WATERTHRUSH .....	U		U	
— Connecticut Warbler .....	R			
— Mourning Warbler .....	R		R	
— WILSON'S WARBLER .....	U		U	
— Canada Warbler .....	U		U	

— Yellow-Breasted Chat .....	R		R	
— ROSE-BREASTED GROSBEAK .....	U	R	U	
— INDIGO BUNTING .....	U	U	U	
● DICKCISSEL .....	U	U	U	
— RUFOUS-SIDED TOWHEE .....	U	U	U	
— AMERICAN TREE SPARROW .....	C		C	
● CHIPPING SPARROW .....	C	C	U	
● CLAY-COLORED SPARROW .....	C	C	U	
● VESPER SPARROW .....	U	U	U	
● LARK SPARROW .....	U	U	U	
● LARK BUNTING .....	U	U	U	
● SAVANNAH SPARROW .....	C	C	U	
● BAIRD'S SPARROW .....	C	C	U	
● GRASSHOPPER SPARROW .....	U	U	R	
— LeConte's Sparrow .....	U	R	U	
● SHARP-TAILED SPARROW .....	U	R	U	
— FOX SPARROW .....	R		R	
● SONG SPARROW .....	C	C	C	
— SWAMP SPARROW .....	U		U	
— WHITE-THROATED SPARROW .....	C		C	
— WHITE-CROWNED SPARROW .....	U		C	
— HARRIS' SPARROW .....	C		C	
— DARK-EYED JUNCO .....	C		C	
— LAPLAND SONGSPUR .....	C		C	U
— Smith's Longspur .....	R		R	
● CHESTNUT-COLLARED LONGSPUR .....	U	U	U	
— SNOW BUNTING .....	U	U	U	C
● BOBOLINK .....	C	C	U	
● RED-WINGED BLACKBIRD .....	C	C	C	
● WESTERN MEADOWLARK .....	C	C	C	
● YELLOW-HEADED BLACKBIRD .....	C	C	U	
— RUSTY BLACKBIRD .....	U		U	
● BREWER'S BLACKBIRD .....	U	U	U	
● COMMON GRACKLE .....	C	C	C	
● BROWN-HEADED COWBIRD .....	C	C	C	
● ORCHARD ORIOLE .....	U	U	U	
● NORTHERN ORIOLE .....	U	U		
— PINE GROSBEAK .....	R		R	
— PURPLE FINCH .....	R		R	
— RED CROSSBILL .....	R		R	U
— COMMON REDPOLL .....	U		U	U
— HOARY REDPOLL .....				U
— PINE SISKEN .....	U		U	U
● AMERICAN GOLDFINCH .....	U	U	U	
— EVENING GROSBEAK .....				R
● HOUSE SPARROW .....	C	C	C	C

WAXWINGS - SHRIKES - STARLINGS - VIREOS - WOOD  
WARBLERS - WEAVER FINCHES - MEADOWLARKS, BLACKBIRDS  
& TROUPIALS - TANAGERS - GROSBEAKS, SPARROWS, FINCHES  
& BUNTINGS

NOTES  
(about your observations)



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