

PRIME HOOK NATIONAL WILDLIFE REFUGE

Milton, Delaware

ANNUAL NARRATIVE REPORT

Calendar Year 1989

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

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Calendar Year 1989

<u><i>Paul D. Daly</i></u>	<u>2-28-90</u>	<u><i>Thomas J. McAndrews</i></u>	<u>4-5-90</u>
Refuge Manager	Date	Refuge Supervisor Review	Date

<u><i>Nancy C. Corn</i></u>	<u>4/6/90</u>
Regional Office Approval	Date

INTRODUCTION

Prime Hook National Wildlife Refuge was established in 1963, primarily to preserve coastal wetlands that are historically of high value as waterfowl habitat. The refuge is located near Milton, in Sussex County, Delaware on the southwest shore of the Delaware Bay. Prime Hook is a satellite of the Bombay Hook Refuge near Smyrna, Delaware, approximately 45 miles north of Prime Hook. Dover, Delaware's capital, lies approximately 32 miles northwest of the refuge.

Prime Hook was acquired under the Migratory Bird Conservation Fund with acquisition costs in excess of \$3 million. The refuge today encompasses 8,818 acres acquired in fee title, and eight flowage easements totaling 884 acres.

The highest point within the refuge is about 15 feet msl, but the vast majority of the refuge lies well below the 10 foot contour. The uplands are gently sloping with few steep grades, while the marshlands are flat with poor natural drainage. Ditches, many built in the 1930's for mosquito control, are numerous.

Refuge habitat types are varied and are managed to maintain a diversity of wildlife species.

Habitats consist of:

Wetland Types	76%
Estaurine (2,707A)	
Palustrine (4,640A)	
Upland Types	24%
Croplands (971A)	
Grasslands (361A)	
Woodlands (771A)	
Brush (221A)	
Sand/Dunes (20A)	
Administrative (11A)	

Acreage figures, as reported on the land type inventory report, include flowage easements.

Prime Hook is managed to provide nesting, resting and feeding habitat for migratory waterfowl, with maintenance of optimum black duck wintering habitat being an important objective. Waterfowl production, especially for black ducks and wood ducks is becoming increasingly important. Public use objectives are to provide wildlife-oriented recreational opportunities compatible with habitat and wildlife objectives. Increased emphasis will be placed on development of environmental education opportunities.

For management purposes, Prime Hook is divided into four units using highways which transect the refuge as unit boundaries.

Figure 1. General Refuge Map

PRIME HOOK NATIONAL WILDLIFE REFUGE

SUSSEX COUNTY, DELAWARE

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

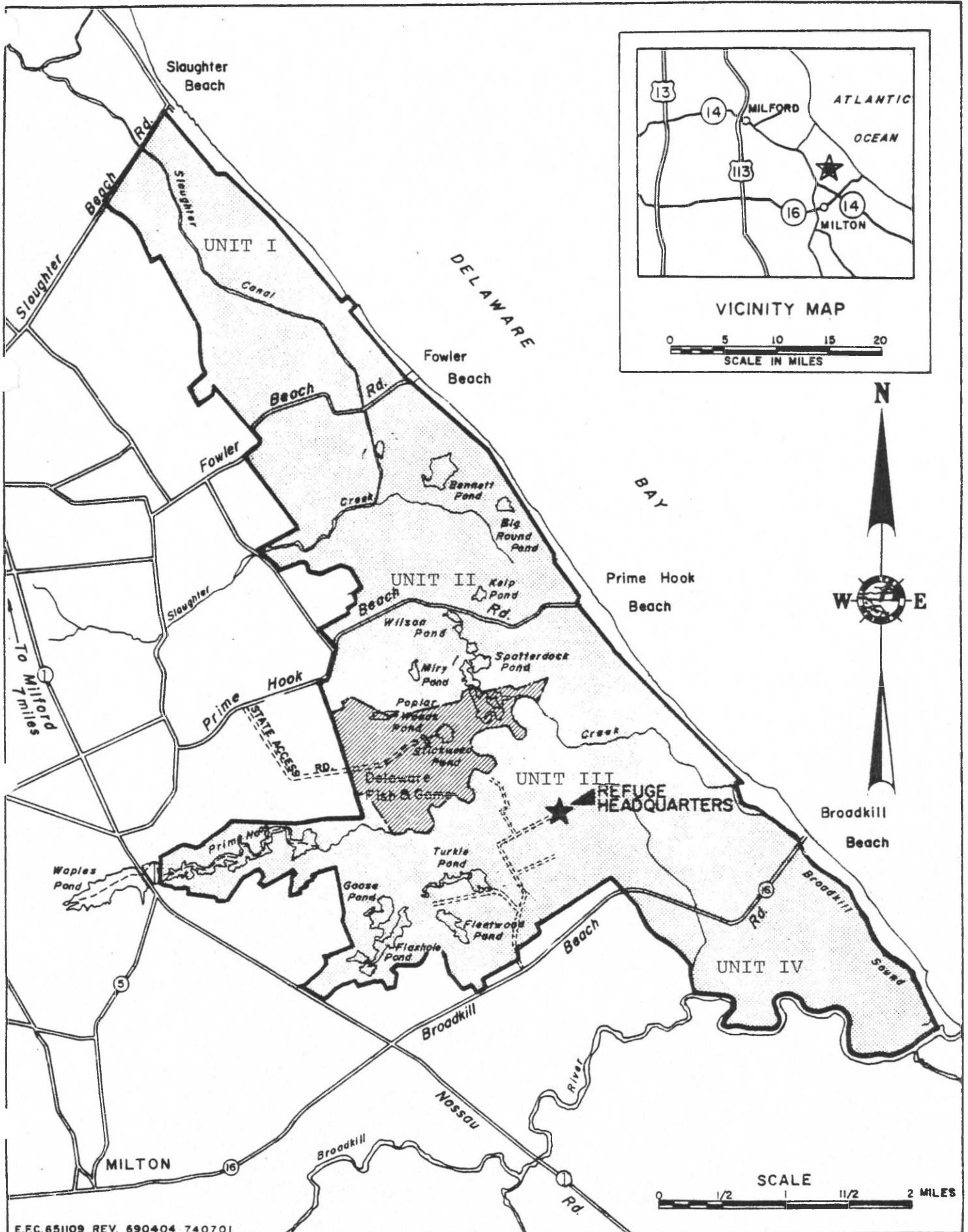


TABLE OF CONTENTS

i

A. HIGHLIGHTS

B. CLIMATIC CONDITIONS

C. LAND ACQUISITION

1. Fee Title.....	2
2. Easements.....	3
3. Other.....	3

D. PLANNING

1. Master Plan.....	NTR
2. Management Plan.....	3
3. Public Participation.....	NTR
4. Compliance with Environmental and Cultural Resource Mandates.....	4
5. Research and Investigations.....	NTR
6. Other.....	NTR

E. ADMINISTRATION

1. Personnel.....	5
2. Youth Programs.....	NTR
3. Other Manpower.....	NTR
4. Volunteer Programs.....	6
5. Funding.....	7
6. Safety.....	8
7. Technical Assistance.....	8
8. Other.....	8

F. HABITAT MANAGEMENT

1. General.....	NTR
2. Wetlands.....	9
3. Forests.....	NTR
4. Croplands.....	16
5. Grasslands.....	NTR
6. Other Habitats.....	NTR
7. Grazing.....	NTR
8. Haying.....	NTR
9. Fire Management.....	17
10. Pest Control.....	18
11. Water Rights.....	NTR
12. Wilderness and Special Areas.....	NTR
13. WPA Easement Monitoring.....	NTR

G. WILDLIFE

	Page
1. Wildlife Diversity.....	19
2. Endangered and/or Threatened Species.....	19
3. Waterfowl.....	19
4. Marsh and Water Birds.....	24
5. Shorebirds, Gulls, Terns and Allied Species.....	25
6. Raptors.....	26
7. Other Migratory Birds.....	26
8. Game Mammals.....	27
9. Marine Mammals.....	NTR
10. Other Resident Wildlife.....	27
11. Fisheries Resources.....	NTR
12. Wildlife Propagation and Stocking.....	NTR
13. Surplus Animal Disposal.....	NTR
14. Scientific Collections.....	NTR
15. Animal Control.....	NTR
16. Marking and Banding.....	28
17. Disease Prevention and Control.....	NTR

H. PUBLIC USE

1. General.....	28
2. Outdoor Classrooms - Students.....	29
3. Outdoor Classrooms - Teachers.....	29
4. Interpretive Foot Trails.....	NTR
5. Interpretive Tour Routes.....	NTR
6. Interpretive Exhibits/Demonstrations.....	30
7. Other Interpretive Programs.....	30
8. Hunting.....	30
9. Fishing.....	35
10. Trapping.....	36
11. Wildlife Observation.....	NTR
12. Other Wildlife Oriented Recreation.....	NTR
13. Camping.....	NTR
14. Picnicking.....	NTR
15. Off-Road Vehicling.....	NTR
16. Other Non-Wildlife Oriented Recreation.....	NTR
17. Law Enforcement.....	36
18. Cooperating Associations.....	NTR
19. Concessions.....	NTR

I. EQUIPMENT AND FACILITIES

1. New Construction.....	NTR
2. Rehabilitation.....	37
3. Major Maintenance.....	NTR
4. Equipment Utilization.....	39
5. Communication Systems.....	40
6. Computer Systems.....	41
7. Energy Conservation.....	41
8. Other.....	NTR

J. OTHER ITEMS

	<u>Page</u>
1. Cooperating Programs.....	41
2. Other Economic Uses.....	NTR
3. Items of Interest.....	NTR
4. Credits.....	42

K. FEEDBACK

NTR

L. INFORMATION PACKET--(inside back cover)

A. HIGHLIGHTS

Total precipitation for the year is over 17 inches above normal (Section B).

Assistant Manager Pelizza transfers to Ninigret National Wildlife Refuge. Assistant Refuge Manager Guadagno EOD in July to fill position (Section E).

Excellent wetlands habitat aids in producing record duck use (Section G.3).

OMWM work in Unit IV over 50% completed (Section F.2).

Total of 740 acres in Unit III and 200 acres in Unit II treated with Rodeo (Section F.2).

Record snow goose and duck use recorded in 1989 (Section G.3).

Snow geese cause extensive eat-outs in Units I, II and III (Section F.2).

Public use reaches record 50,000 visits (Section H.1).

Extensive rehabilitation of 5 gravel roads completed (Section I.2).

B. CLIMATIC CONDITIONS

Annual precipitation for 1989 totaled 59.57 inches as compared to the normal 41.98 inches. Temperatures ranged from a low of 13 recorded on February 25 to a high of 94°F recorded on August 6. Total snowfall for the year was 36 inches.

Following several years of below normal precipitation, 1989 was a drastic change. Rainfall was frequent and heavy from March through July, severely hampering farming operations. Most crops were planted late with some soybeans not planted until mid July. Nitrogen for corn growth could not be applied to most acreage due to the wet conditions. Standing water and water logged soils also hampered planting of wheat, buckwheat, etc. Most fields that were planted were drowned by heavy rainfall. The above normal rainfall helped maintain excellent marsh conditions including thick mats of duckweed.

An early snowfall of 9 inches on November 23 provided the first white Thanksgiving for Delaware in over 100 years. Following this storm temperatures remained well below normal with refuge marshes frozen through the end of the year. These conditions resulted in closure of the refuge to waterfowl hunting from November 23 until the end of the season on January 6 - the loss of 13 hunting days. Total snowfall for November -December was 20 inches, well above normal. December 1989 was the coldest on record in this area.

Table 1. Precipitation/Temperatures - 1989

<u>Month</u>	<u>High</u>	<u>Low</u>	<u>Inches</u> <u>Precipitation</u>	<u>Normal</u> <u>Precipitation</u>	<u>Departure</u>	<u>Inches</u> <u>Snow</u>
Jan	59	16	2.72	2.88	-0.16	3
Feb	74	13	2.94	3.52	-0.58	13
Mar	84	22	7.91	3.57	+4.34	
Apr	79	32	4.93	2.70	+2.23	
May	84	40	2.87	2.91	-0.04	
Jun	92	60	6.54	2.90	+3.64	
Jul	93	64	8.57	4.40	+4.17	
Aug	94	60	3.54	6.91	-3.37	
Sep	91	46	6.90	1.97	+4.93	
Oct	84	37	3.53	3.09	+0.44	
Nov	75	19	5.92	2.62	+3.30	9
Dec	59	16	3.20	4.51	-1.31	11
EXTREMES	94	13	TOTAL 59.57	41.98	+17.59	36

C. LAND ACQUISITION1. Fee Title

No additional action was taken during the year regarding the proposed purchase of 343 acres of marsh, woodlands and upland from Hudson Management Company. Also, no further action has been taken regarding acquisition of rights-of-way for refuge access to isolated sections of the refuge.

The refuge was contacted by two individuals representing different realty companies regarding possible development of the beach between Prime Hook Beach and Slaughter Beach. Although much of what could be developed has eroded away by tidal action, and continues to erode, these individuals propose to reclaim land lost by erosion, construct a bulkhead and pump sand to build the beach up for development, even proposing to build a sewage treatment plant on-site. All of this would be immediately adjacent to the refuge, and would involve rights-of-way from the Service both north and south of County Route 199 (Fowler Beach Road), since the Service owns tracts that extend to the bay. The land proposed for development is an important resting and feeding area for shorebirds during their northward migration in May and June. Up to 100,000 birds composed of 8-10 species have been observed.

The beach-front tracts were submitted to the Regional Land Acquisition Review (LARC) Committee in November for approval to purchase any lands that became available. Approval was granted. Rob McKim, Delaware representative for the Nature Conservancy has begun contacting landowners regarding the properties.

2. Easements

The Delaware Department of Transportation was granted an easement on portions of Tracts 79, 82 and 85a for reconstruction of the State Route 16 bridge over Petersfield Ditch. The easement includes 0.92 acres. The 50 year old bridge is being upgraded with a modern, wider bridge, thus the need for the easement.

The project was carefully coordinated with the Ecological Services Office in Annapolis, Maryland, and the Delaware Department of Transportation to minimize disturbance to wildlife and to ensure refuge access to the water control structure located 300 feet north of Route 16.

3. Other

Assistant Refuge Manager O'Shea presented a check in the amount of \$27,652.00 to Sussex County Administrator Robert C. Stickels on May 17, 1989, as the refuge's payment to Sussex County for FY 88 under the Refuge Revenue Sharing Act.

D. PLANNING

2. Management Plan

The following table lists plans that have been submitted for the refuge and the dates they were approved:

Table 2. Management Plans - Prime Hook NWR

<u>Plan Name</u>	<u>Date Submitted</u>	<u>Date Approved</u>
Animal Control	6-10-87	*
Cropland/Grassland Management	7-22-87	*
Disease Contingency Plan	9-30-85	1-27-86
Fire Management	5-20-85	7-10-85
Fishing	1-13-86	*
Hunting	4-27-87	*
Introduction Management Plan	10-1-87	*
Law Enforcement	8-01-86	*
Marsh and Water Management	9-26-86	*
Occupant Emergency Plan	6-29-83	8-8-83
Safety	5-13-86	5-22-86
Station Sign Plan	4-29-80	*
Trapping	4-27-87	12-1-87
Wildlife Inventory	9-30-86	*

* Not approved to date.

