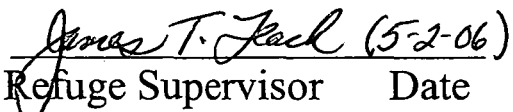
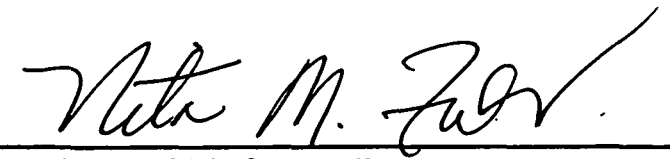


# HORICON NATIONAL WILDLIFE REFUGE

Mayville, Wisconsin  
Fiscal Year 2005

 4/24/06  
Refuge Manager Date

 (5-2-06)  
Refuge Supervisor Date

 5.2.2006  
Regional Chief, NWR Date

**HORICON NATIONAL WILDLIFE REFUGE**

**Mayville, Wisconsin**

**ANNUAL NARRATIVE REPORT**

**Calendar Year 2005**

**U.S. Department of the Interior  
Fish and Wildlife Service  
National Wildlife Refuge System**

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## Introduction

Horicon National Wildlife Refuge was established in 1941 for the protection and preservation of migratory birds. It 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 (21,955 acres) of the almost 33,000 acre Horicon Marsh while the southern third is managed by the Wisconsin Department of Natural Resources as a wildlife area and fur farm. The marsh basin, gouged out by the Wisconsin Glacier thousands of years ago as a shallow peat-filled lake bed, is 14 miles long and from 3 to 5 miles wide. Horicon Marsh is bounded on the east by a sharply rising ridge of the Niagara escarpment which rises approximately 250 feet above the marsh to an elevation of 1,100 feet. The land to the west of the Refuge rises slowly and is dotted with many small potholes and several shallow lakes. Horicon Marsh is located in the upper reaches of the Rock River watershed.

In 1990, Horicon Marsh was designated a "Wetland of International Importance" by the Ramsar Convention, an intergovernmental treaty that obligates 45 signatory nations to consider wetland conservation through land use planning, wise use of wetlands, establishment of wetland reserves, and wetland research and data exchange. In 1997, the Horicon Marsh was accepted as a Globally Important Bird Area in American Bird Conservancy's United States Important Bird Areas program. The marsh received this recognition especially because more than 50 percent of the Mississippi Flyway Canada geese migrate through the marsh during the fall and two percent of the biogeographic population of mallards migrates through during the fall, with impressive numbers of other waterfowl. In the fall of 2004, the Horicon Marsh was recognized by the State as an Important Bird Area.



# Climate Data

## Climatological Review - 2005

### Temperatures (in Fahrenheit)

Month	2005 Average		Normal *		2005 Highest      Lowest Recorded	
	High	Low	High	Low		
January	26.3	11.7	26.0	13.3	41.0, Jan 1	-12.5, Jan 23
February	36.6	21.2	30.2	15.8	50.4, Feb 6	4.3, Feb 18
March	41.5	21.5	39.2	24.9	69.6, Mar 31	0.1, Mar 2
April	64.2	39.0	53.5	35.6	81.1, Apr 19	29.5, Apr 3 & 28
May	67.1	45.5	64.8	44.7	81.0, May 9	30.9, May 2
June	84.8	61.3	75.0	54.7	94.1, Jun 25	47.1, Jun 18
July	85.1	61.1	79.8	61.1	94.8, Jul 18	48.9, Jul 2
August **	82.8	60.3	78.4	50.2	92.3, Aug 10	49.5, Aug 23
September **	78.6	54.4	71.2	52.5	90.7, Sep 11	35.6, Sep 29
October	64.1	41.4	59.9	41.9	86.0, Oct 5	24.8, Oct 28
November	48.3	29.7	44.7	29.9	64.8, Nov 3	9.5, Nov 17 & 24
December	26.6	13.4	32.0	18.2	43.7, Dec 24	-7.4, Dec 6

\* Data from the National Weather Service Bureau, Milwaukee, Wisconsin

\*\* Battery back up on weather station failed. Only days with correct readings were used to get averages and the highest and lowest temperatures. Eleven days of data are missing.

### Rainfall (in inches)

Total for the year

Greatest in 24 hours

### Actual

23.8

1.71" on November 6

### Normal

18.01

### Snowfall (in inches)

Calendar Year 2005

Greatest in 24 hours

### Actual

56.75

9" on Jan 6th and Jan 21st

### Normal

47.6



## Climatic Highlights

Climate changes from year to year have been dramatic in the recent past. Last year, 2004, was the year of the flood and this year, 2005, was the year of the drought. January was fairly snowy this year with over twenty-two inches. February was average with temperatures in the thirties and forties, even fifty degrees one day. Over ten inches of snow fell in February. March was mild, with temperatures starting in the twenties and ending the month near seventy degrees. Snowfall for March was over twelve inches. April was warm with many days in the seventies and several in the eighties. April was the start of the dry spell with less than one inch of precipitation. May was very comfortable with mild temperatures ranging from the upper fifties to the low eighties. It was another dry month with less than three inches of rain. June, July, August and September were hot this year with temperatures reaching the nineties every month. Precipitation over the summer was minimal. Rain events were followed by spans of seven to fifteen days without any precipitation. The hot weather, coupled with lack of precipitation, caused many of the impoundments to dry up. October was warm and even dryer than summer months with less than one inch of rain the entire month. November saw temperatures mainly in the fifties and sixties with a cool spell and some snow during the deer gun season. Precipitation totaled more than seven inches. December reminded us of the winter to come when temperature plummeted to the teens and below zero at night early in the month. However, December ended very mild in the mid-thirties. An average snowfall of eight inches fell by the new year.



Main Pool, near "the Hilton", dry in combination with the draw down and drought conditions. Shorebird use was high all summer.

# 1

## Monitoring and Studies

### 1a. Surveys and Censuses

Spring of 2005 was drier than normal resulting in decreased waterfowl numbers during the spring migration. Peak spring migration occurred on April 20<sup>th</sup> with ruddy ducks and blue-winged teal yielding the highest population numbers. Despite the drought conditions, large numbers of dabbling ducks continued to utilize the Marsh because the Marsh was one of a few basins in the area with water remaining.

Brood surveys were conducted June 28 – July 8. Due to the drought, only four survey points were monitored this summer as many other survey points were dry or had no access to them because of mudflats.

The highest peak number of ducks in 2005 was September 23<sup>rd</sup>. This was attributed to high numbers of green-winged teal, mallards, blue-winged teal and northern shovelers. Mallards, however, peaked later in the fall on October 5<sup>th</sup>. With the drought conditions persisting throughout the fall, diving duck numbers were drastically lower than previous years. Ruddy ducks normally seen in rafts of thousands peaked on November 10<sup>th</sup> at less than 200.

Since the discontinuation of the Wisconsin Department of Natural Resources (DNR) aerial goose surveys in the fall, Canada goose population estimates are sketchy at best due to continuous movement of geese to various feeding and loafing areas throughout East Central Wisconsin. Refuge numbers are also best-guess-estimates by Refuge and DNR staff as geese leave the Refuge at sunrise and are not included during the routine road and airboat surveys. See Table 1a.

Table 1a. Canada goose data 1985-2004

<u>Year</u>	<u>Refuge Peak</u>	<u>Refuge Use Days</u>	<u>Horicon Area Peak</u>	<u>E.C. WI Peak</u>
1985	123,000	8,429,256	191,900	327,000
1986	160,000	8,145,540	172,000	266,300
1987	236,200	10,919,955	236,250	404,750
1988	149,000	11,508,440	201,250	348,750
1989	222,000	11,976,774	228,000	585,000
1990	188,000	12,897,500	199,100	499,500
1991	233,000	8,045,895	237,800	635,100
1992	115,800	5,667,945	117,600	274,500
1993	185,300	10,544,820	191,400	687,400
1994	250,800	12,322,758	255,800	608,500
1995	161,000	7,524,799	unknown	unknown
1996	170,000	11,155,731	unknown	unknown
1997	214,300	15,020,347	unknown	unknown
1998	223,700	15,880,497	unknown	unknown
1999	257,368	14,091,922	unknown	unknown
2000	276,795	13,097,483	unknown	unknown
2001	200,785	12,916,246	unknown	unknown
2002	*	*	unknown	unknown
2003	147,858	8,514,127	unknown	unknown
2004	153,002	9,032,088	unknown	unknown
2005	225,000	unknown	unknown	unknown

\* Data not calculated

The coot is considered an indicator species at Horicon Refuge, demonstrating the health of the marsh. Coot use in 2005 was very low compared to previous years. Low water levels did not provide adequate nesting habitat.

A Call Playback Marsh Bird Survey has been conducted for several years at Horicon Refuge using a broadcasted call and recording the responses. In 2001, the protocol for conducting the survey was changed to the National protocol recently established. The survey is conducted three times during the year. This will be the last year of Courtney Conway's field testing of the Continental Marsh Bird Monitoring Program in North America. This year the survey produced an exciting newcomer – a yellow rail was heard for the first time on the survey. Some concern is that no least bitterns were heard on the survey. (see Table 1b.).

Table 1b. Peak weekly number of individuals detected per point

	sora	Virginia rail	king rail	American bittern	least bittern	yellow rail	marsh wren	sedge wren	red-wngd blkbrd	yellow-headed blkbrd
1990	0.44	0.13	0.19	0.06	0.06		1.56	0.38	2.75	0.13
1991	0.31	0.19	0.25	0	0		1.36	0.12	2.69	0.25
1992	1.06	0.38	0.25	0.19	0		0.94	0.06	4.25	0.88
1993	1.19	0.38	0.13	0.19	0.19		2.5	0.06	3.25	0.56
1994	1.18	0.53	0	0.12	0.06		1.88	0	2.29	0.24
1995	2	1.44	0	0.13	0		3.69	0.25	3	0.56
1996	1.63	0.69	0.06	0.31	0.13		2.63	0.25	2.25	0.56
1997	1.44	1	0.06	0.13	0.13		1.63	0.06	3.44	0.13
1998	1.25	1.06	0.06	0.19	0.06		2.44	0.19	3	0.19
1999	1.63	0.94	0.06	0.31	0.19		2.44	0.13	4.31	0.31
2000	0.88	1.19	0.06	0.63	0.19		3.56	0.25	3.13	0.06
2001	3.36	0.57	0	0.29	0.14		3.36	0	3.43	0.14
2002	3.09	1.08	0.11	0.56	0.11		0.8	0	1.9	0
*2003	1.33	0.33	0	0.07	0.13		0.87	0	1.53	0.07
2004	3.43	0.88	0.06	0.18	0.06		1.24	0	5.5	0
2005	1.2	0.7	0	0.22	0	0.11	0.32	0	3.11	0

\*only one survey was conducted in 2003 due to time constraints



This year's pelican survey was conducted on May 20<sup>th</sup> which is earlier than previous years in order to reduce disturbance to chicks. Peak population numbers were on June 17<sup>th</sup> with 3,834 pelicans (see table 1c).



Pelicans fishing in Main Pool. ww05

Table 1c. Colonial Bird Nesting and Population Survey								
<b>American White Pelican</b>								
Year	1999	2000	2001	2002	2003	2004	2005	
Number of Nests	13 *	*	*		522 ♦		494	
Number of Young	0	16	152	335	727	17	940	
Peak Population	600	900	1100	1800	2750	1266	3834	
*No nest surveys conducted in 2000-2002 due to fear of nest abandonment								
♦No nest count due to flooding and disturbance to remaining chicks.								

Shorebird use this year was phenomenal as the drought conditions provided many mudflats throughout the year. No official surveys were conducted but casual observation on several waterfowl surveys and bird outings revealed a variety of shorebirds including killdeer, greater and lesser yellowlegs, common snipe, short-billed dowitchers, long-billed dowitchers, American avocet, Wilson's phalarope, dunlins, ruddy turnstone, semipalmated plover, American golden plover, black bellied plovers, least sandpiper, buff-breasted sandpiper, and pectoral sandpipers. Flocks in the thousands were seen around the Refuge at the end of September through the end of October.



Large flock of shorebirds feeding in Main Pool. ww05

A botulism outbreak in July not only affected ducks but some shorebirds also contracted the disease. A total of 25 shorebirds were picked up including: greater yellowlegs, pectoral sandpiper, least sandpiper and Wilson's phalarope.



Pectoral and least sandpipers affected by the botulism toxin. ww05



In 2000, a volunteer initiated a frog survey as part of the Marsh Monitoring Program sponsored by Bird Studies Canada and Environment Canada to study wetland amphibians and birds in the Great Lakes basin. Eight stations were set up and sampled three times in 2000. In 2001, volunteers Jack Bartholmai and Bill Holmes took over the survey mid-season. They conducted the surveys for a full season starting in 2002 and have continued the survey through 2005 (see table 1d).

Table 1d. Amphibian Survey

<u>Species</u>	<u>Number of sites where occurred</u>			
	<u>2002</u> <u>20 Total Sites</u>	<u>2003</u> <u>20 Total Sites</u>	<u>2004</u> <u>20 Total Sites</u>	<u>2005</u> <u>20 Total Sites</u>
Northern Leopard Frog	20	12	16	19
Chorus Frog	15	15	19	16
Wood Frog	1	1	0	0
Pickerel Frog	0	0	0	0
Blanchard's Cricket Frog	0	0	0	0
Bullfrog	0	1	0	0
Green Frog	16	10	20	20
American Toad	19	11	11	20
E. Gray Tree Frog	11	11	13	11
Spring Peeper	0	0	0	0

Point count surveys were conducted on the grasslands in 2005. Three survey points are of interest this year and show how fire can affect the habitat and use of the area by a key bird species, the Henslow's Sparrow. During the spring of 2005 a prescribed fire was conducted in the fields containing points 27, 28 and 29. See table 1e for details.

Table 1e Grassland Bird Survey

	<u>Number of Henslow's Sparrows</u>		
	<u>2003</u>	<u>2004</u>	<u>2005</u>
Survey point 27	0	4	1
Survey point 28	4	4	0
Survey point 29	0	2	0

The rookery in Radke Pool was not used this year. Early in the Spring, it was observed that hundreds of black crowned night herons were staging in the small willow in the southwest corner of Teal Pool. This site was later abandoned and no other sightings of possible nesting areas were found.

Bald eagle sightings were more frequent this year. The eagle nest, found on the south side of Potato Lake during the wildfire in December 2002, was used again this year. Early in spring several adults and immatures were seen in the area of the nest. The first eaglet sighting in the nest was on June 2<sup>nd</sup>. Later in the summer three immature eagles were observed. The eagles could be seen by visitors from the floating boardwalk of the egret hiking trail.

Snowy owls were fairly common sightings on the Refuge during January 2005. They could be seen perched in trees along Highway 49.

River otter sightings are fairly frequent and enjoyed by staff and visitors alike. They can be found in most impoundments on the Refuge.



Who's watching who?? A fun sighting at the Refuge. sk05

Much activity was noted by beavers this year. Refuge staff were plagued by the undeterred beavers in I-8. Beavers plugged the water control structures daily in hopes of discouraging the draw down. More sign and activity has been found. A lodge on east Townline ditch was removed during dike removal operations. Other signs are in I-4, just south of Milligan road parking lot along the creek, and a dam across the Rock River near the old Chester bridge.



Very few tundra swans used the Refuge for a migration stopover during 2005. Drought conditions left little feeding habitat for the swans.

The grassland surveys, initiated in 2001 using plant community associations at the point count sites, continued this year. These surveys were developed and tested in 1999 on several points at Horicon Refuge based on a similar grassland survey conducted at J. Clark Salyer NWR. In addition to several association changes based on local habitat, visual obstruction readings (VOR) using a Robel pole and litter depths were taken at each site. It is hoped that eventually the grassland survey will be correlated to grassland bird surveys and guide our grassland management program including prescribed burning. Many staff days and hours are required to monitor each site every year. In 2005, five of the plots were completed including two sites, 19 and 20, at the Bud Cook Hiking area, site 29 at Rockvale road, and sites 27 and 28 on the hill near the State parking lot by Main Dike road. Several of these areas had been burned in spring and the surveys showed thick sweet clover taking over the grassland. Survey methods are being looked at to see if they can be simplified to reduce the time involved on each plot by reducing the individual points down from 800.

The 30th Annual Crane count, sponsored by the International Crane Foundation (ICF) in Baraboo, Wisconsin, was held April 16. A new coordinator for Dodge County organized the efforts for the count this year. Nine of 13 sites were counted on the Refuge. Refuge sites will continue to be available for the crane count.

Crane numbers for Dodge County and the Refuge:

Dodge County Total # of Cranes	- 395
Dodge County Total # of Pairs	- 82
Refuge Total # of Cranes	- 119
Refuge Total # of Pairs	- 30

Nesting pairs of sandhill cranes have been stable the past 3 years on the Refuge at 29-30 pairs.

A roadkill survey has been conducted along Highway 49 since 2001. The roadkill survey is conducted daily most of the year, less frequently in winter. The survey is conducted at the same time of day, between 7:00 am and 8:00 am. This year Refuge staff contacted Sandra Jacobson, roadkill/wildlife crossing expert with the US Forest Service in California. Ms. Jacobson visited the Refuge to see what kind of options or solutions may be available. Several options, including installation of poles along Highway 49 to discourage birds from flying over the road, were discussed. Currently, funding options, such as grants, are being sought to assist with purchasing the supplies and equipment necessary. Refuge staff have ordered and installed new wildlife crossing signs along Highway 49 urging vehicles to slow down. The signs also shows the cumulative roadkill count for the calendar year.





New roadkill signs installed along Highway 49 urge motorists to slow down and let them know the number of animals killed. jk05

Results from 2005 included a total of 330 individuals killed, representing 43 different species. The changes in habitat on both sides of the highway influence what species are using the area. For example, drought conditions in 2005 changed use in the impoundments along Highway 49. The table below shows the change in species and numbers killed over the years. Muskrat using Radke Pool have decreased because it is at lake stage with more water than vegetation; therefore, muskrat deaths have also decreased in the last two years.

Top 5 species killed									
2001		2002		2003		2004		2005	
muskrat	597	muskrat	842	muskrat	71	coot	97	Muskrat	80
painted turtle	54	red-winged blackbird	87	painted turtle	42	painted turtle	66	painted turtle	35
coot	51	painted turtle	69	coot	25	mallard	20	mallard	32
least bittern	41	coot	64	tree swallow	21	snapping turtle	17	snapping turtle	23
red-winged blackbird	40	Canada goose	41	Canada goose	18	red-winged blackbird	17	Unidentifiable Bird	17
Frog and toad numbers are not included because they are too numerous to count.									



## 1b. Studies and Investigations

Dr. David Shealer from Loras College in Dubuque, IA, continued his study this year involving Forster's Terns with his research topic: *Factors Influencing Reproductive Success Of Forster's Terns At Horicon Marsh, Wisconsin*. Forster's Terns (*Sterna forsteri*) experienced complete breeding failure at Horicon Marsh (Dodge Co., Wisconsin) in 2005. All 42 nests found in 2005 were located in one impoundment (Teal Pool) in the northern part of the marsh. Chicks hatched from only one nest but disappeared from a fenced enclosure within 3 days of hatching. Most (81%) of the nest failures were attributed to predation or abandonment. Forster's Terns nesting at Horicon Marsh have suffered complete breeding failure in three of the past six years. Only in 2004, when flood conditions prevailed, did Forster's Terns experience unusually high reproductive success. However, since 2000, only 63 chicks are estimated to have fledged from Horicon Marsh, an average of about 10 per year. All available evidence at this point suggests that poor reproductive performance of Forster's Terns at Horicon Marsh is due to predation, which, in turn, appears to be mediated by water levels throughout the marsh, and in Teal Pool in particular. Current evidence indicates that the breeding population of Forster's Terns at Horicon is maintained by constant immigration, due to low productivity and high adult mortality.

*Rotational Grazing Affects on Reed Canary Grass* – This study is being conducted at the Horicon National Wildlife Refuge in cooperation with Laura Paine, UWEX-Columbia County, Portage, WI; Randall Jackson, University of Wisconsin-Madison, Madison, WI; and Brian Pillsbury, NRCS, Baraboo, WI. This study will focus on how rotational grazing of sheep can affect the vegetative cover of a field dominated by reed canary grass. Vegetation surveys were conducted fall of 2005 prior to any grazing. In spring of 2006, sheep will be allowed to graze on the divided field with limited time frames. Annual vegetation surveys conducted by UW – Madison students will determine the affects of the grazing on the reed canary grass. It is hoped that the grazing will decrease the reed canary grass and allow other grasses and forbs to germinate.



Keith Jensen mowing plot boundaries for Grazing study. ww05



# 2

## Habitat Restoration

### 2a. Wetland Restoration

U.S. Fish and Wildlife Service staff began developing a Comprehensive Conservation Plan (CCP) for Horicon National Wildlife Refuge in spring 2005. During that summer, an extended drought provided ideal conditions for completing a survey of the marsh to determine the location of the historic Rock River channel in relation to Main Ditch and make management recommendations. The survey revealed that Main Ditch has filled in due to increased amounts of sediment entering the marsh, especially during the flood of 2004. The straightened channel of Main Ditch exists for only about a half mile north of Dike Road. The Rock River has changed its course back to a meandering waterway that winds through most of the Federally managed section of the marsh.





## 2b. Upland Restoration

This year 27 acres of native prairie was seeded at the entrance to the auto tour route. The seeding was started on November 17<sup>th</sup> and finished on December 1, 2006, using a newly purchased seed blower attached to the hitch of a vehicle. Preparation for the seeding included spraying the field to kill most of the cool season grasses and wild parsnip that had taken over. The area was then burned to provide good seed-to-ground contact. The seed mix included 21 forb species and 5 grass species, all Wisconsin Genotype.



Biotech. Krapfl and volunteer Sasha Kyle seeding auto tour route. ww05

As part of the Refuge's grassland management program, removal of treelines was initiated in 2001 and has continued. There are several old fencelines on the Refuge that have grown up in a line of trees. These trees divide grassland units into smaller fields and increase edge habitat, bringing in undesirable competing species. Removal of the trees creates larger continuous blocks of grassland as well as reduces habitat for undesirable species such as predators and brown-headed cowbirds.

This past year, several hundred linear feet of trees were removed, as well as clearing several acres of brush and trees growing in grasslands. These areas included a fenceline and trees in the new seeding east of the auto tour route entrance, mechanical brushing

using a fecon mower at the Sterr Road grassland and various areas at the hiking trails area. Refuge staff began clearing trees off dikes starting with all the trees on teal/redhead dike. Beginning in 2005, the public was offered free wood cutting permits to assist the Refuge in clearing grasslands and dikes of trees. With higher heating costs, there was much interest in the program. Despite no hardwoods being offered, twenty seven permits were issued to willing participants. They cut mostly box elder, cottonwood, willow, and some ash trees.



Wood cutting permittees cutting a load of box elder from a fenceline at the hiking trail complex on Highway 49. jk05



# 3

## Habitat Management

### 3a. Water Level Management

Water level management has been quite challenging the last two years. In 2004 we dealt with a major flood event and this year we experienced one of the worst droughts on record. Most impoundments completely dried up or had no more than one or two inches of water in isolated pockets. Use of the airboat was restricted to the Rock River in Main Pool and to major ditches within the impoundments.



West Townline Ditch Dry and vegetated. ww05



North west side of Main pool. ww05



Remains of carp trapped by receding water. ww05



Underground spring – only water left. ww05



## Main Pool

The flood of 2004 caused much damage to habitat and water control structures on Main Pool, resulting in a decision to draw down the Main Pool in 2005. With the cooperation of the Horicon State Wildlife Area (Wisconsin DNR), a Marsh-wide drawdown began on February 15. Coupled with the drought, the drawdown resulted in water levels on Main Pool reaching a low of 852.74 msl on September 15. The drawdown was a huge success in many ways:

- Re-rooted hundreds of acres of floating cattail mats that had been ripped from the bottom and became floating from the flood and tornado
- Allowed elevation data to be gathered by the United States Geological Survey – Northern Prairie Research Center for the replacement of the radial gate at two proposed sites
- Allowed for surveying and mapping of the new path of Rock River (it no longer follows Main Ditch but has changed its course back to a meandering river)
- Created mudflats and shallow water habitat for shorebirds
- Stimulated new growth of bulrushes, sedges, smartweeds, bidens and millet
- Stimulated new cattail shoots for food for muskrats
- Decreased the European carp population
- Established a benchmark for Refuge drawdown capabilities



New meandering River channel. sk05



Avocets, sandpipers and pelicans feeding. sk05



Smartweed, bulrush, millet and sedges. ww05



Muskrats eating new cattail shoots. jk05

## I-8

I-8 was selected as a unit in the Cattail/Fire Monitoring Study, which will be taking place at the Refuge over many years to study the effect fire and water control have on cattail. The unit was drawn down and will be burned during the summer of 2006.

## Luehring

Luehring is the second impoundment that is involved in the Cattail/Fire Monitoring Study. This unit was also drawn down and will be burned in the fall of 2006. The drawdown will also help re-root floating cattail mats that were a huge problem in this unit.

