

HORICON NATIONAL WILDLIFE REFUGE
Mayville, Wisconsin

ANNUAL NARRATIVE REPORT
Calendar Year 1978

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

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Mayville, Wisconsin

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Permanent staff

Front row-left to right

Jack Toll, Refuge Manager, GS-12

Dorothy Thompson, Outdoor Recreation Planner, GS-9

Andrew Pachan, Maintenance Worker, WG-7

Harold Bushweiler, Administrative Technician, GS-7

Back row-left to right

John Francis, Ass't. Refuge Manager, GS-7

Robert Drieslein, Ass't. Refuge Manager, GS-11

Review and Approvals

Jack Toll 2/8/79
Submitted by Date

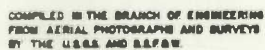
[Signature] 2/23/79
Area Office Date

Horicon National Wildlife Refuge
Refuge

R. Wayne Heier 3/6/79
Regional Office Date

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



MINNEAPOLIS, MINNESOTA

OCT, 1960

FOURTH PRINCIPAL MERIDIAN

Scale

TOWNSHIP
DIAGRAM

MEAN
DECLINATION
1960



Temporary staff-Biological Technicians, GS-5 (Airboat Operators)

Back row, left to right-

Cedric Alexander, Jon Sease, Gary Nesselth, Tom Legeret,
Liz Smith, Leon Vanderhoef, Wayne Norling.

Middle row, left to right-

Brenda Hale, Susan Weston, Lex Buford, Debra Campagna.

Front row, left to right-

Mia Hay, Crhis Kainz, Jon Anderson, Janice Tompkins,
Karen Hale, Riley Atkins, Lynn Gordon.

Not pictured - Kay Mullins, Pat Lee & Tom Jacikoff

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I. GENERAL

A. Introduction

Horicon National Wildlife Refuge is located on the west branch of the Rock River in southeastern Wisconsin, 43 miles west of Lake Michigan and 65 miles northwest of Milwaukee. The refuge comprises the northern two-thirds, 20,976 acres, of the Horicon Marsh. The southern third of the marsh (about 10,000 acres) is managed by Wisconsin Department of Natural Resources as a wildlife area for hunting, fishing and other public uses.

B. Climatic and Habitat Conditions

Precipitation the first three months of 1978 was below normal with March unusually dry. Snow melt in March was gradual, allowing nearly all the moisture to soak into the ground. Spring breakup occurred about March 28.

Precipitation for April through September was 9.5" above normal. Wet fields delayed silo filling and harvesting of corn for grain.

The marsh froze over on November 20. Snowfall during December was above normal with below normal temperatures the last half of the month.

C. Land Acquisition

1. Fee Title

Nothing to report.

2. Easements

Nothing to report.

3. Other

Nothing to report.

D. System Status

1. Objectives

A final Master Plan for the Horicon NWR is presently being completed by Owen Ayres & Associates, Inc., Eau Claire, WI. Public input to the Master Plan was sought at meetings in Waupun, WI on Feb. 16, June 22, and September 6. At this final meeting, an Environmental Assessment of the Master Plan was presented. From this effort, Owen Ayres will prepare refuge objectives for each output at Horicon. This material, with input from the refuge staff, will constitute a revised update of

station objectives.

- a. Migratory Birds - The Goose Management Program is still high priority and will probably continue through 1980 as planned. Expansion of upland nesting cover through seeding of native grasses will continue. Funding of dikes and water control structures for impoundments north of Old Marsh Road will greatly expand water manipulation capabilities.

Effective January 1, 1979, the responsibility for administering Waterfowl Production Areas in Wisconsin will be transferred from the Necedah NWR to the Horicon NWR. In view of the rapid expansion of this program, and the workload associated with it, this station is scheduled to receive an additional permanent position (Wildlife Biologist, GS-9) sometime during FY 1979. This individual would work cooperatively with Wisconsin DNR area game managers to assure effective management of these wetland units.

- b. Interpretation and Recreation - The I&R complex including auto tour route, boardwalks, kiosks and trail system should be completed during 1979. Opening of these facilities will hopefully shift some of the public's interest from goose viewing along Highway 49 to a more general appreciation of the marsh and its great variety of wildlife.

In further support of these thrusts, a refuge visitor center has been approved for funding in FY 1980. This facility will serve as a focal point of reference for refuge visitors.

During the coming year, ORP Thompson will be devoting much of her time and effort to organizing and implementing a more effective environmental education program. The old EE barn, presently being renovated, will provide a shelter and meeting place for school groups participating in refuge EE activities.

2. Funding

A resume of projected funding and manpower for Horicon NWR through 1981 is as follows:

	<u>1979</u>	<u>1980</u>	<u>1981</u>
Const. & Anadrom. Fish	<u>656,000</u>	<u>826,000</u>	--
New construction	656,000	796,000	--
Major rehab	--	30,000	--
Operation & Maintenance	<u>344,000</u>	<u>372,000</u>	<u>252,000</u>
Migratory Birds	279,000*	289,000*	169,000
Mammals & Non-Migr. Birds	4,000	4,000	4,000
Interpretation & Recreation	61,000	79,000	79,000

*includes funding for Goose Management Program scheduled to continue through FY 1980.

The permanent refuge staffing pattern in 1980 and 1981 will probably stay the same except for addition of the Wildlife Biologist, GS-9 position. The Migratory Bird allotment was increased \$13,000 in 1979 to cover a portion of the salary. An additional \$10,000 was added in 1980 and 1981 to fully fund that position.

Additional temporary employees will be needed to administer public use programs when the interpretive complex is completed and functional in CY 1979 or 1980.