The following annual programs were prepared in 1989:

Marsh and Water Management
Hunting
Trapping
Cropland (Cooperative Farming Agreements)

4. Compliance with Environmental and Cultural Resource Mandates

Letters of Authorization were received from the U.S. Army Corps of Engineers and State Wetlands Section for maintenance of existing ditches in Unit III using the "Cookie Cutter". Rehabilitation began in February and ended in March, with approximately 4 miles of ditches being cleaned.

Letters of Authorization were also received from the U.S. Army Corp of Engineers and State Wetlands Section for the placement of stone rip-rap adjacent to the Unit II(Slaughter Canal) and Unit III(Prime Hook Creek) water control structures. Work in Unit II was completed in April. Stone placed in Unit III was completed in August. This work should sufficiently protect the banks from erosion. (See Section I.1).

E. ADMINISTRATION

2 7 5 6 4

1. Paul D. Daly	Refuge Manager	GS-12 PFT*
2. George F. O'Shea	Assistant Refuge Manager	GS-11 PFT
3. Sylvia R. Pelizza	Assistant Refuge Manager	GS- 7 PFT
(Transferred to Ninigret NWR 2/24/89)		
4. Richard J. Guadagno	Assistant Refuge Manager	GS- 7 PFT
(EOD 7/3/89 from Great Swamp NWR)		
5. Louise G. Kotarba	Clerk-Typist	GS- 3 PPT
6. Otis J. Clifton	Engineering Equipment Operator	WG-10 PFT
7. G. David Windsor	Maintenance Worker	WG- 7 PFT
8. Teresa R. Hammond	Office Assistant	GS- 6 PFT*
9. Suzan M. Staley	Clerk-Typist	GS- 3 PFT*
10. Marian Johnson-Pohlman	Outdoor Recreation Planner	GS-11 PFT*

* Stationed at Bombay Hook NWR

1. Personnel

Table 3. On-Board Strength FY 86 - 90

	Permanent		Temporary	Total FTE
	<u>Full-Time</u>	<u>Part-Time</u>		
FY 90	4	1	0	4.80
FY 89	4	1	0	4.55*
FY 88	4	1	0	4.80
FY 87	4	1	1	4.80
FY 86	4	1	0	4.80

*Assistant Manager position vacant from 2/24/89 to 7/2/89.

Assistant Refuge Manager Sylvia R. Pelizza transferred to Ninigret NWR effective 2/27/89. Richard J. Guadagno EOD 7/13/89 transferring from Great Swamp NWR. Assistant Refuge Manager George F. O'Shea completed 20 years of service in May.

Engineering Equipment Operator Otis J. Clifton and Assistant Refuge Manager George F. O'Shea received Special Performance Awards for maintaining Level 4 performance evaluations during the rating period ending 6/30/89. Assistant Refuge Manager Richard J. Guadagno was recognized for his performance while stationed at Great Swamp National Wildlife Refuge.

Assistant Refuge Manager O'Shea attended a seminar on snow goose management at Bombay Hook NWR on January 16.

Clerk-Typist Louise G. Kotarba attended a Regional Clerical Workshop in Williamsburg, VA on May 1-5.

Maintenance Worker G. David Windsor attended bulldozer, backhoe and grader equipment training at the Eastern Shore of Virginia National Wildlife Refuge on May 10-12.

All refuge staff received training in First Aid and CPR at Bombay Hook National Wildlife Refuge on July 5 and 7. Outdoor Recreation Planner Marian Johnson-Polhman and Secretary Teresa Hammond presented the training to the class.

Assistant Refuge Manager Richard J. Guadagno reported to the Federal Law Enforcement Training Center in Brunswick, GA on July 5 for a 10-week Basic Police Training course. He graduated on September 14, and reported for duty at Prime Hook Refuge on September 18.

Assistant Refuge Manager O'Shea attended the project leaders' meeting at Stockton State College in New Jersey on July 24-28.

On October 11, Assistant Refuge Manager O'Shea attended a workshop on R-base Budget Programing at Blackwater National Wildlife Refuge.

On November 30, Assistant Refuge Managers O'Shea and Guadagno attended a Waterfowl and Moist Soil Management seminar at the University of Maryland, Horn Point Environmental Laboratory, Cambridge, Maryland.

On December 12, Assistant Refuge Manager Guadagno and Engineering Equipment Operator Otis J. Clifton attended a Pesticide Applicator seminar sponsored by the Delaware Department of Agriculture.

4. Volunteer Programs

Volunteers again provided valuable assistance in refuge programs. An estimated 600 hours were volunteered to the

refuge during the year. The most significant volunteer projects were:

Assist with special deer hunts in the Office Area in January and November - 9 volunteers 180 hours

Assist with construction and placement of deer stands in the North Hunting Area and the Office Area and enlargement of a hunter parking area on Prime Hook Beach Road - 52 volunteers 251 hours

Pick up litter on 3 miles of roads and trails - local boy scout troops - 25 volunteers 50 hours

Assist with lottery drawing of deer hunting applications - 21 volunteers 39 hours

Assist with cutting grass for waterfowl blinds and construction of blinds - 4 volunteers 20 hours

Assist with repairs to Boardwalk Trail - Delaware Marine Bay Institute - 4 volunteers 16 hours

Assist with staffing an exhibit featuring the refuge, Take Pride and North American Waterfowl Plan at annual Coast Day Exhibit in Lewes - 2 volunteers 5 hours

5. Funding

The funding pattern for the past five years is summarized in Table 4.

Table 4. Funding - FY 86 - FY 90 (Thousands)

	<u>1260</u>	<u>ARMM</u> <u>(Included in 1260)</u>	<u>Resource</u> <u>Problems</u>	<u>YCC</u>	<u>12xx</u>	<u>Total</u>
FY 90	200.8	(32.0)	20.0	-	18.0	238.8
FY 89	246.0	(46.5)	31.0	-	9.2	286.2
FY 88	181.2	(25.0)	31.0	-	5.0	217.2
FY 87	183.2	(68.0)	-	-	5.0	188.2
FY 86	169.7	(68.0)	-	13	-	182.7

Additional funding from contaminant funds, not included above, was available in FY 89 for removal of the 1,000 gallon underground fuel storage tank. A total of \$5,900 available from funds donated to the refuge by J. Howard Isaacs, through Ducks Unlimited, was used for Phragmites control in Unit II through the State's Cost Sharing Program.

6. Safety

No accidents occurred during 1989.

Monthly Staff/Safety meetings are held at Bombay Hook Refuge on the last Wednesday of each month with all staff members planning and presenting one meeting during the year. All staff on-board in July were recertified in basic First Aid and CPR by Marian Johnson-Pohlman and Teresa Hammond.

Field personnel were tested for Lyme Disease in June, and all tested negative at that time. On June 22, Assistant Refuge Manager O'Shea, Engineering Operator Clifton and Maintenance Worker Windsor took their annual hearing test in Milford.

Peter S. Suich, Regional Safety Manager, visited on January 9 to conduct a safety inspection. No major safety violations were noted.

Assistant Refuge Manager O'Shea attended the Regional Safety Workshop at Wallops Island, Virginia on July 17 - 21.

7. Technical Assistance

Information on the use of Rodeo(glyphosate) for Phragmites control was provided to personnel of the Maryland Wildlife Administration and several other individuals.

Region 4 Field Biologist Otto Florschutz and Larry Ditto, Manager of Mattamuskeet National Wildlife Refuge, visited the refuge on June 21 to observe use of the open marsh water management rotary ditcher being used in Unit IV. Their interest was the potential use of the ditcher at Swanquarter Wildlife Refuge for creation of waterfowl ponds in the marsh.

8. Other Items

Deputy Regional Director James Gillette visited on October 4 and was given a tour of the refuge.

On December 1, Bob Hider Associates, a professional film crew, visited the refuge with Lou Hinds(RF), Susan Wenger(WA-RES) and Frank Cockrell(EN) from the Washington Office, to film refuge maintenance problems for a film the Washington office is preparing to promote the refuge maintenance management system. Manager Daly was photographed identifying and inspecting the refuge maintenance needs. The finished film will be used to identify refuge maintenance needs to the congress.



Refuge Manager Paul D. Daly on camera discussing refuge maintenance needs for a film being prepared by the Washington Office to identify service maintenance to congress.

12/1/89 Guadagno

The Prime Hook NWR lies within the Atlantic Coast Joint Venture and is playing an active role in achieving the objectives of the Joint Venture and the North American Waterfowl Management Plan (NAWMP) by providing and managing wetland habitat for migrating waterfowl, particularly the black duck.

1989 North American Waterfowl Management Plan activities included:

Initial operation of the Unit II Water Control Structure to manage 1,500 acres of wetlands.

Participation in the grand opening of the Kent-Sussex Visitor Center in Milford, Delaware. The NAWMP exhibit was used. Approximately 150 persons stopped at the exhibit.

Participation in the Annual Coast Day Celebration at the University of Delaware's College of Marine Studies in Lewes, DE. The NAWMP exhibit was viewed by approximately 1,000 persons.

F. HABITAT MANAGEMENT

2. Wetlands

Management of wetlands is now possible in three units, totaling 4,200 acres, following completion of the Unit II

water control structure in October of 1988. Remaining wetlands in Units I and IV are primarily salt marsh and are subject to prevailing tidal conditions.

Unit I

Unit I wetlands are dominated by salt marsh with both saltmeadow hay and saltmarsh cordgrass. The eastern boundary of the Unit along the bayshore is dominated by Phragmites.

Two mudflats, approximately 12 acres in size, have been created within the unit by snow geese. These areas provide excellent shorebird habitat during the spring and fall migrations and are used extensively by waterfowl during the fall migration. They also produced abundant saltmarsh mosquitoes this year.

Two vegetation transects were established in the marsh during September by Refuge Biologist Frank Smith of Bombay Hook to monitor the snow goose eat-outs. These transects will replace longer transects set out in 1988. Future development planning in this unit will include cooperative management with the Delaware Mosquito Control Section through installation of open marsh water management (OMWM) to benefit wildlife and to reduce mosquito breeding populations.

Unit II

1989 was the first year that water control was possible in Unit II. In order to avoid conflicts with refuge neighbors during this initial year, we maintained impoundment water below planned management levels during both the spring and fall-winter periods. Summer levels were above those planned due to frequent and above normal precipitation. Management on 1,500 acres of marsh within the unit is now possible through use of the water control structure on Slaughter Canal.

Wetlands consist of both freshwater and salt marsh species with several large ponds and numerous small ponds scattered throughout the unit. Regular tidal action, through Slaughter Canal, has resulted in salt marsh vegetation along the canal until it merges with Slaughter Creek at Oak Island. The remaining marsh is dominated by cattail, millet and Phragmites.

Efforts to control Phragmites in the unit have been hampered by erratic herbicide application, encroachment from off-refuge Phragmites and the delay in water management development within the unit. Large sections have reverted to Phragmites and must be retreated with glyphosate.

Two hundred acres of Phragmites were treated with the aquatic herbicide Rodeo in September under a cost sharing program with the Delaware Division of Fish and Wildlife. Additional portions of the unit will be treated as funds become available.

Two vegetation transects were set out in Unit II tidal ponds where snow goose eat-outs have occurred, to monitor vegetation recovery and additional damage caused by the geese.

Plans are being formulated for construction of a boat ramp within the unit to provide access for the airboat to accomplish surveys and vegetation monitoring. Ideally, a "cookie cutter" will be used to reopen ditches long closed by erosion, thus providing greater access within the marsh. Region 5 now has such a machine which is rotated among several refuges which need to utilize it.

Unit III

Unit III is the largest marsh unit within the refuge. The unit totals over 2,500 acres, not including wetlands in the State's Prime Hook Wildlife Management Area, which lies within it. Two large water control structures, a small gut plug and one mile of low dike, completed in 1984, provide water level management capability.

Water levels remained high throughout the year due to above normal precipitation. Constant effort was required to release water from the unit before it could impact on adjacent farmland or adjacent houses. This required considerable effort in raising and lowering of the three screw gates in the unit. Hopefully, we will one day be able to install flap gates to make the job less labor intensive.

Excellent stands of duckweed were found throughout the unit and were heavily utilized by waterfowl. Although water levels never dropped significantly during late summer, emergent vegetation such as wild rice, millet, rice cutgrass, smartweed and nutsedge was plentiful. The abundance of natural foods resulted in lower than normal banding success, but also aided in maintaining record fall duck populations (See Section G).



Assistant Refuge Manager Richard Guadagno setting a new
vegetation transect to monitor snow goose eat-out.
12/1/89 Guadagno



A portion of Unit III following 3 days of intensive
feeding by snow geese.

1/22/89

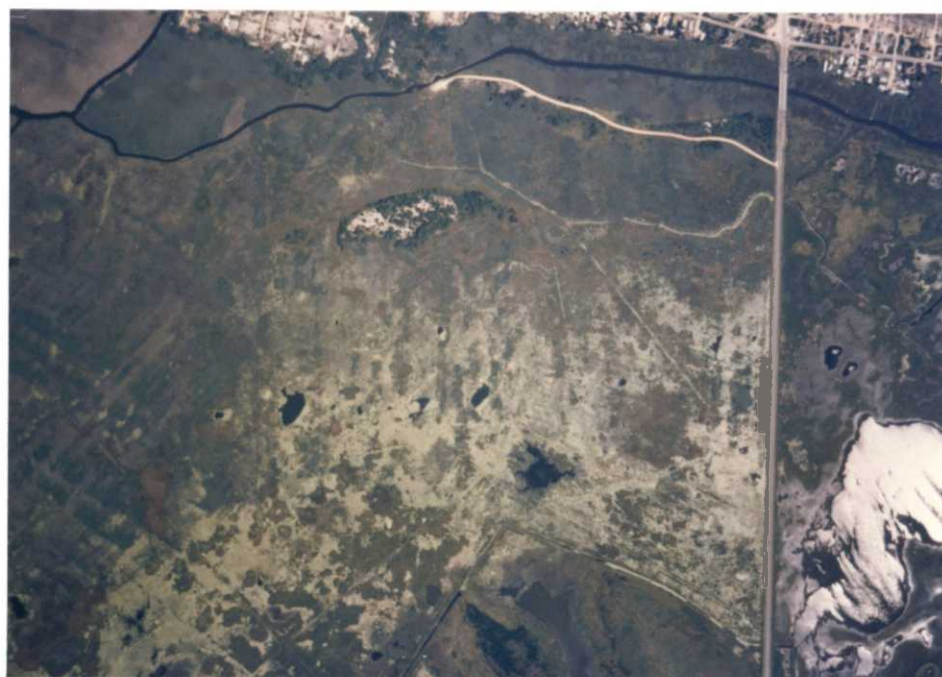
In January and February, flocks of snow geese descended upon Unit III, wreaking havoc with stands of cattail, which had become established since the area was treated by Rodeo to eliminate Phragmites. Approximately 150 acres of marsh were consumed by the birds and turned into mudflats. By August, however, it became apparent that at least part of the damage was not detrimental, as nutsedge and millet were found growing on the eat-out areas. Unavoidably higher than planned water levels kept the plants from reaching normal robust size, coverage and seed production; however, abundant food was available for migrating and wintering waterfowl.

The eat-out must be closely monitored over the next few years to determine what plant species will become established. Three transects were set up during 1989 for this purpose, in addition to longer transects established in 1988.

During February and March, the Service's "cookie cutter" was moved here from Edwin B. Forsythe NWR (Brigantine Division) to clean approximately 4 miles of ditches within the unit.