## Frankfurth

Frankfurth was severely impacted by the flooding and tornado, resulting in a great deal of floating cattail. This was the first year of the drawdown in this unit and will continue in 2006 to re-root those floating cattail mats. Decisions on the Frankfurth pump were also discussed throughout the year. The pump has not been run since 1996 and when Refuge staff tried to start it for the drawdown, it was discovered that the pump no longer works. The water inlet channel for the pump is also inadequate as not enough water flows to the pump to keep it running. Ducks Unlimited has assisted with resurveying, engineering a new flow plan and sending an electrician to look over the pump. Cost of repairing the pump will decide its ultimate fate.

## 3b. Moist Soil Management

Because of the drought conditions throughout the Marsh, many impoundments became moist soil units.

## 3c. Graze/Mow/Hay

Local farmers were very interested in haying reed canary grass this year because of the drought. The extreme dry conditions allowed heavy farm equipment into areas that are normally quite wet. Approximately 106 acres were hayed at six different sites. The sites included the comfort station viewing area, Babbitt west warm season grass, north of the gate at Old Marsh Road on the east end, South Point Road south of the gate, the new warm season planting east of the office building, and the reed canary grass east of the office woods.

About 332 acres of uplands were mowed to reduce the spreading of wild parsnip and sweet clover within the units. Locations included: Auto tour route, office area and I-9.

Forty-eight acres of uplands were mowed for seed bed preparation including the Environmental Education Barn and Auto Tour route entrance east.

Forty acres of uplands were mowed for maintenance of newly seeded native prairie which included the Schultz tract.

### 3f. Fire Management

Horicon NWR received a new permanent seasonal Lead Range Technician this year. Greg Hamilton was hired for this position. Also, Dan Bell and Justin Cannon from Mayville returned as AD-2's for the prescribed fire season along with Roy Stern from Hustisford. As part of the crew, they participated in the same classes, physical training, and burning as the staff. The additional help proved invaluable to the Refuge staff. They are available at a moment's notice, even taking off of work at their own jobs to help burn. We also received help on prescribed burning from Leopold WMD and Necedah NWR. Several staff members assisted on prescribed burns at Leopold WMD, Necedah NWR, Seney NWR and the Wisconsin DNR.

Fire danger reached extreme levels at the Refuge this spring. Staff patrolled the Refuge and were on standby during these periods. Fire staff responded to two wildfires on the Refuge this year. The first fire was on 3/23/05 on the north side of Highway 49. The Brownsville Volunteer Fire Department along with Refuge staff responded to the fire. Cause was unknown. The second fire occurred on 6/30/05 and was west of Highway Z near Reiser Rd. Refuge staff responded to this fire, caused by lightning. Several staff and equipment were made available to the Wisconsin Department of Natural Resources to assist with wildfires off-Refuge. Staff responded to five off-Refuge calls during the season.

Several staff had the opportunity to assist on out of state prescribed fire, severity and wildfire details this year.

Sallmann	2/21/05 – 3/07/05	RX	Savannah, GA
Sallmann, Merk, Hamilton	3/29/05 – 4/03/05	RX	Port Louisa, IA
Sallmann, Madel	7/19/05 – 8/04/05	Initial Attack	St. George, UT
Jensen, Merk	8/02/05 – 8/04/05	RX	Seney, MI
Meyers	8/08/05 – 8/23/05	SECM	Alpine, MN
Sallmann	8/13/05 – 8/26/05	Initial Attack	CMR, MT
Cannon, Stern	8/30/05 – 9/17/05	Katrina	Waveland, MS
Sallmann	9/06/05 – 9/24/05	Katrina	San Antonio, TX

Major equipment purchases and updates for fire included:

- 1) Mat tracks for a trailer that Maintenance Mechanic Madel built and a 300 gallon slip on pumper unit that will mount to it and can be pulled behind trucks, marshmasters, or tracked vehicles.
- 2) Utility trailer for hauling fire vehicles to the burn units.
- 3) 2 Stihl 440 Chainsaws.

The following table shows the units and prescribed acres burned CY05 :

<b>Burn Unit</b>	<b>Acres</b>	<b>Date</b>	<b>Refuge</b>
BPFRNWR0501	0.5	1/31/05	Fox River
BPFRNWR0502	0.5	3/22/05	Fox River
Sterr Rd.	88.68	4/4/05	Horicon
MDR-State Parking Lot	89.0	4/5/05	Horicon
Rockvale Rd. Overlook1	29.25	4/6/05	Horicon
I-9 Prairie	17.25	4/6/05	Horicon
Rock to Potato	234.0	4/7/05	Horicon
Rockvale Rd. Overlook2	99.0	4/8/05	Horicon
I-7	190	4/9/05	Horicon
ATR – West	175.0	4/13/05	Horicon
ATR- West 1	10.0	4/13/05	Horicon
ATR – Service Rd.	8.5	4/13/05	Horicon
Frankfurth Prairie	22.5	4/15/05	Horicon
EE Barn West	31.6	4/17/05	Horicon
Island Rd.	105.5	4/19/05	Horicon
Sommers Rd. South	2006	4/24/05	Horicon
Spring South	4.8	5/24/05	Fox River
Spring North	11.6	5/24/05	Fox River
ATR – North	24.0	10/7/05	Horicon
EE Barn East	24.0	11/2/05	Horicon
<b>Total Acres</b>	3171.68		

The following table shows wildfires which occurred on Horicon NWR in CY05 :

<b>Fire Name</b>	<b>Acres</b>	<b>Date</b>	<b>Location</b>
Wild Goose Rd. WF	0.1	3/23/05	South of Hwy 49 west of WildGoose Rd.
Deadwood WF	2.3	6/30/05	Reiser Rd.



Prescribed Burn History for Horicon NWR (includes satellites)												
Year	2000		2001		2002		2003		2004		2005	
Season	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Acres	434	0	120	10	820	0	455	230	422	272	3124	48



Burn crew after the Sommers Rd. South prescribed burn. 4-24-05 sms.



Mat tracks on new trailer.

### 3g. Pest Plant Control

The Refuge continues to monitor the purple loosestrife infestation. Refuge staff had concerns about how many beetles survived the flood of 2004. Some areas of the Refuge where beetles were released did see a reduction in the beetle population, while areas that had no beetle release showed signs of beetle presence. The flood also spread the seed source and new areas of purple loosestrife were found. Drought conditions in all of the impoundments also offered the perfect growing environment for the newly transported seeds. Refuge staff will continue to monitor the changes around the Refuge where beetles were released to see if additional beetles will need to be collected and released to combat the purple loosestrife. The original release sites have shown encouraging results over the last seven years. In June, Refuge staff went to Trempeleau NWR to collect *Gallerucella spp.* beetles for release on the Refuge. Several hundred beetles were released along the floating boardwalk area and in Redhead impoundment along the dike between Redhead and Stony. These are two areas where the loosestrife has been spreading. Late season loosestrife checks showed that the beetles had worked their "magic".



Leafy spurge continues to be a problem for the Refuge. It was first discovered along Oak Center Road on the north end of the Refuge. Currently there is about one acre of Refuge property infested with leafy spurge. Previous measures to control leafy spurge included spraying it with the herbicide Plateau. The spurge flea beetles collected last year at Trempeleau NWR and released here at Horicon NWR were monitored this year. Staff was unable to find any of the beetles on several inspection trips. Leafy spurge is mainly spreading from along the road and old railroad right-of-ways.



Oak Center Road leafy spurge ww05

Common buckthorn, *Rhamnus cathartica*, has become a problem around the Refuge spreading through most of the woodlands. This summer and fall Refuge staff, volunteers and a local Tree Cutting Service continued the removal of buckthorn from the egret hiking trail area that was started in 2004.



Egret trail woods with buckthorn. ww04



Egret trail woods after buckthorn removal. ww05

Garlic mustard, *Alliaria petiolata*, a rapidly spreading woodland weed, will end up dominating the forest floor and displacing native woodland wildflowers. Garlic mustard was previously a problem at the pine plantation at I-10, but this area was clear cut in 2004 and the open canopy and previous herbicide spraying have kept this area in check. Unfortunately several new locations of garlic mustard were discovered in 2005 including in the woodlot along the egret hiking trail, along Main Dike Road on the west side near the beginning of the



Wildland Urban Interface (WUI) dike, and in the woodlot along Headquarters Road. The patch along the egret hiking trail was hand pulled prior to seeding out and taken to a burn pile. The other patches were sprayed in 2005 using Roundup® and will be monitored for any new sprouting.

Due to the drawdown on Main Pool, areas on the West side which in previous years were covered with water, now have cottonwood seedlings sprouting everywhere. Close attention will need to be paid to these areas to make sure the sedge meadow is not overtaken by the trees.



Cottonwood seedlings in middle of picture. ww05



Larger cottonwood seedlings in back. ww05



# 4

## Fish and Wildlife Management

### 4a. Bird Banding

The banding quota of 400 mallards was not reached this year. The first attempt and rocket shot was made August 23 with the last shot on August 30. There were several unsuccessful attempts made during that period. Additionally, walk-in traps were borrowed from Necedah NWR for the first time this year. The summer drought and lack of water at the banding areas made reaching the quota difficult. Wood ducks were more frequent than mallards, especially in the walk-in traps. Fifty mallards were banded. The mallard breakdown was AHY-M 3, AHY-F 9, HY-M 19, and HY-F 19.



Walk-in duck traps, borrowed from Necedah NWR, were used on shore.



Nobody was willing to mess with this "snapper" that entered one of the walk-in traps. At least it didn't get a free lunch.

### 4b. Disease Monitoring and Treatment

Staff is continually monitoring the health and condition of wildlife populations on the Refuge and staying abreast of the regional status of diseases that affect the health of wildlife, humans, or both. Through monitoring and preventive measures, it is possible to prevent isolated cases from triggering major outbreaks of disastrous epidemics.

In 2005, the Refuge experienced the first major avian botulism outbreak in many years. Historically the Refuge had a type C Avian botulism outbreak every year with a couple of hundred birds picked up in the various impoundments. Staff would routinely conduct



surveillance in mid-July and continue until December. Since 1992, the number of dead birds had dropped dramatically to less than a dozen per year and the surveillance had been limited to observations during daily Refuge functions. If mortality of birds is suspected, then further searches in the impoundments are conducted by airboat. In 2005, the environmental factors were present which can contribute to the botulism spores germinating, producing the toxin, and resulting in an outbreak. These environmental factors, included high temperatures, low water levels with exposed mudflats, and the presence of decaying organic matter (fish), which support the toxin production. About 1,200 ducks, mostly mallards, were retrieved and buried by Refuge staff. This number does not reflect the total loss of birds, since only a percentage of the birds were picked up. The USGS also assisted with the botulism outbreak. Grace McLaughlin and Rex Sohn from the National Wildlife Health Center in Madison arrived on July 28<sup>th</sup> to survey the situation and assist in the retrieval.



Volunteer Ted Turlock picks up a dead Teal. ww05 USGS assisting with botulism pickup. ww05

Botulism Outbreak Totals for Main Pool 2005

	21-Jul	22-Jul	23-Jul	25-Jul	26-Jul	27-Jul	28-Jul	1-Aug	3-Aug	8-Aug	10-Aug	15-Aug	25-Aug	31-Aug	Total
Mallard	2	108	246	10	119	164	179	47	7	25	5	20	4		936
Wood Duck		2	8		4	31	17	5							67
Blue-Winged Teal			14		1	14	12	1	1	3	3	3	1	3	56
Green-Winged Teal			6			5	7				1		2	2	19
Gadwall								1		1					2
Greater Yellowleg		3			3	2		1	1						10
Least Sandpiper							5								5
Pectoral Sandpiper							5								5
Wilson's Phalarope							1								1
Unidentified Shorebird						3						1			4
Ring-Billed Gull						2	3	2				1	1		9
Herring Gull						2	2	1							5
Unidentified Gull						1	1				1				3
Double Crested Cormorants		2	2							1					5
Canada Goose						1	3			1					5
Sandhill Crane						1									1
Great Blue Heron							1								1
American White Pelican		3						7		1	4	1	3	1	20
American Coot										1					1
<b>Totals</b>	<b>2</b>	<b>118</b>	<b>276</b>	<b>10</b>	<b>127</b>	<b>226</b>	<b>236</b>	<b>65</b>	<b>9</b>	<b>33</b>	<b>14</b>				<b>1118</b>

In 2002, the Wisconsin Department of Natural Resources found the first confirmed case of Chronic Wasting Disease (CWD) within the State's deer herd in the southwestern part of Wisconsin. Horicon Refuge is not located within the area of Wisconsin where CWD has been detected. However, in preparation for an outbreak, Refuge staff wrote a Chronic Wasting Disease Surveillance and Management Plan, along with an Environmental Assessment (EA). The Plan identifies the strategies for CWD management on the Refuge, which mirror the strategies identified in the State Plan.



These strategies include Disease and Population Management measures, Surveillance and Coordination measures, Testing and Handling of CWD Suspect Animals, and Baiting and Feeding measures. In summary, Refuge staff will rely on hunter harvest during established seasons to approach the Wisconsin DNR population goals and will conduct active, opportunistic observations of deer on Refuge lands. Baiting and feeding will not be allowed on Refuge lands and any deer suspected of CWD will be euthanized. The complete Plan and EA is available at the Refuge office.

West Nile Virus was found in Wisconsin for the first time in 2001 in infected wild birds. Spread by mosquitoes, this exotic virus infects mammals, including humans, and birds. Members of the Corvidae family (crows and jays) seem to be especially vulnerable. In 2005, three pelicans on the Refuge tested positive for West Nile Virus. Staff continues to monitor for West Nile.

#### 4c. Re-introductions

Fish stocking efforts continue each year as part of the carp control program and to improve marsh health after the carp treatments. Predator game fish are being restocked at every opportunity. Restocking with game fish in 2005 consisted of 400,000 northern pike fry released in Main Pool in April. In October, Genoa National Fish Hatchery delivered a load of fingerlings including 10,660 bluegills, 9,782 yellow perch, and 13,600 black crappie for stocking in the Refuge. Due to the drought and lack of water for over wintering, the fish were released upstream of the Refuge in Waupun's Mill Pond. All fish were supplied by Genoa National Fish Hatchery.



Volunteer, Marcy Guza, assists with release of the northern pike fry.



Perch fingerlings released in Waupun at the Mill Pond.

#### 4d. Nest Structures

Refuge staff, with help from volunteers, checked, cleaned and maintained the many wood duck boxes around the Refuge. For the 2004 nesting season, (tornado and flood), more nest boxes were used by starlings and tree swallows (33) than by wood ducks and hooded mergansers (23). Sixteen boxes had successful wood duck nests with a total of 67 young produced and seven boxes had successful hooded merganser nests with 41 young produced. Other nest box users included fox squirrels, mice, and the occasional screech owl. Only six wood duck boxes were not used at all. Eight of the houses required repairs after the tornado and flood. An additional 16 new houses were installed.

For the 2005 nesting season, more nest boxes were used by wood ducks and hooded mergansers (41) than by starlings and tree swallows (27). Twenty-six boxes had successful wood duck nests with a total of 145 young produced and fifteen boxes had successful hooded merganser nests with 72 young produced. Several nest boxes had unhatched eggs in them, one wood duck nest contained 22 unhatched eggs. Other nest box users included fox squirrels, mice, and the occasional screech owl. Only six wood duck boxes were not used at all.

Two volunteers, Jack Bartholmai and Larry Hopwood, checked and maintained the bluebird nest boxes at various sites around the Refuge. Most of the nest boxes on the Refuge usually receive use by tree swallows, rarely bluebirds. Many nesting attempts are fouled by predators. A total of 101 nest boxes were monitored over the summer. Tree swallows made 103 nesting attempts. Ninety-one were successful and fledged 423 young. Bluebirds made five nesting attempts with four successful, fledging 17 young. Twenty-one nest boxes were used by house wrens. Bluebirds are becoming more frequent sightings and are finally starting to use Refuge nest boxes.

#### 4e. Pest, Predator and Exotic Animal Control

The carp trap installed along the Rock River at the north side of the Refuge was emptied many times this year. Refuge staff enthusiastically cleaned out the trap for the first time on April 26 with approximately 7,335 pounds of carp taken out. Enthusiasm dwindled fast as the trap was cleaned out ten more times in May and June. The largest amount of carp in one effort was on June 1 when 77,220 pounds of carp were removed from the trap that morning. An additional 400,000 pounds (200 ton) were treated with rotenone that afternoon. Total carp taken from the trap in 2005 was 202,750 pounds (101.1 tons). Starting mid-May, when water temperatures were at sixty degrees or above, the trap needed to be emptied daily. The excavator and dump trucks were brought in for fish removal. No one had ever seen this many fish in the trap before. There were too many fish in the trap to use a seine net. For the first time, buffalo carp were caught in the trap. They were released since they are a native species. Other species in the trap included walleye, northern pike, and white suckers. Several painted turtles and snapping turtles were also released. Scales of the carp were taken and aged, with the following results:



three year old carp were 15 and 17 inches long; four year old carp were 20 inches long; and five year old carp were 22.5, 27.5, and 29 inches long.



Biologist Woyczik holding 5 year old carp. jk05



Volunteers and staff help clean out carp trap. ww05

A variety of furbearer species are traditionally trapped on the Refuge: muskrat, mink, raccoon, opossum, red fox, coyote, and weasel. Trapping units on the Refuge are sold through an open auction held in conjunction with the Wisconsin Department of Natural Resources each September. Interest in trapping for the 2004/05 season was definitely at an all time low primarily due to the decrease in muskrat numbers on the marsh. Less than 20 people showed up for the auction to bid on units for both State and Federal. The Refuge offered six dike units and two upland units. Two of the dike units (Radke and Frankfurth) never even sold. Only one unit out of the remainder sold above the \$25 minimum bid. Total bids resulted in \$160. No marsh units or youth/senior units were offered.

Two of the dike trappers did not trap their units the entire season. The other two dike trappers harvested 60 muskrats. Less than 90 predators were trapped in one upland unit. The second upland trapper never trapped.

Due to the low trapper interest, the low number of muskrats, and the planned drawdown of the Main Pool in 2005 which was coupled with the drought, Refuge staff decided to not offer a trapping program for the 2005/06 season.

Shown below are the trapping results for the last several years.

	2000-01	2001-02	2002-03	2003-04	2004/05
Muskrat	397	2,430	1,224	415	60
Mink	0	2	10	6	0
Raccoon	162	75	20	7	44
Opossum	75	28	57	12	28
Fox	0	0	0	0	0
Skunk	41	7	0	7	10
Weasel	2	0	0	1	0
Coyote	0	0	0	0	5

# 5

## Coordination Activities

### 5a. Interagency Coordination

On February 15 to 16, with a follow-up on September 13, Refuge staff hosted a **Wetland Workshop** where various experts came together to discuss future management of the marsh. Attendees include staff from the Refuge, Regional Office, Wisconsin Department of Natural Resources, U.S. Geological Survey, Lake Kinnissippi Association, and various Universities. After much discussion and many ideas presented, Refuge staff met again and produced a final plan: the radial gate will be replaced at the main channel of the Rock River (about 750 feet east of its current location), with a spillway added further to the east. The spillway would be at a higher elevation and release water during heavy rain events. The radial gate would be kept open most of the time to allow the removal of the daily influx of phosphorus and sediments and allow a meandering river channel throughout the Main Pool. However, the staff would have the ability to maintain high water levels in key years to stress and kill cattails and simulate the high water of the wetland cycle. Much discussion at the wetland workshop also revolved around the need for work in the watershed in order to reduce the contaminants and sediments coming into the marsh.

Refuge staff have been involved with the **Rock River Headwaters, Inc. (RRHI)** since 1994, when the organization was under the name, Horicon Marsh Area Coalition. The mission of RRHI, a nonprofit organization, is to serve as a catalyst for cooperation between citizens, businesses, agriculture, and government to protect, restore, and sustain the ecological, economic, cultural, historic, and recreational resources in the Upper Rock River Basin through a watershed-based approach.

The Refuge's involvement with the **Marsh Management Committee**, formed in 1998, has continued. The committee is made up of representatives from non-profit organizations, government organizations, and the private sector for the purpose of guiding the management of Horicon Marsh for the benefit of a healthy ecosystem and the people who enjoy it. Refuge staff attended monthly meetings throughout 2005.

Throughout the year, Refuge staff coordinated with the local **Wisconsin Department of Natural Resources** staff on a variety of issues, including public use events and publications; water management; carp control; law enforcement; hunting programs; fire; maintenance; and trapping programs.

The Refuge participated in the Rural Fire Assistance Program for the fifth year, which

provided financial assistance to **rural fire departments** in the community around the Refuge. This year four of the six departments took advantage of this opportunity by applying for the financial assistance and they all were funded. Oakfield Fire Department received \$2,956.07; Knowles Fire Department received \$1,530.00; Waupun Fire Department received \$4,363.20; and Brownsville Fire Department received \$3,475.48. Since the program's inception, five out of six fire departments have received over \$76,000 dollars. Only Burnett Fire Department on the west side of the marsh has chosen not to participate in the grant program. Refuge staff felt that it is a great partnership opportunity and hope to be involved with the program in the future.

## 5d. Cooperating Association

In Fiscal Year 2005, Coot's Corner, managed by the Friends of Horicon NWR, generated \$18,996 in sales and \$586 from the donation box for a total of \$19,582.

The Friends of Horicon National Wildlife Refuge hosted their fourth annual meeting on Thursday, July 14, at 6:00 pm. The meeting took place at the Horicon NWR visitor center. About 25 people attended. Activities included a potluck dinner, short business meeting, election of new officers, silent auction and a program by Dave Edwards on National Parks. Refuge manager Patti Meyers thanked the Friends for their dedication and extended an invitation for airboat rides for the outgoing officers.

Election of board members included the Secretary, Treasurer, and President-Elect officer positions. Nancy Hall (previously President-Elect) of Fort Atkinson automatically rolled into the President position.

Roy Zastrow of Mayville was elected the new President-Elect; Glenn Burg of Fox Lake continues as Treasurer; and Beneeta Steinbach was elected Secretary. Continuing board members include Liz Roy of Fond du Lac and Glen Burg of Fox Lake. Newly elected board members include Bill Holmes of Rubicon and Beneeta Steinbach of Waupun.

The Friends of Horicon NWR now meets on the second Thursday every month at 6:00 pm at the Horicon NWR visitor center. A different program follows each meeting at 7:00 p.m. Future programs will include presentations by various Refuge staff and Friends members about birds, wildlife, wildflowers, archaeology, and the history of the Horicon Refuge.





*Friends President Nancy Hall*



*Coots Corner gift shop*



# 6

## Resource Protection

### 6a. Law Enforcement

Since spring of 2004, the Refuge has been without any law enforcement personnel. Refuge staff are anxiously awaiting the arrival of a full-time officer who will start in January 2006.

In the meantime, trespass, vandalism, and hunting incidents continue to be the most common problems. "Parking" has been on the increase as well. One incident in 2005 involved a man who was living out of his car, apparently wandering through the countryside and parking wherever he could find privacy and shade. He made the Refuge home for several weeks while Dodge County officers and the local Department of Natural Resources wardens helped us by making contact with him on several occasions. The man never violated any rules, but did alarm several people who noticed his frequency on the Refuge. Eventually he moved on.

Fortunately, the Refuge does not have a huge litter or vandalism problem. However, dumping and littering continues to be prevalent on the west side roads, which are township roads that dead end at the Refuge. Vandalism incidents this year included graffiti on signs and bathroom walls and damage to kiosks and trails. One incident involved someone taking apart the electric gate at the Auto Tour. Apparently they were locked in and decided to get themselves out, leaving all the pieces of the gate in a pile.

### 6b. Permits and Economic Use Management

The following special use permits were issued last year: Eleven special use permits for the trappers and their helpers (issued in FY04, but permit was for the 2004/2005 trapping season); twenty-seven firewood permits for cutting wood on the Refuge; three permits for haying on the Refuge; two permits for buckthorn removal at the Auto Tour; and one permit for placement of an anabat detector on the Refuge (research study conducted by Wisconsin Department of Natural Resources).

## 6g. Land Acquisition

A 7.1 acre tract of land (Zuelke property) was purchased by the Service this year. The property is located on the northeast side of the Refuge and allows staff the only access to the east side of Radke Pool. Since it was potentially a homesite, the purchase price of \$56,000 was quite high, but ownership will prove invaluable, especially during fire events.

# 7

## Public Education and Recreation

### 7a. Provide visitor services

#### Facilities and Access

In fiscal year 2005, a new kiosk was constructed at the entrance to the Refuge visitor center. Wilderness Graphics was contracted to develop interpretive panels for the kiosk. The final panels are scheduled to be added to the kiosk in spring of 2006.



*New kiosk at entrance to office/visitor center*

At the end of FY05, the Horicon Ternpike Auto Tour Route and Main Dike Road was left open after September 15<sup>th</sup> with the hopes of leaving it open all year ("conditions permitting"). Staff monitored the route, especially during the busy fall season, and were pleased with the outcome. Refuge staff received many favorable comments.