II. CONSTRUCTION AND MAINTENANCE

A. Construction

A summary of construction contracts awarded during the year is as follows:

<u>Contract Number</u>	<u>Contractor</u>	<u>Description of Work</u>	<u>Amount</u>	<u>Current Status</u>
14-16-0009-78-503	C.C. Linck, Inc. Beaver Dam, WI	Blacktop rest of auto tour road & install turn-outs	\$70,417.40	Completed
14-16-0003-78-119	C.C. Linck Beaver Dam, WI	Grade & gravel 7600' of main dike	22,376.00	Completed
14-16-0009-78-521	Robert Craig Madison, WI	Const. kiosk at comfort station	36,660.00	Completed
14-16-0009-78-522	Westra Const. Co. Waupun, WI	I&R facilities incl. boardwalks, gates, displays, etc.	134,802.70	Awaiting materials
14-16-0009-78-523	C.C. Linck Beaver Dam, WI	Dirt work, blacktopping for I&R complex	101,086.00	Partially completed
14-16-0003-79-005	Zunker Contractors	Luehring Lake dike	159,786.00	Pending

The remainder of the I&R complex including the auto tour route, boardwalks, displays and gates should be completed sometime this coming summer. Hopefully, a contract can be awarded in January for the refuge signing and interpretive displays for the kiosk and visitor contact points.

4.



Portion of newly black-
topped comfort station
parking lot and newly
constructed kiosk.
Roll 8-78, Exp. 12
Drieslein



Blacktop machine working on road to comfort station.
Roll 8-78, Exp. 8. Drieslein

The Luehring Lake dike work has been delayed pending review of an EIS and public notice by the State of Wisconsin.

B. Maintenance

A large share of minor rehab and maintenance type work was performed under the Youth Conservation Corps program again this year. This included installation of additional pipe gates at boundary access points, removal of old fencing, installation of a footing for the south wall of EE barn, and others. Further details on work accomplished under YCC are included in Section VI. B of this report.

Several new light fixtures were installed in the storage barn at the maintenance area. This will improve conditions for repairing and storage of propane exploders and airboats.

Two, 12-inch culverts were installed at a low spot along Sterr Road to alleviate spring water problems there.

Two local individuals were hired to dismantle three concrete silos; one at the maintenance barn; one at the Jenkins tract along Highway 49, and a third at the Clarence Pieper farm off Highway 26, recently purchased as a WPA.

An 8 $\frac{1}{2}$ -foot John Deere offset disk was purchased to assist in the establishment of native grass stands.

Additional insulation was added to the ceiling in the existing refuge headquarters.

After much expense and down time on our Saxon 3 copy machine, we finally were able to negotiate a maintenance contract with the Saxon Company after GSA renewed their service contract agreements. Although the Saxon 3 cost more than other comparable machines of different make, we had to buy it since Saxon has the government contract. This is a high maintenance machine and we recommend the service contract.

Other equipment purchases during the year included an aluminum canoe and an airboat hull for the goose management program. This hull was built by Bob Stassel of West Palm Beach, Florida. Bob hauled the hull to Horicon and installed a rebuilt engine that we purchased two years ago as a spare. The new hull is 6" deeper, 6" wider and about 12" longer. It also has a splash guard under the rudder to prevent water from sloshing in from the stern when stopping.

C. Wildfire

Nothing to report.

III. HABITAT MANAGEMENT

A. Croplands

1. Cooperative Farming Agreements

In continuing with the objectives of the Goose Management Plan, there were no cooperative farming agreements in 1978.

2. Refuge Farming

In accordance with the Goose Management Plan, there was also no refuge farming conducted in 1978.

B. Grasslands

Eighty acres of retired cropland were intended for seeding into native grasses for dense nesting cover this year; however, due to above normal rainfall only 45 acres were seeded. This brought the total area seeded on the refuge to 165 acres. Switchgrass, big bluestem, little bluestem and Indiangrass were seeded at a rate of 4.0, 3.0, 5.3 and 1.5 lbs./acre, respectively. Although stands to date have been almost exclusively switchgrass, big bluestem and Indiangrass are beginning to show up.

Three acres of native prairie was seeded in the northwest section of the refuge. A seed mixture of grasses and forbs was obtained locally and seeding rates were arrived at after consultation with experts from the University of Wisconsin.

C. Wetlands

1. General

Above normal rainfall beginning in April necessitated opening the main dike radial gate frequently from mid-May through December. The radial gate was closed several times for periods from a few days to two weeks only to be reopened because of increased rainfall. Regardless of efforts to release excess water, the water level in the main pool remained almost two feet higher than last year. The ground remained saturated through freeze-up.

An effort was made to draw down subimpoundment I-8 and dry the ground sufficiently to allow heavy equipment to enter to break up dense cattail growth. The drawdown was initiated on May 15 using a Crisafulli pump located near the I-8 and I-9 water control structure and pumping from I-8 into I-9. Pumping continued five days a week and was concluded unsuccessfully on August 9. Heavy rains and resultant runoff kept progress at a



Area west of Main Ditch that was nearly solid cattail in 1977. Roll 6-78, Exp. 6
Drieslein

minimum. Also, heavily silted ditches prevented complete drainage once the rainfall decreased. A major ditch cleaning operation is needed before any further drawdown efforts can be attempted.

Recently, an increase in the abundance of an alien plant, purple loosestrife, (Lythrum salicaria), on the refuge has been cause for concern. The woody nature of this plant, its extreme aggressiveness, and its tendency to become established after drawdowns and/or disturbance raise questions regarding how it will respond to planned dike construction and moist soil management of impoundments. Apparently, on some refuges back east, purple loosestrife has become a serious management problem forming nearly solid stands and crowding out native vegetation, including cattail!



Purple loosestrife along Old Marsh Road. 8/78

2. Furbearers

The muskrat trapping season began on November 27, 1978 and will continue through April 15, 1979. Selection of trappers and unit assignments was done on a sealed bid system this year for the first time. A total of \$54,890.12 was collected from 17 trappers.

The number of furbearers removed by trappers this fall as compared to the same period for the previous two years is as follows:

	<u>1976</u> <u>11/1-12/31</u>	<u>1977</u> <u>11/28-12/31</u>	<u>1978</u> <u>11/27-12/31</u>
Muskrat	6,076	1,977	6,100
Mink	18	4	10
Raccoon	29	2	1
Opossum	26	0	0
Red fox	3	4	6
Skunk	2	0	0

Extremely high water levels this year has apparently had some effect on the muskrat population; however, it is not certain whether the population has decreased or has been redistributed into peripheral areas. The figures in the above table appear to reflect an increased population over last year, however trappers have put out an extra effort this year due to the initial monetary outlay. In previous years trappers worked on a percentage basis, and had no initial investment.