In September, 740 acres of Phragmites within the unit were sprayed with Rodeo by Helicopter Applicators Inc., including a widened firebreak adjacent to the community of Prime Hook Beach. This total included 200 acres treated under a cost-sharing agreement with the Delaware Division of Fish and Wildlife, with the Service paying 50% of the total cost.

The improvement of the Unit III marsh since active management was initiated in 1984 has been tremendous. Large, dense stands of Phragmites have been reduced; cattail, wild rice and millet stands have increased; muskrat usage, as monitored by house counts, has increased over four fold; and duck usage has more than tripled. We have come a long way toward answering the critics who said it couldn't be done.



Portions of Units III and IV near Broadkill Beach showing snow goose eat-outs from early 1989.

11/89 Smith

Unit IV

Unit IV consists of a small 200 acre impoundment and approximately 800 acres of salt marsh, much of which was formerly grid ditched. The salt marsh is tied into a cooperative program with the Delaware Division of Fish and Wildlife - Mosquito Control Section, and their plans for open marsh water management (OMWM). Installation of OMWM systems was begun in November, 1988.

Studies conducted by the Mosquito Control Section indicate that over one half of the salt marsh in the unit (417 acres) is prime mosquito breeding habitat. By the end of December, 1989, approximately 215 acres (52%) of the unit had been treated with OMWM, using basically closed sill systems. A total of 12 ponds ranging in size from 0.10 to 0.75 acres were excavated in areas of severe mosquito breeding marsh. A variety of shorebirds, wading birds and waterfowl have been casually observed using the new ponds immediately following excavation and continuing through vegetation recovery.

Large sections of marsh disturbed by OMWM installation revegetated to millet within 30 days of initial treatment. These are expected to revert to salt marsh species (Spartina patens and Distichlis spicata) by the next growing season.

State personnel, refuge staff and George Ruddy (ES-Annapolis) met frequently to review OMWM plans. These meetings are important in maintaining an excellent working relationship and meshing OMWM plans with other refuge management. Thus, areas such as breeding habitat for black rails were avoided during the nesting season and the "flats" area was avoided during peak waterfowl use. State plans are to complete OMWM work in Unit IV by late 1990.



Refuge and ES personnel meet with State Biologists on-site prior to excavation of each OMWM area. This area adjacent to Broadkill Beach, was completed by November. The stakes indicate ditches, sill and pond locations.

9/89 Guadagno

Dramatic changes have occurred in Unit IV's marshes since 1981. Dense stands of Phragmites have been replaced with salt marsh, millet and other emergents. The small ponds, formerly hidden by the Phragmites, are now greatly enlarged and offer excellent opportunity to view wildlife. Snow geese have played an important part in enlarging the ponds. Vegetation transects have been established to monitor plants within the unit and the effects of snow goose feeding on the plant communities.



Newly completed OMWM work in Unit IV North of the Broadkill River. The area was 95% revegetated by November.

6/89 Roger Wolfe
(Div. of Fish & Wildlife)

4. Croplands

All refuge farming is accomplished by cooperative farmers. In 1989, agreements totaling 652 acres planted to corn or soybeans, as the cooperator's share were signed with four farmers. The refuge's share, in lieu of cash rent, is provided in services by the farmers for the benefit of wildlife.

Rainfall well above normal was experienced in 1989 following several years of drought conditions, causing delays in planting and harvesting and poor crop yields. Depredation by deer further reduced crop yields.

Corn was grown on 325 acres with some planting delayed as late as May 20. Five fields totaling 138 acres which had been planned for corn were switched to soybeans due to delays in planting caused by precipitation. Corn yields averaged 83.3 bushels/acre with a high range of 105 bushels/acre and a low of 20 bushels/acre. Several fields produced poor yields because the wet conditions prohibited knifing of nitrogen into the soil in the early stages of growth.

Soybeans were grown on 327 acres with some fields not planted until after July 4 (one month late). Late planting resulted in poor plant development. Yields ranged from 35 bushels/acre to 17 bushels/acre with an average yield of 27.4 bushels.

No insect damage was noted this year; however, deer and woodchuck depredation continue to be a problem in our croplands. Most post-emergent Johnsongrass control was accomplished by hand as the fields were generally too wet to permit a tractor to enter.

Precipitation also severely limited crops planted for wildlife use by the cooperators. Eight acres of buckwheat near the office were drowned out by heavy rainfall soon after planting while an additional 10 acres never became dry enough to plant. Twelve acres of grassland were not mowed due to the wet conditions. In Unit II, 22 acres of soybeans representing a portion of the cooperator's share were not harvested due to wet soil conditions and depredation by Canada geese.

Other services provided to the refuge by the cooperators:

Plant 18 acres of pasture mix - special white-tail clover mix.

Plant 43 acres of wheat for goose browse.

Plant 6 acres of gamebird mix.

Plant 302 acres to barley after corn harvest.

Aerially seed 260 acres of ryegrass over standing soybeans.

Supply and spread 300 pounds of 5-20-30 fertilizer on 115 acres of established grass fields. (Total 17.25 tons).

Mow 182 acres of grassland and strips in upland hunting area.

Pasture mixes are planted and maintained in fields taken out of production by rotation. Wheat, buckwheat, barley, and ryegrass are planted as green manure crops, hot foods and/or browse for geese and deer. Snow geese made extensive use of fields in Units II and III by mid-November.

9. Fire Management

No wildfires or prescribed burning occurred in 1989. Wet conditions throughout the spring resulted in postponement of all burning. A planned burn in Unit I during the early

fall was not conducted due to wet conditions and other high priority work.

The marsh tractor was used to mow 3 miles of firebreaks along the refuge boundary adjacent to Prime Hook and Slaughter Beaches. In September, these same firebreaks were aeriaily treated with Rodeo to widen them and to reduce the future need for mowing.

Two portable radios, tuned to the Sussex County Fire Department frequencies, were purchased with 1260 fire monies to enable refuge staff to communicate directly with local fire companies during a fire emergency. The radios will also give us a back-up communications system, for personnel working in the field when the office is closed. The radios may be used as portable units or, through a vehicle charging unit, as mobile radios. Total cost was \$2,755.60.

10. Pest Control

Agricultural pesticides used in 1989 are listed in Table 5.

Table 5. Agricultural Pesticides

<u>Herbicide</u>	<u>Crop</u>	<u>Acres</u>	<u>Pest</u>
Dual 8E & Aatrex	Corn	170	Fall panicum, crabgrass, seedling Johnsongrass.
Dual 8E & Scepter	Soybeans	32	Seedling Johnson-grass, Jimsonweed, ragweed.
Sutan & Aatrex	Corn	155	Nutsedge, seedling Johnsongrass, morning glory, fall panicum.
Scepter & Prowl	Soybeans	157	Established Johnson-grass, crabgrass, and fall panicum.
Dual & Lorox 4L	Soybeans	138	Seedling Johnson-grass, fall panicum, crabgrass and pigweed.

In addition, refuge personnel applied Pramitol 5PS granules around fences, buildings and deer stands to reduce maintenance costs for trimming. Roundup was also sprayed around buildings and walkways to reduce maintenance costs.

A total of 940 acres of Phragmites in Units III and IV were sprayed in September. Again, in 1989, the refuge was able to take advantage of a State cost-sharing program under which 200 acres in Unit II and 200 acres in Unit III were treated at one half the cost (\$29.50/A) to the refuge.

G. WILDLIFE

1. Wildlife Diversity

Prime Hook is managed to provide a variety of habitat types for maximum wildlife diversity. Gamebird and pasture mixes in agricultural fields, hedgerows, and mowing of wildlife trails through grasslands help to maintain this diversity. Active water management and use of herbicides for control of Phragmites have assisted in increasing the diversity of our marshlands. It is estimated that the refuge provides habitat for over 260 species of birds, 30 species of mammals, 28 species of reptiles and amphibians and 27 species of fish.

2. Endangered and/or Threatened Species

Delmarva Fox Squirrels

The refuge population of Delmarva Fox Squirrels was estimated to be between 25 and 35 animals during 1989. Although no population studies were conducted during the year, frequent observations by refuge staff around Goose Pond and the refuge entrance area confirmed a small and apparently healthy population.

Other Endangered/Threatened Species

Observations of bald eagles were frequent this year. A nest located southwest of the refuge boundary has again produced two eaglets which were observed in the nest in April. Several adults and two immature birds were regularly observed around headquarters and the Unit IV area throughout May, June and July. Two adults and one immature bald eagle were again frequently observed on the refuge throughout October and November.

One peregrine falcon was observed in early November in the Island Farm area of Unit IV.

3. Waterfowl

a. Ducks

Unusually warm weather in January and February prevented the marsh from freezing over, which provided excellent habitat for waterfowl. Duck populations

remained about normal throughout the period. Black ducks and mallards peaked at 3,000 and 1,500, respectively, with lesser numbers of other duck species present. Green-winged teal populations increased during February with a peak of 1,000 being observed. March populations were high with peaks of 1,500 black ducks, 2,500 mallards, 2,500 green-winged teal and 1,100 blue-winged teal. Wood ducks were also frequently observed, and peaked at 800 birds on March 20.

Summer duck populations were about normal, with wood ducks being the primary species. Broods of wood ducks, black ducks and gadwall were observed in June. Numbers peaked in August, with 2,200 wood ducks, 800 blue-winged teal and 600 black ducks being recorded.

Fall populations were spectacular, surpassing recent records of peak numbers. Out of an estimated number of 67,000 ducks counted state-wide during an aerial survey by state wildlife personnel in October, 23,000 were counted on the refuge. Green-winged teal numbers were most impressive, with a peak of 16,000 birds on October 20. Pintails peaked at 11,000 birds in mid-November, and black ducks and mallards peaked at 8,000 and 3,000 birds, respectively, in mid-December.

Table 6 shows average monthly duck populations during the months of October through December for the past five years. Table 7 shows duck use days for the same period.

Table 6. Average Monthly Duck Populations - 1985-89

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
October	20,313	10,085	6,420	8,295	7,837
November	21,321	12,274	10,631	8,325	6,659
December	10,527	8,022	11,137	8,070	7,712

Table 7. Use Days-Ducks - 1985-89 (In Thousands)

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
Total Use Days (UD)	2,679	2,132	1,642	1,541	1,334
UD Black Ducks	618	532	462	399	436
% Black Ducks	23	25	28	26	33

As can be seen from the preceding tables, duck use has increased steadily since 1985. This is a direct result of the marsh development work over the same period. Water level control through the installation of structures in Units II, III and IV, and Phragmites control have combined to produce one of the premier attractions to waterfowl in the Delmarva area.

b. Duck Production

Waterfowl production was lower than 1988 totals. Above normal, persistent rainfall and relatively cool weather are possible reasons for reductions in production this year.

Table 8 shows estimated waterfowl production over the past five years.

Table 8. Waterfowl Production 1985-89

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
Mallard	250	300	125	25	25'
Black duck	250	600	200	75	100
Gadwall	60	75	75	25	10
Blue-winged Teal	60	80	40	10	20
Wood duck	800*	1,260	1,200	700	700

* Number estimated in September prior to nest box survey. A more accurate figure may be found below.

Most nesting occurs in Unit III where water management provides sufficient habitat for brood rearing and survival.

A total of 301 wood duck nest boxes was available in 1989. Results are tabulated below:

Table 9. Wood Duck Nest Box Program 1989

		<u>% of Useage</u>
Total boxes available	301	
Estimated use by wood ducks	223	74.1%
Estimated use by other ducks	0	
Estimated use by other birds	13	4.3%
Estimated wood duck broods produced	177	79.1%
Estimated total wood ducks hatched	1271	7.2birds/brood
Estimated wood ducks to flight stage	635	50%

c. Canada Geese

Canada goose use days for 1989 totaled 571,000, a decrease of 597,763 from 1988. Fall and early winter goose populations were also lower than last year, with a peak of 9,000 geese being observed in December. For the past five years, the peak population in October has been considerably lower than normal. Only 3,000 birds were observed this year, as compared to 10,000 in 1988.

Late winter and spring populations were also lower than normal, averaging only 4,000 birds. Most Canadas departed northward by mid-March. A few stragglers did remain through the summer months; however, no nesting occurred.

Table 10 shows estimated Canada geese use days over the past five years.

Table 10. Use Days - Canada Geese (In Thousands)

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
October	78	248	115	109	155
November	45	120	105	144	150
December	186	155	186	202	248

d. Snow Goose

Snow goose use days totaled 5,241,921 in 1989. Overwinter populations peaked on January 1 with 61,000 birds being recorded. Most of the birds rested overnight in Slaughter Creek (Unit II) and the Island Farm Marsh (Unit IV) during early winter. Late January and February concentrations were in Unit III near the headquarters, where considerable loss of marsh habitat occurred. The geese mainly ate saltmarsh grass and cattail in the unit, and unfortunately left Phragmites intact.

The first fall migrants were observed in September. By late October, peak numbers reached 15,000. Although heavy use occurred in November and December, the heaviest concentrations here seem to appear in mid to late winter.

Table 11 . Use Days - Snow Geese (In Thousands)

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
October	310	310	180	155	248
November	1,050	750	450	900	300
December	1,240	1,085	1,085	1,240	930

(refer also to Figure 2).

Snow goose numbers have increased tremendously since the refuge was established. A peak of 75 snows was recorded during the fall of 1966, while numbers prior to that year were too insignificant to tally. Peak populations are continuing to increase yearly. Figure 3 illustrates peak numbers over the past 10 years.