### Environmental Education and Interpretation

In FY05, about 4,800 people participated in on-site, staff-conducted, interpretive talks, tours, and demonstrations. In addition, about 5,600 people participated in environmental education and interpretation programming and services including workshops, activity trunks, on-site field trips, off-site programs, and self-led activities. (See Outreach for additional programs).



The Rhythms of the Refuge environmental education guide book for use by preschool through 12<sup>th</sup> grade teachers was completed and added to the Refuge website as a resource for teachers to find pre and post activities for field trips, lesson plans, field trip activity options and educational trunk inventories. The curriculum was developed by the U.S. Fish and Wildlife Service and field piloted by Refuge Ranger Molly Stoddard.

More than 730 3rd-12th grade students and teachers participated in 5 live, interactive **distance education** classes during the 2004/05 school year sponsored by Cooperative Educational Services Agency 6 and presented by Horicon Refuge. Statewide connections were made for five double sessions to 15 communities or school districts. The sites included Brandon, Necedah, Herman, Dodgeand, Green Lake, Markesan, Waupun, West Salem, CESA 4, LaCross (Channel 19 WXOW Hometown Schools Series), Holmen, Westby, Sciocton, Winneconne, and Oshkosh-Lourdes. Some of these locations are remote and rural with otherwise little or no access to the Refuge system and the Fish and Wildlife Service. Topics included spooky marsh tales and tails, marsh animals, the Refuge System, and whooping cranes and local raptor rehabilitator, Barb Harvey, who showcased some of her education birds. This is the third year that Horicon Refuge has partnered with CESA 6 to provide distance education programming.



*Molly Stoddard – Distance Education Program*

Horicon Refuge completed a Girl Scout partnership project with Girl Scouts of the Milwaukee Area, Camp Silverbrook in West Bend, and Carroll College in Waukesha. The project is named **Linking Girls to the Land** in support of the federal initiative among several conservation agencies including the Fish and Wildlife Service.

Girls Scouts from Camp Silverbrook have been visiting the Refuge each summer since 1997 as part of their camp experience. They have benefited from numerous educational programs provided by Refuge staff as well as self-guided recreational activities.

The Girl Scouts of the Milwaukee Area, Inc. publicized the Going Places, Saving Spaces summer camp opportunities; coordinated participant recruitment and registration; provided equipment, transportation and logistical support to deliver summer camp programs at Horicon National Wildlife Refuge; and provided funding and staff to support the project. Camp Silverbrook and Girl Scouts of the Milwaukee Area received a Nature of Learning Grant to cover transportation expenses to monitor bluebird boxes and take field trips to the Refuge for educational activities.

Horicon Refuge's Watershed Monitoring Project culminated May 18<sup>th</sup>, 2005 with Beaver Dam Charter School students participating in an educational field trip to the Genoa National Fish Hatchery. During the hands-on tour, students made connections between fish culture, fish health, and water quality. Students camped at Black Hawk Park and visited the Kickapoo Valley Reserve visitor center on the return trip where they learned about federal flood control. Funding was provided by a challenge cost-share grant and Friends of Horicon Refuge.

Refuge staff continued to provide **interpretive programs** including fall Goose Talks and Guided Bird Watching Tours on Saturdays. Attendance for these programs is relatively low. Other interpretive programs were conducted as part of special events and therefore are included in the section written below. Refuge volunteers continue to assist with tours and programs.

#### Public Visitation

About 450,000 people visited Horicon Refuge in FY05. About 15,000 people enjoyed marsh exhibits at the Visitor Center during the year.

#### Special Events

Numerous events marked the seasons: National Wildlife Refuge System Week (October), Earth Day (April), Marsh Melodies (April-May) and National Public Lands Day (September). For Friends-specific events, please refer to Section 5d. Cooperating Association Activities.



In celebration of **National Wildlife Refuge Week 2004**, the Friends of Horicon Refuge and the Fond du Lac Running Club sponsored a 5K Run/Walk for the Refuge on the Horicon Ternpike Auto Tour Route. The visitor center was open during the weekend and programs offered included guided birding tours, video viewing and goose talks. In celebration of Earth Day, Old Marsh Road was opened to hiking and bicycling. Visitors enjoyed looking for ducks, geese, swans, cranes, herons and muskrats as they hiked and biked across Old Marsh Road.

Horicon National Wildlife Refuge participated in the ninth annual Horicon Marsh Bird Festival on May 6-9<sup>th</sup>, 2005. The event is held as part of Marsh Melodies, a marsh-wide event that takes place over six weekends in April and May. Programs are offered throughout the marsh and include guided hikes, boat tours, banding demonstrations, exhibits, kids activities, birding tours and art displays.

Refuge activities included a program on whooping cranes, guided birding tours via car caravan, and a reception for local k-12<sup>th</sup> grade winners of the Wisconsin Federal Junior Duck Stamp Contest. Seventy-eight people attended the reception which was sponsored and coordinated by the Friends of Horicon NWR. The visitor center was open all weekend during the festival and volunteers led guided hikes for visitors at the floating boardwalk.

On September 24<sup>th</sup> in celebration of **National Public Lands Day**, Visitor Services Specialist, Erin Railsback and Refuge Manager, Patti Meyers assisted with the Urban Treehouse dedication and National Public Lands Day event at Lyndon Hill in Milwaukee. Duties included staffing the America's Outdoors Booth and leading programs on camping skills and outdoor ethics.



*National Public Land Day – Lyndon Hill*



*Patti Meyers and Erin Railsback – camping program*

## Hunting

Hunting opportunities on the Refuge include ring-necked pheasant, gray partridge, cottontail rabbit, squirrel, and deer. All of the Refuge is open to hunting except for a few closed areas, including the Viewing Area and Interpretive Displays on Highway 49, the Bud Cook Hiking Area, and a small area around the Office/Visitor Center. The Auto Tour Route/Hiking Trail Complex is closed to all hunting except during the deer gun season; a 600-acre area around the Office/Visitor Center is closed to all hunting except for special hunts for hunters with disabilities; and the former Stensaas unit is closed to all hunting except for youth and novice pheasant hunters. The Refuge is closed to migratory bird hunting, other than a controlled Youth Waterfowl Hunt. State regulations apply to all Refuge hunters, except that all seasons close at the end of the deer gun season on the Refuge.

For the sixth year, the Refuge participated in the State's early gun hunt in October 2005, only open to hunters with disabilities. The 880-acre area was opened October 1 to 9 for this special hunt. Hunters had to pre-register by the end of the summer, with a maximum of 12 selected. Out of the twelve hunters, one doe was harvested.

During the regular nine-day deer gun season in 2005, nine hunters and their assistants signed up to hunt for a total of 18 hunters. Five people ended up not hunting. Out of the remaining thirteen hunters, four doe were shot.

Traditionally, each year the Refuge has hosted a youth waterfowl hunt. For the first time since it's inception in 1984, the hunt had to be cancelled this year due to the drought. There was absolutely no water in any of the impoundments and no water to even pump. Unfortunately, the youth hunters had already applied for the drawing and the turnout was great, with 31 applicants. Hopefully, the youth will apply again in 2006 and Mother Nature will cooperate!

## 7b. Outreach

Five federal agencies which comprise the America's Outdoors Center for Education, Recreation and Resources partnered to sponsor a booth at the Milwaukee Journal-Sentinel Sports Show held March 11-20th. The five agencies included the National Park Service, Bureau of Land Management, Natural Resource Conservation Service, National Forest Service, and U.S. Fish and Wildlife Service. Three volunteers and one employee from Horicon National Wildlife Refuge helped staff the booth, representing the FWS. The Sports Show typically draws 150,000 people during the 10-day event, held in suburban West Allis at the Milwaukee County fairgrounds. It is estimated that 50,000 people visited the display during the show. It is an excellent opportunity for all of the America's Outdoors agencies to reach out to our public with recreation and career information and



put a friendly face with the names of our government agencies. The primary purpose of the booth is to provide information about federal, outdoor recreation lands in Wisconsin, including national wildlife refuges. Blue goose mobiles and station brochures were provided. Information about federal lands in other states was also available.



*Volunteers at DU Outdoor Show*



*America's Outdoors Booth at Milwaukee Sports Show*

On August 26-28th, Erin Railsback and volunteers Harold Steinback, Darlene Drews and Curtis Railsback staffed Horicon Refuge's display at the Ducks Unlimited Great Outdoors Show in Oshkosh. About 1,452 people visited the booth. Volunteers gave out brochures, maps and answered questions about the Refuge.



# 8

## PLANNING AND ADMINISTRATION

### 8a. Comprehensive Conservation Planning

The CCP planning process for Horicon NWR and Fox River NWR began in January 2005 with a kickoff meeting at the Refuge office between Refuge staff and regional planners from the Service's office in the Twin Cities. The participants in this "internal scoping" exercise reviewed the Horicon and Fox River NWR vision statements and goals, existing baseline resource data, planning documents and other refuge information. In addition, the group identified a preliminary list of issues, concerns and opportunities facing the Refuges that would need to be addressed in the CCP.

A list of required CCP elements such as maps, photos, and GIS data layers was also developed at this meeting and during subsequent e-mail and telephone communications. Concurrently, the group studied federal and state mandates plus applicable local ordinances, regulations, and plans for their relevance to this planning effort. Finally, the group agreed to a process and sequence for obtaining public input and a tentative schedule for completion of the CCP. A Public Involvement Plan was drafted and distributed to participants immediately after the meeting.

Internal scoping continued with a meeting at the Regional Office in Fort Snelling, Minnesota in March 2005. Staffers from Region 3, including supervisors, planners, and biologists covering wildlife/habitat and migratory birds joined Horicon's Refuge Manager for a discussion on the issues, public response and a number of considerations related to the CCP.

Public input was encouraged and obtained using several methods, including open houses, written comments during a public scoping period, issue-based focus groups, and personal contacts.

Initial public scoping for the Horicon and Fox River National Wildlife Refuge CCP began in March 2005 with a series of open house events held in Montello (Fox River), Waupun and Mayville, Wisconsin. Turn-out was light with approximately 25 people in total attending.

Those interested in making written comments had until April 15, 2005 to submit them. Comments could be sent by U.S. mail, e-mail, or via the Horicon planning website on the Internet. Approximately 20 comment forms and other written comments were submitted to the Refuge during the scoping process.

On June 1-2 (Horicon) and June 7 (Fox River), 2005, all-day public focus group workshops were held to obtain more detailed input on the issues and opportunities identified in preliminary scoping and to begin development of alternatives. Twenty-eight people,

representing Wisconsin DNR, Refuge staff, conservation organizations, neighboring communities, Refuge users, and other stakeholders attended these discussions.

## 8b. General Administration

### Funding – 2005

Refuge Operations	1261	\$ 534,209
Volunteer Program	1261	\$ 4,244
Challenge Cost Share/CCI	1261	\$ 30,500
Law Enforcement	1261	\$ 90,000
Contaminant Cleanup	1261	\$ 17,500
Maintenance Mgmt	1262	\$ 370,415
Chronic Waste Disease	1261	\$ 7,000
Flood/Storm Damage	2977	\$ 2,838,922
Fire Preparedness	9131	\$ 1,260
Fire Use and Mgmt	9263	\$ 105,167
Wildland Fuel Reduction	9264	\$ 57,000
Projects		
Rural Fire Department	9265	\$ 15,326
Assistance		
NRDA	9822	\$ 160,910
NRDA	9822	\$ 112,000
Fox River Wetland	5521	\$ 17,500
Restoration		
Visitor Facility		
Enhancement	2821	\$ 116,204
<hr/>		
Total		\$ 4,478,157

## Personnel

The following is a list of employees who were members of the staff at Horicon Refuge in 2005.

- |     |  |       |              |      |
|-----|--|-------|--------------|------|
| 1.  | Patti A. Meyers<br>Project Leader  | GS-13 | EOD 08/11/91 | PFT  |
| 2.  | Diane M. Kitchen<br>Refuge Operations Specialist   | GS-12 | EOD 05/31/92 | PFT  |
| 3.  | Molly K. Stoddard<br>Ranger<br>Transferred to Fergus Falls, Prairie Wetland<br>Learning Center 06/24/05                        | GS-11 | EOD 06/23/96 | PFT  |
| 4.  | Erin Railsback<br>Park Ranger - Visitor Services Manager<br>Transferred from Cypress Creek NWR where she was a<br>SCEP student | GS-07 | EOD 06/27/05 | PFT  |
| 5.  | Wendy Woyczik<br>Wildlife Biologist  | GS-11 | EOD 05/05/03 | PFT  |
| 6.  | Jean Pieper<br>Administrative Technician   | GS-07 | EOD 01/24/84 | PFT  |
| 7.  | Sean Sallmann<br>Prescribed Fire Specialist  | GS-09 | EOD 02/09/04 | PFT  |
| 8.  | Jon Krapfl<br>Biological Technician  | GS-06 | EOD 04/18/93 | PFT  |
| 9.  | Sherry Schwoch<br>Office Clerk   | GS-02 | EOD 09/07/97 | PINT |
| 10. | Angie Rusch<br>Office Clerk<br>Resigned 07/10/05   | GS-02 | EOD 09/09/97 | PINT |



11.	Mary Hull Office Clerk	GS-02	EOD 08/17/99	PINT
12.	Mike Madel Maintenance Mechanic	WG-10	EOD 08/17/97	PFT
13.	Dusty Balson Laborer Terminated 04/17/05	WG-02	EOD 11/13/04	STEP
14.	Andy Gross Laborer	WG-02	EOD 6/12/05	STEP
15.	Keith Jensen Engineering Equipment Operator Position ended 04/30/05	WG-08	EOD 06/10/02	TEMP
	Keith Jensen Engineering Equipment Operator	WG-08	EOD 05/31/05	TERM
16.	Duane Ketter Maintenance Worker (part-time)	WG-05	EOD 06/12/05	TEMP
17.	Randal Herman Maintenance Worker (part-time) Resigned 07/19/05	WG-05	EOD 06/28/05	TEMP
18.	Bill Herman Maintenance Worker (part-time)	WG-05	EOD 10/03/05	TEMP
19.	Nate Merk Student Trainee (Maintenance Worker)	WG-05	EOD 2/20/05	SCEP
20.	Shawn Papon Wildlife Biologist (Fox River NWR) Transferred to Madison WI Private Lands Office 12/02/05	GS-09	EOD 05/19/03	TERM
21.	Jake Ivan Wildlife Biologist (Green Bay and Gravel Island NWRs) Resigned 07/08/05	GS-09	EOD 07/28/03	TERM

- |     |   |       |              |      |
|-----|---|-------|--------------|------|
| 22. | Elizabeth Roznik<br>BioScience Aid (Green Bay and Gravel Islands NWRs)<br>Position ended 09/03/05 | GS-03 | EOD 05/17/04 | STEP |
| 23. | Brianne Winter<br>BioScience Aid (Green Bay and Gravel Islands NWRs)                              | GS-03 | EOD 05/31/05 | STEP |
| 24. | Mischa Connine<br>Wildlife Biologist (Green Bay and Gravel Island NWRs)                           | GS-09 | EOD 11/14/05 | TERM |
| 25. | Julie Bohen<br>Biological Science Technician – Fire Study<br>Resigned 04/30/05                    | GS-05 | EOD 09/07/04 | TEMP |
| 26. | Lori Wienke<br>Biological Science Technician – Fire Study   | GS-04 | EOD 07/05/05 | TEMP |
| 27. | Greg Hamilton<br>Range Technician<br>Resigned 05/14/05  | GS-05 | EOD 05/17/04 | TEMP |
|     | Greg Hamilton<br>Lead Range Technician  | GS-06 | EOD 10/16/05 | PSEA |
| 28. | John Below<br>Law Enforcement Officer<br>Transferred from Neil Smith NWR                          | GS-09 | EOD 12/18/05 | PFT  |



Back row from left, Mike Madel, Diane Kitchen, Keith Jensen, John Below, Jon Krapfl, Sean Sallmann, Patti Meyers

Front row from left, Jean Pieper, Wendy Woyczik, and Erin Railsback





Mischa Connine



Bill Herman



Jake Ivan



Sherry Schwoch and Mary Hull



Duane Ketter



Angie Rusch



Greg Hamilton

Dennis Raether began work at the Refuge on January 12, 2005, under the Experience Works program (formerly called Green Thumb), a non-profit organization that offers training, employment, and community service opportunities for mature workers. Through their Senior Community Service Employment Program, funded under Title V of the Older Americans Act, they are able to help thousands of low-income individuals, age 55 or older, gain valuable new skills and experience at various jobs so that they can secure meaningful employment in the future. Dennis worked 19 hours each week and was paid through Experience Works. Dennis did a variety of janitorial and maintenance duties each week. He required very little guidance and was a superb worker, enthusiastically embracing every task! Dennis "graduated" from the program when he successfully found a permanent, full time job near his home in Neosho, WI. After working for the Refuge for seven months, Dennis's last day was on August 10, 2005. Experience Works proved to be an excellent source of free labor for the Refuge, while providing valuable experience for Dennis.



Dennis Raether, Experience Works

Alexander ("Sasha") Keyel of Racine volunteered a total of 416 hours between the months of August and November 2005. He mainly assisted the biologists with vegetation projects and seeding, botulism clean-up, waterfowl surveys, and data entry. He also assisted with group service projects and checked water levels. By living in the mobile home, he was on-hand and cheerfully willing to lend a hand whenever needed.





Sasha Keyel, volunteer

## Volunteers

In calendar year 2005, over 284 people volunteered in wildlife, habitat, outreach, administrative, and maintenance projects for the Horicon National Wildlife Refuge. They contributed over 4,658 hours of time and talent, at an estimated value of \$82,221.

Those figures include 49 volunteers who worked more than 2,826 hours as individuals from at least 22 communities: Beaver Dam, Fox Lake, Brownsville, Mayville, Ripon, Waupun, Sun Prairie, Fond du Lac, Fort Atkinson, Hubertus, Juneau, Rubicon, Wauwatosa, Horicon, Campbellsport, Portage, Sheboygan, Racine, Milwaukee, Stevens Point, West Bend and Oshkosh.



*Redeemer Lutheran Pioneers clearing brush*



*John Krapfl used his woodworking skills to make the Refuge a whooping crane for educating visitors.*

The figures also include more than 234 people who volunteered in eight groups from 6 communities: Beaver Dam, Portage, Stevens Point, Milwaukee, Juneau and Fond du Lac.



The groups include the Friends of Horicon National Wildlife Refuge, Beaver Dam Charter School, River Crossing Charter School (Portage), Camp Silverbrook, Juneau Victorians 4-H, Redeemer Lutheran Church Boy Pioneers, John Muir Middle School (Portage), Community Care, Inc., and UW Stevens Point.

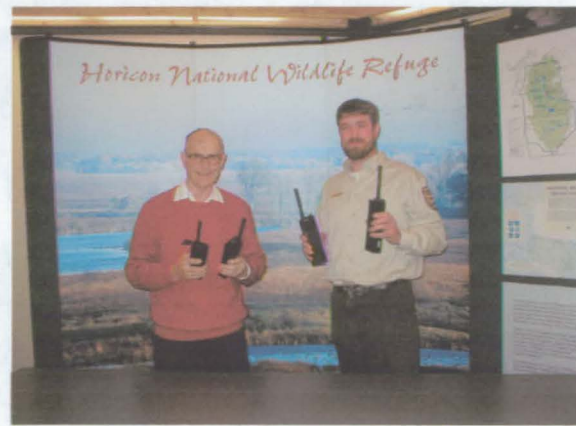
A training session was held in August of FY 2005 to prepare volunteers for incoming visitors and upcoming events.

The annual volunteer recognition banquet for CY2005 was held on February 28, 2006, at the Refuge visitor center. The event included dinner, a program by Kay Stellpflug (a motivational speaker), and awards highlighting the volunteer with the most hours, volunteer group with the most hours and Volunteer of the Year. A total of 42 people attended the recognition banquet.

**Bill Holmes of Rubicon** was named *volunteer of the year* (below with Erin Railsback). Bill has been an active member of the Friends group and also a dedicated volunteer for many years. He has helped with numerous projects, including visitor center landscaping, educational programs, outreach events, administration of Coot's Corner, frog surveys, maintenance of the Critter Cam and also wrote a successful grant to purchase much-needed fire radios for the Refuge fire crew.



Bill Holmes and Erin Railsback – Volunteer Award



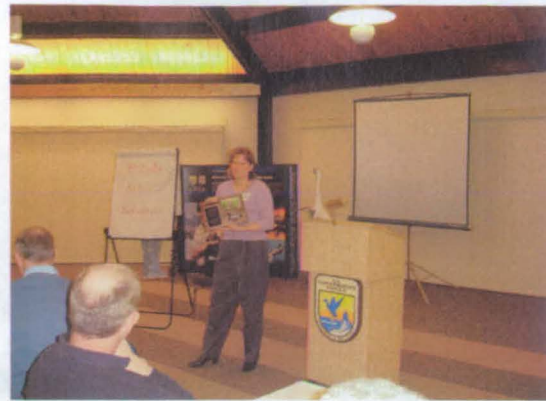
Bill Holmes presenting fire radios to Sean Sallman

**Ted Turluck of Sheboygan** was recognized as the *individual* who worked the most hours during CY2005. Ted put in a total of 525 hours assisting the biologists with vegetation and bird surveys, botulism clean-up, crane monitoring and the completion of a herbarium collection for the Refuge. Ted was unable to attend the recognition banquet so biologist Wendy Woyczik accepted on his behalf.



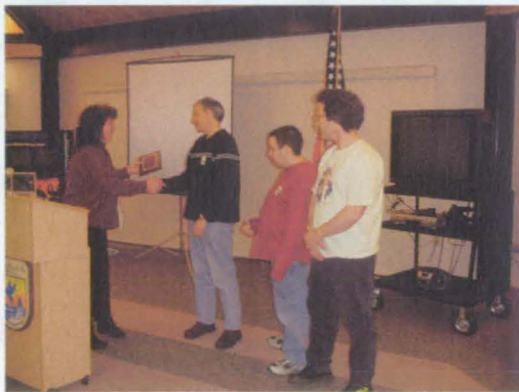


*Ted Turluck – botulism clean-up*



*Wendy Woyczik accepts volunteer award for Ted*

For the eighth year, **The Beaver Dam Charter School** was recognized as the group that worked the most hours. Fifty-two individuals put in a total of 457 hours at Horicon and Fox River National Wildlife Refuges during CY2005. They assisted with seeding, brush removal, maintenance, duck wing I.D. and litter pickup.



*Tow W., Jordan K, and Bill E.. accept volunteer award for charter school from Diane Kitchen*



*Human Treasure Hunt – Kay Stelpflug*



*Volunteer Recognition Dinner*



Wilderness Is.

**GREEN BAY AND GRAVEL ISLANDS NATIONAL WILDLIFE  
REFUGES**

**New Franklin, Wisconsin**

**ANNUAL NARRATIVE REPORT**

**Calendar Year 2005**

**U.S. Department of the Interior  
Fish and Wildlife Service  
National Wildlife Refuge System**

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# Introduction

Green Bay and Gravel Island National Wildlife Refuges (NWR) were set aside by Executive Orders in 1912 and 1913, respectively, as preserves and breeding grounds for birds. They were the 2<sup>nd</sup> and 3<sup>rd</sup> refuges established in the Great Lakes region. Originally under the Department of Agriculture, the islands came under the jurisdiction of the Department of the Interior by Presidential Proclamation, July 30, 1940. Gravel Island NWR is comprised of Gravel (10 acres) and Spider (25 acres) Islands. Hog Island (7 acres) is the lone component of Green Bay NWR. The 2 refuges were added to the Wilderness Preservation System in 1970 and together form the Wisconsin Islands Wilderness Area, one of the smallest in the country. No development has taken place on the islands and general public use is restricted to minimize disturbance to colonial nesting birds.

Presently, the U.S. Fish and Wildlife Service (Service), U.S. Coast Guard (USCG), and Bureau of Land Management (BLM) are working to transfer Plum (314 acres) and Pilot (6 acres) Islands to the Service in FY06. Upon transfer, Plum and Pilot will become part of Green Bay NWR. While they are not technically a part of the National Wildlife Refuge System at this time, refuge staff committed considerable effort toward a biological inventory of these islands in anticipation of their transfer, and a summary of that work is presented here along with work on refuge property. Portions of Plum and Pilot Islands were developed to serve as lighthouse facilities or life saving stations during the late 19<sup>th</sup> century. Many of the historic structures remain, some of which are included on the National Register of Historic Places. General public use of USCG property is restricted.

## Climate Data

	Mean Temp (°F)	Min. Temp (°F)	Max. Temp (°F)	Precip. (Inches)	Snowfall (Inches)
Oct-04	33	69	48	4.46	0.0
Nov-04	26	54	40	3.00	0.0
Dec-04	-1	47	26	2.21	21.0
Jan-06	-6	46	17.5	0.78	11.7
Feb-05	8	40	25.5	1.19	11.6
Mar-05	-1	54	25	0.83	14.8
Apr-05	27	74	43	1.42	0.0
May-05	30	71	49	2.23	0.0
Jun-05	49	86	65.5	1.92	0.0
Jul-05	48	91	70	2.48	0.0
Aug-05	54	87	70	2.08	0.0
Sep-05	45	81	64	2.86	0.0
Oct-05	35	69	51	1.53	0.0

(Data Source: NOAA National Climatic Data Center, Washington Island Weather Station, COOPID 478905. Data not available after 10/05).