1977 Photo showing part of trapping unit between Townline and Lehnerns Ditches. Most of this area was under 3 to 4 feet of water in 1978. Roll 2-78, Exp. 15, 2/78, Drieslein.

Two trapping units this year were designated for youth trapping and seven area youths were selected to trap. Each of the youths had attended a trapping workshop conducted by the Wisconsin DNR. Horicon has received criticism in the past that the trapping program was aimed at high profit. The youth trapping program is directed toward the non-professional trapper and should help our public relations.

D. Forestlands

Several areas on the refuge totalling 720 acres, adjacent to existing woodlands, were designated as timber regeneration areas. No habitat manipulation, with the exception of some thistle cutting, will occur within these areas and natural succession will allow them to revert to timberland. Although much of the surrounding area was forested at one time, approximately one percent of the refuge is currently in timber. These timber regenerated sites were posted by YCC crews with small, rustic signs mounted on cedar posts.



Plaque designating one of the timber regeneration sites on the refuge. Roll 5-78, Exp. 19; 7/78 Thompson.

E. Other Habitat

Nothing to report.

F. Wilderness and Special Areas

Nothing to report.

G. Easement for Waterfowl Management

Nothing to report.

IV. WILDLIFEA. Endangered and/or Threatened Species

Nothing to report.

B. Migratory Birds1. Waterfowl

(a) Ducks. The first spring migrants began arriving on the refuge on March 20. Total duck use-days this year were 2,181,361, slightly down from the 2,415,691 duck use-days reported for 1977.

Estimated 1978 production figures for the four most common ducks are:

<u>Species</u>	<u>1977</u>	<u>1978</u>	<u>Percent Change</u>
Mallard	710	390	-45
BWT	1860	875	-53
Redhead	1860	1100	-41
Ruddy	310	220	-29

The decrease in overall duck production in 1978 may have been due to the tremendous amount of rainfall received from mid-May thru the summer. Approximately 29 inches of rainfall were received during this period, resulting in extremely high water levels on the marsh. Much of the available upland nesting cover was flooded during the nesting season. Also, redheads and ruddies were apparently forced into peripheral areas of the marsh to nest. Further data gained from an ongoing nesting study showed continuing high predation rate on upland nests (approximately 80%).

An outbreak of Type C Botulism occurred on the refuge this fall, isolated in an area north of the Old Marsh Road and east of the Main Ditch. The outbreak was discovered by an airboat crew on September 29 and was judged to have begun about two to three weeks earlier. Four airboats and crews were immediately assigned to the area following consultation with personnel from the National Fish and Wildlife Health Lab in Madison. The airboat crews, in two, 8-hour shifts, picked up dead and sick birds in the affected

Table #1. Duck Production, Horicon NWR, 1971-78

<u>Species</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>8-Yr. Avg.</u>
Mallard	630	810	430	770	500	2200	710	390	805
Black duck				25			10		4
Gadwall	50	245	110	160	50	50	170	20	107
Pintail	30	330		30		50	60		63
GWT		80		20		30	100		29
BWT	3150	5450	3300	3430	600	1140	1860	875	2476
Shoveler	390	245	70	300	100	60	130	40	167
Wood duck		160		20	50	10			30
Redhead	760	730	430	770	2920	260	1860	1100	1104
Ringneck	30								4
Ruddy	210	80	140	750	810	30	310	220	319
Total	5250	8140	4490	6270	5030	3830	5210	2645	5108

area and prevented healthy birds from entering the area. An additional crew located on the Old Marsh Road identified and recorded dead birds by species and sex and those birds were incinerated on site. Sick birds were transported to a holding pen where they were provided with fresh food and water and where an antitoxin was administered. The major cleanup effort lasted three weeks and as frequency of dead birds decreased airboats and crews were gradually reassigned to other duties. At least one boat continued surveillance in the affected area until Health Lab personnel judged the area relatively safe, around October 25. Final count on birds killed was 5409 ducks (primarily wigeon and green-winged teal), 111 geese, 553 coots and 424 shorebirds. Breakdown on sick birds brought in was: 243 ducks, 24 geese, 22 coots and 2 shorebirds. Of the sick birds confined and treated approximately 50% recovered. The dieoff would undoubtedly have been more severe had we not had four airboats on hand and 20 temporary personnel on board when the outbreak occurred.

Duck trapping and banding activities were carried out between August 14 and September 6. A total of 754 mallards, 328 wood ducks and 10 blacks were banded. A summary of mallards and wood ducks banded is as follows:

	<u>Adult</u>	<u>Adult</u>	<u>Imm.</u>	<u>Imm.</u>
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Mallards	61	134	288	271
Wood ducks	261	20	26	21

(b) Geese. The first spring migrant geese were seen on March 18. Canada goose numbers peaked at 20,000 on March 30.

A total of 18 spring depredation complaints were handled from March 20 through April 26. The number of complaints was down from the 33 reported for spring 1977.

The first fall migrant Canada geese arrived on September 9, one day earlier than in 1977. The goose population for east central Wisconsin peaked at 118,600 on November 9, although the number of geese on the refuge at that time was 38,600. The peak number on the refuge occurred on October 10 with 62,300 birds counted. This peak occurred during a temporary suspension of goose dispersal activity when all boats and personnel were involved in a botulism clean up effort on the north end of the refuge. Re-establishment of goose dispersal efforts resulted in fewer birds using the refuge. Details are included in the 1978 Goose Management Plan Report, a copy of which is included here.

Comparison of goose population trends between 1978 and the previous five-year period are presented in Table #2. Total use-days for Canada geese in 1978 was 3,091,044, half of that for 1977.