Figure 2 . Snow Goose Use Days 1979-89 (Thousands)

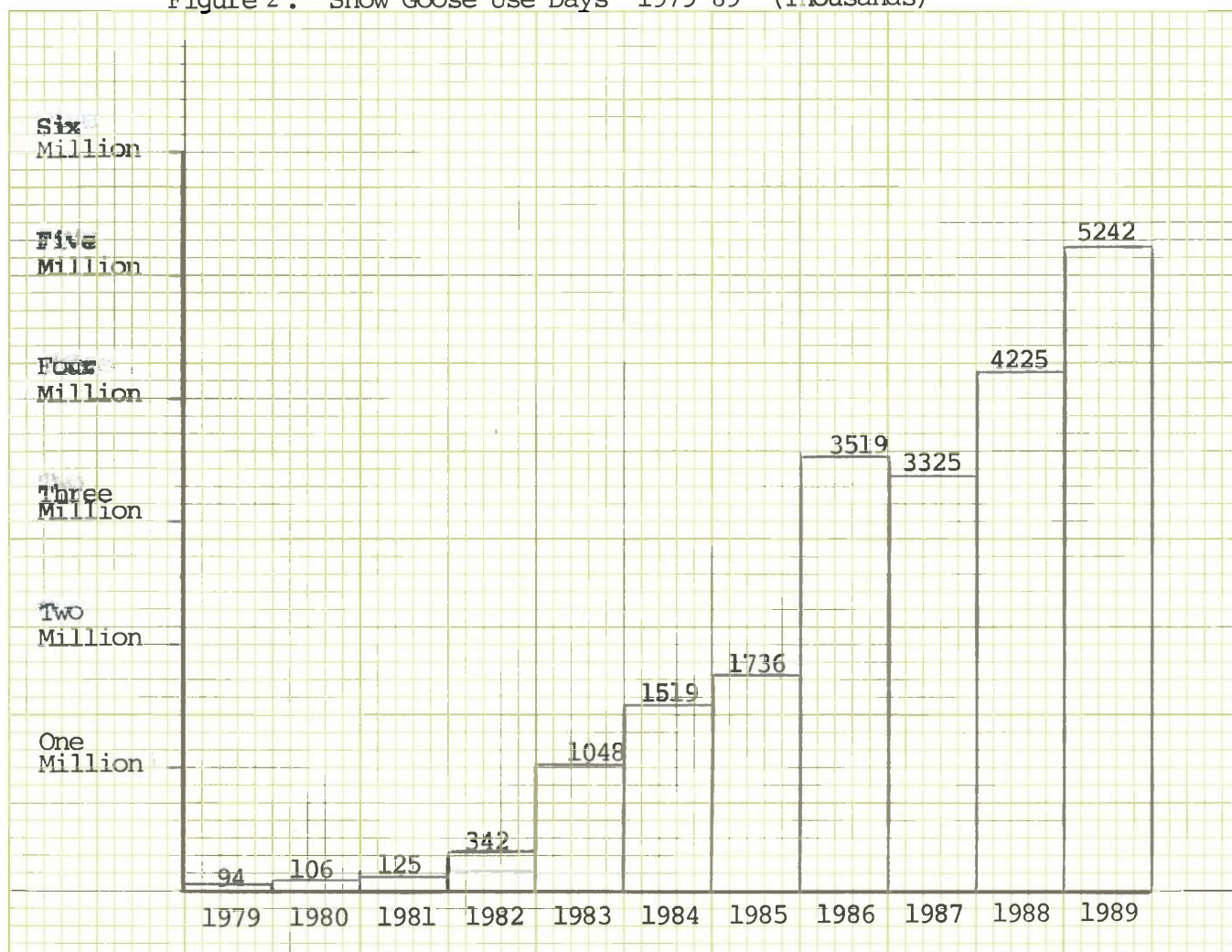
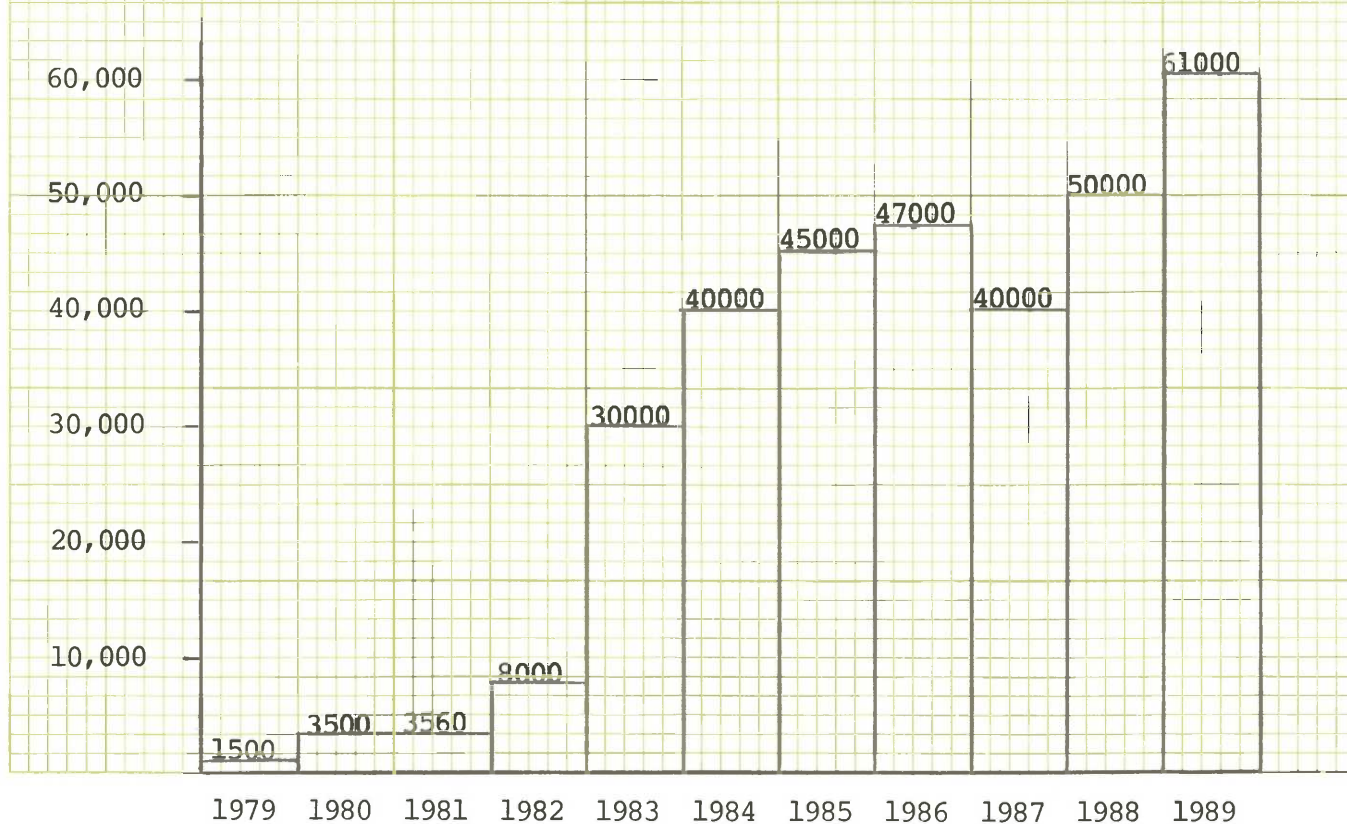


Figure 3 . Peak Populations for Snow Geese 1979-89





Sunrise - Snow geese start out in search for food.

12/89 O'Shea

e. Other Waterfowl

Populations of tundra swans over the past year have increased slightly, with a peak number of 250 birds being recorded on December 15. Total use days were estimated at 3,820 for the year.

Coots peaked at 200 birds in late October. Total coot use days were estimated at 10,350, a decrease of 16% from last year.

No brant were observed this year on the refuge.

4. Marsh and Water Birds

A total of 21 species of marsh and water birds was observed in 1989, producing an estimated 207,793 use days. The great blue heron rookery south-west of the refuge was inventoried on June 29, with a total of 127 nests being counted. When the rookery was first inventoried in 1977, only 30 nests were found. On August 17, five immature common moorhens were observed in the marsh off Route 16.

Estimated peak populations of marsh and water birds for 1989 are as follows:

Horned grebe	2	Little blue heron	50
Pied-billed grebe	60	Louisiana heron	10
Common loon	2	*Green-backed heron	50
Red-throated loon	50	Black-crowned night heron	30
Double-crested cormorant	75	*Black rail	15
American bittern	15	*Clapper rail	100
*Least bittern	10	*Virginia rail	100
Great egret	50	*Sora rail	50
Snowy egret	300	*Common moorhen	10
Cattle egret	250		
Glossy ibis	200		
Great blue heron	350		

* nest on-refuge

5. Shorebirds, Gulls and Terns

A single little gull was observed in Unit IV on April 12 by birder/volunteer William Frech. The bird was seen off and on until August. Mr. Frech observed 6 stilt sandpipers in the same unit on August 15.

A pair of black-necked stilts nested in Virgie's Pond in Unit IV. The nest, a refuge first, was initially observed in June. Heavy rains and above normal tides, however, washed the nest out before the eggs could hatch.

Two pair of black skimmers and 2 pair of Forsters terns also attempted to nest in Unit IV; however, they were broken up by avian predators. These species also were first-time refuge nesters.

Marsh management efforts in Unit IV, particularly management of water levels and use of the aquatic herbicide Rodeo to control Phragmites, coupled with extensive snow goose eat-outs, have resulted in creating excellent feeding and resting areas for shorebirds. Over the past 2 years several new species for the refuge's bird list have been identified in this area in addition to three new nesting records.

In 1989, a total of 39 species were observed on-refuge producing an estimated 1,185,841 use days.

Species occurring on the refuge and peak numbers include:

Great black-backed gull	50	Upland sandpiper	2
Herring gull	150	Sanderling	500
Ring-billed gull	3,000	White-rumped sandpiper	1,200
Laughing gull	2,500	Least sandpiper	2,500
Bonaparte's gull	4	Dunlin	4,500
Little gull	1	Semi-palmated sandpiper	1,000
Caspian tern	2	Western sandpiper	300
Royal tern	20	Greater yellowlegs	200
*Forster's tern	32	Lesser yellowlegs	75
Common tern	35	Solitary sandpiper	10
Least tern	50	*Willet	600
*Black skimmer	10	*Spotted sandpiper	10
Wilson's phalarope	1	Black-bellied plover	400
*American woodcock	200	Golden Plover	4
Common snipe	300	*Killdeer	50
Short-billed dowitcher	700	Semi-palmated plover	350
Long-billed dowitcher	150	Ruddy turnstone	1,200
Stilt sandpiper	7	Red knot	3,000
Pectoral sandpiper	10	Curlew sandpiper	1
Black-necked stilt	4		

* nest on-refuge

6. Raptors

No golden eagles were observed this year for the first time in 12 years.

Sixteen species of raptors were recorded this year producing an estimated 72,195 use days. We had anticipated osprey nesting on-refuge this year after the species made a weak try in 1988; however, no nesting attempts were noted.

Raptor species and peak populations included:

*Turkey vulture	60	Merlin	1
Black vulture	50	American kestrel	30
Northern harrier	25	Barn owl	4
Sharp-shinned hawk	20	Short-eared owl	20
Cooper's hawk	2	*Barred owl	8
*Red-tailed hawk	8	*Screech owl	60
*Red-shouldered hawk	10	*Great horned owl	40
Rough-legged hawk	10	Osprey	8

*nest on-refuge

7. Other Migratory Birds

Damp cool weather appears to have hampered nesting by mourning dove; estimated production was only 800 birds as compared to 1,500 birds produced in 1988. Several late broods were observed in nests in September.

A loggerhead shrike was observed in Unit IV on September 30. This species is seldom seen on the refuge. A single male yellow-headed blackbird was observed in a flock of 1,500 red-winged blackbirds on Fowler Beach Road on November 2.

The spring bird census by the Delmarva Ornithological Society was conducted on May 6, with a total of 118 species being observed on-refuge. The Christmas bird count was conducted on December 17 in bone chilling weather. This hardy group recorded a total of 100 species.

8. Game Mammals

Evening deer counts in the 450 acre office area peaked at 187 animals in late October. Crop damage in the vicinity continues to be extensive both on and off-refuge. The refuge herd is estimated at 850-875 head and has been expanding for several years.

A muskrat house count was conducted in a portion of Unit III in December. A total of 736 houses were counted. Lack of suitable snow cover and access to an airplane have resulted in incomplete aerial muskrat house counts for several years; however, since the time when active marsh management was implemented in Units II and III visual evidence has shown a 3 to 4 fold increase in houses. Hopefully, favorable conditions will exist in January or February 1990 to permit an aerial census.



Please finish planting the soybeans, I'm hungry.
5/89 O'Shea

10. Other Resident Wildlife

Populations of ring-necked pheasant and northern bobwhite

appear stable. Wet spring and summer conditions appear to have reduced breeding success.

Wild turkeys continue to be observed in Units I, II and III. No observations were made in Unit IV this year. Several broods were seen by farmers adjacent to Unit I. A spring calling census recorded four calling turkeys- a refuge first. Numerous deer hunters have reported seeing from 4-24 turkeys. The species seems well established on the refuge.

16. Marking and Banding

Pre-season banding for both wood ducks and black ducks was poor, although plenty of birds could be found in the area. Excellent water conditions and abundant natural foods played a role in limiting our success.

The quota for Prime Hook and Bombay Hook is:

50 wood ducks each age and sex
200 black ducks

Banding was initiated on August 3 and terminated on September 12. Banding results at Prime Hook are as follows:

Table 12. Pre-Season Banding - 1989

	<u>AHY M</u>	<u>AHY F</u>	<u>HY M</u>	<u>HY F</u>	<u>TOTAL</u>
Black duck	3	31	1	14	49
Wood duck	13	25	5	14	57
Mallard	0	7	0	1	8
Blue-winged teal	4	3	4	6	17
Green-winged teal	2	4	2	5	13
Black x mallard cross			1		1
TOTAL	<u>22</u>	<u>70</u>	<u>13</u>	<u>40</u>	<u>145</u>

No pintails were trapped this year.

Nine screech owls were banded in wood duck nest boxes during winter box checks.

Angela and Alex Thor were given a permit to set mist nets on the refuge for songbird banding. Nets were set at two locations on weekends during the spring migration. A total of 117 birds representing 28 species were banded.

H. PUBLIC USE

1. GENERAL

Prime Hook provides few public facilities. Two short trails, a small picnic pavilion and several boat launching sites are the only facilities available. The 1.6 mile entrance road and four public highways transecting the

refuge also provide the public with the opportunity to view wildlife. A public restroom is available only at the office which is closed on weekends.

A self-guiding brochure for the 0.5 mile Boardwalk Trail was prepared by Delaware State College student Ron Brown as part of his student field study assignment in 1986. The brochure has not yet been printed due to funding constraints; however, limited copies of the brochure are placed at the beginning of the trail for use by the public.

Total visits for all purposes in 1989 were estimated at 50,463, an increase of 5% from 1988. When one considers that the refuge is basically unmarked on the State highways, the total number of visits is exceptional. We remain at loggerheads with the State over placing signs along State Route 1 to identify and direct the public to the refuge. During the past 10 years public use of Prime Hook has doubled, yet we still lack basic public facilities or a staff person to manage public use.

2. Outdoor Classrooms - Students

Two classes totaling 115 first grade students from H.O. Brittingham Elementary School in Milton visited the refuge on May 17 as part of a year-round environmental program at the school.

On May 30, Outdoor Recreation Planner Marian Johnson-Pohlman from Bombay Hook Refuge conducted a habitat study program for fifty 7th grade students from Rehoboth Elementary School.

Seventy 3rd and 4th grade students from H.O. Brittingham Elementary School visited the refuge on September 27 as part of their classroom environmental education program.

On November 1, 108 kindergarten children from Milton visited the refuge to study fall plants and wildlife as part of their year-round program.

3. Outdoor Education - Teachers

The transfer of Assistant Manager Pelizza in February left a void in refuge educational programs. A teacher workshop planned for April was cancelled when only 2 teachers signed up for the program, which was received by the State Educational Coordinator too late for inclusion in a workshop brochure sent to teachers State-wide.

A second workshop was conducted on October 15 by Assistant Refuge Manager O'Shea and Bombay Hook Recreation Planner Marian Johnson-Pohlman. Six teachers attended the program.

6. Interpretive Exhibits/Demonstrations

On May 20, Assistant Refuge Manager O'Shea staffed an exhibit on Prime Hook Refuge and the North American Waterfowl Management Plan (NAWMP) at the opening of the Kent Sussex Visitor Center in Milford, Delaware. Approximately 150 people viewed the exhibit.

On October 1 (Coast Day), Assistant Refuge Managers O'Shea and Guadagno staffed an exhibit on the refuge and the North American Waterfowl Management Plan at the University of Delaware College of Marine Study in Lewes. Approximately 1,000 persons stopped at the display.