# 1

## Monitoring and Studies

### 1a. Surveys and Censuses

This past year, 2005, marked the second year of baseline biological inventory work for Green Bay and Gravel Island NWRs. Identification and quantification of biotic resources (vegetation, migratory and breeding birds, small mammals, and herpetiles) began in April 2004 and will continue through the 2006 field season. A brief summary of 2005 activities appears below.

#### *Vegetation*

In 2004 general cover maps of all islands were digitized into a GIS using geo-rectified scans of 1:8000 color aerial photos taken in July 2003. Vegetation categories for these maps were based on physiognomic characteristics and followed the National Vegetation Classification Standard (NVCS) through the formation level (Federal Geographic Data Committee 1997; Table 1). Formation boundaries were ground-truthed in the field using aerial photos and GPS.

**Table 1.** Acres and number of patches of the 13 vegetation formations present on Green Bay and/or Gravel Island National Wildlife Refuges, 2004. Formation descriptions follow the National Vegetation Classification Standard, Federal Geographic Data Committee (1997).

Formation (National Vegetation Classification Standard)	#	Acres
	Patches	
Cold-deciduous woodland ( <i>trees 25-60% canopy cover</i> )	8	124.0
Lowland or submontane cold-deciduous forest ( <i>trees 60-100% canopy cover</i> )	4	92.8
Medium-tall temperate or subpolar grassland with a sparse cold-deciduous tree layer ( <i>herbaceous vegetation dominant, trees/shrubs &lt;25% canopy cover</i> )	10	35.3
Cobble/gravel beaches and shores	11	24.7
Pavement with sparse vascular vegetation	18	24.4
Conical-crowned temperate or subpolar needle-leaved evergreen forest	5	18.7
Semipermanently flooded temperate or subpolar grassland ( <i>surface water persists throughout growing season in most years</i> )	2	16.7
Tall temperate or subpolar perennial forb vegetation ( <i>forbs &gt;1m tall</i> )	2	7.9
Low temperate or subpolar perennial forb vegetation ( <i>forbs &lt;1m tall</i> )	1	6.8
Temperate cold-deciduous shrubland ( <i>shrubs ≥ 0.5-m tall, shrubs &gt;25% canopy cover, trees &lt;25% canopy cover</i> )	4	4.7
Low temperate intermittently exposed annual forb vegetation ( <i>substrate usually exposed, but surface water can be present for variable periods</i> )	2	4.3
Permanently flooded temperate or subpolar hydromorphic-rooted vegetation	1	1.4
Cliffs with sparse vascular vegetation	1	0.5
<b>Total</b>	<b>69</b>	<b>362.1</b>

To provide more detailed description of the floral community and facilitate future monitoring efforts, vegetation sampling plots were randomly distributed within each of the vegetative formations present on the islands. Data gathering at vegetation plots followed standard overstory tree, pole-size tree, seedling tree, shrub, herbaceous, and fuel load protocols presented in the National Park Service's Fire Monitoring Handbook (FMH; U. S. Department of Interior National Park Service 2003). Following these protocols allowed Service staff to concurrently fulfill NVCS requirements so that the vegetative formations can be divided into alliances and associations and provided baseline data so that changes can be monitored through time using FMH software. In 2005, 20 permanent vegetation plots were set up on Plum Island. Combined with the 2004 effort, at least one plot has now been set up in each formation on each island. More plots will be added in the future until the precision on estimates of percent cover of various species/groups of species attains an acceptable level. After that, plots will only be monitored once every 5 years to track long-term vegetation responses to management and natural processes.



Fig. 1. Vegetation plot on Plum Island



Fig. 2. Vegetation plot on Plum Island

Vegetation information was also collected on a single plot at Rock Island State Park. Rock Island lies about 13 kilometers northeast of Plum Island and contains a virgin forest. Information collected on plots at Rock Island should provide a base of comparison for what Plum Island might look like in the future or would look like presently if it had not been subjected to several bouts of extensive logging.

#### *Migrant Landbirds*

Surveys for migrant landbirds on Plum Island followed the "Area Search Method" described by Ralph et al. (1993). Accordingly, a GIS shapefile was created in which Plum Island was divided into 3-ha blocks. This shapefile was downloaded to hand-held GPS units. Due to lack of time and personnel available for conducting spring surveys, the entire island was not



mapped. Instead, during each survey, staff sampled 1 column of 3-ha blocks running north-south down the center of the island and 1 row of blocks running east-west across the center of the island. Sampling was carried out by spending 20 minutes within each block mapping the location of all individuals detected by sight or sound. GPS and downloaded grids were used to guide observers through each plot and to estimate location of individuals observed. All surveys took place during the first 5 hours of daylight (approximately 5:00 am to 10:00 am). Surveys were conducted on May 7, 8, 15 and 26 in an effort to capture both early and late migratory species. No fall migrant surveys were conducted in 2005.

Surveys of Hog, Pilot, and Gravel Islands followed the same general methodology except that these islands are small enough that they can be searched entirely in 20-30 minutes. Therefore, they were not divided up into blocks for sampling. Each was visited during the afternoon of May 17. Migrant landbird surveys on Spider Island were conducted incidental to the band-resighting effort (see below), also on May 17.

Sixty-five species were observed on Plum Island during the migratory season including 14 species of warblers and 7 species of sparrows. By far, yellow-rumped warblers composed the majority of the warbler observations; white-throated and white-crowned sparrows were the most abundant sparrows. No landbirds were recorded on Spider, Pilot, or Hog Islands during the spring migratory period.

#### *Breeding Birds*

Surveys for breeding birds on Plum Island followed the "Area Search method" described above with 2 exceptions: 1) all blocks were visited during a survey, and 2) surveys were conducted 3 times corresponding to early (6/7-6/8), mid (6/15-6/17), and late (6/22-6/23) breeding season. The breeding bird communities on Hog, Spider, and Gravel Islands are largely comprised of colonial nesting species. To minimize disturbance, each island was visited once during the breeding season (Spider on 6/17, all others on 6/7), and the number of nests of each species were tallied. Non-colonial species were also recorded during these visits.

Fifty-six species were detected during the breeding season on Plum Island. As in 2004, the ubiquitous American redstart was observed more often than the next most common species (in order: house wren, indigo bunting, red-eyed vireo, red-winged blackbird, American robin, eastern wood-pewee). Notable species recorded in 2005 but not observed in 2004 included hermit thrush, yellow-billed cuckoo, black-billed cuckoo, and scarlet tanager. Canada geese, mallards, bald eagles, American woodcock, and northern flickers were among the Region 3 conservation priorities that used Plum Island during the breeding season. The eagle nest near the center of the island was successful again in 2005; 2 eaglets were produced.

Spider Island again housed 8 double-crested cormorants colonies (1.6 total acres) interspersed among a matrix of herring gull nests. In combination these 2 species cover most of the 25-acre island. 1985 cormorant nests were recorded on the 6/17 survey. A single Canada goose nest and a mute swan nest were observed on Spider Island during early spring visits to erect blinds for the cormorant demography study (see below).

On Hog Island, 212 herring gull nests were counted around the perimeter of the island on open rocks. Staff also discovered 2 red-breasted merganser nests and 7 great blue heron nests on snags in the center of the island. Singing male song sparrows and red-winged blackbirds were observed as well.

Pilot Island was home to an estimated 2937 double-crested cormorant nests occurring in 2 colonies (1.1 total acres). A handful of great blue and black-crowned night herons also nested on Pilot. Red-winged blackbirds were the only non-colonial nesting species observed.

Much like Spider Island, Gravel Island was covered almost entirely by a matrix of 395 herring gull nests (Figure 3) except for the northeast portion of the island and the adjacent shoal where Caspian terns formed a colony of roughly 1025 nests. Service staff also observed a pair of great black-backed gulls incubating a nest on Gravel, confirming suspicions from the previous 2 years that that they were, in fact, breeding there.



**Fig. 3.** Nesting herring gulls on Gravel Island





**Fig. 4.** Double-crested cormorant colony on Spider Island

In addition to refuge breeding bird surveys, staff also sampled 40 3-ha plots within the virgin forest on Rock Island using the same methods as described above. All plots were sampled on the same morning near the end of the breeding season (6/29). As with the vegetation plot on Rock Island, the purpose of this survey was to obtain information on what the bird community on Plum Island would look like if it had not been substantially harvested. Not surprisingly, mature interior forest species such as scarlet tanager and black-throated green warbler were relatively abundant on Rock Island whereas they are observed only occasionally in the remnant mature patches on Plum. Conversely, many open forest or forest edge species seen routinely on Plum (e.g. mourning warbler, Baltimore oriole) were absent from the plots on Rock Island.

#### *Migrant waterfowl and shorebirds*

The eastern shores of Gravel and Spider Islands provide the best shorebird habitat on the refuge during low-water conditions. In such circumstances, a wide, flat area of dolomite pavement becomes exposed and numerous fissures and shallow depressions in the limestone retain water after rain, storms, or heavy seas. This water is quickly warmed and, along with racks of vegetation that wash up, supports invertebrates and feeding shorebirds.

During the spring migration, formal shorebird surveys were conducted (5/25 & 5/26) by slowly walking shorelines of the islands, stopping intermittently to scan ahead using binoculars and 60x spotting scopes. A handful each of short-billed dowitchers, whimbrels, killdeer, red knots, ruddy turnstones, black-bellied plovers, and spotted sandpipers were observed during the survey along with 54 dunlins and 26 semi-palmated sandpipers. Least sandpipers, pectoral sandpipers, and semi-palmated plovers were not observed during the spring survey but were common during the previous fall migration. Spider Island was never formally surveyed in spring 2005, and no islands were surveyed during the fall migration.



### *Small Mammals*

Beginning in June 2004, a trapping effort was initiated to document small mammals present on Plum Island. Trapping occurred along randomly distributed transects according to the following guidelines: 1) as a minimal effort, at least 1 transect (10 traps) was established per 25 acres of habitat, 2) every habitat type (i.e. NVCS formation) had to be sampled by at least 1 transect, 3) no transect was <100m from an adjacent transect, and 4) with regards to spatial context, transects were distributed evenly for habitat types with multiple patches occurring across the island (e.g. aspen patches occur in the northeast, northwest, southeast, and southwest quadrants of the island, therefore transects were distributed such that patches in at least 3 of the 4 quadrants were sampled). Transects were 75 or 150 m in length depending on patch size, and consisted of Sherman™ live traps placed every 15m. In addition, Tomahawk™ live traps (7" x 7" x 20" or 9" x 9" x 26") were placed at the first station in each line. Sherman™ traps were baited with a mixture of rolled oats, peanut butter, and sunflower seeds. Tomahawk™ traps were alternately baited with apples (to attract lagomorphs), nuts (to attract tree squirrels), and sardines (to attract small or medium-sized carnivores).

In 2005, 4 transects were run in habitat types that were not sampled in 2004. As in 2004, 120 trap-nights in June yielded captures of only a single species: deer mouse (*Peromyscus maniculatus*). White-tailed deer were observed intermittently throughout the summer, including fawns. It does not appear that insectivores, lagomorphs, small carnivores, or other rodents have been able to successfully colonize the island, although it should be large enough to support at least some of these species. Trapping was not conducted on the other islands due to time constraints and diminished chances of mammals occurring there.

### *Herpetofauna*

In 2004, coverboard transects were randomly distributed within each habitat type following the rules described previously for trapping transects. Three-eighths inch to ½" thick blandex boards (24" x 24" or 40" x 40") were placed every 15 m along transects. Staff removed vegetation at each station so that boards were placed directly on the soil. Twenty transects (154 boards) were established in July. At least one transect occurs on each of the 5 islands. Coverboards were left undisturbed for the remainder of the summer and were checked 4 times during the 2005 field season. Staff also conducted frog and toad call surveys around the wetland on Plum Island during 3 evenings in mid to late May and early June.

Five species of herpetofauna were observed across the 4 coverboard sampling occasions: common garter snake (*Thamnophis sirtalis*), brown snake (*Storeria dekayi*), western fox snake (*Elaphe vulpina*), northern ringneck snake (*Diadophis punctatus edwardsi*), blue-spotted salamander (*Ambystoma laterale*), and central newt (*Notophthalmus viridens louisianensis*). A strong chorus of northern spring peepers (*Pseudacris crucifer*) along with several individual American toads (*Bufo americanus*) and eastern gray tree frogs (*Hyla versicolor*) were recorded on each of the 3 call surveys. Incidental to other work on Plum Island, staff observed several northern water snakes (*Nerodia sipedon*). No herpetiles were noted on any of the other islands, although fox snakes have been reported to be abundant on Pilot Island in the past.



**Fig. 3** An American toad (*Bufo americanus*) found on Plum Island during herpetile surveys



**Fig. 4.** Betsy Roznik holding a northern water snake (*Nerodia sipedon*) found on Plum Island during herpetile surveys

## **1b. Studies and Investigations**

The Contaminants Biologist at the Green Bay Ecological Services Office continues to lead a mark-recapture demographic study of double-crested cormorants on Spider Island. Ongoing since 2001, the objectives of this study are to 1) determine age of first nesting, 2) determine age specific survival rates, and 3) determine frequency of breeding by individuals. Refuge staff helped erect blinds for the study in April, collected re-sighting information on 2 occasions in May and June, and assisted in color-banding 400 nestlings in July.

All re-sighting histories were entered into Program Mark for a preliminary analysis in 2004. Based on Closed Jolly-Seber time-dependent models, adult survival from 2001-2002 was estimated at  $0.694 \pm 0.089$  (Resighting probability =  $0.343 \pm 0.068$ ); adult survival from 2002-2003 was estimated at  $0.610 \pm 0.061$  (Resighting probability =  $0.655 \pm 0.062$ ). Data collection will continue through at least 2006 on this project.

Several bands placed on cormorants at Spider Island have been recovered on the wintering grounds. Most of the recent recoveries have come from aquaculture facilities near the lower Mississippi River where cormorants are harassed or dispatched to minimize depredation of fish stocks. Band returns from this source has increased over the past 2 years following recent efforts to control cormorant populations.



# 3

## Habitat Management

### 3g. Pest Plant Control

Small (<0.5 acres) patches of phragmites (*Phragmites australis*) and reed canary grass (*Phalaris arundinacea*) occur around the perimeter of the permanent wetland at the north end of Plum Island. Scattered reed canary grass also occurs throughout the area that is intermittently flooded. To prevent these invasive plants from taking over the otherwise pristine wetland, staff initiated control efforts in July, 2005. In larger patches, individual phragmites and canary grass plants were tied off into bundles, seed heads were clipped off, and plants were sprayed with Rodeo. Staff also worked to clip seed heads off of reed canary plants that were scattered widely and sparsely throughout the remainder of the wetland. In total, approximately 1.25 acres of the 17.5 acre wetland area were chemically and/or manually treated.



**Fig. 5** Wildlife biologists Jake Ivan and Wendy Woyczik removing phragmites on Plum Island



**Fig. 6.** Biological science technician Jon Krapfl spraying phragmites on Plum Island

# 5

## Coordination Activities

### 5a. Interagency Coordination

The refuge biologist coordinated exotic vegetation removal activities with non-governmental organizations (NGO's), state agencies and volunteer groups. Agencies that aided in the exotic vegetation removal were The Door County Land Trust, The Nature Conservancy (TNC) and The Wisconsin Department of Natural Resources (WDNR).



# 6

## Resource Protection

### **6f. Cultural Resource Management**

In May 2005, refuge staff conducted research in the National Archives to gather historical, cultural, and ecological information about Plum and Pilot Islands using the daily logbooks from the Coast Guard facilities that have been operating there since the mid to late 1800s. Livestock were run on Plum Island early in its operation and a substantial amount of firewood (hundreds of cords) was cut early on to heat, cook, and operate the steam fog signal. However, aerial photos taken in the 1930s suggest that effects of these practices were negligible or non-existent by that time. Original blueprints, plot plans, and elevations were also located. These should assist in efforts to restore the historic structures on these islands, and will help in locating wells, septic fields, electric lines, etc. as well as provide material for future displays on the refuge.

### **6g. Land Acquisition Support**

Work has continued on the acquisition process for Pilot and Plum Islands. Both are former USCG Stations that will be relinquished back into the public domain (i.e. to BLM) and would become part of Green Bay NWR upon subsequent transfer to the Service. A Director Concurrence Package, Plum and Pilot Island Concept Plan and a Briefing statement was prepared and sent to Washington D.C. in January 2006 for approval. Consideration for addition of these islands to the NWR system should occur in FY06.

# 7

## Public Education and Recreation

### **7b. Outreach**

As explained in section 8b, outreach activities with volunteer groups and private volunteers was conducted. This allowed for education regarding the Green Bay and Gravel Islands National Wildlife Refuges, as well as, allowing access to the otherwise closed areas.

# 8

## Planning and Administration

### **8b. General Administration**

In 2003, one full-time term wildlife biologist was hired as the area biologist for the Green Bay and Gravel Islands National Wildlife Refuges. The primary duties were to conduct baseline vegetation and vertebrate surveys, habitat restoration and preparing a habitat management plan.

Funding for the project was obtained from the National Resource Damage Assessment (NRDA) for four years. After the project is complete, the Horicon staff is expected to manage the refuge.

Individual volunteer, Jeff Bahls, assisted the biologist with bird surveys on the islands.

Volunteers donated more than \$8,000 in labor assisting with these projects.

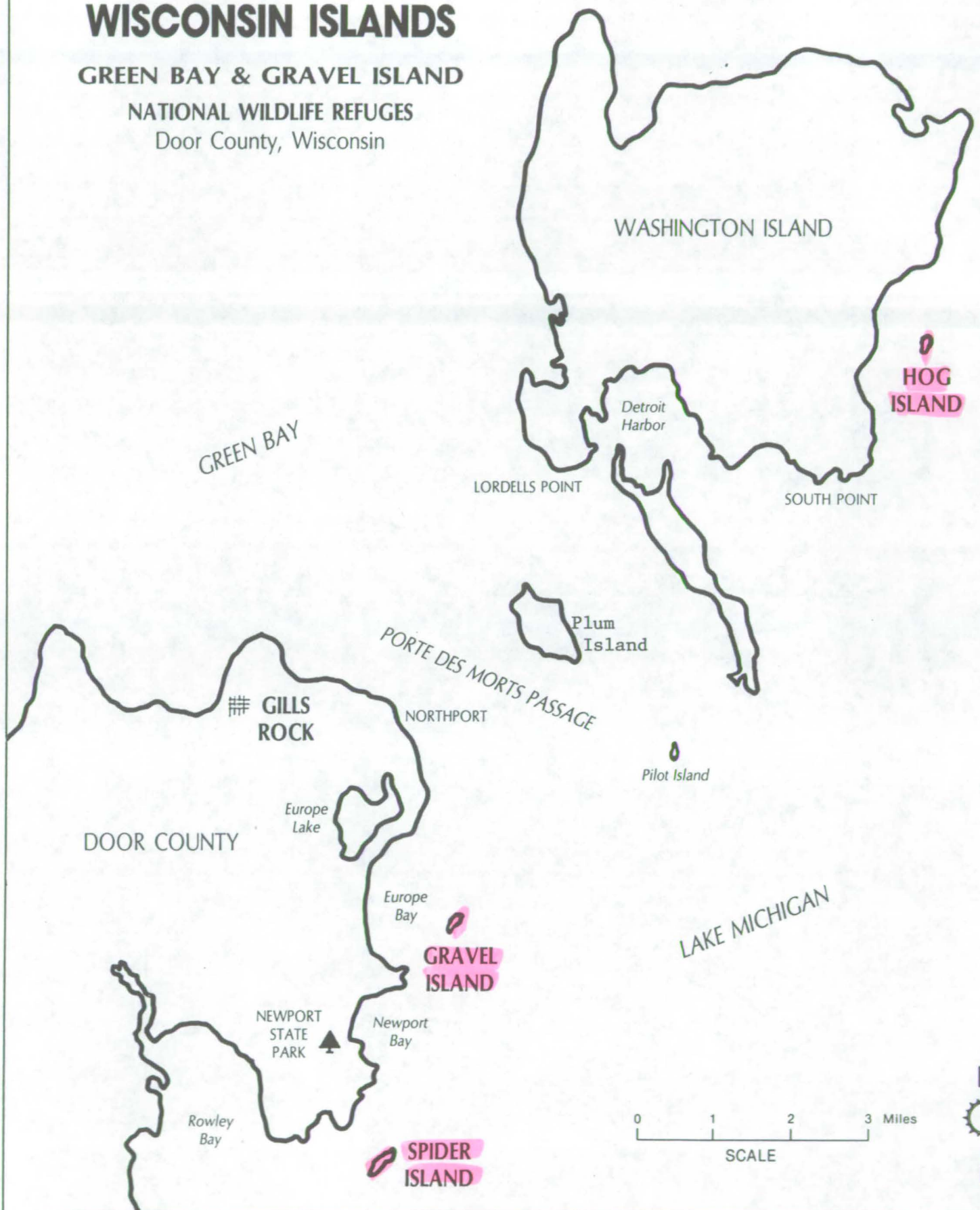


# WISCONSIN ISLANDS

## GREEN BAY & GRAVEL ISLAND

### NATIONAL WILDLIFE REFUGES

Door County, Wisconsin



U.S. Department of the Interior  
Fish and Wildlife Service





**FOX RIVER NATIONAL WILDLIFE REFUGE**

**Marquette County, Wisconsin**

**ANNUAL NARRATIVE REPORT**

**Calendar Year 2005**

**U.S. Department of the Interior  
Fish and Wildlife Service  
National Wildlife Refuge System**



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# Introduction

Fox River National Wildlife Refuge, managed by staff at Horicon National Wildlife Refuge, encompasses 1,004 acres of wetland and upland habitat along the Fox River in Marquette County, Wisconsin. The majority of the current Refuge was acquired in 1978 under the U. S. Fish and Wildlife Service's Unique Wildlife Ecosystem Program for the purposes of protecting an area known as the Fox River Sandhill Crane Marsh from further drainage and protecting an important breeding and staging area for the greater sandhill crane. Refuge objectives include restoring, enhancing, and preserving the wetland and adjacent upland habitat historically found in extensive areas along the Fox River, namely Oak Savanna uplands and Sedge Meadow wetlands. Another objective is to restore, enhance, and preserve the wildlife populations that use the wetland and upland habitats along the Fox River, with special emphasis on those species dependent upon large expanses of natural marsh, such as the greater sandhill crane. Other objectives include protecting the habitats of any Federal or State endangered or threatened species that may utilize the Refuge, such as Bald Eagles, and to make the Refuge available for outdoor recreation, environmental education, and other public use activities compatible with the above objectives.



# Climate Data

## Climatological Review - 2005

Climate data for Fox River Refuge was similar to that at Horicon Refuge and is provided below.

<u>Temperatures (in Fahrenheit)</u>						
Month	2005		Normal *		2005	
	Average High	Low	High	Low	Highest Recorded	Lowest
January	26.3	11.7	26.0	13.3	41.0, Jan 1	-12.5, Jan 23
February	36.6	21.2	30.2	15.8	50.4, Feb 6	4.3, Feb 18
March	41.5	21.5	39.2	24.9	69.6, Mar 31	0.1, Mar 2
April	64.2	39.0	53.5	35.6	81.1, Apr 19	29.5, Apr 3 & 28
May	67.1	45.5	64.8	44.7	81.0, May 9	30.9, May 2
June	84.8	61.3	75.0	54.7	94.1, Jun 25	47.1, Jun 18
July	85.1	61.1	79.8	61.1	94.8, Jul 18	48.9, Jul 2
August **	82.8	60.3	78.4	50.2	92.3, Aug 10	49.5, Aug 23
September **	78.6	54.4	71.2	52.5	90.7, Sep 11	35.6, Sep 29
October	64.1	41.4	59.9	41.9	86.0, Oct 5	24.8, Oct 28
November	48.3	29.7	44.7	29.9	64.8, Nov 3	9.5, Nov 17 & 24
December	26.6	13.4	32.0	18.2	43.7, Dec 24	-7.4, Dec 6

\* Data from the National Weather Service Bureau, Milwaukee, Wisconsin

\*\* Temperature sensor on weather station failed. Only days with correct readings were used to get averages and the highest and lowest temperatures.