Table #2. Horicon Canada Goose Concentrations,
1972-78* (From weekly aerial surveys)

<u>Date of</u> <u>Count</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Sept. 18	10,000						
20		25,000					
24				84,400			
25			128,370				
27	65,800					35,800	24,800
29					88,870		
30	83,500						
Oct. 1				134,600			
3		130,700					
4	143,800					130,800	30,300
6					120,750		
10	123,850		203,850				62,300
12		168,300					
13						98,300	
14				168,700	148,700		
15		140,000					
16	210,300						
20					172,200	81,700	
21			102,100				36,450
27				220,100			
29		99,300					44,900
Nov. 2					150,500		
4			87,650				
5						61,800	
8	155,125				81,900		38,600
12		99,300				51,100	
15	146,660						40,800
17				111,600		34,200	
21			91,600				
24					18,800		
25				42,500			
26						12,300	
28		67,900					
30	107,175						13,750
Dec. 5			37,000		4,800		6,200
7						765	
10		40,700					
11	8,700						
12						200	
16		50					
17				4,900			
Total Surveys	8	9	6	7	8	10	9

*Figures include birds on the refuge, Horicon Marsh Wildlife Area, and private land in the vicinity of the marsh.

Table #3. Weekly Canada Goose Populations-Horicon Zone
(From aerial census)

	<u>Green Lake</u>						
	<u>9/24-30</u>	<u>10/1-7</u>	<u>10/8-14</u>	<u>10/15-21</u>	<u>10/22-28</u>	<u>10/29-11/4</u>	<u>11/5-11</u>
1973	-	-	-	-	-	-	-
1974	-	10	-	200	-	3,900	-
1975	-	-	-	-	-	-	-
1976	-	1,300	8,100	8,100	-	12,700	42,300
1977	-	500	11,200	29,200	-	-	31,400
1978	-	-	5,600	-	11,000	4,500	26,000
	<u>Eldorado Marsh</u>						
1973	-	-	900	4,500	-	1,850	-
1974	1,250	460	6,700	4,400	-	2,800	-
1975	-	1,550	4,200	-	4,900	-	-
1976	1,800	5,200	10,000	10,000	-	5,900	4,000
1977	200	2,800	7,600	16,500	-	-	17,800
1978	125	1,000	6,200	-	5,500	2,700	3,300
	<u>Fox Lake and Lake Maria</u>						
1973	-	-	-	-	-	-	-
1974	-	-	-	-	-	-	-
1975	-	-	-	-	-	-	-
1976	-	1,700	4,450	4,450	-	7,300	31,700
1977	-	-	1,150	6,800	-	18,400	22,800
1978	-	-	2,160	-	8,700	10,000	8,900
	<u>Grand River</u>						
1973	-	2,000	2,800	8,200	-	5,900	-
1974	1,370	4,000	9,800	5,000	-	2,600	-
1975	1,100	7,800	13,200	-	2,800	-	-
1976	6,200	12,400	4,000	7,000	-	4,600	525
1977	300	3,500	7,300	32,500	-	41,000	36,800
1978	350	4,500	14,100	-	15,000	14,000	40,000



Airboat operators picking up dead and crippled birds during the botulism outbreak. 10/78, Drieslein



Andy Pachan supervising incineration of dead waterfowl. 10/78, Drieslein



Sick ducks and geese picked up during botulism outbreak. Legs in the background belong to Andy Pachan. He was not a patient. 10/78, Drieslein



Dr. Louis Locke with the National Fish and Wildlife Health Lab and wife performing necropsy of waterfowl found in the botulism area. 10/78, Drieslein

Fall Depredations. Depredation complaints began on September 22 and continued through October 30, resulting in complaints from 106 area farmers. Fall 1978 depredation complaints decreased from 161 complaints for 1977.

Most depredation complaints were handled by one person, either Darrell Haugen, Ass't. Refuge Manager, Necedah NWR or Bill Bonduel, ADC biologist from Sandusky, Ohio. Both individuals did an excellent job.

(c) Swans. The first and only recorded sighting of whistling swans in the spring was on April 8, with several flocks observed flying over the refuge. Fall swan migrants were observed on November 6, 15, 18 and December 1 with 10, 41, 10 and 50, respectively, sighted.

2. Marsh and Water Birds

Hérons and Egrets. Four sightings of single yellow-crowned night herons, three in May and one in July, were recorded this year. These are rare sightings for the area. A previously unknown rookery of cattle egrets was discovered in October, between the Old Marsh Road and Highway 49. There were approximately 50 nests counted, three of which still contained young birds. The rookery area is only accessible by boat and was discovered during the botulism cleanup effort.



Cattle egret nest in rookery located during the botulism cleanup. 10/78, Drieslein

Rails and Gallinules. A temporary Biological Technician made dawn and dusk rail calling counts in May and estimated a spring population of 1618 sora and Virginia rails on the refuge.

3. Shorebirds, Gulls, Terns and Allied Species

No reliable census procedure has been established for these species. Killdeer, dowitchers, yellowlegs, dunlins, pectoral sandpipers, solitary sandpipers, herring gulls and black terns were the most commonly observed species. Extremely high water levels this year eliminated much of the ideal shorebird habitat.

Woodcock "peenting" counts were conducted this spring. Resident birds reached a peak in mating activity around the second week in May, with a peak population of 430 breeding birds.

4. Raptors

Raptors common to the Horicon area are great-horned owls, short-eared owls, screech owls, marsh hawks, red-tailed hawks, kestrels and rough-legged hawks. Other species seen throughout the year include: broad-winged hawks, ospreys, a turkey vulture, sharp-shinned hawks, Cooper's hawks and bald eagles during fall migration.

5. Other Migratory Birds

A Christmas bird count was conducted on the refuge and vicinity on December 16, but was called off at noon due to inclement weather. The count was attended by three permanent staff members, four former temporary employees, and two interested birders, although invitations were extended to Audubon and other interested groups. Below is a list of species seen.