7. Other Interpretive programs

The following groups were provided with on-site interpretive programs during 1989:

<u>Group</u>	<u>Attendance</u>	<u>Program</u>
Sussex Bird Club	30	Search for turkeys
Kent/Sussex Consortium	12	General tour
Boy Scouts-Milton/Rehoboth	25	Refuge management and litter pick-up

Off-site refuge programs were provided to:

<u>Group</u>	<u>Attendance</u>	<u>Program</u>
Lord Baltimore Middle School, 57 Ocean View, DE		Wood ducks, bluebirds and banding
Lake View Elementary School, 20 Milford, DE		Birds
Dewey Beach Lions Club 25 Dewey, DE		Refuge and NAWMP
Frederick Douglass Elem. 255 Seaford, DE		Animal adaptations
Covenant School, 21 Pittsville, MD		Trail tour

The number of both on-site and off-site programs was considerably lower than in 1988. Due to the vacant assistant refuge manager position, we were forced to turn down numerous requests due to higher priority work.

8. Hunting

Prime Hook offers one of the most extensive hunting programs in the region with a variety of hunting seasons and opportunities. Included are waterfowl, including a Young Waterfowler Training Program; deer, archery, muzzleloader and shotgun; small game, rabbit and squirrel; upland game birds, pheasant and bobwhite; and other migratory game birds; dove, woodcock and snipe. The deer

hunts include special hunts in the office area, two days during the early shotgun season and one in the late muzzleloader season; and a 2-day special hunt for non-ambulatory persons. Hunting seasons begin on September 1 with the opening of the archery season for deer and close on the last day of February with the end of the bobwhite season.

a. Waterfowl

The 1989-90 duck season for Delaware was 30 days in length with a three-way split. Season dates, bag limits and restrictions may be found in the Information Packet. Two changes in State-wide regulations were made this year - shooting hours were set back to 1/2 hour before sunrise (last year was sunrise) and black ducks could be taken during the entire season (limit one per day). In past years black ducks were not legal to take during the first split.

Refuge hunting is permitted on Monday-Wednesday-Friday and Saturday during the duck season. Twenty-five grassed blinds are available on a daily lottery basis. The hunt is a cooperative program with the State's Division of Fish and Wildlife with eight of the blinds lying on the State's Prime Hook Wildlife Management Area.

The 1989-90 refuge duck season was very short. Snow and ice forced closure of all blinds from Thanksgiving day until the end of the season, resulting in only 5 refuge hunting days. High duck populations in the refuge during the season resulted in excellent hunter success during the short season. The following tables compare this season to previous years.

Table 13. 1989-90 Waterfowl Hunting Results

<u>Season</u>	<u>Days</u>	<u>Hunters</u>	<u>Harvest</u>	<u>Ave/ Hunter</u>	<u>Reported Crippling Loss</u>	<u>% Crippling</u>
1	4	264	412	1.56	43	9.4
2	1*	60	157	2.62	15	8.7
3	closed	0	0	0	0	0
		324	569	1.76	58	9.2

* 2 days lost to ice

Table 14. Black Duck Harvest 1985-1989

	<u>1989</u>	<u>1988</u>	<u>1987</u>	<u>1986</u>	<u>1985</u>
First split	33	0*	0*	0*	0*
Second split	16	38	55	35	30
Third split	<u>0</u>	<u>138</u>	<u>135</u>	<u>91</u>	<u>74</u>
TOTAL	49	176	190	126	104

* black ducks not legal to hunt

Table 15. Waterfowl Harvest - Selected Species
1986-1990

	<u>1989-90*</u>	<u>1988-89**</u>	<u>1987-88***</u>	<u>1986-87***</u>
Canada Goose	21	99	100	200
Snow Goose	11	22	30	9
Mallard	76	123	279	123
Black Duck	49	176	190	126
Green-winged teal	229	117	217	279
Wood duck	25	52	111	17
TOTAL HARVEST-				
all species	<u>569</u>	<u>729</u>	<u>1,195</u>	<u>970</u>

* - 5 hunting dates

** - 18 hunting dates

*** - 30 hunting dates

b. Young Waterfowl Training Program

An educational/hunting experience for young hunters aged 12-17 continued for its 6th year with volunteer instructors J. Ross Harris, William Dugent and Frank Buck. The program is co-sponsored by the refuge, Delaware Division of Fish and Wildlife, Broadkill Sportsmans Club and the Eastern Sussex Chapter of Ducks Unlimited.

The training was conducted on four Saturdays at the nearby Broadkill Sportsmans Club and on-site at the refuge. Training consisted of hunter safety, shooting skills with steel shot, waterfowl identification, decoy use and rigging, boating safety, blind construction and layout, use of calls and wildlife law.

Only six youngsters participated in the program. Graduation was held on November 4 with a 1/2 day hunt in Unit IV. A total of 8 ducks and one Canada goose was taken - an average of 1.5 birds per hunter. No cripples were lost and the hunters average 4.2 shots per bird bagged.

c. Big Game

Permits are required for all deer hunting on the

refuge, which is open during portions of the archery, muzzleloader and shotgun seasons. This report will include the entire 1989-90 season which ends on January 31, 1990. This year, the State added a late shotgun deer hunting season (two days in January). Refuge regulation changes for the 1989-90 season included the requirement that hunting will be from provided stands (elevated platforms) between one half hour before sunrise until 8:00am and from 3:30 pm until the end of legal shooting time (1/2 hour after sunset). Two small areas, accessible only by boat, did not contain stands; however, the number of hunters in these areas was restricted to provide safe, quality hunting.

Permits for archery hunting are issued each hunting day on a self-service basis. Permits for firearms seasons are issued based on an advanced lottery drawing (See maps and regulations in the information packet for application due dates for each season).

The Delaware Division of Fish and Wildlife donated 20 stands for use in the programs. An additional 15 stands were donated by hunters. The North Hunting Area and Hunting Area B now contain 60 stands, while Area A (the Office Area) contains 45 stands. Volunteers helped place and number the stands and assisted in expanding one parking area to accommodate hunter vehicles. Excellent and well appreciated assistance from the hunters contributed to a successful program.

Archery hunting was open daily (except Sunday) during September and on Saturdays following the early shotgun season - a total of 35 hunting days. During September, 410 persons bow hunted, braving biting insects and heat. A total of 9 deer was taken. During the remainder of the refuge season a total of 89 hunters were afield; however, no deer were taken.

Nearly 500 applications were received for the early muzzleloader season (October). A public lottery drawing was held on September 15 to award 180 permits. Warm weather and mosquitoes kept many hunters away during the hunt on October 12-14.

Applications for the November shotgun seasons (Office Area and the combined North Hunting Area and Area B) resulted in a combined total of approximately 1,000 applications. The lottery drawing was conducted on October 11 to award 480 permits for the North Area and 180 permits for the Office Area. The combined work of the refuge staff and volunteers took nearly three days to process and return the permits to the hunters. On opening day of the shotgun season, approximately 50 stand-by hunters were turned away when all stands had been filled - the first time that this had occurred.

The Office Area hunts were held on Monday November 13 and Friday November 17. As usual turn-out by hunters was excellent. Only four non-ambulatory hunters participated in this year's hunt with two being successful. One individual took a 9-point 217 pound(field dressed) buck, which was the largest deer taken in the state during the early season.

The January firearms hunts drew also a total of nearly 1,000 applications for the two-day muzzleloader hunt. The drawing for permits was held on December 21 with a total of 165 permits drawn for the shotgun hunt and 250 permits for the muzzleloader hunt.

On the opening day of the shotgun hunt, nearly 100 hunters were turned away after all permits had been issued. The muzzleloader hunt was not as popular, and no hunters were turned away.

Results of the 1989-90 deer hunting programs are reported in Tables 16 and 17. Table 18 illustrates hunting success from 1978-1990. The deer harvest has risen significantly as has the refuge deer herd.

Table 16. Summary of the 1989-90 Deer Hunting Season

<u>Season</u>	<u>Area</u>	<u>#Visits</u>	<u>#Days</u>	<u>#Deer Taken</u>	<u>%Success</u>
Archery	North Hunting Area	499	35	9	1
Early Muz- zleloader	North Hunting Area, Area B	210	3	14	7
Shotgun	North Hunting Area, Area B	560	8	49	9
Shotgun	Area A(Office)	193	2	58	30
Shotgun	Area A-Headquarters- Handicap	12	2	2	17
Late Shotgun	North Hunting Area, Area B	205	2	7	3
Late Shotgun	Area A(Office)	48	1/2day	7	15
Late Muz- zleloader	North Hunting Area, Area B	111	3	3	3
Late Muz- zleloader	Area A(Office)	93	1	6	6
	TOTAL	<u>1131</u>	<u>56.5</u>	<u>155</u>	

Table 17. Hunter Activity - Hunting Area A - Early Shotgun Season

	<u>1989**</u>	<u>1988*</u>	<u>1987*</u>	<u>1986*</u>	<u>1985*</u>
Hunters	193	149	104	100	100
Deer Taken	58	47	42	39	26
Non-Ambulatory	4	4	3	5	5
Hunters					
Deer Taken	2	1	2	2	1

* 35 stands available

** 45 stands available

Table 18. Deer Harvest By Season 1978-1989

	<u>Archery</u>	<u>Shotgun</u>	<u>Office Shotgun</u>	<u>Non-Amb. Shotgun</u>	<u>Ml (1) Oct.</u>	<u>Ml (1) Jan.</u>	<u>Shotgun* Jan.</u>	<u>Total</u>
1978	0	13	-	-	0	0	-	13
1979	1	11	-	-	2	2	-	16
1980	0	17	-	-	1	3	-	21
1981	2	11	-	-	1	1	-	15
1982	4	21	-	1	3	3	-	32
1983	2	22	32	5	5	8	-	74
1984	3	27	26	2	6	5	-	69
1985	7	27	26	1	8	12	-	81
1986	6	45	39	2	23	3	-	118
1987	3	34	42	2	15	12	-	108
1988	5	59	47	1	19	10	-	141
1989	9	49	58	2	14	9	14	155

* new 1989-90

(1) muzzleloader

d. Small Game, Upland Game Birds and Other Migratory Game Birds

Hunting is permitted only on the 2,200 acre North Hunting Area during the respective seasons for each species. Populations have remained relatively stable over the past few years. Species hunted include northern bobwhite, ring-necked pheasant, gray squirrel, cottontail rabbit, mourning dove, woodcock and snipe. Overall hunter activity is generally light with a total of 1,375 visits in 1989.

9. Fishing

Fishing is a popular year-round sport in this locale, weather permitting. Generally, the best opportunities occur in Prime Hook Creek, Slaughter Canal and Turtle and Fleetwood Ponds. Largemouth bass, white crappie, white perch, brown bullhead and chain pickerel are the most commonly taken species.

Crabbing is a favorite pastime along Slaughter Canal and near our Unit III water control structure. During 1989, an estimated 9,859 visits were made to the refuge for fishing and crabbing. Combined they provided a total of 35,945 recreational hours.

10. Trapping

During the 1988-89 trapping season, six units were open to bidding. The Delaware season runs from December 15 - March 15; however, the refuge season was delayed until the end of the duck hunting season in early January, 1989. Only one unit was bid upon, and awarded for a total of \$207.70. Trapping was brief, since the permittee moved from the area in February after having trapped only 10 days. Success was nil, with the target species being primarily muskrat and raccoon.

In an attempt to draw more bids, Prime Hook's trapping program was included in a bid package with State trapping units. However, again only one bid was made on a single unit (V). Since trapping will actually occur in 1990 following conclusion of the duck season, results will be reported in the 1990 Annual Narrative.

17. Law Enforcement

Prime Hook's primary thrust in enforcement is violation prevention through use of signs, gates, hedgerows, posting of regulations in each parking area and high visibility patrol. It has been the refuge's policy that clear cut violations will result in prosecution, except for juveniles. When circumstances warrant verbal and/or written warnings are issued. The presence of four public highways transecting the refuge provide unique enforcement problems with our small staff. It is not uncommon to find spent cartridges along the roadway, indicating that wildlife have been taken from it, despite high visibility patrols. It is rare to happen upon such a violation when it is in progress.

One incident of vandalism occurred at the new Unit II Water Control Structure; spray paint was used to write initials and obscenities on the monument; however, the damage was minimal as the Lexan over the monument aided in easy cleaning. The entrance sign on Fowler Beach Road was also vandalized and had to be repainted.

A total of 66 individuals were contacted regarding violations in 1989, resulting in 29 Notices of Violation being issued. Table 19 summarizes law enforcement activity during 1989.

Table 19. 1989 Violations - Prime Hook NWR

<u>Resource Violations</u>	<u>Prosecuted</u>	<u>Warning</u>	<u>Juvenile</u>
Take waterfowl early/late	3	2	
Take over limit of waterfowl	3		1
Unsigned Federal duck stamp	3	1	2
Unsigned State duck stamp	2	1	2
Possess lead shot in steel zone	1		
Hunt without a license			2
Take deer before legal hours	1		
Hunt in closed area	2		
Violation of State hunter orange law		12	
Violate refuge specific regulations	3	12	
Fish in closed area	3	4	
Collect vegetation		2	
 <u>Non Resource Violations</u>			
Loaded weapon in vehicle	1		
Uncased/Assembled weapon	1		
Destroy Government property	3		
Boating violations	1		1
Parking violation		4	
Reckless driving		1	
Trespass - closed area, late, motor vehicle	2	15	—
TOTAL	29	54	8

I. EQUIPMENT AND FACILITIES2. Rehabilitation

ARMM funding was provided for upgrading refuge gravel roads. The fill material was purchased locally and spread by Engineering Equipment Operator Clifton using Bombay Hook National Wildlife Refuge's road grader. The following roads received upgrading:

<u>Road</u>	<u>Length</u>	<u>Fill Placed</u>
Turkle Pond Road	0.5 mi	1200 CY
Shop Road	0.5 mi	1200 CY
Access road to Prime Hook Creek Water Control Structure	0.5 mi	700 CY
Unit IV access road	0.5 mi	700 CY



Engineering Equipment Operator Otis J. Clifton operating Bombay Hook's road grader during rehabilitation of Prime Hook's gravel roads.

7/14/89 O'Shea

Delivery of fill for the office road (1200 CY) was delayed until the spring of 1990 due to wet conditions throughout the fall.

Refuge gravel roads are maintained periodically using the Massey-Ferguson 1085 Tractor with a backblade attachment or a stone rake. Five tons of cold patch were purchased for use in patching potholes on the 0.6 mile entrance road.

In April, 100 tons of large rip-rap were placed between the New Unit II Water Control Structure and the County Route 199 Bridge to prevent erosion of the bridge when water is released from Unit III. Cost of the stone was \$1,941; while cost to place the rip-rap was \$1,950. While making a final inspection of the project, we noticed that the aluminum sheeting downstream from the Water Control Structure (WCS) had begun to sag inward due to erosion, similar to what had happened at the Unit III WCS. An additional 40 tons of rip-rap were purchased and placed adjacent to the bulkhead to shore it up.

During August, 165 tons of rip-rap were purchased and placed downstream from the Prime Hook Creek WCS in Unit III for protection of the streambank. Cost of the stone was \$3,223 and placement cost an additional \$1,625 using a crane and clamshell bucket.

Fifty tons of crusher run stone were placed at the office area to create a parking area for refuge personnel, away from visitor parking. Too many close calls occurred when the visiting public nearly backed into a vehicle belonging to the refuge staff.

Eighty one tons of 3/4" stone were delivered to the shop area and spread on the driveway to the equipment fueling area.

During February and March, approximately four miles of ditches in Unit III were cleaned using the Service's "Cookie Cutter" borrowed from the Brigantine Division of Edwin B. Forsythe NWR.