### Rainfall (in inches)

Total for the year

Greatest in 24 hours

### Snowfall (in inches)

Calendar Year 2005

Greatest in 24 hours

### Actual

23.8

1.71" on November 6

### Actual

56.75

9" on Jan 6th and Jan 21st

### Normal

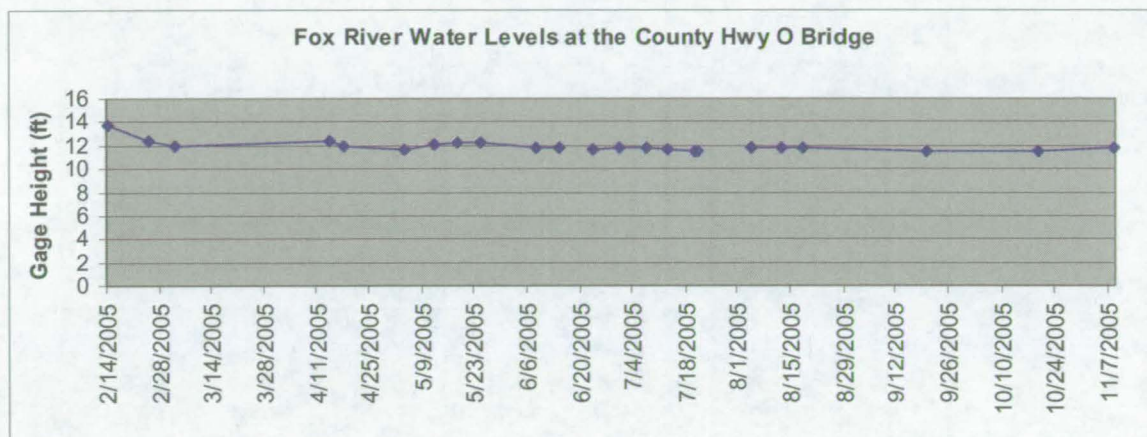
18.01

### Normal

47.6

## Climatic Highlights

Many of the same climatic events mentioned in the Horicon Refuge section applied to Fox River Refuge as well. At Fox River NWR, a rain gauge maintained by the biologist documented 15.75 inches of rain between May 14 and November 8. This information will be helpful in planning the wetland restoration project. On March 25, the biologist installed a river gage on the highway O bridge to document river levels and their relation to Refuge wetland habitat. That data is shown below.



# 1

## Monitoring and Studies

### 1a. Surveys and Censuses

#### **Vegetation and Habitat Surveys**

The majority of the Refuge is sedge meadow, wet prairie, and shallow marsh wetlands dominated by many species of sedges, grasses, and cattail. However, other wetland types such as fens, lowland forest, shrub-carr thickets, deep marsh, and open water occur on the Refuge as well. Fens are a very rare wetland type in Wisconsin and harbor many state threatened and endangered plants. Upland habitats consist of closed canopy upland deciduous forest dominated by white, black and bur oak, upland dry prairie and oak savanna. Two spring-fed creeks flow through the Refuge, two other spring-fed creeks originate on and flow through the Refuge and the Fox River forms the southern and western boundaries of the Refuge, adding to the diversity of the area. Eleven springs have been documented on the Refuge and many other groundwater seeps are located throughout the Refuge. Soils in Refuge wetlands are predominantly deep and shallow mucky peat underlain by sand; soils in uplands are very sandy, ranging from loamy sand to sandy loam. The sand underlayment in Refuge wetlands means the groundwater table is very high, acting to keep the wetlands wet. Therefore, groundwater inputs are likely more important than surface runoff in the proper functioning of this unique wetland and water levels are less likely to fluctuate. However, surface water inputs are still important in the proper functioning of this wetland.

As mentioned in 2003, an extensive network of 100 survey points were randomly placed in six broad habitat types on the Refuge in order to monitor vegetation and wildlife communities, as well as abiotic conditions, namely the hydrologic regime (see map in 2003 narrative). At this point, the data has not been entered or analyzed, but a summary of common plant species and other habitat characteristics in each of the six habitat types surveyed follows. These surveys will provide good insight into the effects of management and restoration efforts on habitat and wildlife.

#### *Wet Prairie - Emergent Marsh (WPEM)*

This habitat type was very broad and included most treeless wetland habitats, such as wet prairie, sedge meadow and shallow emergent marsh. Wet prairie and sedge meadow was difficult to differentiate as these two habitats tended to mix together. Wet prairie was drier than the sedge meadows and was dominated by tussock sedge (*Carex stricta*), flat-top aster, joe-pie weed, goldenrod spp., wild iris, smartweed spp. and sensitive fern. Wet prairie also tended to be overgrown in many places with shrubs such as red-osier



dogwood, willow spp., poison sumac and alder. Many of the wet prairie sites were also fens, where rare plants characteristic of fens were documented, such as hedge nettle, swamp thistle, lousewort, obedient plants, sneezeweed, culvers root, water hemlock, downy willoweed and St. John's wort, among others. There was rarely any surface water in the wet prairie; only moist soil. Sedge meadows were dominated by plant species with more flooding tolerance, such as lake sedge (*Carex lacustris*), *Carex lasiocarpa*, blue joint grass, marsh fern, some patches of tussock sedge, *Impatiens* spp., wild iris and moss spp. The sedge meadows were much more monotypic than the wet prairies and had fewer forbs than wet prairie. Other species documented that were not too common included mint spp., bedstraw, and *Rumex* spp. Water depths in sedge meadows varied from 0 – 10 inches, with a mean close to 5 inches. Shallow emergent marsh had generally deeper water depths, ranging from 0 – 30 inches, with a mean close to 15 inches. Again, it was difficult to discern distinct differences in shallow marsh and sedge meadow, but shallow marsh tended to be dominated by cattail spp., lake sedge, some blue joint grass, *Epilobium* spp., *Sagittaria* spp., *Biden* spp., *Rumex* spp., *Scirpus* spp. (wool grass, river bulrush and softstem bulrush), smartweed spp., bur reed and sweet flag.

#### *Wetland Shrub-Scrub (WSS)*

These shrub-carr habitats were dominated by red osier dogwood, other dogwood spp., willow spp., alder spp., bog birch, tamarack, green ash, poison sumac and some aspen. The herbaceous community and hydrology was similar to that of wet prairie, and as a result fens occurred in this shrub scrub habitat.

#### *Wetland Forest (WF)*

Dominant trees in this habitat type included tamarack (mostly), green ash, swamp white oak, red maple, elm spp. and some bur oak. Mid-canopy trees and shrubs included those mentioned previously, dogwood spp., bog birch, poison sumac, alder spp. and willow spp. The herbaceous layer was dominated by moss spp., *Carex* spp., grass spp., wild raspberry, fern spp., *Impatiens* spp. and nettle spp. Little, if any, surface water was present, but soil was very moist.

#### *Upland Prairie (UP)*

Only four survey locations were located in upland prairie (old agriculture fields). These points were dominated by monotypic cool season grass stands consisting of mainly smooth brome, quack grass, and Kentucky bluegrass. Goldenrod spp. and common mullein were the only common forbs found.

#### *Upland Savanna (US)*

Upland savanna was similar to upland prairie, the only difference being that these sites were invaded by small red cedar and white pine, thus creating an old field savanna. This savanna is not the goal of management and restoration efforts – the goal is true oak savanna. These old field savannas did contain some good native plant species (in a limited amount) not found on upland prairie sites, such as big bluestem, little bluestem,

whorled, common and sand milkweed, *Carex* spp., wild raspberry, aster spp., multiflora rose, western ragweed, bush clover, needle grass, *Cyperus* spp., horsemint, blazing star and butterfly milkweed.

#### *Upland Forest (UF)*

All of the upland forest on the Refuge was historically oak savanna, dominated by white, black and bur oak. Now, it is a closed canopy forest with many tree species that are not fire tolerant. Many remnant savanna trees exist in these forests, obviously open grown, with broad, spreading, drooping crowns. Dominant tree species were white oak, black oak, bur oak, black cherry, red cedar, elm spp., northern red oak, shagbark hickory, sugar maple and some green ash. Mid-canopy trees and shrubs consisted of those dominant trees mentioned previously, plus mulberry, grape spp, winterberry and dogwood spp. The herbaceous layer was dominated by huckleberry spp., wild raspberry, garlic mustard (not good), avans, nettle spp., grass spp. and burdock.

#### *Open Water – Deep Marsh (OW)*

This habitat type was not officially sampled with the methods used in the habitat types above. However, casual observations from open water/deep marsh wetlands on the Refuge are recorded here. Wild rice and a variety of submersed aquatic vegetation was present on Refuge open water wetlands. Submerged aquatic vegetation consisted of water lilies, *Potamogetan* spp., coontail, wild celery and a variety of others not identified.

### **Wildlife Surveys**

The matrix of the many wetland and upland habitat types present provides excellent habitat for both wetland and upland associated wildlife, such as ducks, greater sandhill cranes, herons, rails, songbirds, deer, turkey and bobwhite quail. Comprehensive plant, bird, fish, amphibian, reptile, or mammal lists need to be developed. These baseline surveys will provide good insight into the effects of habitat management and restoration efforts on wildlife.

#### *Waterbird Surveys*

Waterbird surveys were performed on 9 transects established either on or within 1.5 miles of the Refuge boundary during the spring. Survey data from all 9 transects was summed in order to get the data shown below. No corrections for disturbance or surveyor error were performed. Surveys were performed via boat and walking, except those mentioned above, which were performed only by walking.

A total of 19 waterbird species were documented on the Refuge during these surveys. Canada geese, greater sandhill crane, mallard, blue-winged teal, green-winged teal, northern shoveler and wood duck make up the majority of individuals documented on the Refuge. The table below shows a summary of species and groups documented on the Refuge.

**Summary of Spring 2005 Waterbird Surveys at Fox River NWR**

<u>Date</u>	<u>Cranes</u>	<u>Geese</u>	<u>Dabblers</u>	<u>Divers</u>	<u>Coot</u>	<u>GB Heron</u>	<u>RB Gull</u>	<u>F Tern</u>	<u>B Tern</u>	<u>Other</u>	<u>Total</u>
2/25/2005	4	2	10	0	0	0	0	0	0	0	16
4/14/2005	206	1006	595	0	0	0	10	0	0	76	1893
9/23/2005	80	35	564	0	0	5	0	0	0	82	766

*Crane Surveys*

In addition to data from the waterbird and bird point count surveys conducted on the Refuge during spring, summer and fall, the Annual Sandhill Crane Count, sponsored by the International Crane Foundation, took place on April 17<sup>th</sup> all across Wisconsin and adjoining states. In Wisconsin alone, 12,779 sandhill cranes were documented (2,197 pairs) by 2,647 observers (4.83 cranes per observer). Observers documented 1038 sandhill cranes (167 pairs) in Marquette County. Thus, it is safe to say Fox River NWR and Marquette County play an important role in the life history needs of Wisconsin Sandhill Cranes. Two survey sites (numbers 18 & 19), each 2 square miles, were located on Fox River Refuge and adjoining private property. Results for the twelve years are shown below.

Totals:

	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
Pairs	5	2	3	9	6	5
Total #	12	31	7	21	22	27
	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>
Pairs	8	2	9	3	1	3
Total #	31	40	22	12	14	17



# 2

## Habitat Restoration

Virtually all the work that needs to be done at the Refuge is some kind of habitat restoration. After completion of wetland and upland restoration activities, Fox River Refuge will provide wonderful examples of habitats present before European settlement of the area in 1850 and managed primarily by periodic prescribed burning, mowing and monitoring/evaluation. General Land Office (GLO) records were found for the area and old aerial photos were collected that provide a glimpse into what the area used to look like. For example, a GLO surveyor in December 1832 described seeing what we call today oak savanna along a section line that runs through the Refuge: “land rolling, second rate, thinly timbered with oak.” In the wetlands the surveyor did not give much detail, only statements such as “land level and marshy, no trees.” However, the fact that the surveyors did not see any trees in the marsh is very notable as today, large blocks of tamarack, aspen, green ash, willow and a variety of shrubs such as red osier dogwood exist in the former treeless marsh. This observation tells us that fire was likely present to keep the woody vegetation out of the marsh (most woody vegetation that can tolerate wet conditions is not fire tolerant). Other sources of information include old aerial photos from the 1930s – 1950s. These photos depict the current day Fox River NWR with oak savanna still present on the uplands (very little closed canopy forest as is seen today) and a nearly treeless marsh.

### 2a. Wetland Restoration

In 2005, additional funding was received towards the 150 – 350 acre wetland restoration project on the Refuge. Ducks Unlimited donated \$12,500 and the refuge received a \$15,000 Challenge Cost Share grant (CCS). This funding combined with the previous year’s NAWCA grant enabled completion of the wetland restoration.

In 2004, Refuge staff completed the re-establishment of the historic stream course of Eggleston Creek. The next stage of the restoration project began in 2005, which included elevation surveys, ditch filling, installing ditch plugs and stream course re-establishment that would restore hydrology to nearly 400 acres of Refuge wetlands. A habitat easement was also needed for the McCreath private in-holding due to the potential impacts of raised water levels.

Elevation surveys were conducted (Jan-March) for the continuance of the wetland restoration project, including the northeast side of the main ditch near springs. In mid January, boundary surveys of the McCreath in-holding were conducted. Shawn Eisch from the Wisconsin Department of Natural Resources visited the restoration site for permitting purposes.

Several ditches were filled on the northeast corner of the refuge in August. Sections of the main ditch and ditches adjacent to the main ditch were filled. Ditches all around the spring were filled which diverted spring flow to the northwest across a large 2-acre scrape. Ditches were also filled on the south and west side of the Tamarack Island on the west side of the large scrape. Another east/west ditch was filled approximately 200 yds southwest of a large scrape. All disturbed areas were seeded to oats. Two D-6 Dozers with wide tracks, a track hoe, and two tracked dump trucks were used to complete the job from LMS Construction, Portage. All previous wetland work was financed by FWS challenge grants (30K) and a donation by the Wisconsin Waterfowl Association (14K). The Wisconsin Waterfowl Association also provided technical assistance in the field during construction and planning.

A 3-4 foot wide, 6-12" deep pilot channel was excavated down the old stream course of Muir creek south of piling #4 to Long Lake during November. Although there was good flow going down the pilot channel, the channel may not be wide enough as some flow is still flowing north in the ditch that skirts the western edge of the oak island. This will continue to be monitored for possible corrective action.

During October-January, 8 sheet piling structures were installed to block flow down ditches to surrounding marsh elevation-structures # 4, 6, 8, 10, 11, 12, 13, and 14 (see Figure 1). Elevations and widths of all structures were recorded, as well as the elevations of the ground on both ends of the piling. All piling locations were GPS'd and photographs were taken.



U.S. Fish & Wildlife Service

# Fox River National Wildlife Refuge

Marquette County, Wisconsin

Wetland Restoration



▲ Sheet\_Piling\_Ditch\_Plugs  
□ fmr boundary 2003



Photo Taken August 6, 2004  
Map Created October 13, 2006  
Produced by Shawn Papon

0 420 840 1,680 2,520 3,360 Feet

Figure 1. Sheet piling structure locations at Fox River National Wildlife Refuge.

## 2b. Upland Restoration

### **Dry Prairie Restoration**

According to 1832 General Land Office surveys, uplands on the Refuge were oak savanna and dry prairie. A Challenge Cost Share (CCS) grant for \$5,000 was received to continue restoration of dry prairie habitats on the Refuge. The 2005 goal was to prepare and seed the remaining 25 (out of 110) acres of old agricultural fields dominated by quack grass and smooth brome to native dry prairie (Overlook, East Muir, and Rataczak units).

Brush piles from the pine plantations were burned along the creek in January. Others were tried with no success.

The Rataczak, East Muir and north 7 acres of the Overlook units were sprayed with Roundup in May. The same units were planted with prairie with a no-till Tye drill. The units were also hand planted with needle grass, leadplant, thimbleweed, NE aster, CA milk vetch, white wild indigo, yellow coneflower, rosinweed, compass plant, cup plant and prairie dock. In June, the Rataczak unit was sprayed again with Roundup due to a light rain shower that came over the unit just after spraying.

All previously seeded prairie restoration units 12" in height were mowed in August.

The 12 acre Spring unit was sprayed with glyphosate in September, leaving the Spring unit ready to be seeded in November.

### **Oak Savanna Restoration**

Nearly all the historic oak savanna on the Refuge has changed from oak savanna to closed canopy forest due to lack of fire. Large, open grown oaks are present in these forests, but are being starved for sunlight due to encroachment by fire intolerant trees and thick stands of young black oaks. Fire intolerant trees such as red cedar, black cherry, green ash and elm have colonized these oak savanna habitats and contributed to the closed canopy.

Oak savanna restoration in 2004 involved thinning of 45 acres of these closed canopy forests in the Cedar and Bur Oak units via SK Forest Products, Inc. of Montello, WI, cutting fire intolerant trees mentioned above and thinning of smaller oaks and hickories. All of the oaks and hickories above 16 inches DBH were not cut. The thinning opened up the forest and created an oak savanna, at least the tree portion of the savanna. The continuance of the restoration project in 2005 concentrated on removing slash, treating stumps, mowing and preparing the habitat for prairie grass and forb seeding. It will likely take several years to restore all aspects of the historic oak savannas on the Refuge.



In January, willows northwest of Oak Island, the burn line on the west side of the Cedar unit and some of the shrubs invading the fen community west of the Cedar and Homestead units were mowed.

Logging continued for the oak savanna restoration. All units were completed in February except half of Oak Island. Cutting had to be stopped one week after starting due to unusually warm temperatures. The skidder was rutting up areas north of Oak Island due to a thin frost layer.

Cedars and box elders were cut out of the Homestead unit in May and August and stumps were treated with Garlon 4. Large brush piles were made on the west side of the unit. In August, more box elders and cedars were cut in the Homestead unit and piled with grapple. The remainder of the unit was mowed using a bushhog in August. This unit was sprayed with glyphosate and 2,4-D Amine in September for the preparation for Spring 2006 prairie seeding.

A 12-acre field north of the 7 acre stand of oak timber and the 4 acre native grass field just to the south (all in Spring unit) were burned in May. Later in July, 7 acres in the Spring Unit were cleaned via dragging out all slash into piles.



Results of thinning the closed canopy forests in the Cedar Unit at Fox River NWR (11/22/2005)

# 3

## Habitat Management

A habitat, fish and wildlife management plan needs to be written, to include monitoring, restoration and management work needed at the Refuge in future years.

### 3a. Water Level Management

As mentioned in the wetland restoration section (2a), hydrological restoration in Refuge wetlands was accomplished via ditch filling or plugging and stream course re-establishment. No water control structures that would require intensive management are needed on the Refuge in order to manage Refuge sedge meadow/shallow marsh habitats similar to historic conditions. The majority of the Refuge has significant groundwater inputs in innumerable locations and surface water inputs from spring fed streams, precipitation and a natural flood regime from the Fox River. As a result, the majority of the Refuge is very wet (see section 1a for a more detailed discussion of water levels). Surface water depths ranged from 0-30 inches above the spongy peat layer and some areas even had floating vegetation (water depths > 30 inches). Vegetation composition and structure varied along this water level gradient. Any wetland restoration that takes place will be designed so that only passive water level management will be needed and hydrological conditions will be restored as closely as possible to pre-European settlement conditions. For instance, after all ditches are plugged or filled, periodic visits should be done to make sure that plugs are holding and ditches remain filled. Stream courses that were restored should be checked to make sure they are still coursing down the restored paths.

### 3b. Moist Soil Management

No intensive moist-soil management occurs on the Refuge because there is no need for infrastructure in the naturally functioning parts of this wetland. The 400 acres of wetland impacted by past ditching efforts will be restored by filling and plugging of ditches (no water control structures). Productive moist-soil areas naturally occur in various locations on the Refuge. The largest moist-soil wetland is Crane Pool, a 10-acre wetland on the southwest side of the Refuge. This wetland is directly connected to the Fox River and as a result, water levels fluctuate with river height. In 2003, high spring flows in the river filled Crane Pool, and lower summer flows and evaporation drained it. This natural water regime created thick stands of *Biden spp.*, *Echinochloa spp.*, and *Polygonum spp.* Water levels never increased in the fall of 2003, but high river flows during spring 2004 made this wonderful food source readily available to dabbling ducks and geese on spring migration. Other pockets of moist-soil exist throughout Refuge wetlands, but in all they total less than another 10 acres.





More than 3,000 Canada Geese were present at any given time during spring migration, utilizing flooded moist-soil and perennial wetland vegetation (4/7/2004).

Nearly all the other Refuge wetlands function as wet prairie, sedge meadow, or shallow emergent marsh where more stable water levels across the seasons and years creates ideal conditions for perennial plant species such as *Carex spp.* The moist-soil areas seem to lack this stable water, likely as a result of little groundwater inputs on these sites (unlike the majority of the Refuge). These sedge meadow/shallow marsh areas with native perennial vegetation and more stable water regimes are also heavily used by waterbirds, namely greater sandhill cranes, Canada geese, blue-winged teal and mallards. In many cases, the birds “roto-till” the marsh, eating tubers, newly sprouted shoots and seeds. Waterbird use of these areas tends to be higher in the spring when more habitat and food sources are made available due to higher river flows, snowmelt and precipitation.

Although wild rice production is not considered “moist-soil,” it should be noted for its significance on the Refuge. Wild rice occurs on the Refuge in shallow, open water areas, such as the outlet to Long Lake, in most Refuge streams and ditches with water flow, in the old Fox River channel slough on the northwest side of the Refuge and along the shoreline of oxbow lake and the active Fox River channel. It is estimated that approximately 20 acres of wild rice exist either on or adjacent to the Refuge. These sites with wild rice are extremely attractive to fall migrating waterfowl as concentrations of 500 plus mallards were noted in the outlet to Long Lake throughout the month of October and November. Blue-winged teal, wood ducks and black ducks were also seen in sizeable numbers in the fall utilizing these wild rice stands. Not only was the wild rice good for fall migration, dabbling ducks used stands of wild rice during the breeding season for brood rearing areas.





This sedge meadow/shallow marsh was covered with *Carex spp.* before heavy spring migration use by waterbirds. The birds have nearly eaten everything, including tubers, newly sprouted shoots, and seeds (3/25/2005).

### 3c. Graze/Mow/Hay

In January, willows northwest of Oak Island, the burn line on the west side of the Cedar unit and some of the shrubs invading the fen community west of the Cedar and Homestead units were mowed.

The Homestead unit was mowed in August in preparation for fall herbicide spraying.

### 3e. Forest Management

See section 2b.

### 3f. Fire Management

Fire was an integral part of the oak savanna and sedge meadow wetland habitats historically present on the Refuge. Fire greatly reduced the abundance of fire intolerant woody and herbaceous vegetation, thus effectively maintaining the savannas and marshes. General Land Office notes describe Refuge wetlands in 1832 as "wet marsh, no trees." Due to fire suppression efforts after human settlement, frequency of fire greatly diminished. Open forests became closed forests, treeless marshes became dominated by lowland forests or shrubs on the higher elevations, and dry prairies were invaded by woody vegetation. In order to reduce this woody component and aid in the process of restoring native habitats, prescribed burns are needed for the entire Refuge. Burn units were identified for the entire Refuge and a burn schedule discussed so each unit gets burned on a recurring 3-4 year schedule; the Horicon complex prescribed fire specialist is currently updating the fire management plan for Fox River NWR.



To assist in the upland prairie restoration, 4 brush piles from the pine plantations were burned along the creek in January. Others were tried with no success.

To assist in the oak savannah restoration, a 12-acre field north of the 7 acre stand of oak timber and the 4 acre native grass field just to the south (all in Spring Unit) were burned in May.

### 3g. Pest Plant Control

The Refuge is very unique in that the abundance of exotic and invasive plants is extremely low as compared to other sites. Only small, scattered patches of exotic plants occur within a sea of native plants. Monitoring should be done on areas of (a) reed canary grass along the river bank and north end of the Refuge (disturbed areas), (b) phragmites (along old ditches), (c) purple loosestrife (small patch on NW corner of Refuge but other larger patches exist outside the Refuge boundary – NW of the Refuge and at the junctions of highways F and O) and (d) garlic mustard and aspen in oak savanna restoration units. All of the above species need control measures, the most important being purple loosestrife. The areas of reed canary grass are spreading and taking over native sedge meadow; Refuge staff need to identify the best control techniques for this exotic species and control it in the worst areas before the problem gets worse.

An attempt was made to remove exotic vegetation within the dry prairie. The Rataczak unit, East Muir and the north 7 acres of the Overlook units were sprayed with Roundup and then planted with prairie with a no-till Tye drill. The units were also hand planted with needle grass, leadplant, thimbleweed, NE aster, CA milk vetch, white wild indigo, yellow coneflower, rosinweed, compass plant, cup plant and prairie dock. The Rataczak unit was sprayed a second time with Roundup due to a light rain shower that came over the unit just after the initial spraying.

The 12 acre Spring unit was sprayed with glyphosate in September, leaving the Spring unit ready for seeding in November.

In an effort to remove exotic vegetation from the oak savannah, cedars and box elders were cut out of the Homestead unit to prep for a fall spraying and later Spring '06 prairie seeding. The stumps were treated with Garlon4.

In August, the Homestead unit was mowed and sprayed with glyphosate and 2,4-D Amine in September.



A prescribed burn at Fox River National Wildlife Refuge (4/09/2005).

# 4

## Fish and Wildlife Management

### 4d. Nest Structures

In April 2004, the Friends of Horicon NWR, donated five homemade wood duck boxes constructed of old Freon tanks. Two of these boxes were placed along Muir Creek on the east side of the Refuge (# 1 & 2), one on the north side of Oxbow Lake (# 3) and two others on the south bank of a slough on the northwest side of the Refuge (# 4 & 5). Following is a table summarizing the data.