Common

Mallard	5
Black duck	1
Red-tailed hawk	1
Marsh hawk	1
Pheasant	5
Gray partridge	19
Mourning dove	17
Rock dove	78
Great horned owl	2
Hairy woodpecker	1
Downy woodpecker	17
Blue jay	5
American crow	2
Black-capped chickadee	36
Wh.-br. nuthatch	6

Total species -- 34

Brown creeper	7
Starling	66
House sparrow	130
Red-winged blackbird	34
American goldfinch	2
Northern junco	8
Tree sparrow	162
Song sparrow	1

Uncommon

Canada goose	148
Redhead	1
Ring-necked duck	2
Hooded merganser	1
American coot	2
Killdeer	1
Am. bittern	2
Total individuals --	762

C. Mammals and Non-Migratory Birds and Others

1. Game Mammals

(a) Deer. No systematic census of deer was conducted during CY 1978. Twenty-one deer were harvested from the refuge during the Wisconsin early bow season and 132 deer were taken during the shotgun season. The refuge was not open for deer hunting during the late bow season.

(b) Cottontail. The refuge was open for cottontail hunting this year, although rabbits did not appear to be particularly plentiful.

2. Other Mammals

(a) Muskrats. Extremely high water levels this year has had some effect on the muskrat population; however it has not been determined whether the population has decreased somewhat or has redistributed into peripheral areas. Trapping success so far has not been particularly good, primarily due to poor ice formation and difficulty in walking the marsh.

(b) Other Furbearers. The otter population seems to be on the increase as sightings are becoming more frequent.

3. Resident Birds

A pheasant crowing count was conducted this spring, resulting in a breeding population of 206 birds. This figure is considerably lower than counts conducted in previous years.

Covies of gray partridge are observed occasionally around the refuge.

4. Other Animal Life

Species lists for reptiles, amphibians and fish were compiled this year. This will hopefully assist refuge personnel in answering questions put forth by non-consumptive users of wildlife who visit the refuge.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation

1. On Refuge

A total of 341,000 visits were made to the refuge in 1978 as compared

to 336,000 visits in 1977. Use of the Main Dike Road and Old Marsh Road for groups engaged in guided and self-guided tours began in March and continued through September 15. State Highway 49 provides the only year-round public access across the marsh. All tours were prohibited on refuge roads during the fall season because of the safety hazard to the public during the goose dispersal program. There were 2 guided tours and 17 self-guided tours in 1978. Eleven talks were given at the refuge headquarters to 361 people.

In addition to the above, there were many groups touring the refuge in the fall that did not contact the refuge headquarters. Most were senior citizens or other adult groups, guided by Blue Heron Tours of Horicon, Wisconsin or were self-guided. These tours were limited to public roads around the perimeter of the refuge, including Highway 49 across the northern end.

Environmental education efforts in 1978 included continuing the "no tour" policy for school groups, encouraging teachers to use the refuge for activities related to classroom studies. Assistance is available from the outdoor recreation planner in selecting an appropriate activity, planning pre- and post- activity sessions for the classroom, and selection of an EE site on the refuge. Refuge lands were used for environmental education activities by 9 groups involving 260 students. Although activities are normally conducted by the teacher, the refuge staff was directly involved in two EE sessions with groups from the Wisconsin DNR's MacKenzie Environmental Education Center.

Five meetings were held with principals and teachers in several school districts during 1978. These mainly involved introducing the EE resources available at the refuge and providing outdoor classroom planning assistance. Three planning sessions were held with individual teachers prior to bringing their class out for an EE activity. The outdoor recreation planner provided assistance as a facilitator in a teacher workshop sponsored by the Blackhawk Girl Scout Council in late August. Fifteen teachers from the Beaver Dam School District participated in the half-day workshop. It was held on a 60 acre tract owned by the Girl Scout Council adjacent to Beaver Dam to promote use of this area by teachers for environmental education.

2. Off-Refuge

Off-refuge programs were presented to 17 groups totalling 1,195 individuals. These programs included slide shows, films and talks to civic groups and organizations, two career day programs, and participation in hunter safety courses. The outdoor recreation planner was interviewed on two local radio stations in the fall. One involved a one hour talk show on the Canada goose management

program and the botulism outbreak; the second interview involved a half hour talk show on the Canada goose life history and 1978 dispersal program.

National Wildlife Week programs were presented to 2,700 elementary students in 16 schools in the refuge vicinity. Posters and literature were sent to 25 additional schools in Dodge and Fond du Lac Counties.

A free-standing display on the National Wildlife Refuge System was set up at seven locations, averaging one to two weeks at each location. The exhibit was rotated between banks and libraries in five communities around the Horicon Marsh. This dimensional display unit included nine 24" x 30" silk-screened panels on two sides. Design work for the colorful panels was contracted out by Region III I&R, and all field stations in the region received these versatile display units.

Eleven news releases were sent to area daily and weekly newspapers during the year. The refuge cooperated with the Wisconsin DNR in providing weekly information on Canada goose numbers and goose locations during the fall period. All media as distant as Chicago received these weekly DNR releases. This was a cooperative public relations program to promote alternative opportunities for viewing geese, other than along Highway 49. The three local Chambers of Commerce appeared to be satisfied with our efforts to provide accurate information to the goose-viewing public.

Media coverage of the 1978 goose dispersal program was somewhat reduced from 1977. A botulism outbreak on September 30, however, received widespread coverage throughout Wisconsin and on a regional basis. A total of 70 individual interviews were held for TV and radio programs as well as newspapers during the first two weeks after the outbreak was discovered. Interviews were also conducted by Sports Illustrated and People magazines.

Filming continued this fall (from 1977) for a segment of the Wild Kingdom program with Marlin Perkins. A Don Meier Productions crew spent five weeks at the refuge in October and early November, filming Canada geese, marsh scenes, dispersal program activities, and goose banding operations. Refuge Manager Toll traveled to Chicago in mid-December to tape the narration for the film. It is scheduled for viewing on national television in March 1979.

B. Recreation

1. Wildlife Oriented

(a) Resident Game Hunting

In addition to the regular shotgun deer season, an early



Marlin Perkins (2nd from left) and Mgr. Toll (3rd from left) receive direction for filming of an airboat scene. 10/78, Drieslein

archery season and a combination pheasant/cottontail rabbit hunt was held in 1978. It was felt that an expanded hunting program would utilize a renewable natural resource and provide additional recreational opportunity to the public. The early bow season ran from September 16 through November 12. Hunting pressure was moderate on opening weekend; with 55 cars counted on opening morning. Car counts were conducted on all weekends during the season. It is estimated that 1,350 hunters visited the refuge during the 58-day season. A total of 21 deer taken from the refuge were registered at local deer check stations.