Approximately 60 feet of the Boardwalk Trail received new stringers and planks. A portion of the work was done by students from the Delaware Bay Marine Institute, Lewes, DE.

4. Equipment Utilization and Replacement

The 1979 Ford Courier was replaced in May with a 1989 Chevrolet S-10 Pick-up. FY 88 end of the year funding was used for the purchase.



New Cheverolet S-10 received in May to replace the 1979 Ford Courier.

12/89 O'Shea

Major repairs or upgrading to vehicles and equipment this year included:

- | | |
|-------------------------------|---|
| 1986 Plymouth Station Wagon | - Repair leaking exhaust system, replace electronic ignition unit. |
| 1989 Chevrolet - S-10 | - Install cargo barrier, undercoat. |
| 1986 Dodge 4x4 | - New 30x12.50 16.5 tires for over sand use. |
| 1987 Ford Ranger | - Repair leaking seal on windshield. |
| IH Stakebed Truck | - Install back up alarm, install trailer hitch and lights. |
| Massey Fergusson 1085 Tractor | - New front tires; replace hoses, belts, thermostat, water pump and repair radiator; repair clutch, pressure plates and throw out bearings; replace bucket on front end loader. |
| John Deere 3010 Tractor | - Replace clutch, repair carburetor and throttle. |
| Panther Airboat | - Replace freeze plugs, seals and gaskets(required removal of protective cage.) |

5. Communication Systems

Two portable radios on the State fire frequencies were purchased to permit us to communicate with the local companies during fire emergencies and for use while conducting prescribed burns. The radios will also serve as a communication link during other emergencies when the refuge office is closed. The units may be charged in the office or kept in a vehicle charging unit and operated as a mobile radio. Total cost was \$2,756, utilizing 1260 fire funds.

Minor repairs on two mobile portable radios were made at Conk Communications in Dover. The radio in the Ford Courier was transferred to the new S-10 by Conk.

The telephone line to our shop has had continuous problems during wet periods due to corrosion of the underground cable. The telephone company notified us that replacement/repair of the line was our responsibility. As

a result we purchased 2,630 feet of wire and contracted to have the line buried and connected. Costs - wire \$ 949
 bury 266
 connect 500
 TOTAL \$1715

6. Computer Systems

An updated R-base version 2.11 was purchased by the Regional Office and installed into the refuge system. The regional refuge budget program, developed at Blackwater NWR, was installed to track the station budget.

7. Energy Conservation

Fuel consumption for the year was as follows:

	<u>Gallons</u>
Gasoline - vehicles	1,790
Gasoline - tractors, mowers	393
Diesel - tractors	613
Diesel - trucks	443
LPG (office/shop heat)	Not metered; total purchase in 1989 559.6 gallons
Electricity	8,256 KWH
Total vehicle miles for 1989	30,123

All energy uses were below base year figures.

Vehicle consumption:

	<u>MPG</u>	<u>EOY Mileage</u>
Plymouth Reliant Station Wagon	22.2	42,851
Ford Courier	-	68,550
Ford Ranger	18.0	14,356
Chevrolet S-10	16.4	4,266
Dodge 4x4	10.2	30,049
IH Stakebed Truck	13.9	2,913

J. Other Items

1. Cooperative Programs

Prime Hook personnel work closely with our counterparts in the Delaware Division of Fish and Wildlife (DFW). The waterfowl hunting program is a joint venture between the refuge and the State. State personnel assist in cutting grass and building blinds. The refuge operates the waterfowl check station and performs enforcement patrols. State personnel also helped by providing a truck and driver to haul a load of cold patch from Salisbury, MD for repairs of the entrance road.

Personnel from the Division of Fish and Wildlife Mosquito Control Section have worked closely with refuge staff during OMWM work in Unit IV, coordinating their work with on-going refuge schedules and the migrating bird nesting season to avoid conflicts. George Ruddy (ES - Annapolis) and State archeological personnel have met with refuge staff and mosquito control personnel on a regular basis to monitor OMWM work.

Robert Zepp and Robert Kelsey (ES-Annapolis) met with Assistant Refuge Manager O'Shea on March 14 to review effluent problems from the adjacent Clifton Canning Company. Water sampling was to be done weekly during the canning season; however, changes in the Annapolis office resulted in no sampling being accomplished. Clifton Canning Company was fined \$36,000 by the State for violations occurring in 1988 when a considerable quantity of canning waste entered the refuge via Prime Hook Creek.

Refuge personnel met several times with personnel of the Delaware Department of Transportation to assist in planning for replacement of the Route 16 Bridge. RAM Inc., contractor for the bridge project, was issued a permit for temporary storage of some of their equipment on the refuge during construction of the new bridge.

University of Delaware Extension Specialists Derby Walker, Ron Jester and Jay Windsor were helpful in planning safety programs and crop inspections.

A special use permit is in effect between the Service and the FAA to maintain a Vortac navigational aid in Unit IV.

The refuge maintains close liaison with Service Special Agents, Delaware State Police and Wildlife Agents from the State Division of Fish and Wildlife.

The Young Waterfowler Training Program is a cooperative program with the Service, Delaware Division of Fish and Wildlife, Broadkill Sportsman's Club and the Eastern Sussex Chapter of Ducks Unlimited.

4. Credits

Sections D and G 1-6, were written by Assistant Refuge Manager Richard J. Guadagno. Engineering Equipment Operator- Otis J. Clifton wrote Section F.4. All other sections were written by Assistant Refuge Manager George F. O'Shea. The report was reviewed and edited by Refuge Manager Paul D. Daly. Typing was by Refuge Clerk- Louise G. Kotarba. Photo credits are shown with each photo.

U.S. FISH AND WILDLIFE SERVICE

Prime Hook is one of more than 430 refuges in the National Wildlife Refuge System administered by the U.S. Fish and Wildlife Service. The National Wildlife Refuge System is a network of lands and waters managed specifically for the protection of wildlife and wildlife habitat and represents the most comprehensive wildlife resource management program in the world. Units of the system stretch across the United States from northern Alaska to the Florida Keys and include small islands in the Caribbean and South Pacific. The character of the refuges is as diverse as the nation itself.

The Service also manages National Fish Hatcheries and provides Federal leadership in habitat protection, fish and wildlife research, technical assistance and the conservation and protection of migratory birds, certain fish and marine mammals and threatened and endangered species.

For further information contact:

Refuge Manager
Prime Hook National Wildlife Refuge
RD #3, Box 195
Milton, Delaware 19968
Telephone: (302) 684-8419

**Take Pride in Prime Hook
National Wildlife Refuge**



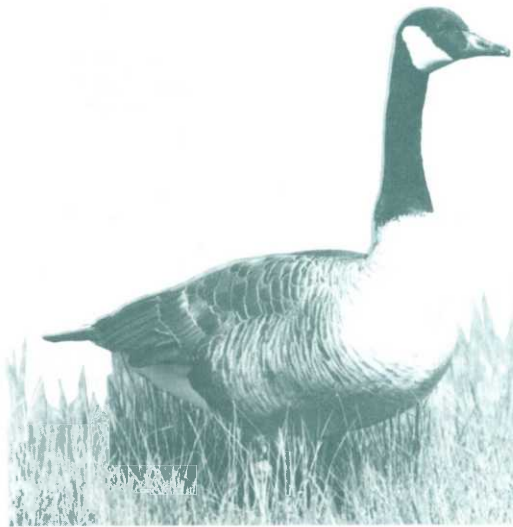
UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

RL-51560-1

September 1988

Prime Hook

National Wildlife Refuge



Delaware

Welcome

The Prime Hook National Wildlife Refuge was established in 1963 primarily to preserve coastal wetlands as wintering and breeding habitat for migratory waterfowl. It is located on the west shore of Delaware Bay, approximately 22 miles southeast of Dover, the State capital, and 64 miles southeast of Wilmington, Delaware.

The refuge consists of 8,817 acres, approximately 6,800 acres of which are fresh marsh, tidal marsh, and water. Other habitat includes 850 acres of timber and brush and 1,100 acres of grasslands and croplands.



Management

Water levels on more than 4,100 acres of marsh are raised or lowered at different times of the year through a system of low dikes and water control structures. This management stimulates the growth of emergent aquatic plant species for wildlife use. Management of the water level is important for restoring and maintaining suitable resting and feeding habitat for migratory and wintering waterfowl. The refuge provides nesting habitat for wood ducks, black ducks, and other species. Overall refuge management is directed toward providing a variety of habitat types for maximum wildlife diversity.

Upland fields are managed under an agreement with local farmers who leave a portion of the crop in the field to provide supplemental food and cover for waterfowl and other wildlife.



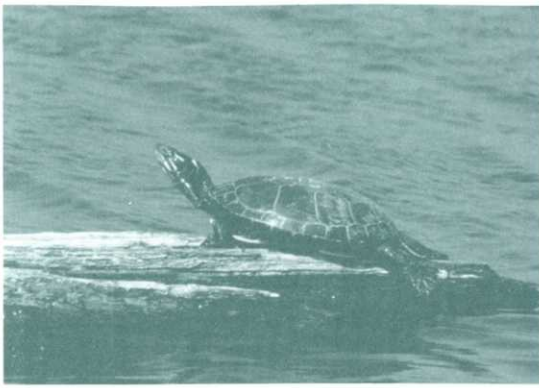
Wildlife Calendar

The varied marsh habitat of the Prime Hook National Wildlife Refuge provides homes for numerous species of birds, mammals, fishes, reptiles, and amphibians.

Spectacular concentrations of migrating waterfowl can be observed during certain periods in the spring and fall.

Migrations through the refuge provide an excellent opportunity for nature study. Fall concentrations of Canada geese, snow geese, black ducks, mallards, and wood ducks are of particular interest. Many waterfowl winter on the refuge. A variety of herons, shorebirds, terns, and songbirds provide additional interesting observations. May is the best time for viewing shorebirds and warblers. Several species of waterfowl and other waterbirds commonly nest in the marshes.

Spring is the best time for observing reptiles and amphibians. The most frequently sighted wetland species are the red-bellied and painted turtles, while various frog species such as spring peeper, cricket, and



bull frogs can be heard and sometimes seen. Upland species frequently spotted are garter and black rat snakes, red-backed salamander, American and fowler toads, and the less commonly seen fence lizard. A list of reptiles and amphibians using the refuge is available at headquarters.

Public Use



Hunting

Hunting of waterfowl, deer, upland game birds, and small game is permitted within season. Special regulations apply for these hunts, and such information is available from the refuge headquarters.



Fishing

Tidal waterways and Turtle and Fleetwood Ponds are open to sportfishing in accordance with State and Federal regulations. Large-mouth bass, pickerel, white perch and crappies are most sought after and abundant. Favorite fishing sites are Prime Hook Creek, Petersfield Ditch, Turtle Pond, and Fleetwood

Pond. Boats using Turtle and Fleetwood Ponds may only be propelled manually or with electric motors.



Canoeing and Boating

Canoe enthusiasts have over 15 miles of streams and ditches to enjoy. Favorite routes are along Prime Hook Creek, Petersfield Ditch and Slaughter Creek. Boating is permitted in tidal waters and Turtle and Fleetwood Ponds in accordance with State and Federal regulations. Several boat launching ramps are available to provide convenient access. These are delineated on maps available at headquarters.

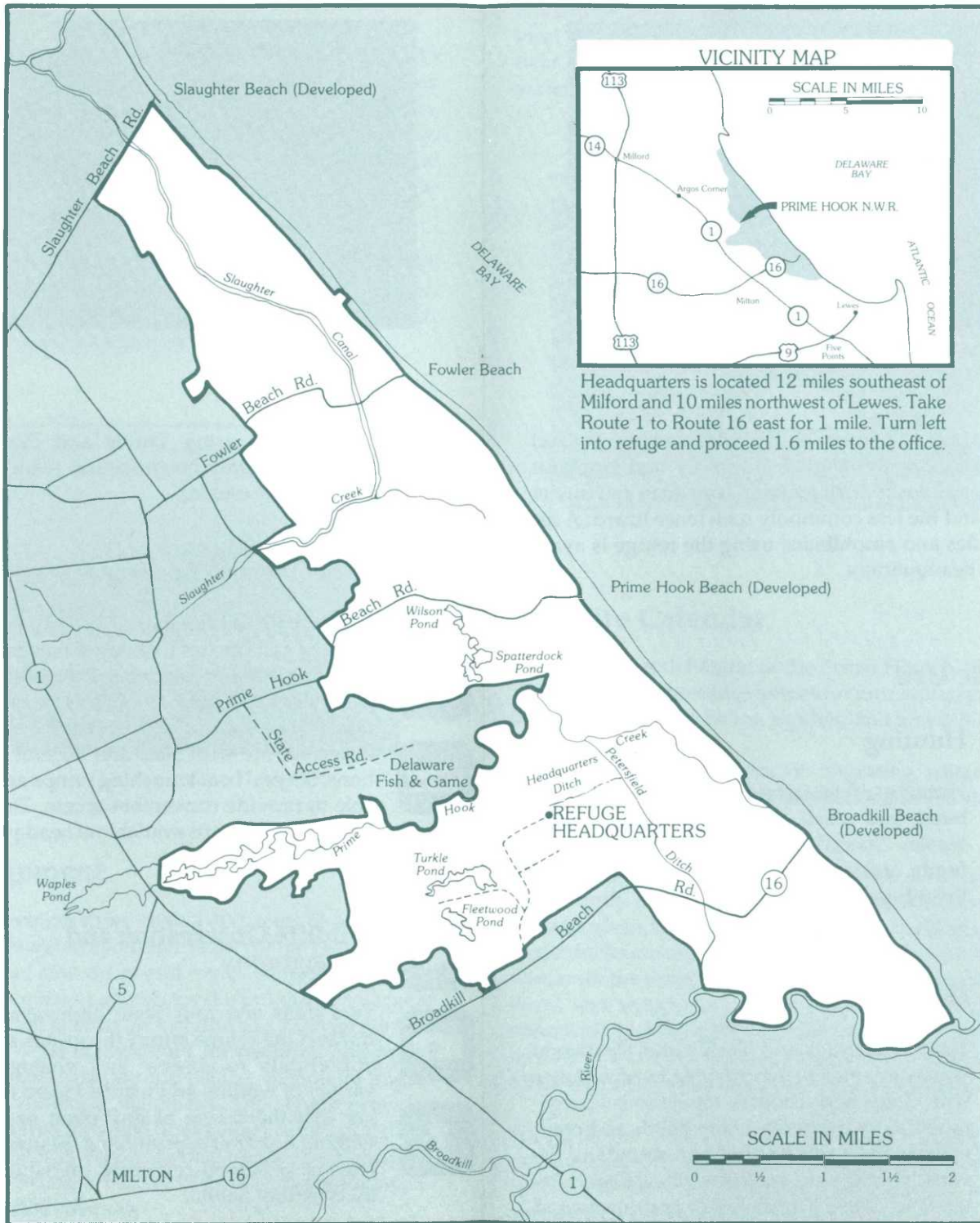


Wildlife Observation and Photography

Two trails and four State highways which transect the refuge afford the visitor an ideal opportunity to observe and photograph a variety of wildlife and plants. Please remember that the taking of any plant or animal without a permit is prohibited. Many species may be observed relatively undisturbed in their natural habitat.