Box #	Date	# Nests	Nest Status	Unhatched Eggs	# Membranes	Species	Down Present
1	02/25/05	2	no eggs laid	0	0	UNK	WODU down & feathers
2	02/25/05	2	no eggs laid	0	0	UNK	WODU down & feathers
3	02/25/05	1	successful	0	7	WODU	WODU down
4	02/25/05	2	unsuccessful	1	0	UNK	WODU down & feathers
5	02/25/05	2	no eggs laid	0	2	TRES	WODU feathers
4	09/23/05	1	no eggs laid	0	0	UNK	WODU down
5	09/23/05	1	successful	0	9	WODU	WODU feathers



Wood duck box along Muir Creek (4/7/2005).



#### 4e. Pest, Predator, and Exotic Animal Control

Exotic vegetation removal was the only exotic control used in 2005. See section 3g for details of removal.

# 5

## Coordination Activities

### 5a. Interagency Coordination

The Refuge biologist has continued efforts to coordinate, plan and implement wetland, dry prairie and oak savanna habitat restoration efforts with the assistance and expertise of staff from Horicon and Necedah NWR's, Leopold WMD, Madison PLO, Green Bay ES office, numerous Wisconsin Department of Natural Resources (WDNR) offices and the Natural Resources Conservation Service (NRCS). Horicon NWR staff is involved in all aspects of Refuge management and restoration as Fox River is a satellite of Horicon. The Necedah NWR biologist visited the Refuge on two occasions; one to provide advice on the oak savanna restoration project and the other to aid in performing a Red-headed woodpecker survey in newly thinned oak savanna restoration units. Leopold WMD and the Madison PLO were more than helpful in the preparation of a fall prairie seeding on the Refuge. Many of their staff devoted time, expertise, and equipment to aid the biologist in seed collection and cleaning efforts, as well as site preparation and planting. WDNR staff members have visited the Refuge to determine applicable water regulations and provide advice for prairie, oak savanna, and wetland restoration and management.

The Refuge biologist has also expanded cooperation with non-governmental organizations (NGO's) and volunteer groups, to include Ducks Unlimited (DU), Friends of Horicon NWR, River Crossing and Beaver Dam charter schools, John Muir Middle School, Montello NRCS Office and numerous individual volunteers. In 2005, these NGO's and volunteers contributed 882 hours of labor to the Refuge, worth more than \$15,000. These non-federal dollars were used as a match to two challenge grants received from the FWS for restoration projects. DU strongly supports the Refuge in wetland restoration efforts via planning and financial support.

# 6

## Resource Protection

### 6a. Law Enforcement

In June 2004, the U.S. Fish and Wildlife Service hired Grand River Cooperative to apply herbicides to a 50-acre unit of the refuge. Jahnke, a licensed pesticide applicator, admitted that after spraying a few acres, his rig became stuck. After a local farmer used his tractor to free the rig, Jahnke, was told by his supervisor to dump 250 gallons of herbicide in the rig's sprayer on the ground to lighten the load on the rig. An investigation led to charged being filed against both subjects. Both subjects pled guilty in 2005 and will be sentenced in 2006.

### 6b. Permits and Economic Use Management

The following special use permits were issued last year: Eight special use permits to aid in oak savanna restoration by removing unwanted oak or pine slash (previously cut tree branches too small for sale as pulp) from the Refuge and one special use permit, allowing ATV operation to access their private in-holding.

### 6g. Land Acquisition Support

Staff worked towards acquiring a habitat easement for the McReath in-holding. This in-holding would be advantageous to purchase as the largest ditch on the Refuge runs through this property. Filling the entire ditch or at least plugging the ditch is key to the success of the wetland restoration project. At year's end, the family agreed to a habitat easement as long as they were provided ATV access to their property in perpetuity.

Refuge staff also examined the Scott Kempley tract immediately north of the refuge. It consists of 186 acres of drained wetlands and 38 acres of intact sedge meadow. It was determined to lie outside of the refuge acquisition boundary. The property would be an excellent restoration project; although there are no plans for enlarging the boundary at this time.





Aerial photo of Kempley's flooded field that has potential for acquisition. The NW corner of the Refuge is in the upper right corner of the photo (8-19-2004).

# 7

## Public Education and Recreation

### 7a. Provide Visitor Services

#### **Deer Hunting**

The Refuge was again open to deer hunting during all state deer seasons in Unit 67A. No Refuge permits were required. The Refuge was located in an Earn-A-Buck (EAB) unit; thus, a buck could not be harvested without first harvesting an antlerless deer to obtain buck authorization. In addition, Zone T antlerless only herd reduction hunts were in effect.

The opening day of the T-Zone gun hunt was reported to be busy by a member of the staff also hunting that day. At least 15 other hunters were noted. No hunters notified the staff on success, so actual number of deer removed is unknown. No complaints were received regarding hunter incidents/ethics as in previous years.

### 7b. Outreach

As partially explained in section 5a above, the Refuge biologist was involved in outreach efforts, namely environmental education, with two local charter schools. Tours of Refuge fens, shallow marshes, oak savannas, and prairies were given to the school groups. Flora and fauna were identified and natural processes such as fire and flooding discussed. Not only did these school groups learn a lot about the Refuge and the environment, they got the chance to get their hands dirty and provide wonderful help on the Refuge's 85-acre prairie restoration project (cedar cutting/piling, prairie seed collection, and prairie planting). The John Muir middle school donated 455 hours and the River Crossing charter school donated 212 hours.

# 8

## Planning and Administration

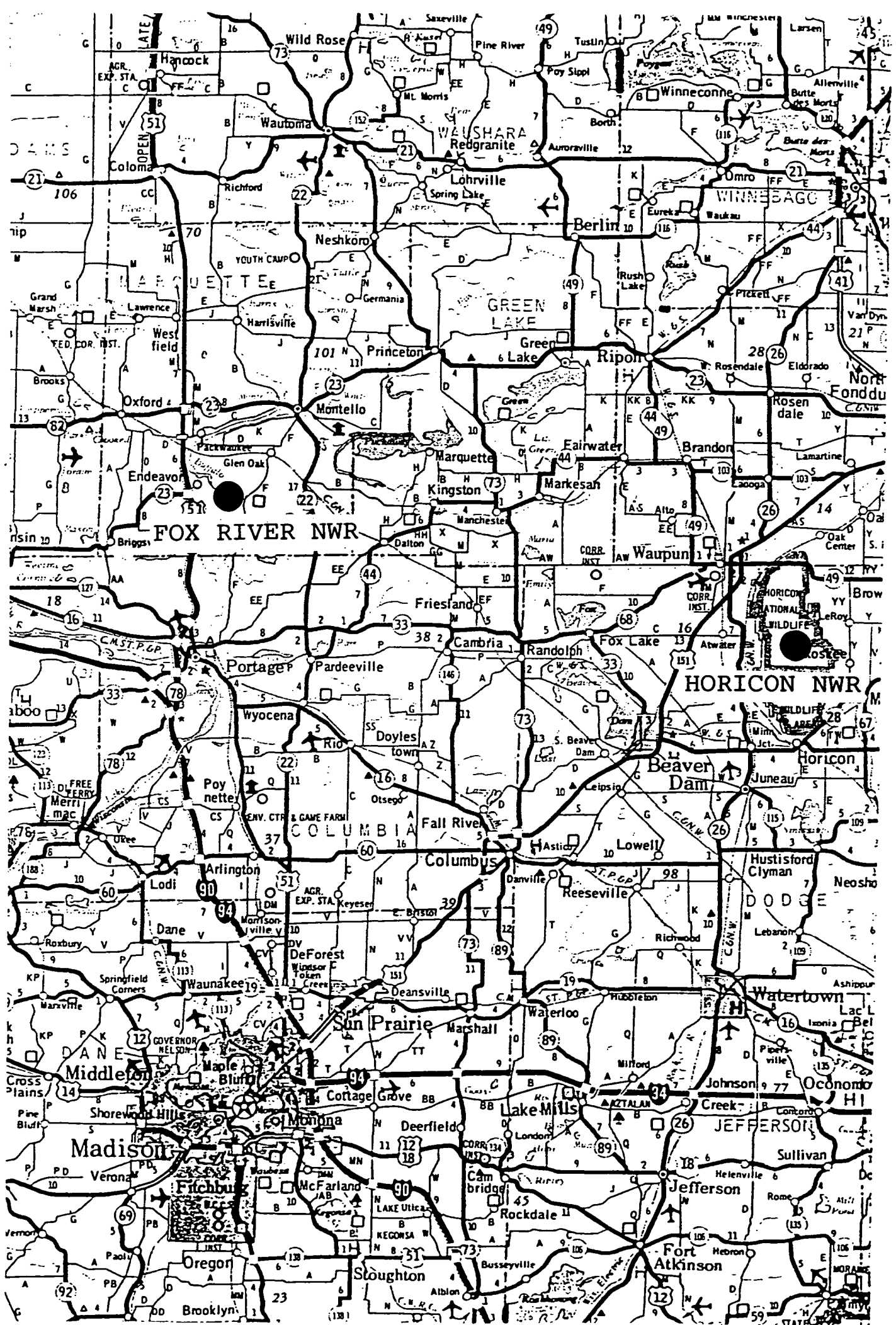
### 8a. Comprehensive Conservation Planning

Refer to Section 8a in Horicon National Wildlife Refuge's narrative.

### 8b. General Administration

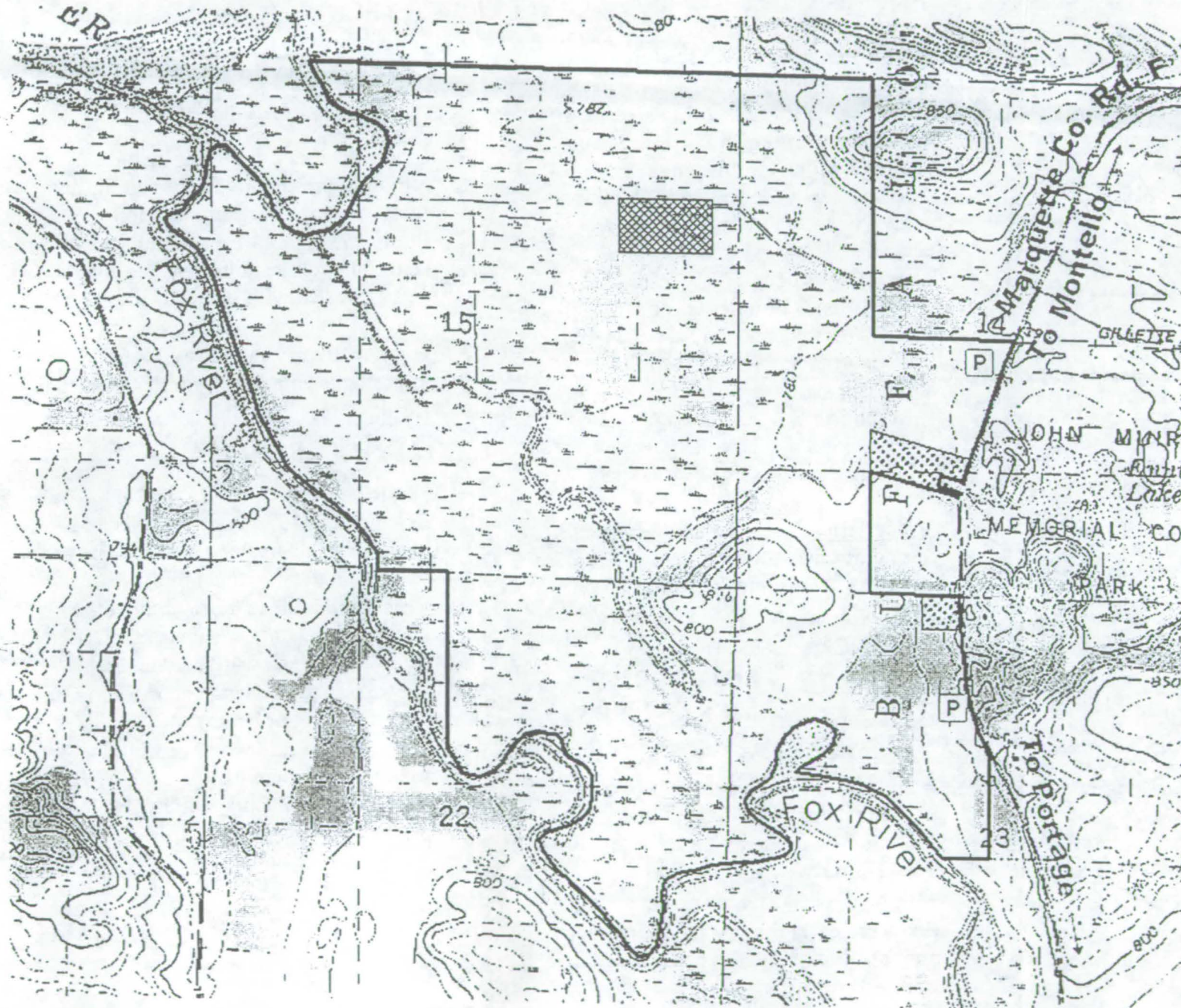
Since Fox River Refuge was acquired in 1978, there has been no staff or funds solely dedicated to this Refuge. Horicon Refuge staff managed the Refuge under the Horicon Refuge budget. As a result, before 2003 virtually no planning, management, restoration activities, or baseline surveys of fish and wildlife populations and their habitats had been conducted for this Refuge.

A grant obtained from the Lower Fox River and Green Bay Natural Resources Restoration Project (Natural Resource Damage Assessment funds) provides funds for a full-time term wildlife biologist, specifically for Fox River National Wildlife Refuge. The biologist's primary duties are baseline habitat, fish and wildlife surveys, habitat management and other Refuge planning, habitat restoration and grant writing. This position is expected to last one more year, unless additional funding is received.



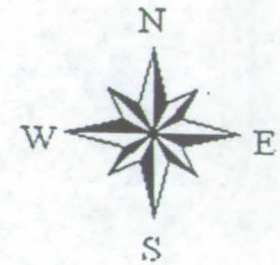


# Fox River NWR Hunting Map



## LEGEND

- No Hunting Zone
- Private Property
- Refuge Boundary
- Parking
- Wetland
- Forest



Fox River  
National Wildlife Refuge  
Marquette County  
Wisconsin

United States  
Fish and Wildlife Service  
Department of the Interior

1,004 Acres

T14N R9E

0.6 0 0.6 1.2 Miles



# Fox River

## National Wildlife Refuge

### 2005 Deer Hunting Map and Regulations



## REGULATIONS

- Fox River National Wildlife Refuge is not open for any public use at this time except deer hunting.
- The Refuge is located within Deer Management Unit 67A; all Wisconsin state regulations for this unit are in effect, including Zone T herd reduction hunts. No special refuge permits are required.
- One antlerless deer only, per license, plus additional antlerless deer per antlerless permit may be harvested on the Refuge during any of the following Wisconsin state seasons:
  - Archery: Oct. 27 – Oct. 30  
Dec. 8 – Dec. 11
  - Gun: Oct. 27 – Oct. 30  
Dec. 8 – Dec. 11
- One antlerless or buck deer, per license, plus additional antlerless deer per antlerless permit may be harvested on the Refuge during any of the following Wisconsin state seasons:
  - Archery: Sept. 17 – Oct. 26  
Oct. 31 – Nov. 17  
Nov. 28 – Dec. 7  
Dec. 12 – Jan. 3
  - Gun: Nov. 19 – Nov. 27
  - Muzzleloader Nov. 28 – Dec. 7
- Scouting for gun deer season is allowed Nov. 1-7 only.
- Parking in designated parking lots only
- Boats are prohibited on the refuge but may be used on the river to access the west side of the refuge.
- Foot travel only; do not litter.

- Hunters may not enter areas posted as "NO HUNTING ZONE."
- Portable tree stands may be used but cannot be left overnight.
- Construction or use of permanent blinds or tree stands are prohibited
- Other prohibited activities include: camping, fires in any form, baiting, and shining to locate or harvest deer.
- Hunters must not trespass onto private land. The refuge boundary (see map) is clearly posted with white "National Wildlife Refuge" signs.
- Practice firearm safety at all times
- Report all accidents or injuries to Refuge Headquarters (see phone below)

## OTHER INFORMATION

- Fox River National Wildlife Refuge was purchased in 1979 to protect wetland habitat for the greater sandhill crane and other migratory wetland birds.
- Because more than 70 % of the refuge is wetland, hip boots are advisable. Also, be aware of deep water in ditches.
- Please respect the land and have a great time during your hunt.
- If you have questions or comments, please direct them to:  
Shawn G. Papon, Wildlife Biologist  
Fox River NWR  
W4279 Headquarters Rd.  
Mayville, WI 53050  
(920) 387-2658 ext. 16

# Horicon

## *National Wildlife Refuge Bird Checklist*





## Welcome to Horicon National Wildlife Refuge

Horicon National Wildlife Refuge was established in 1941 for the conservation of migratory birds, especially redhead ducks. There are more redheads nesting here than anywhere else east of the Mississippi River.

Although famous as a fall stopover for hundreds of thousands of interior Canada geese, the vitality of the marsh is much better represented by the diversity of birds that use the refuge as indicated in this bird list. In fact, an equal number of species use the marsh in spring as in fall. Look for waterfowl and perching birds in their colorful breeding plumage in spring. They are easy to find before cattails and other vegetation emerge. Plus, most birds are actively establishing and defending their nesting territories and attracting mates, so they can be plainly visible us. Remember to use binoculars and spotting scopes to get a closer look at nesting and migrating birds and other wildlife as the refuge is their home and sanctuary.

This bird list contains 223 species which have been recorded on the refuge. Another 44 birds, listed under "Accidental" birds, have been reported but are not normally expected to be present.

The English, or common names of birds are in accordance with the American Ornithologists Union's "Checklist of North American Birds" revised in 1989.

### Season

Sp... Spring, March-May  
S..... Summer, June-July  
F .... Fall, August-November  
W ... Winter, December-February

### Status

a ..... Abundant – Common species that is very numerous  
c ..... Common – Certain to be seen or heard in suitable habitat, not in large numbers  
u ..... Uncommon – Present but not certain to be seen  
r ..... Rare – Seen at irregular intervals of 2-5 years

\* Denotes species nesting on the refuge





	Sp	S	F	W
<b>Grebes</b>				
___ Pied-billed Grebe*	c	c	c	
___ Red-necked Grebe	r		r	
___ Horned Grebe	r		r	
<b>Pelicans</b>				
___ American White Pelican*	c	c	c	
<b>Cormorants</b>				
___ Double-crested Cormorant*	a	a	a	
<b>Hérons and Bitterns</b>				
___ American Bittern*	u	u	u	r
___ Least Bittern*	u	u	u	
___ Great Blue Heron*	c	c	c	u
___ Great Egret*	c	c	c	
___ Snowy Egret	r	r	r	
___ Cattle Egret	r	r	r	
___ Green Heron*	u	u	u	
___ Black-crowned Night-Heron*	c	a	a	
___ Yellow-crowned Night-Heron	r	r	r	
<b>Vultures</b>				
___ Turkey Vulture	u	u	r	
<b>Swans, Geese and Ducks</b>				
___ Greater White-fronted Goose	r		r	
___ Snow Goose	u		u	
___ Canada Goose*	a	c	a	c
___ Trumpeter Swan	r		r	
___ Tundra Swan	u		u	
___ Wood Duck*	u	c	c	
___ Gadwall*	u	u	c	
___ American Wigeon*	u	u	c	
___ American Black Duck	u	u	u	r
___ Mallard*	a	a	a	u
___ Blue-winged Teal*	c	c	c	
___ Northern Shoveler*	c	u	c	
___ Northern Pintail	u	u	u	
___ Green-winged Teal*	c	u	a	
___ Canvasback	u	r	u	
___ Redhead*	c	c	c	
___ Ring-necked Duck	c	u	c	
___ Greater Scaup	r		r	
___ Lesser Scaup	c	u	c	
___ Bufflehead	u		u	r
___ Common Goldeneye	u		u	
___ Hooded Merganser*	u	u	u	r
___ Common Merganser	u		u	r
___ Red-breasted Merganser	r		r	
___ Ruddy Duck*	c	u	c	

	Sp	S	F	W
<b>Hawks and Eagles</b>				
___ Osprey .....	r	r	r	
___ Bald Eagle .....	r	r	u	r
___ Northern Harrier* .....	c	c	c	c
___ Sharp-shinned Hawk* .....	u	r	u	r
___ Cooper's Hawk* .....	u	r	u	r
___ Red-shouldered Hawk .....	u		u	
___ Broad-winged Hawk .....	u		u	
___ Red-tailed Hawk* .....	c	c	c	c
___ Rough-legged Hawk .....	c		c	c
<b>Falcons</b>				
___ American Kestrel* .....	c	c	c	c
___ Peregrine Falcon .....	r		r	r
<b>Upland Game Birds</b>				
___ Gray Partridge* .....	u	u	u	u
___ Ring-necked Pheasant* .....	c	c	c	c
___ Wild Turkey* .....	u	u	u	u
<b>Rails and Coots</b>				
___ Yellow Rail .....	r			
___ King Rail* .....	u	u	r	
___ Virginia Rail* .....	c	c	c	
___ Sora* .....	c	c	c	
___ Common Moorhen* .....	c	c	c	
___ American Coot* .....	a	a	a	
<b>Cranes</b>				
___ Sandhill Crane* .....	c	c	c	c



*American White Pelican* Jim Mattsson, USFWS



# Shorebirds

___ Black-necked Stilt*	r	r	r
___ Black-bellied Plover	u	r	u
___ Lesser Golden-Plover	r	r	r
___ Semipalmated Plover	u	u	u
___ Killdeer*	c	c	c
___ Greater Yellowlegs	c	u	c
___ Lesser Yellowlegs	c	u	c
___ Solitary Sandpiper	u	u	u
___ Spotted Sandpiper*	r	r	r
___ Semipalmated Sandpiper	c	u	c
___ Least Sandpiper	c	u	c
___ White-rumped Sandpiper	r	r	r
___ Baird's Sandpiper	r		r
___ Pectoral Sandpiper	u	u	c
___ Dunlin	c	u	c
___ Stilt Sandpiper	r	r	u
___ Buff-breasted Sandpiper		r	
___ Short-billed Dowitcher	r	r	u
___ Long-billed Dowitcher	u	r	u



	Sp	S	F	W
___ Common Snipe* .....	c	u	c	
___ American Woodcock* .....	c	u	u	
___ Wilson's Phalarope* .....	r	r	r	
___ Red-necked Phalarope .....	r		r	

### Gulls and Terns

___ Bonaparte's Gull .....	u		u	
___ Ring-billed Gull .....	c	u	c	
___ Herring Gull .....	c	u	c	u
___ Forster's Tern* .....	c	c	u	
___ Black Tern* .....	c	c	u	

### Doves

___ Rock Dove* .....	c	c	c	c
___ Mourning Dove* .....	c	c	c	c

### Cuckoos and Roadrunners

___ Black-billed Cuckoo* .....	u	u	u	
___ Yellow-billed Cuckoo* .....	u	u	u	

### Owls

___ Eastern Screech-Owl* .....	c	c	c	c
___ Great Horned Owl* .....	c	c	c	c
___ Snowy Owl .....	r			r
___ Barred Owl .....	u	u	u	u
___ Long-eared Owl .....	r		r	r
___ Short-eared Owl .....	u	r	u	u

### Nighthawks and Nightjars

___ Common Nighthawk* .....	u	u	u	
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*Yellow-headed Blackbird, Jim Mattsson, USFWS*



Swifts

\_\_\_ Chimney Swift\* ..... u   u   u

Hummingbirds

\_\_\_ Ruby-throated Hummingbird\* ..... u   u   u

Kingfishers

\_\_\_ Belted Kingfisher\* ..... u   u   u

Woodpeckers

\_\_\_ Red-headed Woodpecker ..... u   u   u

\_\_\_ Red-bellied Woodpecker ..... u   u   u   u

\_\_\_ Yellow-bellied Sapsucker ..... u   u

\_\_\_ Downy Woodpecker\* ..... c   c   c   c

\_\_\_ Hairy Woodpecker\* ..... c   c   c   c

\_\_\_ Northern Flicker\* ..... c   c   c

	Sp	S	F	W
<b>Flycatchers</b>				
___ Olive-sided Flycatcher .....	r		r	
___ Eastern Wood-Pewee* .....	c	c	c	
___ Yellow-bellied Flycatcher .....	r		r	
___ Alder Flycatcher .....	u	u	u	
___ Willow Flycatcher* .....	c	c	c	
___ Least Flycatcher* .....	c	c	c	
___ Eastern Phoebe* .....	c	c	c	
___ Great Crested Flycatcher* .....	c	c	c	
___ Eastern Kingbird* .....	c	c	c	

### Shrikes

___ Northern Shrike .....	r			u
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### Vireos

___ Blue-headed Vireo .....	u		u	
___ Yellow-throated Vireo* .....	u	u	u	
___ Warbling Vireo* .....	c	c	c	
___ Philadelphia Vireo .....	u	r	u	
___ Red-eyed Vireo* .....	c	c	c	