The pheasant/rabbit season this fall was the second to be held on Horicon Refuge since the early 1960's, the other hunt held in 1976. An estimated 280 hunters were on hand for the noon opening on October 28. The 44-day season ran through December 10, with an estimated 1,200 hunters visiting the refuge. Bag checks show a projected kill of 200 pheasants.

The nine-day shotgun deer season opened on November 18 with an estimated 550 hunters present. Approximately 2,300 hunters spent 10,400 hours hunting deer this year. This compares to 1,625 hunters and 9,750 hours in 1977. Extremely high water levels on the marsh this fall presented a problem to deer hunters. However, many resorted to hip boots and waders to reach their favorite hunting spots on the numerous islands and in the brushy lowlands. Again the refuge was included within a State Deer Management Unit, which permits the hunting of bucks only with rifled slugs. An additional number of party permits for the taking of antlerless deer were used by refuge

hunters. A total of 132 deer taken from the refuge were registered at local deer check stations.

A history of the gun-deer harvest at Horicon Refuge is as follows:

<u>Year</u>	<u>No. Deer Taken*</u>	<u>Year</u>	<u>No. Deer Taken</u>
1957	162	1970	111
1958	161	1971	252
1960	146	1972	152
1964	213	1973	25
1965	238	1974	71
1966	154	1975	131
1967	172	1976	60
1968	91	1977	98
1969	118	1978	132

*Number of deer registered at the 4 local check stations.
Exact number of deer taken on refuge not known.

The entire refuge, except for a 600 acre closed area, was open to hunting this year. The closed area included the headquarters and the two residences.

(b) Migratory Bird Hunting - Geese

The Canada goose hunting season within the Horicon Zone was divided into three permit periods this year. October 1 through October 15 established the first permit period, during which 17,000 permits were issued with one goose tag per hunter. The kill quota was set at 10,000 for this period. From October 16 through October 31, 25,000 permits were issued with two goose tags per hunter. The kill quota for this second period was set at 10,000. During the third period, November 1 through December 9, 48,000 permits were issued with three goose tags per hunter. The kill quota was 12,000 in the third period. Total kill quota was 32,000 in 1978 compared to 23,000 in 1977.

(c) Fishing

The fishing season on the refuge runs from May 15 through September 15. Bank fishing only during daylight hours is permitted in four areas. State regulations apply for fishing on the refuge. A total of 1,100 visits were made to the fishing areas in 1978. Bullheads and small northern pike are the main species taken.

C. Enforcement

Vandalism was a constant problem during the year, particularly in

spring and fall. Much of this occurred on the west side of the refuge at access points. Area youth entered refuge lands and parking areas for nighttime parties. In the process, signs were stolen or defaced, gates were pushed in with vehicles, barbed wire fences were cut, and fence posts removed. Sections of a YCC constructed rock wall around the Peachey Road parking area were knocked down in late summer-early fall. Four-wheel drive vehicles were used to break down the mortared walls. Litter was a continuous problem in the isolated parking areas. On the night of April 14, three outboard motors were stolen from trappers' boats parked on the main dike. These were valued at \$1,350 and were never recovered. Dodge County Sheriff's Department investigated the theft. The east gate of the Main Dike Road had been forced open.



Pipe gates were put
to the test from
time to time by
4-wheel drive
vehicles.
5/78, Drieslein



Weekend parties at isolated parking areas presented a constant problem for the refuge staff. 10/78, Thompson

Enforcement efforts were made to reduce this vandalism and refuge trespass. Evening patrols and stake-outs on several weekends in late summer and early fall proved unproductive. Three pipe gates replaced flimsy cable gates at access roads where trespass was a problem. In addition, a gate was installed at the Peachey Road parking area to better control access. Gates were effective in stopping vehicle trespass in these areas. The 14 regulation signs located on all access roads around the perimeter of the refuge were updated. These signs were very effective in clarifying the permitted activities on the refuge. This has provided refuge staff with support when citing individuals for trespass.

Three refuge personnel were involved in law enforcement activities and bag checking during the opening weekends of early bow, pheasant and deer gun seasons. Special agents assigned to the Horicon area this fall handled most of the enforcement effort associated with the Canada goose season.

VI. OTHER ITEMS

A. Field Investigations

A brief abstract of progress and results of research projects active during the year is as follows:

1. Distribution, Migration and Survival of Canada Geese in East-Central Wisconsin. Scott R. Craven, Paul Merola, Wis. Co-op Wildlife Research Unit, Madison, Wis.

In 1974-1977, more than 6,000 Canada geese were fitted with plastic neckbands in Wisconsin, Ontario and Manitoba. Geese from diverse parts of the breeding grounds stopped in Wisconsin, stayed for about 5 weeks and migrated to southern Illinois. The great majority of surviving geese maintained similar migration patterns year after year. In 1978, an additional 1400 and 100 geese were neckbanded in Wisconsin and Ontario, respectively. Paired samples of geese were legbanded at all locations and years. These and future data will be used to test hypotheses on goose migration and survival. Mr. Craven's thesis is now complete. Estimated project completion is September 1982.

2. Distribution of Redheads on Horicon National Wildlife Refuge. Cynthia D. Swanberg, Donald H. Rusch, Wis. Co-op Wildlife Research Unit, Madison, Wis.

Redhead ducks breeding on Horicon Marsh comprise the only sizeable nesting population east of the Mississippi River. Despite the fact that Horicon NWR was established to protect nesting habitat for this species, no specific information is available on the ecological requirements, production, and subsequent migratory patterns of redheads in Wisconsin. As a pre-requisite to development of management strategies for the species, this study will determine the distribution of redheads in relation to nesting and brood habitat, estimate of production of redheads and monitor recovery and mortality rates of banded birds.