Prime Hook National Wildlife Refuge



U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PRIME HOOK NATIONAL WILDLIFE REFUGE
MILTON, DELAWARE 19968

FISHING REGULATIONS

Fishing on the Prime Hook National Wildlife Refuge is permitted on areas designated by signs as open to fishing. Sport fishing shall be in accordance with all applicable State regulations subject to the following special conditions:

Season - Fishing is permitted during open seasons designated by the Delaware Division of Fish and Wildlife.

Species, Limits and Equipment - Species, limits and equipment must be in conformance with State regulations. Boats using Turkle and Fleetwood Ponds may be propelled manually or by electric motors only. State boating regulations are applicable.

Permit - No refuge permits are required, however, a valid State license is required to fish in Turkle and Fleetwood Ponds. The license must be carried on the person at all times and must be exhibited to Federal and State officers upon request.

General - Fishermen must remain at least 30 feet away from nesting boxes. The portions of Turkle and Fleetwood Ponds containing wood duck nesting boxes are closed to the public from March 1 to June 30.

The destruction, disturbance or removal of nesting facilities, plants, animals or public property is prohibited.

Weapons and littering are prohibited.

Pets are permitted if on a leash not over 10 feet long. One end of the leash must be secured to restrict movement of the animal.

Camping and open fires are prohibited.

Vehicles - Motor vehicles are permitted on designated roads open to public travel. Maximum speed is 25 MPH. Parking is permitted in designated parking areas.

Boat Launching - Boats must be launched from designated points for access to tidal water or ponds.

Hours - The refuge is open from sunrise to sunset.

For further information contact Refuge Manager, Prime Hook National Wildlife Refuge, R.D.3, Box 195, Milton, Delaware 19968. Telephone: (302) 684-8419.



TAKE PRIDE IN PRIME HOOK REFUGE

PRIME HOOK NATIONAL WILDLIFE REFUGE SUSSEX COUNTY, DELAWARE

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

PUBLIC FISHING MAP



BOAT ACCESS



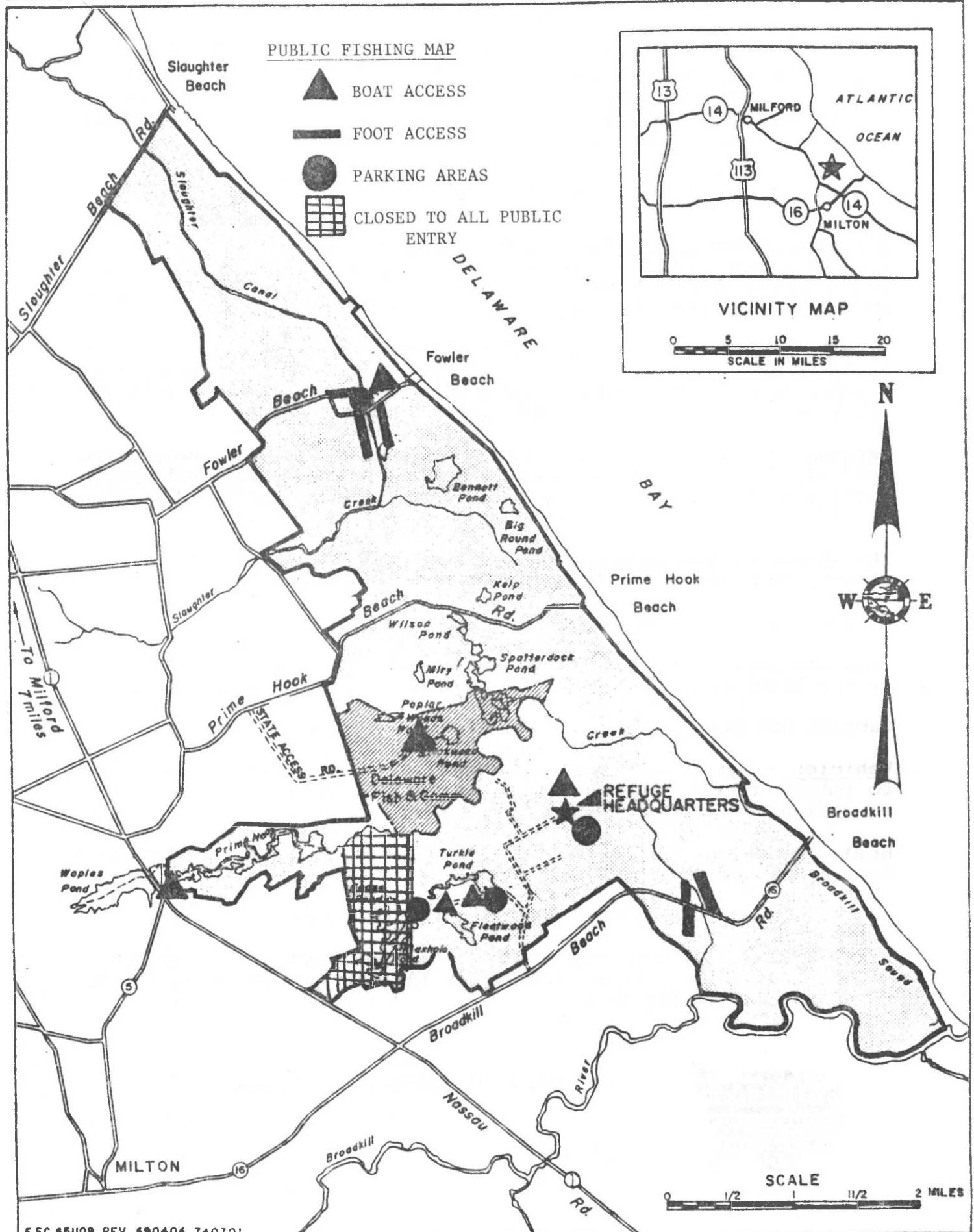
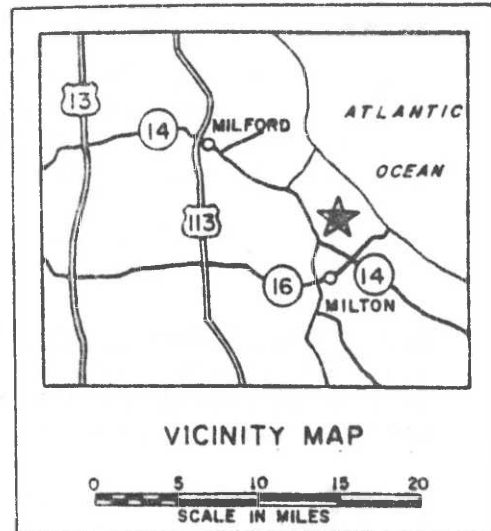
FOOT ACCESS



PARKING AREAS



CLOSED TO ALL PUBLIC
ENTRY



U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PRIME HOOK NATIONAL WILDLIFE REFUGE
MILTON, DELAWARE 19968

PUBLIC USE REGULATIONS

The following rules or regulations pertain to public use of the Prime Hook National Wildlife Refuge. Use may be further restricted by the Refuge Manager if determined necessary for public safety, protection of wildlife, natural beauty, and/or protection of the environment.

- * The refuge is open daily from sunrise to sunset. Wildlife oriented activities such as nature study, sight-seeing, wildlife observation, photography, and hiking are permitted.
- * Pets are permitted if on a leash not exceeding 10 feet in length. One end of the leash must be secured to restrict movement of the animal.
- * Motor vehicles are permitted only along designated routes. Vehicles may be parked in designated parking area only. Maximum speed limit on refuge roads is **25 MPH**.
- * Molesting, harming or unauthorized collecting of plants or animals is prohibited.
- * Fires and camping are prohibited.
- * Help keep Prime Hook clean. Take your litter home. "Take only pictures and memories, leave only footprints."
- * Hunting and fishing are permitted in season by special regulations. Consult Manager for current regulations.
- * Firearms must be case or broken down when transported on refuge.
- * Three short trails are available for public enjoyment.
- * Canoes and boats are permitted on Prime Hook Creek. Boats using Fleetwood and Turkle Ponds must be propelled manually or with electric motors.
- * Closed areas as shown on the front of this leaflet and areas posted as "Area Closed," are closed to all public use or entry.

All local, State and Federal laws are enforced on refuge lands.

For further information contact Refuge Manager, Prime Hook National Wildlife Refuge, R.D.3, Box 195, Milton, DE 19968.
Telephone (302) 684-8419.



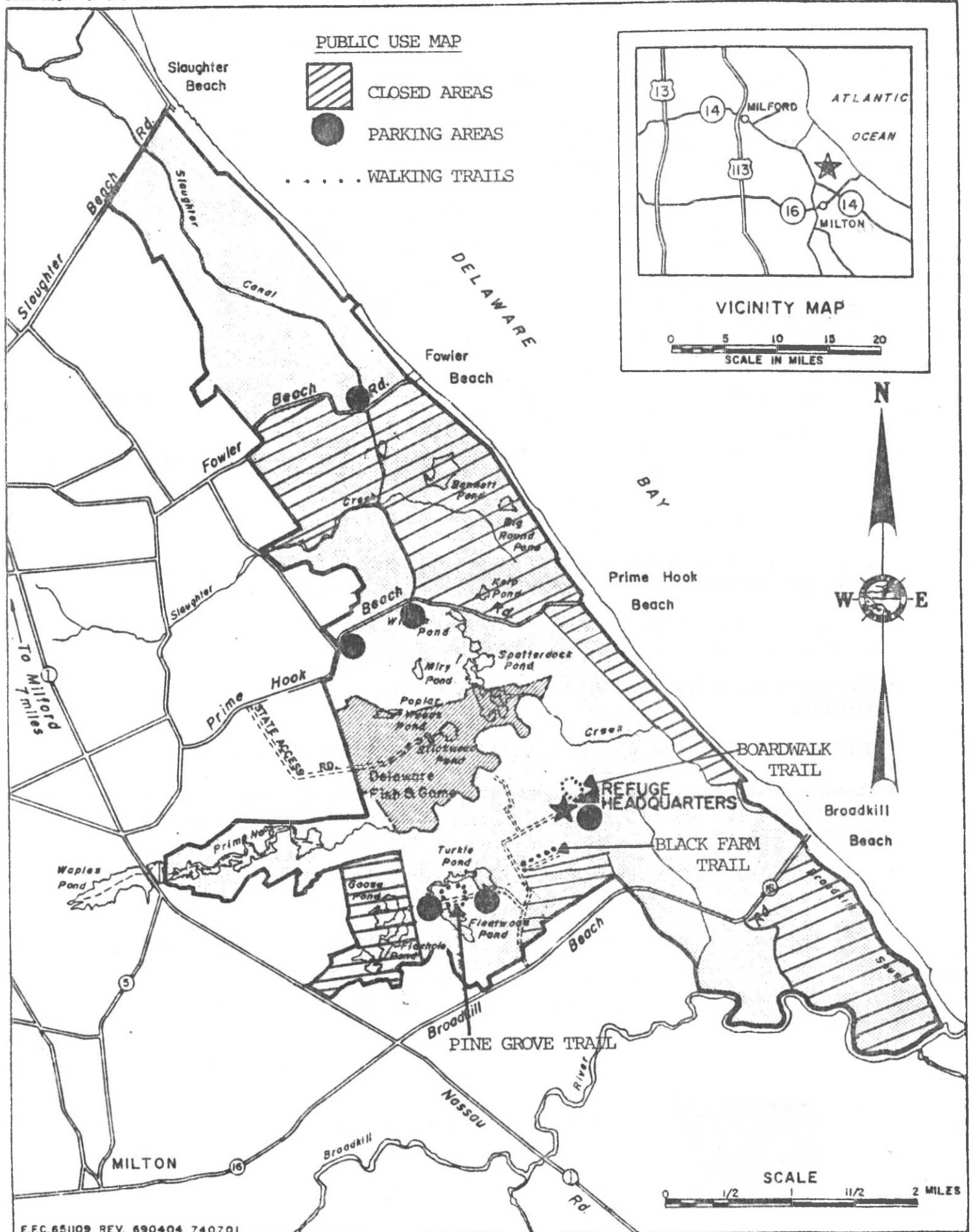
TAKE PRIDE IN PRIME HOOK REFUGE

PRIME HOOK NATIONAL WILDLIFE REFUGE

SUSSEX COUNTY, DELAWARE

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



PRIME HOOK NWR



Public Hunting

Prime Hook National Wildlife Refuge offers the following regulated hunts:

DEER

Archery
Muzzleloader - early season *
Shotgun - early season *
Shotgun - office area *
Shotgun - late season *
Muzzleloader - late season *
Muzzleloader - late season -
office area *

WATERFOWL

(Daily Lottery Drawing)

UPLAND GAME

* Requires advanced reservation.

Hunting of waterfowl, deer and small game on the Prime Hook Wildlife Refuge will be permitted, subject to applicable State and Federal regulations and the following special conditions:

GENERAL REQUIREMENTS

- 1) Hunters must possess a valid State Hunting License, unless exempt by State law. Persons 15 years and under must be accompanied by a licensed hunter.
- 2) Reservations may be obtained by applying to the Refuge Manager for applications. Application deadlines are:

Deer -early muzzleloader-Sept.15
Deer -shotgun(November) -Oct. 7
Deer -shotgun(November) -Oct. 7
office area
Late shotgun,muzzleloader-Dec.15
(including office area)

Applications must be postmarked by the above shown dates. Only one application per hunter, per hunt will be accepted.

3) Archery and waterfowl permits are issued daily.

4) Successful applicants are selected by public lottery. Failure to appear on the day of the hunt will result in forfeiture of the reservation. Forfeited reservations and permits not requiring advance reservation will be awarded to stand-by hunters by a ticket - lottery drawing system on the day of the hunt.

5) All hunters except those hunting upland game, are required to obtain a daily permit before hunting.

6) Waterfowl hunters must have both State and Federal waterfowl stamps which must be signed in ink across the face of each stamp.

7) It is prohibited to enter or remain on a national wildlife refuge when under the influence of alcohol to a degree that may endanger oneself or other persons.

8) Hunters, when requested by Federal or State enforcement officers, must display for inspection, all game, hunting equipment and ammunition.

9) Vehicles must be parked in designated parking areas.

DEER HUNTING

GENERAL

1) No nailed deer stands, platforms or blinds, other than those provided by the government are permitted. Portable stands must be removed daily.

2) Hunters may not enter or damage standing crops.

ARCHERY

1) Permits are issued daily at the waterfowl check station from 4:00 am until 3:00 pm, by self-service.

2) Permits must be left in permit box at Parking Area at the end of the day.

3) Hunting is permitted daily during September and Saturdays only following the November shotgun season, within the open season set by State regulations.

4) Hunting is permitted only in the North Hunting Area.

FIREARMS

1) Individuals selected by advance reservation must appear at the waterfowl check station by the time designated on their reservation.

2) A stand-by lottery will be held to award vacant stands 1 1/2 hours before legal shooting time.

3) Sixty(60) hunters will be selected daily. Hunters must hunt from elevated stands between the hours of 1/2 hour before sunrise until 8:00 am and from 3:30 pm until 1/2 hours after

sunset. During the time between 8:00 am and 3:30 pm hunters may leave their stand to hunt or to leave the area.

4) Stands will not be required on Oak Island or in Unit I north of Draper-Bennett Ditch or east of Slaughter Canal. Hunters choosing to hunt in these areas will forfeit their stand reservation to a stand-by hunter.

5) Shotgun and primitive weapon hunting is permitted within both the November and January seasons as established by the State.

OFFICE AREA (AREA A)

1) Hunting will be 1/2 day hunts - morning and afternoon.

2) Individuals holding reservations for the morning hunt must appear at the waterfowl check station prior to 2 hours before shooting time.