### Jays, Magpies and Crows

___ Blue Jay* .....	c	c	c	c
___ American Crow* .....	u	u	u	u

### Larks

___ Horned Lark* .....	c	u	c	c
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### Swallows

___ Purple Martin* .....	u	u	u	
___ Tree Swallow* .....	a	a	a	
___ Northern Rough-winged Swallow* .....	u	u	u	
___ Bank Swallow* .....	u	u	u	
___ Cliff Swallow* .....	u	u	u	
___ Barn Swallow* .....	c	c	c	

### Chickadees and Titmice

___ Black-capped Chickadee* .....	c	c	c	c
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### Nuthatches

___ Red-breasted Nuthatch .....	r		r	r
___ White-breasted Nuthatch* .....	u	u	u	u

### Creepers

___ Brown Creeper .....	u		u	u
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### Wrens

___ House Wren* .....	c	c	c	
___ Winter Wren .....	u	r	u	
___ Sedge Wren* .....	c	c	c	
___ Marsh Wren* .....	a	a	c	r



	Sp	S	F	W
<b>Kinglets, Bluebirds, and Thrushes</b>				
___ Golden-crowned Kinglet .....	c		c	r
___ Ruby-crowned Kinglet .....	c		c	
___ Blue-gray Gnatcatcher* .....	u	u	u	
___ Eastern Bluebird* .....	u	u	u	
___ Veery* .....	u	u	u	
___ Gray-cheeked Thrush .....	u		u	
___ Swainson's Thrush .....	u		u	
___ Hermit Thrush .....	u		u	
___ Wood Thrush* .....	u	u	u	
___ American Robin* .....	c	c	c	r

### Mimics

___ Gray Catbird* .....	c	c	c	
___ Brown Thrasher* .....	u	u	u	

### Starlings

___ European Starling* .....	c	c	c	c
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### Waxwings

___ Cedar Waxwing* .....	u	c	c	r
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### Warblers

___ Blue-winged Warbler .....	u	r	r	
___ Golden-winged Warbler .....	u	r	r	
___ Tennessee Warbler .....	c	r	c	
___ Orange-crowned Warbler .....	u		u	
___ Nashville Warbler .....	c	r	c	
___ Northern Parula .....	u	r	u	
___ Yellow Warbler* .....	a	c	c	
___ Chestnut-sided Warbler .....	c	r	c	
___ Magnolia Warbler .....	c	r	c	
___ Cape May Warbler .....	u		u	
___ Yellow-rumped Warbler .....	a		a	
___ Black-throated Green Warbler .....	c		c	
___ Blackburnian Warbler .....	u	r	u	
___ Yellow-throated Warbler .....	r	r	r	
___ Pine Warbler .....	r		r	
___ Palm Warbler .....	c		c	
___ Bay-breasted Warbler .....	u	r	u	
___ Blackpoll Warbler .....	u		c	
___ Black-and-white Warbler .....	c	r	c	
___ American Redstart* .....	c	u	c	
___ Ovenbird* .....	u	u	u	
___ Northern Waterthrush .....	u	r	u	
___ Louisiana Waterthrush .....	r		r	
___ Connecticut Warbler .....	r		r	
___ Mourning Warbler .....	u		u	
___ Common Yellowthroat* .....	a	a	a	
___ Wilson's Warbler .....	u		u	
___ Canada Warbler .....	u	r	u	

	Sp	S	F	W
<b>Tanagers</b>				
___ Scarlet Tanager* .....	u	u	u	

### Sparrows, Buntings and Grosbeaks

___ Rufous-sided Towhee* .....	u	u	u	
___ American Tree Sparrow .....	c	u	c	c
___ Chipping Sparrow* .....	u	u	u	
___ Clay-colored Sparrow .....	r		r	
___ Field Sparrow* .....	u	u	u	
___ Vesper Sparrow* .....	u	u	u	
___ Savannah Sparrow* .....	c	c	c	
___ Grasshopper Sparrow* .....	r	u	r	
___ Henslow's Sparrow* .....	r	r	r	
___ Fox Sparrow .....	c		c	
___ Song Sparrow* .....	a	c	c	u
___ Lincoln's Sparrow .....	u		u	
___ Swamp Sparrow* .....	a	a	a	u
___ White-throated Sparrow .....	c		c	
___ Harris' Sparrow .....	r		r	
___ White-crowned Sparrow .....	u		u	
___ Dark-eyed Junco .....	c		u	c
___ Lapland Longspur .....	u		u	u
___ Snow Bunting .....	u		u	u
___ Northern Cardinal* .....	c	c	c	c
___ Rose-breasted Grosbeak* .....	c	c	c	
___ Indigo Bunting* .....	c	c	c	
___ Dickcissel* .....	u	u	u	

### Blackbirds and Orioles

___ Bobolink* .....	c	c	u	
___ Red-winged Blackbird* .....	a	a	a	c
___ Eastern Meadowlark* .....	c	c	c	r
___ Western Meadowlark* .....	u	u	u	
___ Yellow-headed Blackbird* .....	c	c	c	r
___ Rusty Blackbird .....	c		c	r
___ Brewer's Blackbird .....	a	u	a	r
___ Common Grackle* .....	c	c	c	u
___ Brown-headed Cowbird* .....	c	c	c	u
___ Baltimore Oriole* .....	u	u	u	

### Finches

___ Purple Finch .....			u	u
___ House Finch* .....	u	u	u	u
___ Common Redpoll .....				r
___ American Goldfinch* .....	c	c	c	u
___ Evening Grosbeak .....				r

### Old World Sparrows

___ House Sparrow* .....	c	c	c	c
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## Accidentals

Common Loon	Hudsonian Godwit
Western Grebe	Sanderling
Little Blue Heron	Ruff
Glossy Ibis	Caspian Tern
White-faced Ibis	Common Tern
Mute Swan	Great Grey Owl
Ross' Goose	Saw-whet Owl
Brant	Whip-poor-will
Cinnamon Teal	Tufted Titmouse
Black Scoter	Carolina Wren
White-winged Scoter	Mockingbird
Oldsquaw	Loggerhead Shrike
Golded Eagle	Bell's Vireo
Northern Goshawk	Prothonotary Warbler
Merlin	Cerulean Warbler
Northern Bobwhite	Black-throated Blue
American Avocet	Warbler
Willet	Worm-eating Warbler
Ruddy Turnstone	Yellow-breasted Chat
Red Knot	Lark Sparrow
Upland Sandpiper	Pine Siskin
Marbled Godwit	Pine Grosbeak

*Ruddy Duck*, J. Mattsson, USFWS



**Horicon National Wildlife Refuge**  
**W4279 Headquarters Rd**  
**Mayville, WI 53050**  
**920/387 2658**

**Horicon's website address:**  
**<http://www.fws.gov/horicon.htm/>**

**U.S. Fish & Wildlife Service**  
**1 800/344 WILD**  
**<http://www.fws.gov>**

**Deaf/hard of hearing individuals may**  
**reach Horicon NWR through the Federal**  
**Information Relay System at 1 800/877 8339.**

**Available in alternative formats upon request.**



Equal opportunity to participate in, and benefit from programs and activities of the U.S. Fish and Wildlife Service is available to all individuals regardless of physical or mental disability. For information please contact the U.S. Department of the Interior, Office for Equal Opportunity, 1849 C street, N.W., Washington, D.C. 20240.



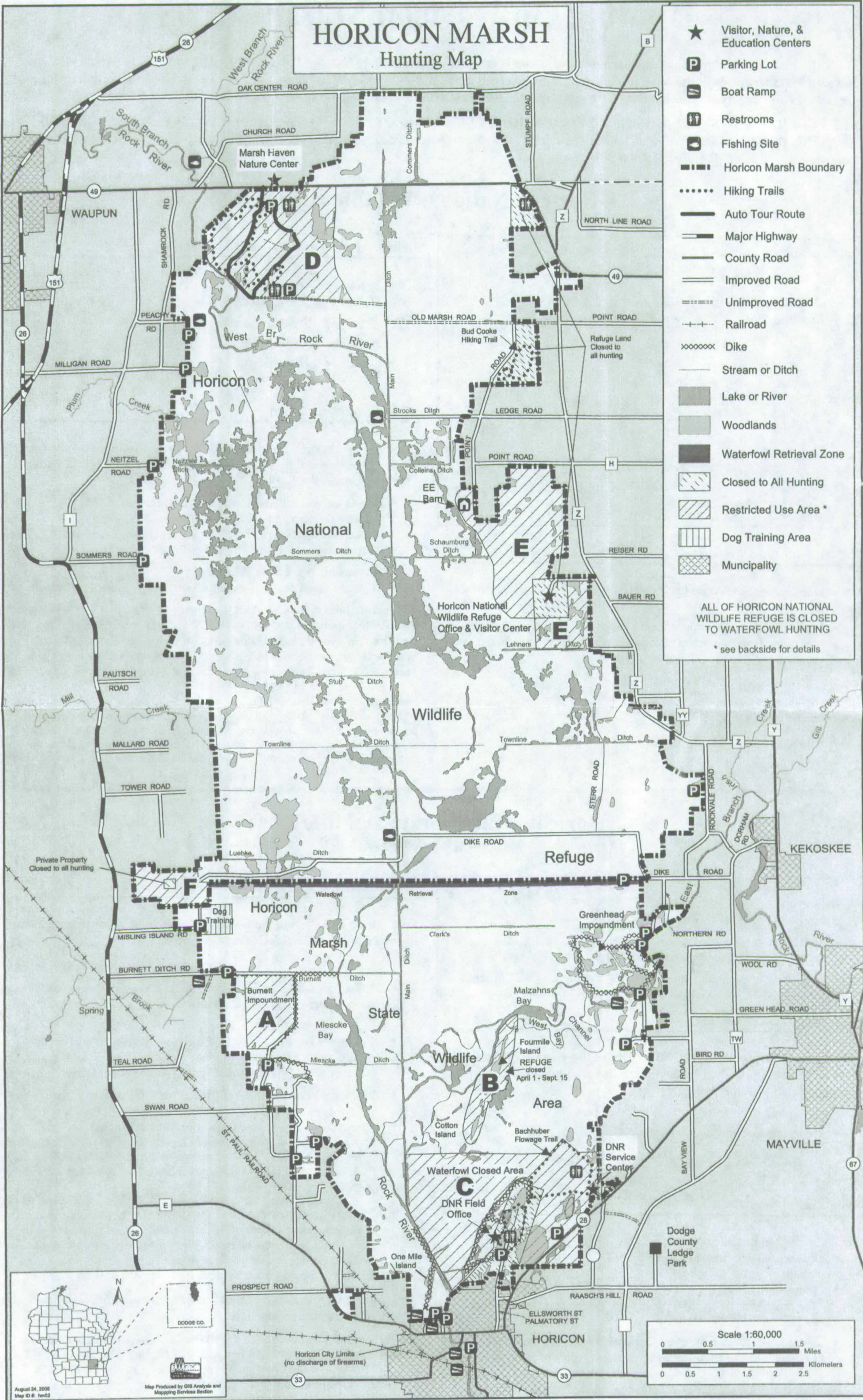
# HORICON MARSH

## Hunting Map

- ★ Visitor, Nature, & Education Centers
- P Parking Lot
- Boat Ramp
- Restrooms
- Fishing Site
- Horicon Marsh Boundary
- Hiking Trails
- Auto Tour Route
- Major Highway
- County Road
- Improved Road
- Unimproved Road
- Railroad
- Dike
- Stream or Ditch
- Lake or River
- Woodlands
- Waterfowl Retrieval Zone
- Closed to All Hunting
- Restricted Use Area \*
- Dog Training Area
- Municipality

ALL OF HORICON NATIONAL WILDLIFE REFUGE IS CLOSED TO WATERFOWL HUNTING

\* see backside for details





# Hunting On Horicon Marsh – 2005

The 32,000 acre Horicon Marsh is divided into the **Horicon National Wildlife Refuge** (managed by the U.S. Fish and Wildlife Service) and the **Horicon Marsh State Wildlife Area** (managed by the Wisconsin Department of Natural Resources). **The two areas have different hunting regulations and different season dates. You are responsible for knowing and abiding by these regulations.**

**ALL FEDERAL AND STATE HUNTING REGULATIONS ARE IN EFFECT. YOU MUST COMPLY WITH THE 2005 WISCONSIN HUNTING REGULATIONS.** Regulation pamphlets are available at Wisconsin Department of Natural Resources – Horicon Service Center and the Horicon National Wildlife Refuge Office/ Visitor Center.

## Horicon National Wildlife Refuge

Only the animals listed below may be hunted. No waterfowl hunting allowed. Note the season dates, which vary from state seasons.

**Horicon National Wildlife Refuge is within Deer Management Units 68A and 68B**

### Small Game

Pheasant, partridge, rabbit –  
Oct. 15 (noon) – Nov. 27  
Squirrel –  
Sept. 17 – Nov. 27

### Big Game

Deer (Archery) –  
Sept. 17 – Nov. 17  
Deer (Gun) –  
Nov. 19 – Nov. 27  
T-Zone (68A & 68B) – Oct. 27 – 30 and Dec. 8 – 11

### Refuge Prohibited Activities

Besides the prohibited activities listed in the Wisconsin Hunting Regulations pamphlet, the following activities are also prohibited on the Federal Refuge:

- Construction or use of permanent blinds, platforms, or scaffolds and damaging trees. All items including portable stands must be removed each night.
- Overnight camping or parking and fires.
- Scouting or baiting
- Toxic shot when hunting small game
- Shining to locate or take wildlife
- Use of motorized vehicles, boats, or horses

### Refuge Areas Closed To All Hunting

- Viewing Area**  
Located near the intersection of Highway 49 and County Road Z
- Refuge Office/ Visitor Center Area**  
Located off County Road Z
- Bud Cook Hiking Area**  
Located on the east side of Point Road

### Refuge Restricted Areas

- Hwy 49 Auto Tour and Hiking Trail Complex (Map Area D)**  
Open only during gun deer season, November 19 – 27 and T-Zone, December 8 – 11
- Area between Point Road and Lehner Road (Map Area E)**  
Open only during both T-Zones, October 27 – 30 and December 8 – 11 and by special permit hunt to hunters with disabilities during gun deer season, November 19 – 27
- Areas on West Side (Map Area F)**  
Open to youth during pheasant season, Oct. 15 (noon) – November 27

**For further information, contact the Horicon National Wildlife Refuge, W4279 Headquarters Road, Mayville, WI 53050, (920) 387-2658. Deaf/hard of hearing individuals may reach Horicon Refuge through Wisconsin's Relay Service at 1-800-947-3529 (v/tty). Office hours are Monday – Friday, 7:30 a.m. – 4:00 p.m. and Saturday – Sunday in the fall.**

Equal opportunity to participate in, and benefit from, programs of the U.S. Fish and Wildlife Service is available to all individuals regardless of age, race, color, national origin, religion, sex, sexual orientation, or disability. Persons who believe they have been discriminated against should contact U.S. Department of Interior, Office for Equal Opportunity, 1849 C Street, N.W., Washington, D.C., 20240.

## Horicon Marsh State Wildlife Area

*All current statewide hunting regulations apply to this wildlife area.*

**Horicon Marsh is in: Deer Management Unit 68B  
Turkey Management Unit 24.**

**Migratory Birds** – Contact Wisconsin Department of Natural Resources for season dates, bag limits & Required Permits.

*All current statewide hunting regulations apply to this wildlife area.*

### State Prohibited Activities

In addition to the prohibited activities listed in the Wisconsin Hunting Regulations pamphlets, the following are also prohibited on the Horicon Marsh Wildlife Area.

- Overnight camping or parking, and open fires
- Blocking access to gates with vehicles
- Unleashed dogs April 15 – July 31
- Use of horses

### State Areas Closed To All Hunting

Two areas within the Horicon Marsh State Wildlife are closed to all hunting (see map) and are as follows:

- Horicon Marsh State Wildlife Closed Area**  
The area surrounding the Horicon Field Station and Quick's Point, located on Palmatory Street
- Wisconsin Department of Natural Resources Service Center**  
Located off State Highway 28 between Mayville and Horicon

**Within these areas, firearms must be unloaded and encased.**

### State Restricted Areas

Four posted areas within the Horicon Marsh State Wildlife Area have restricted hunting (see labeled areas on map):

- Burnett Impoundment (Map Area A)**  
Closed to all hunting during the waterfowl season, except deer during the gun deer season. Legally killed or crippled game may be retrieved by hand.
- Fourmile Island, Cotton Island, and Buffer Zone (Map Area B)**  
No entry wildlife refuge from April 1 – September 15, open thereafter
- Horicon Marsh State Wildlife Area Closed Area (Map Area C)**  
An expanded area around the Horicon Marsh Wildlife Refuge (as listed above) is closed to migratory bird hunting. Legally killed or crippled game may be retrieved by dog or hand. Portions of this area may be open during the Early September Goose Season. Boundaries are as posted.
- Waterfowl Retrieval Zone (see Map Key)**  
No hunting except deer during the gun deer season is allowed in this zone which buffers the boundary line between the Horicon National Wildlife Refuge and the Horicon Marsh State Wildlife Area. Legally killed or crippled game may be retrieved by dog or hand.

Development and management of this property are principally funded by hunting and trapping license fees.

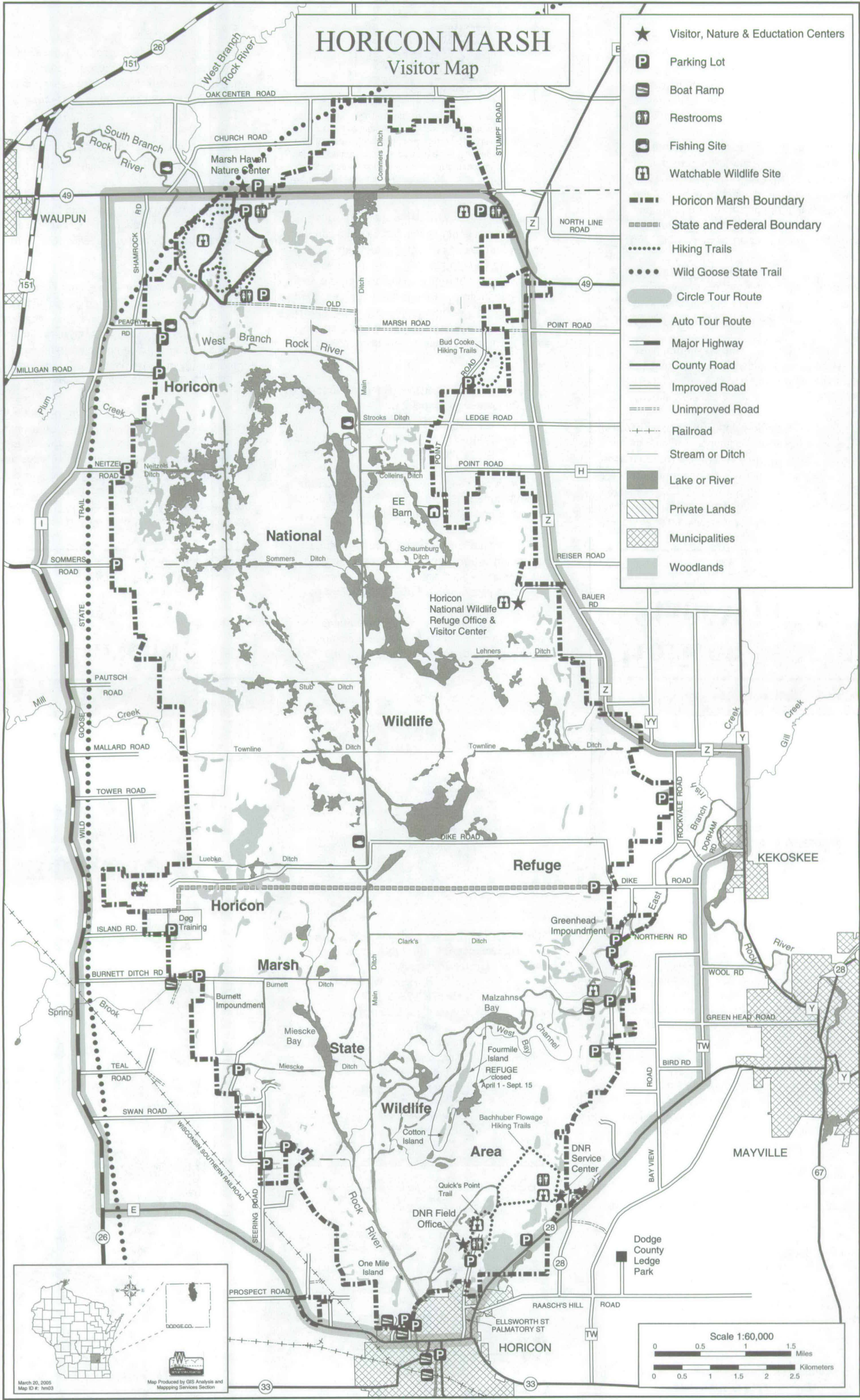
**For further information, contact the Wisconsin Department of Natural Resources – Horicon Service Center, N7725 Highway 28, Horicon, WI 53032 (920) 387-7860. Office hours are Tuesday – Friday, 8:15 a.m. – 1:00 p.m. and 2:00 p.m. – 4:00 p.m.**



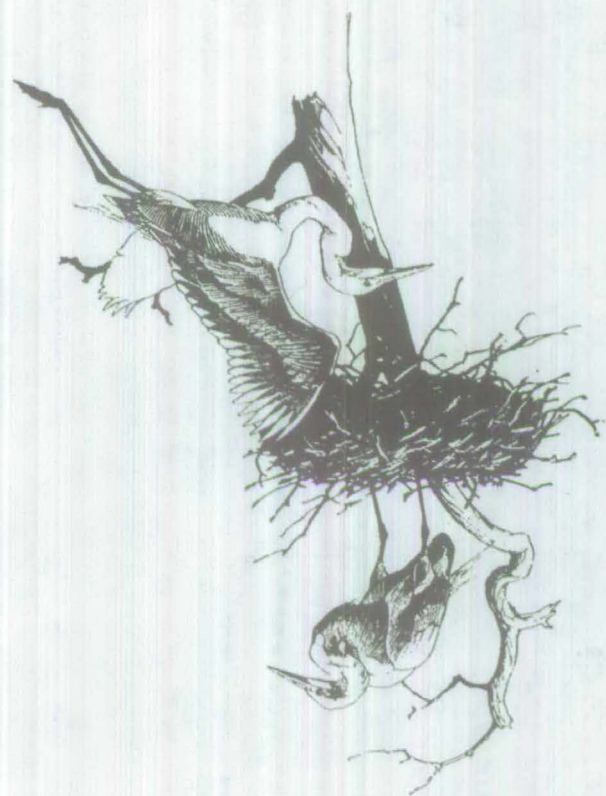
# HORICON MARSH

## Visitor Map

- ★ Visitor, Nature & Education Centers
- P Parking Lot
- Boat Ramp
- Restrooms
- Fishing Site
- Watchable Wildlife Site
- Horicon Marsh Boundary
- State and Federal Boundary
- Hiking Trails
- Wild Goose State Trail
- Circle Tour Route
- Auto Tour Route
- Major Highway
- County Road
- Improved Road
- Unimproved Road
- Railroad
- Stream or Ditch
- Lake or River
- Private Lands
- Municipalities
- Woodlands







# Horicon Marsh Visitor Map



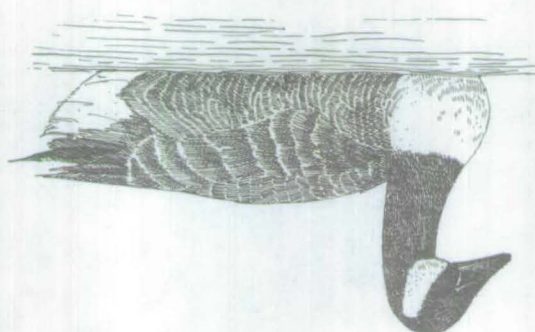
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If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington, D.C. 20240.  
This publication can be made available in alternative formats (large print, Braille, audiocassette, etc.) upon request. Please call (920) 387-7860 for more information.

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan.

**Turn in Poachers**  
Call Wisconsin DNR Hotline to report Violations  
1-800-847-9367  
(Strictly Confidential)

For further information, contact the Wisconsin Department of Natural Resources—Horicon Service Center,  
N7725 Hwy 28, Horicon, WI 53032  
(920) 387-7860.  
<http://dnr.wi.gov/org/land/wildlife/reclands/horicon/index.htm>  
Office hours are  
Monday—Friday, 8:00 am—1:00 pm and  
2:00 pm—4:00 pm



*We hope you enjoy your visit to Horicon Marsh. Please come again!*

Development and management of this property are largely funded by hunting and trapping license fees.

- 10) **Housekeeping** - To help keep the marsh beautiful for others and your next visit, please take litter with you.
- 9) **Restrictions** - Horses, snowmobiles, ATVs, bicycles, camping, open fires and overnight parking are not allowed on the State Wildlife Area.
- 8) **Trapping** - The State Wildlife Area is available to fur trapping through auction bid. Trapping is administered through the Horicon Marsh Fur Farm, per CH 29.749 Wisconsin statutes.
- 7) **Hunting** - Thousands of acres of the State Wildlife Area are available for hunting during the various seasons. However, several areas are closed or restricted. Please contact 920-387-7860 or reference the Horicon Marsh Hunting Map for current restrictions.
- 6) **Dogs** - Dogs are welcome on the State Wildlife Area for hunting and recreation. You are required to leash your dog on the entire State Wildlife Area during the nesting season from April 15 - July 31<sup>st</sup>. Additionally, dogs must be leashed at all times when using the public hiking trails. Please pick up after your dog.
- 5) **Fishing** - The State Wildlife Area is open for fishing. Check current regulations for season dates, bag and size limits.