Aerial photographs were used to construct a detailed vegetation map of the marsh, and nesting habitat was quantified for 44 nests. Breeding pair and weekly waterfowl counts were made and broods were also observed on frequent census routes. A total of 209 ducklings were captured at night from an airboat. Preliminary results indicate that about 600 breeding pairs were present on the marsh and most hens nested in cattail stands in about 65 cm of water; 75% of the hens nested on existing structures such as muskrat houses. Production estimated from mark and recapture data was 1500 ducklings.

3. Abundance, Harvest and Ecology of the American Coot in Wisconsin. Donald Rusch, Wis. Co-op Wildlife Research Unit, Madison, Wis.

A continuing interest of the Horicon NWR and the Wisconsin Co-op Wildlife Research Unit is the large coot population which breeds and congregates on the Horicon Marsh. This year, one week in June was spent searching for nests of marsh birds with an airboat. On 25 miles of transect, 465 coot nests were located.

On three nights between September 19 and November 8, 1978, a total of 613 coots were captured with airboats and banded. Colored, neck-collars were placed on 220 of these birds. Already a neck-banded coot has been reported from South Carolina. Data from this and previous years will be analyzed by a University student in January.

4. Duck Nesting in Farming Units at the Horicon NWR. Brad Livezey, Dept. of Wildlife Ecology, University of Wisconsin, Madison, Wis.

Duck nesting in 85 agricultural units (235 ha) at the Horicon NWR was studied each nesting season during 1976-78 to assess the impact of land-use histories, locations, and cover-types of fields on duck production. Nests of 646 blue-winged teal (Anas discors), 27 mallards (A. platyrhynchos), 8 gadwalls (A. strepera), 7 shovelers (A. clypeata), 2 pintails (A. acuta), and 1 green-winged teal (A. crecca) were found during May and June searches over the period. Nest initiation peaked during 15-18 May. Nest initiation differed among field types ($P \leq 0.05$); nesting was earliest in hay-fields and latest in grass plantings. Nests in hayfields had taller, more dense cover ($P \leq 0.05$). Bluegrass (Poa spp.) was most abundant at nest sites, especially at nests of blue-winged teal. Nest densities (flushed hens/ha) averaged 1.2 in 1977 and 1.8 in 1978. Densities of mallard nests appear to have declined since 1954. Nest success, corrected for stage bias, was 31.5 percent in 1976, 7.5 percent in 1977, and 5.3 percent in 1978. Striped skunks (Mephitis mephitis) and raccoons (Procyon lotor) were important nest predators. Generally, successful nests, relative to predated nests, were characterized by: earlier dates of initiation ($P \leq 0.01$), greater distances from water ($P \leq 0.03$), taller and more dense cover ($P \leq 0.05$), more large grasses and alfalfa and less small grasses in cover ($P \leq 0.05$). Also, nest success of blue-winged teal was less than for other species ($P \leq 0.11$). Six indices to observer disturbance indicated human visitation did not increase nest predation. Conclusions were as follows: (1) cover removal in any land use practice was detrimental to duck production (2) plantings of dense nesting cover were, during the study, not as yet productive for duck nesting (3) predation was severe on duck nests in Horicon NWR uplands (4) predator control should be tested in local areas with high nest densities and low nest success.

5. Effects of Environmental Pollutants on Common and Red-breasted Mergansers in Door County, Wisconsin. Gary Heinz, Patuxent Wildlife Research Center, Laurel, MD.

This study continued in 1978. A detailed report on the progress to date is available in the refuge files, however, a few of the more significant preliminary findings are summarized here.

Dieldrin levels in eggs from less successful merganser nests (0-80% hatching success) were significantly higher than from eggs from the more successful nests (80-100% hatching success). Eggshell thickness for eggs collected in 1977 was significantly less than in eggs from the Richter collection from the period 1880 to 1927. Levels of DDE were correlated with eggshell thickness, giving further indication that DDE is the primary eggshell thinning agent in nature. Herring gull eggs were the most highly contaminated of all eggs collected in 1977. One hundred and thirty-nine red-breasted merganser nests were located on the islands in 1978 compared to 165 in 1977. Pesticide residue analyses for eggs collected in 1978 are presently underway.

In addition to the preceding formal research projects, abstracts of field studies conducted by refuge personnel during the year are included below. Detailed reports on these investigations are in refuge files and available upon request.

6. Vegetative Transects on Fallow Peatland. Kay Mullins, Bio. Tech., USFWS.

In an effort to follow successional changes in three former farming units, three vegetation transects were run. These transects included 21 quadrats and were sampled for the third consecutive year. Dramatic differences occurred in comparison to the two previous transects, Kord 1976 and Swanberg 1977. Unusual water conditions were present in 1978. High water conditions prevailed. The area was flooded from spring into fall. This is in contrast to two seasons past when the area was being drawn down at the same time that the state was under a drought. The vegetation present was indicative of this change. Encroaching cattail (Typha latifolia) was the dominant species. Dead vegetation covered with duckweed (Lemna minor), forming a thick mat covered as much as 50% of the area. The water content of the peat was extremely high.

7. A Wildlife Inventory of Horicon National Wildlife Refuge, Wisconsin. Dawain Prellwitz, Bio. Tech., USFWS.

Wildlife populations were inventoried at Horicon NWR in east-central Wisconsin from April through August 1978. The refuge supports, for at least part of the year, 216 species of birds, 30 species of mammals, 9 species of amphibians, and 8 species of