## Horicon National Wildlife Refuge

Horicon National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, was established in 1941 for the protection of migratory birds. The Refuge consists of 21,000 acres of marsh and upland areas, comprising the northern two-thirds of the Horicon Marsh. The Refuge is one of over 540 National Wildlife Refuges in the U.S. Activities to enjoy on the Refuge:

- 1) **Hiking/Snowshoeing/Cross-Country Skiing** - Three trails are located off State Highway 49, including the floating boardwalk on the Egret Trail. Two trails are located at the Bud Cook Hiking Area, south of Highways 49 and Z. Refuge hiking trails are open every day, year-round. Hiking is only allowed on established Trails.
- 2) **Auto Tour Route** - The Horicon Turnpike, with interpretive stops, is located in the northwest part of the marsh off State Highway 49. Open daily conditions permitting.
- 3) **Hiking/Biking/Driving** - Enjoy Main Dike Road and Ledge Road, open daily year-round, conditions permitting.
- 4) **Fishing** - The Main Dike Road, Ledge Road and Peachy Road fishing sites are open daily, year-round according to State seasons. All other State regulations apply. Bank fishing only.

5) **Hunting** - Call or stop by for a hunting map and details about various game, seasons, and regulations.

6) **Educational Programs** - Special events, tours, field trips and talks take place year round. Call for information. All visitor activities are allowed during daylight hours only.

Help protect wildlife and promote public safety. Remember that public use activities are allowed during daylight hours only. Dogs must be leashed and on the trails or roads at all times. Please pick up after your dog. No camping, boating, canoeing, ATVs, snowmobiles or fires are allowed on the Refuge. For law enforcement assistance or to anonymously report a violation, contact the visitor center or the sheriff's office.

For more information, contact the Visitor Center, Horicon National Wildlife Refuge, W4279 Headquarters Road, Mayville, WI 53050. Phone: (920) 387-2658. Deaf/hard of hearing individuals may reach Horicon NWR through Wisconsin's Relay Service at 1-800-947-3529 (V/TTY). Visitor Center hours are 7:30 a.m. to 4:00 p.m. Monday through Friday year-round. Open weekends in fall and spring. <http://midwest.fws.gov/Horicon>

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## Horicon Marsh State Wildlife Area

Welcome to the Horicon Marsh State Wildlife Area. This 11,000 acre complex of wetlands and uplands is managed for wildlife by the Wisconsin Department of Natural Resources. This area is open daily from 5:00 a.m. to 10:00 p.m. for year-round enjoyment. The following information is provided to help you enjoy the property safely.

- 1) **Hiking/Snowshoeing/Cross-Country Skiing** - Hiking trails are open year-round and are available to cross-country skis or snowshoes as conditions permit.
- 2) **Biking and Hiking** - Biking, hiking and other uses are available on the Wild Goose Trail. Check with Dodge County Park System for current regulations.
- 3) **Canoeing** - The best canoeing opportunities are available along the main river corridor and main ditch accessed through the various boat landings located around the south one-third of the marsh. Please be careful to minimize disturbance to wildlife and watch out for motorboats which also use the area.
- 4) **Educational Programs** - Group presentations are available on a reservation basis. Public naturalist programs are available on the weekends during spring and fall. Call 920-387-7877 for reservations or program schedules.



U.S. Fish & Wildlife Service

# Horicon

*National Wildlife Refuge*



The background of the page is a photograph of a marsh. In the foreground, there are tall, dry, yellowish-brown grasses. A Canada goose is visible on the right side, partially obscured by the text. The goose has a white head and neck, a dark body, and a long, dark beak. It appears to be standing in the marsh. The overall scene is a natural, outdoor setting with a focus on the wildlife and habitat.

*Over 32,000 acres in size, Horicon Marsh is the largest freshwater cattail marsh in the United States. The marsh provides habitat for endangered species and is a critical rest stop for thousands of migrating ducks and Canada geese. It has been recognized as a Wetland of International Importance, a unit of the Ice Age National Scientific Reserve, and both a Globally and State Important Bird Area.*

### **More than Geese!**

Many visitors enjoy watching migrating Canada geese in the fall. Several hundred thousand interior Canada geese migrate between Hudson Bay and southern Illinois, stopping at Horicon Marsh. These birds are part of the Mississippi Valley population of Canada geese.

But geese are just part of the picture. Over 223 species of birds, along with white-tailed deer, red fox, river otters, muskrats, snapping turtles, garter snakes, and other animals call the marsh home. Horicon National Wildlife Refuge supports the largest nesting population of redhead ducks east of the Mississippi River. Thousands of redheads use the marsh each year.

Besides waterfowl, you may observe other types of birds at Horicon refuge, like shorebirds, marsh birds, terns, raptors, and songbirds. Notable species include American white pelicans, sandhill cranes, dowitchers, Forster's terns, wild turkeys, northern harriers, and yellow-headed blackbirds. The marsh supports the largest great blue heron nesting rookery in Wisconsin.

Great egret, *Jack R. Bartholmai*





Wetland habitat makes up the majority of the refuge, but valuable upland habitats, like prairie and woods, provide the diversity needed to support many types of wildlife through the seasons.

Horicon National Wildlife Refuge (21,000 acres) makes up the northern two-thirds of the marsh and is managed by the U.S. Fish and Wildlife Service. The southern one-third is administered by the Wisconsin Department of Natural Resources as the Horicon Marsh State Wildlife Area (11,000 acres). Both agencies work together to manage the marsh as one wetland ecosystem.

### **From Glacier to Refuge**

Horicon Marsh is a shallow, peat-filled lake bed scoured out of limestone by the Green Bay lobe of the massive Wisconsin glacier. Look for the hills rising on the east side of this 14-mile long depression, survivors of an ancient, frozen past. The glacier entered this area about 70,000 years ago and receded about 12,000 years ago.

A source of food for many different Native American groups for thousands of years, Horicon Marsh attracted immigrants, too. In the 1800s, logging opened the uplands for farming. In 1846 a new settlement called Hubbard's Rapids, at the south end of the marsh, was renamed Horicon, meaning pure, clean water. That same year,



The dredge, circa 1910



settlers built a dam on the Rock River in Horicon that changed the marsh into the largest artificial lake in the world at the time, Horicon Lake. People used the lake to float logs and move farm products by steamboat. Water from this dam also powered a saw mill and a grist mill.

After the dam was removed in 1869, the lake reverted to a marsh once again. Over the next 30 years, people used Horicon Marsh for unregulated recreational and commercial hunting. Attempts to convert it to farmland about 100 years ago ultimately failed because the soil was simply too wet and peaty. Following a 20-year struggle by conservationists, especially the Izaak Walton League, Congress established the Horicon National Wildlife Refuge on July 16, 1941, for the protection and conservation of migratory birds.



Horicon Shooting Club, circa 1910



Marsh sunset, *Jack R. Bartholmai*

State legislative tour, 1927

## Working for Wildlife

Horicon staff actively manage the refuge to benefit a diversity of wildlife for your enjoyment. Management activities include restoring upland habitat, monitoring waterfowl populations, providing artificial nesting structures, controlling invasive exotic species, and providing visitor services.



Fish survey,  
*Jack R. Bartholmai*



Environmental  
education, *USFWS*



Prescribed burn,  
*Mike Husar*

Manipulating water levels is the most vital management tool used to benefit waterfowl and shorebirds. The presence or absence of water, water depth, and timing are all coordinated to reduce carp and produce various stages of marsh plant succession upon which these birds rely. Various impoundments, which have been subdivided from the main pool of the marsh using a system of dikes and water control structures, are managed on seasonal, annual, and multiple-year cycles. Because of changing water levels, you may notice some wetland areas of open, deep water, others with dense cattails, and still others with bare mud.

Special care is taken to protect endangered and threatened species that use the refuge. For example, nesting platforms are provided for osprey. Essential habitat is provided for trumpeter swans, great egrets, Forster's tern, peregrine falcons and bald eagles.

Forster's Tern, *Jack R. Bartholmai*





Blue-winged teal,  
*Jack R. Bartholmai*



Muskrat,  
*Jack R. Bartholmai*



You can help by properly identifying bird species, especially swans and cranes, so they are not accidentally shot while hunting.

### **The Refuge System and You**

Horicon National Wildlife Refuge is one refuge of over 545 national wildlife refuges and 3,000 waterfowl production areas. These lands span more than 95 million acres across the continent. The National Wildlife Refuge System is the only network of lands primarily dedicated to the preservation and management of fish and wildlife resources. It is home to thousands of species of mammals, birds, reptiles, amphibians, fish, plants and many endangered species.

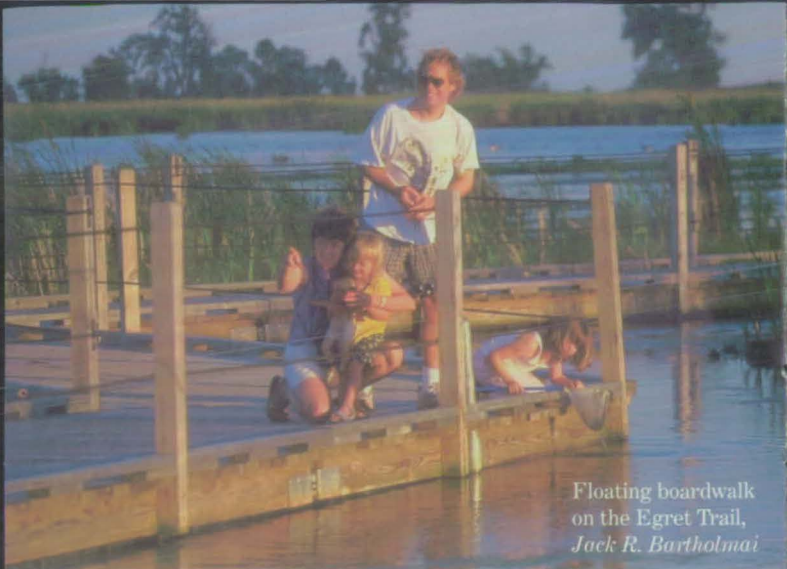
The refuge system is for people, too! About 400,000 people visit Horicon refuge each year to enjoy wildlife-dependent activities. Horicon refuge is accessible to persons with disabilities. Call or write before visiting to schedule a tour, obtain special event schedules, or inquire about other details.

Fishing at Horicon Marsh,  
*Mike & Lisa Husar*

Common moorhen, *Jack R. Bartholmai*







Floating boardwalk  
on the Egret Trail,  
*Jack R. Bartholmai*

### Things to Enjoy on the Refuge

Horicon National Wildlife Refuge is open during daylight hours only. There are a number of activities for you to enjoy during your visit.



Cross-country skiing,  
*USFWS*

- Auto touring
- Hiking
- Cross-country skiing
- Snowshoeing
- Bicycling
- Bird watching
- Wildlife observation
- Fishing
- Hunting
- Trapping
- Nature photography and art
- Environmental education
- Talks and tours
- Special events
- Educational resources

Special refuge rules apply, as well as Wisconsin state regulations. The separate Horicon Marsh Visitor and Hunting Maps provide current details on these opportunities.

November is typically, but not always, the best month to observe peak numbers of migrating Canada geese. Most people visit in October, however, since the weather





White Pelicans,  
*USFWS*

is warmer and fall colors are peaking. In spring, the marsh comes alive after the quieter winter season. Duck and warbler watching is best in April and May respectively, as these birds wear colorful breeding plumage. In summer look for broods of redheads, American coot and yellow-headed blackbirds.

During your trip to Horicon refuge, be sure to stop at the visitor center. Here you can pick up maps, ask questions, enjoy marsh exhibits, view wildlife through spotting scopes, and shop for souvenirs and gifts at Coot's Corner. Proceeds help support visitor services. The visitor center is located on the east side of Horicon Marsh, 3.5 miles south of State Highway 49, and is open year-round.



Bird watching,  
*C. Anderson*

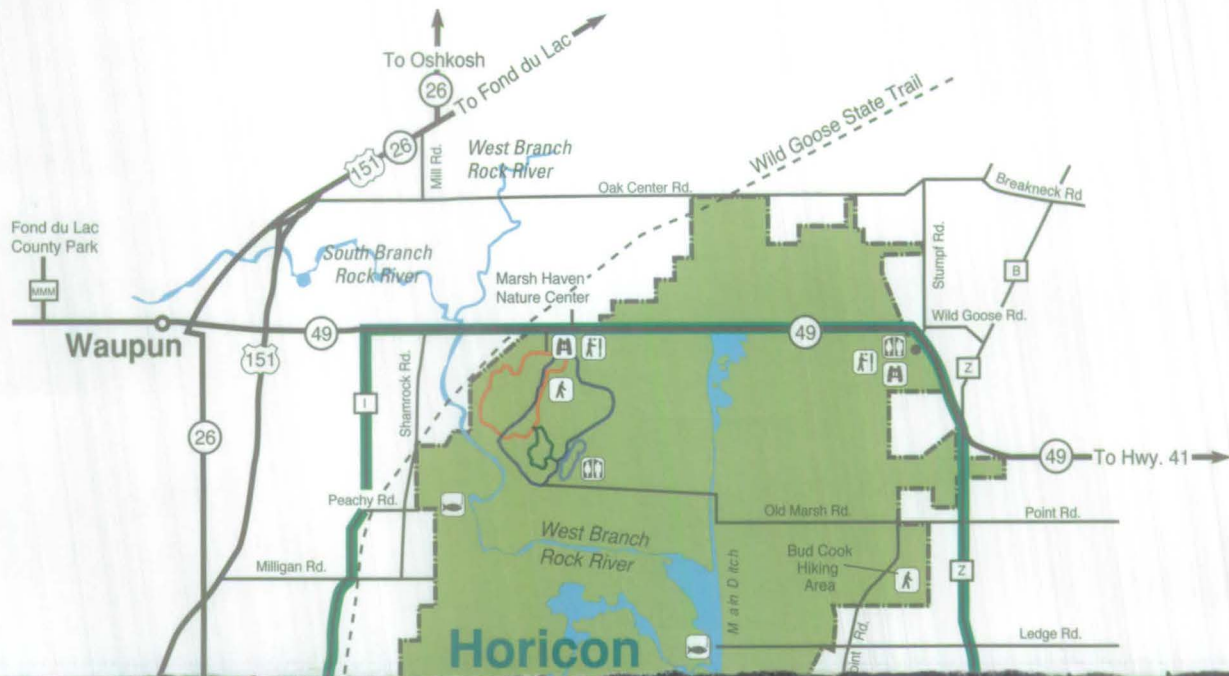
If you have binoculars, be sure to bring them with you. The animals that use Horicon Marsh are wild and will flee if you come too close. Using binoculars brings wildlife closer to you without disturbing them and allows everyone to enjoy watching them feed, fly, swim, dive, and play.

Other local wildlife viewing areas include Dodge and Fond du Lac County Parks, Theresa Marsh State Wildlife Area, and federal Waterfowl Production Areas.

Nearby towns provide an array of restaurants, hotels, special events, and shopping opportunities to help you feel right at home. Several campgrounds are located within a 30-minute drive. Contact the refuge visitor center or a local chamber of commerce for details.



Visitor center,  
*USFWS*



To Beaver Dam

151

To Lomira

Point Rd.

Reiser Rd.

Bauer Rd.

Lehner Rd.

Headquarters Rd.

Environmental Education Barn

Refuge Office/ Visitor Center

Rockvale Rd.

Dohrman Rd.

East Branch Rock River

Greenhead Rd.

Mayville

Horicon

To Beaver Dam

To Hwy. 41

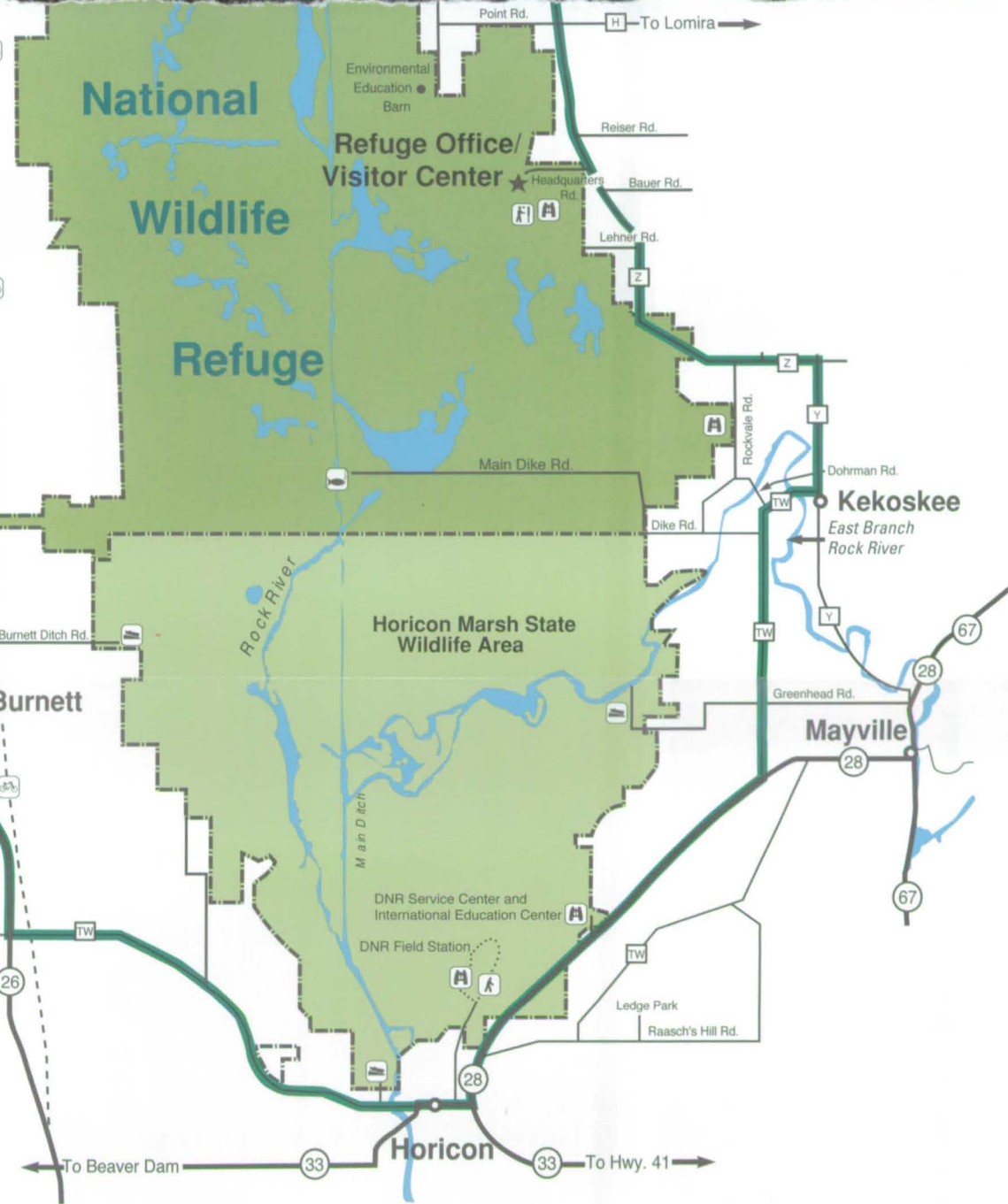


Scale in Miles



# LEGEND

- Public restrooms
- Boat Ramp
- Refuge Fishing Site
- Trails
- Interpretive Displays
- Wildlife Viewing Area
- Biking
- River or open water
- Towns
- Property Boundary
- Auto Tour Route
- Horicon Marsh Parkway
- Redhead Hiking Trail
- Red Fox Nature Trail
- Egret Nature Trail







### Help Protect Wildlife

Everything on the refuge is either a home or food for wildlife. Therefore, please remember ...

- Take only pictures, leave only footprints.
- Use official trails only.
- Respect refuge boundary signs, closed areas, and private property.
- Keep dogs leashed and on the trails at all times.
- *Keep your distance – respect nesting wildlife.*
- Pack your garbage out with you.
- Obey posted speed limits.

It is your responsibility to know and follow refuge regulations. If you need assistance, please ask for help at the visitor center.

### Citizen Involvement

You can also help by joining a group that cares for the marsh!

- Refuge Volunteer Program
- Friends of Horicon National Wildlife Refuge
- Rock River Headwaters, Inc.
- Marsh Management Committee

Horicon National Wildlife Refuge  
W4279 Headquarters Road  
Mayville, WI 53050  
920/387-2658

<http://midwest.fws.gov/horicon>

People with hearing impairments  
may reach Horicon NWR through  
Wisconsin's Relay Service at  
1-800/947-3529 (V/TTY)  
<http://www.fws.gov/horicon.html>

U.S. Fish and Wildlife Service  
1 800/344 WILD  
<http://www.fws.gov>

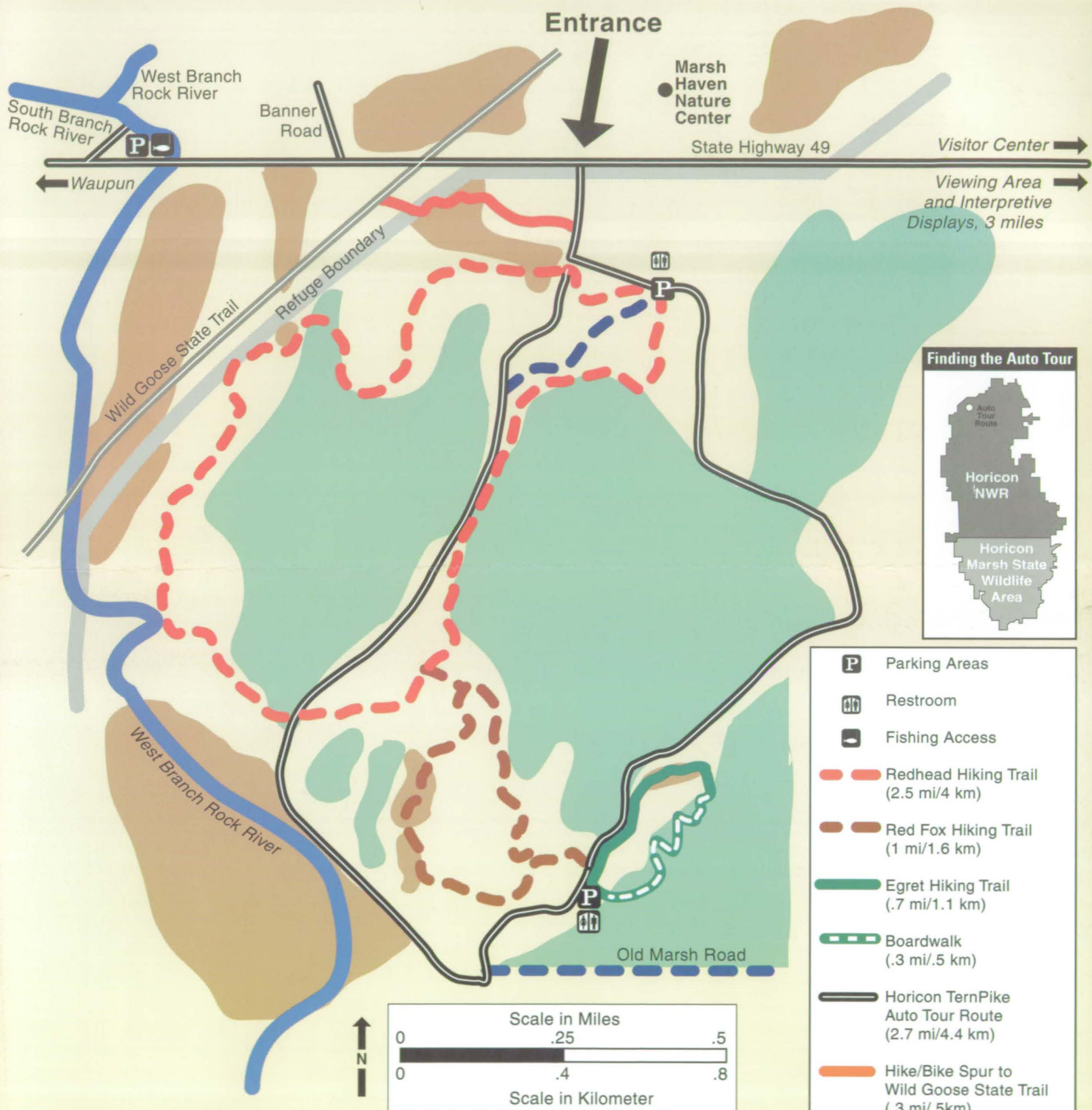


Sunset crane, *Jack R. Bartholmai*

Redhead duck, *Jack R. Bartholmai*



# Horicon NWR Auto Tour & Trails



## Finding the Auto Tour





# Horicon NWR Bud Cook Hiking Area