reptiles. An additional 32 bird species occur rarely on the refuge. Pheasant crowing counts and woodcock (Scolopax minor) censuses revealed peak spring populations of 206 ring-necked pheasants (Phasianus colchicus), and 430 woodcock, as well as 512 common snipe (Gallinago gallinago), 676 American bitterns (Botaurus lentiginosus), and 1618 sora (Porzana carolina) and Virginia rails (Rallus limicola). Small woodlots, shrub areas, and cattail (Typha) - bulrush (Scirpus) marsh supported more individual song-birds than other habitat. Bird species diversity was greatest in small woodlots and shrub areas, and lowest in grassland and cattail-bulrush. Bluebird (Sialia sialis) nesting sites are lacking; 57 bluebird houses were constructed by YCC workers and placed in suitable habitat. Twenty-three red fox (Vulpes vulpes) were produced in five known active dens, giving a minimum spring population of 33 red fox. An additional nine inactive dens were located. More small mammals were trapped in small woodlots and on dikes adjacent to cattail-bulrush areas than in other habitats, presumably because the large amount of edge in the former areas provided diverse habitats. An average of 144 white-tailed deer (Odocoileus virginianus) were harvested annually from 1957 through 1977. The eastern garter snake (Thamnophis sirtalis sirtalis) and the northern leopard frog (Rana pipiens) are the most abundant reptile and amphibian species, respectively. Carp (Cyprinus carpio) comprised 90 percent of the fish caught in fyke-nets, followed by black bullhead (Ictalurus melas), white sucker (Catostomus commersoni), northern pike (Esox lucius), and yellow perch (Perca flavescens). A blooming phenology for 129 common wildflowers and herbs was developed, as well as a plan for future wildlife inventories on the marsh.

B. Cooperative Programs

1. Youth Conservation Corps

Horicon Refuge hosted its third YCC camp this past summer. We did not contract out the staff through a college as in the previous two years. Local recruiting of teachers in area school districts and interns working at environmental education centers proved fairly successful. Two of the group leaders were local teachers who have expressed an interest in returning next year. This would add continuity to our YCC program, reducing the refuge staff's involvement in training a new staff each year. Difficulty was met however, in finding a qualified applicant for the GS-9 director position due to the 2 year administrative experience requirement. The outdoor recreation planner, who previously acted as the refuge YCC coordinator, took on the camp director responsibilities this year. It is hoped that we can resolve this problem with the director position before recruiting next year. Other members of the five person staff included an environmental awareness coordinator and three group leaders.

The eight week non-resident program ran from June 19 to August 11. Twenty youth (coed) from six local school districts were recruited through the State of Wisconsin. Staff and enrollees successfully completed the 8-hour Standard Red Cross First Aid Course during the first week.

The 20 enrollees were divided into three work crews of six or seven each. YCC completed 17 work projects during the program, with an estimated appraised value of \$24,600. Major projects included: construction of a rock wall around a parking area, installing 4 pipe gates, posting of reforestation areas and running vegetation transects to document natural succession, placing and leveling of forms to pour cement for south wall foundation at the EE barn, leveling dirt floor at barn, removing thistle in 20 acres of native grass, repairing emergency spillway on Main Dike, construction of 5 stoplog storage racks and 80 stoplogs, construction and erection of 50 bluebird houses, boundary fencing, construction of two airboat ramps, and salvaging of 1500 board feet of barn boards.



These signs, designed and produced by YCC, were used in posting the newly established reforestation areas. Roll 5-78, Exp. 6, Thompson.



Limestone rock was gathered by YCC'ers and hauled to Peachey Rd. parking area, to be used in constructing a rock wall. 7/78, Thompson



Rock was painstakingly laid to construct a $2\frac{1}{2}$ ft. wide wall, mortaring between all layers of rock. 7/78, Thompson



The completed rock wall was a source of pride for all enrollees. 7/78, Thompson



YCC'ers place cement forms in a 4-foot trench they dug in preparation for the foundation to be poured. 7/78, Thompson



Vegetation transects were run in the reforestation areas to document natural succession. 7/78, Thompson



Five stoplog storage racks and stoplogs were constructed by YCC. 7/78, Thompson

Individual enrollees and staff volunteered their time in banding ducks on several mornings. All interested enrollees had an opportunity to observe the cannon netting operation and get involved in the banding.

Off-refuge environmental education activities included a field trip to waste water treatment facilities in the local communities of Mayville, Horicon and Waupun. These cities add effluent to the Rock River, the main water source of the Horicon Marsh. A second field trip was taken to a pioneer cemetery on the edge of the Horicon Marsh. Tombstone rubbings yielded a wealth of data on the early settlers in the area. A spike camp overnight involved visiting a Forest Service YCC group working in the Nicolet National Forest in northern Wisconsin. This campout provided an opportunity to observe and raft on the Wolf River, a designated National Wild and Scenic River.

An open house was held for parents and friends during the last week of camp. The evening program featured a tour of work projects, displays and a slide program presented by the enrollees.

One accident occurred during the 8-week camp. A smashed finger resulted when an enrollee was moving rocks and one slipped, catching his finger.

C. Items of Interest

During a severe snowstorm on January 26, 1978, three loyal refuge employees, determined to get to work under any conditions, were stranded by snowdrifts and forced to spend the night at refuge headquarters. This bizarre group composed of Bushweiler, Francis and Drieslein were finally rescued by two local farmers who transported them to the nearest plowed road (Highway 49) by snowmobile. At one point during their period of confinement, Bushweiler was quoted as stating, "what a h_____ of a way to spend administrative leave!"

Harold Bushweiler became a grandfather in May of this year for the first time when his daughter-in-law gave birth to a baby girl.

John Francis and Bob Drieslein had the good fortune to spend several weeks at the goose research camp near Cape Churchill in the spring of 1978. Francis was at the camp during the entire month of May, and Drieslein was there the first two weeks of June. Field studies at the Cape were being conducted on the nesting ecology and behavior of Canada goose broods. This tundra area in northern Manitoba includes part of the nesting range of the Eastern Prairie Population of Canada geese. The spring of 1978 was a late one in the Churchill area with 8 to 10 inches of snow and tundra ponds still frozen by

June 1st. Francis and Drieslein both added some new birds to their life lists and returned with a feeling of humble respect for the rigors of this subarctic environment.

The various sections of this report were written by several staff members as follows: Harold Bushweiler wrote IA and IB and typed the report; Bob Drieslein wrote Sections IC and ID, II and VIa and VID; John Francis wrote III and IV; Dottie Thompson did V and VIB. Manager Toll reviewed and edited the entire report.

D. Safety

Safety equipment purchases made during the year included a supply of Stearns flotation vests and jackets for airboat operators and a number of fire extinguishers for airboats. In addition, splash guards were installed on airboat hulls to reduce the danger of swamping.