3) A stand-by ticket-lottery drawing for the morning hunt will be held 2 hours before shooting time - for all forfeited reservations.

4) Individuals holding reservations for the afternoon hunt must appear at the waterfowl check station prior to 1:00 pm.

5) A stand-by ticket-lottery drawing for the afternoon hunt will be held at 1:00 pm.

6) Thirty five(35) hunters will be permitted in the Office Area. All hunting is confined to assigned stands.

7) Slugs only may be used.

8) Non-ambulatory hunters will be permitted in a separate

portion of the area.

9) Hunting is permitted on Monday and Friday during the November shotgun deer hunting season and on the second day of the late muzzleloader season.

10) Hunters must stay on their stand until 9:00 am on the morning hunt and until 1/2 hour after sunset on the afternoon hunt.

11) No hunter may possess a loaded weapon while away from their assigned stand unless while in pursuit of a crippled deer.

12) Persons who successfully kill and retrieve a deer may leave the area at any time.

WATERFOWL HUNTING

1) Steel shot is required of all waterfowl hunters. No person shall use or have in their possession lead shot shells.

2) Waterfowl may be taken only on the waterfowl hunting area.

3) A lottery drawing is held daily two hours before shooting time.

4) Hunting is permitted on Monday, Wednesday, Friday and Saturday during the regular duck hunting season.

5) Hunting hours - From legal shooting time established by Federal Regulation until 3:00 pm.

6) Permits are issued until 12:00 noon.

7) A boat is required to reach all blinds.

8) A maximum of 3 persons may occupy a blind.

9) Hunters must leave the area and turn in their permit by 4:00 pm each hunting day.

10) Hunting is permitted from government blinds only. The possession of an uncased gun or shooting outside of an assigned blind is prohibited except in active pursuit of a crippled bird.

11) The area may be closed completely or in part, without notice when wind, ice or other conditions make entry hazardous.

UPLAND GAME

1) Hunting of dove, snipe, woodcock, squirrel, rabbit, quail and pheasant is permitted only on the North Hunting Area. No permit is required.

2) Taking or possession of freshly killed waterfowl is prohibited on the North Hunting Area.

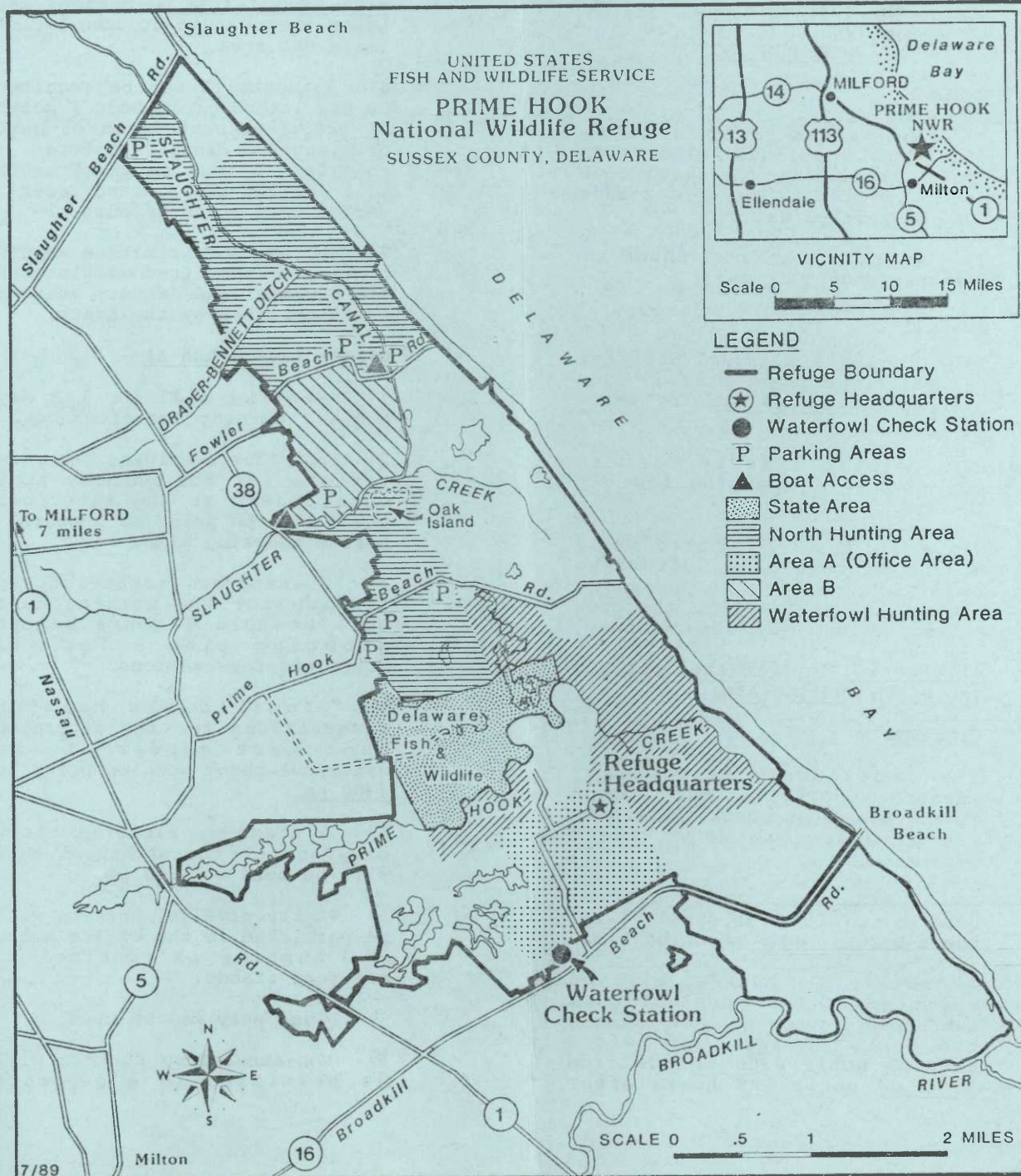
3) Hunters must park in designated parking areas.

4) No hunting is permitted from March 1 through August 31.

For further information contact Refuge Manager, Prime Hook National Wildlife Refuge, R.D. #3, Box 195, Milton, DE 19968. Phone (302) 684-8419.

Take Pride in Prime Hook
National Wildlife Refuge

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE



U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PRIME HOOK NATIONAL WILDLIFE REFUGE
MILTON, DELAWARE 19968

DEER HUNTING REGULATIONS:

Deer hunting will be permitted in accordance with applicable current State and Federal Regulations and the following regulations and provisions:

PERMITS ARE REQUIRED FOR ALL DEER HUNTING

SEASONS: Archery - Hunting is permitted daily during September. The area is closed during October and until the end of the early shotgun season for deer. Hunting will also be permitted on Saturdays only following the early shotgun hunting season for deer.
Muzzleloader - Seasons established by the State for Sussex County
Shotgun - Seasons established by the State for Sussex County
Area A (Office) - Monday and Friday during the early shotgun season and the second day of the late muzzle-loader season.

Hunts in Area A will be 1/2 day hunts ending at 11:00 am and the end of legal shooting time.

PERMITS: Issued by public lottery drawing.

STANDS: Sixty (60) stands are available on the North Hunting Area and Hunting Area B for firearms hunting. Stands will be awarded by advanced public lottery drawing. Hunters must hunt from government stands, except as indicated below:

Oak Island, and portions of Unit I lying east of Slaughter Canal and west of Slaughter Canal but north of the Draper-Bennett Tax Ditch will be limited to a maximum of 25 hunters. In these areas, hunters are not required to use government stands.

HUNTING HOURS - 1/2 hour before sunrise until 1/2 hour after sunset.

Hunters using stands, must be on their stand 15 minutes before legal shooting time in the morning and remain on their stand until 8:00 am. In the afternoon, hunters must be on their stand by 3:30 pm and must remain on their stand until the end of legal shooting time.

Between 8:00 am. and 3:30 pm hunters may leave their stand to hunt or to leave the area.

GENERAL REGULATIONS

TRAVEL - Motor vehicles are restricted to designated routes. Vehicles may not be operated across fields etc. Boats may be used to reach hunting area.

PARKING - Parking is restricted to designated parking areas.

CLOSED AREA - Hunters may not enter posted closed areas or enter or damage standing crops. Entry into Area B is limited to hunting days and the third weekend in September when advance scouting is permitted.

STANDS - Personal stands may not be left on refuge overnight. Portable stands are permitted, however, they may not be nailed to trees. Screw-in climbing spikes are not permitted.

Overnight camping and open fires are prohibited.

Hunters are reminded that Title 50 Code of Federal Regulations (50 CFR 27.81) prohibits persons from entering or remaining in any national wildlife refuge while under the influence of alcohol to a degree that may endanger oneself or other persons. This regulation will be strictly enforced.

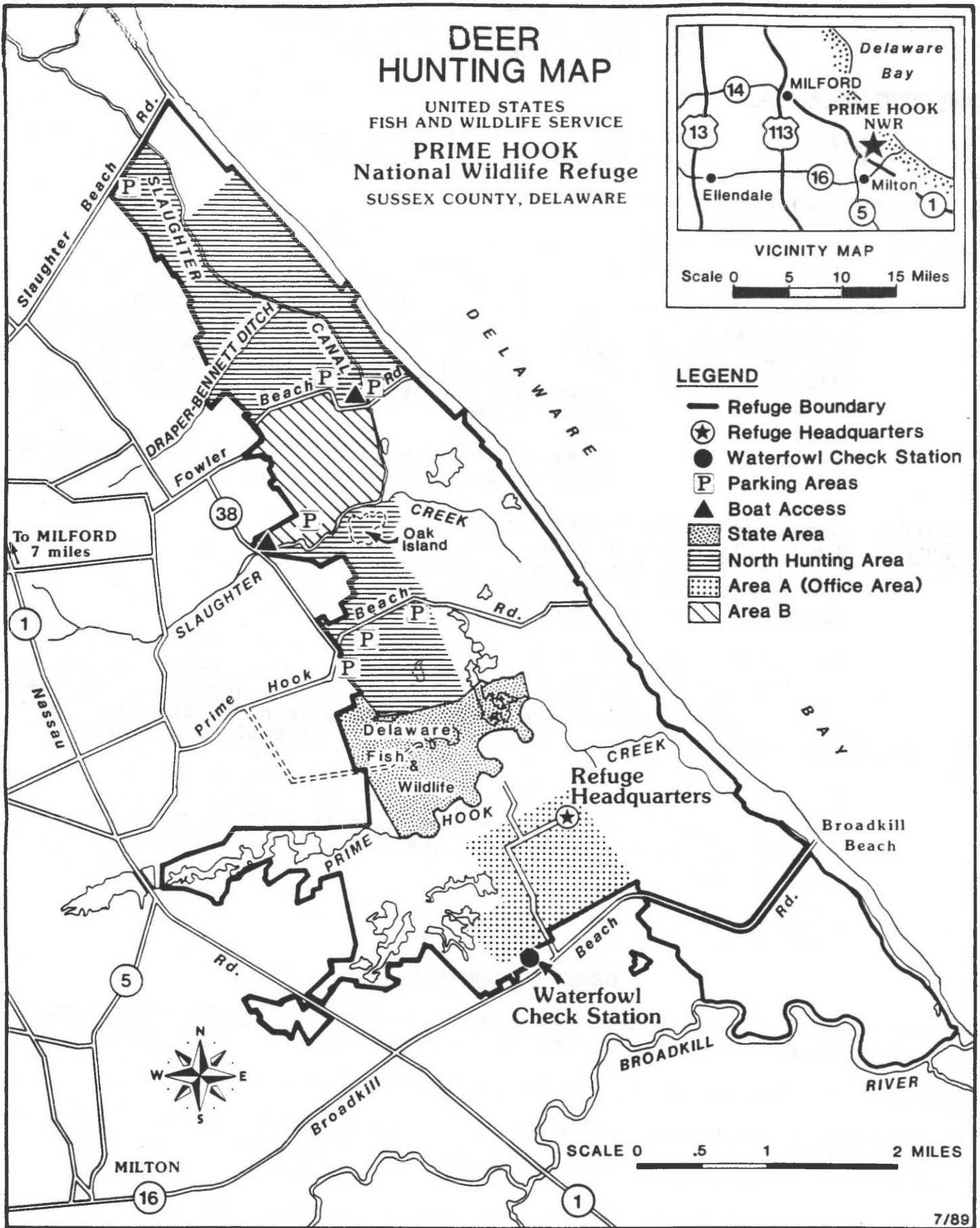
Field possession of waterfowl or coots is prohibited in areas of the refuge closed to hunting of waterfowl and coots.

For further information, contact Refuge Manager, Prime Hook National Wildlife Refuge, RD3, Box 195, Milton, DE 19968. Tel. (302) 684-8419. Office hours are Monday - Friday, 7:30 am to 4:00 pm.

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ARCHERY - Permits issued daily at waterfowl check station by self service.

SHOTGUN, MUZZLELOADER - Applications for advanced lottery drawing are required.

APPLICATION DEADLINES

Early Muzzleloader.....	September 15
November Shotgun.....	October 7
November Shotgun - Area A (Office).....	October 7
Late Shotgun.....	December 15
Late Muzzleloader.....	December 15
Late Muzzleloader - Area A (Office).....	December 15

U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
PRIME HOOK NATIONAL WILDLIFE REFUGE
MILTON, DELAWARE 19968

UPLAND GAME SPECIES AND WEBLESS MIGRATORY GAME BIRDS - NORTH HUNTING AREA

SPECIES - Open to hunting of resident game species (rabbit, squirrel, pheasant and quail) and webless migratory game birds (dove, snipe and woodcock), subject to applicable current State and Federal regulations and the following special regulations and provisions:

DEER - See separate regulations

WATERFOWL - See separate regulations. Waterfowl may only be taken on the Waterfowl Hunting Area. Taking or possession of waterfowl on the North Hunting Area is prohibited.

SEASONS - Hunting is permitted on the North Hunting Area only, as shown on the reverse side, between September 1, and February 28, each species being legal concurrently with the Delaware Hunting Season.

HOURS - Hunting is permitted from one-half hour before sunrise to one-half hour after sunset. These hours may be further restricted depending on the species you are hunting. Check your regulations.

PERMITS - No permits are required to hunt upland game species or webless migratory birds.

CLOSED AREAS - Hunters may not enter or damage standing crops or areas posted as closed.

TRAVEL - Motor vehicle use is restricted to designated routes. Vehicles may not be operated across fields etc. Boats may be used to reach hunting areas, however, it is a violation of State regulations to have a loaded firearm in or on a motorboat while underway. Boat access is limited to designated sites.

PARKING - Parking is permitted on designated parking areas only.

GENERAL REGULATIONS

Overnight camping and open fires are prohibited.

Practice or target shooting is not permitted.

The use of artificial lights including auto headlights for spotting or locating wild animals is prohibited.

Hunters are reminded that Title 50 Code of Federal Regulations (50 CFR 27.81) prohibits persons from entering or remaining in any national wildlife refuge when under the influence of alcohol to a degree that may endanger oneself or other persons. This regulation will be strictly enforced.

Hunters, when requested by Federal and State enforcement officers, must display for inspection all game, hunting equipment and ammunition.

For further information, contact Refuge Manager, Prime Hook National Refuge, RD3, Box 195, Milton, De 19968. Tel.: 302-684-8419.







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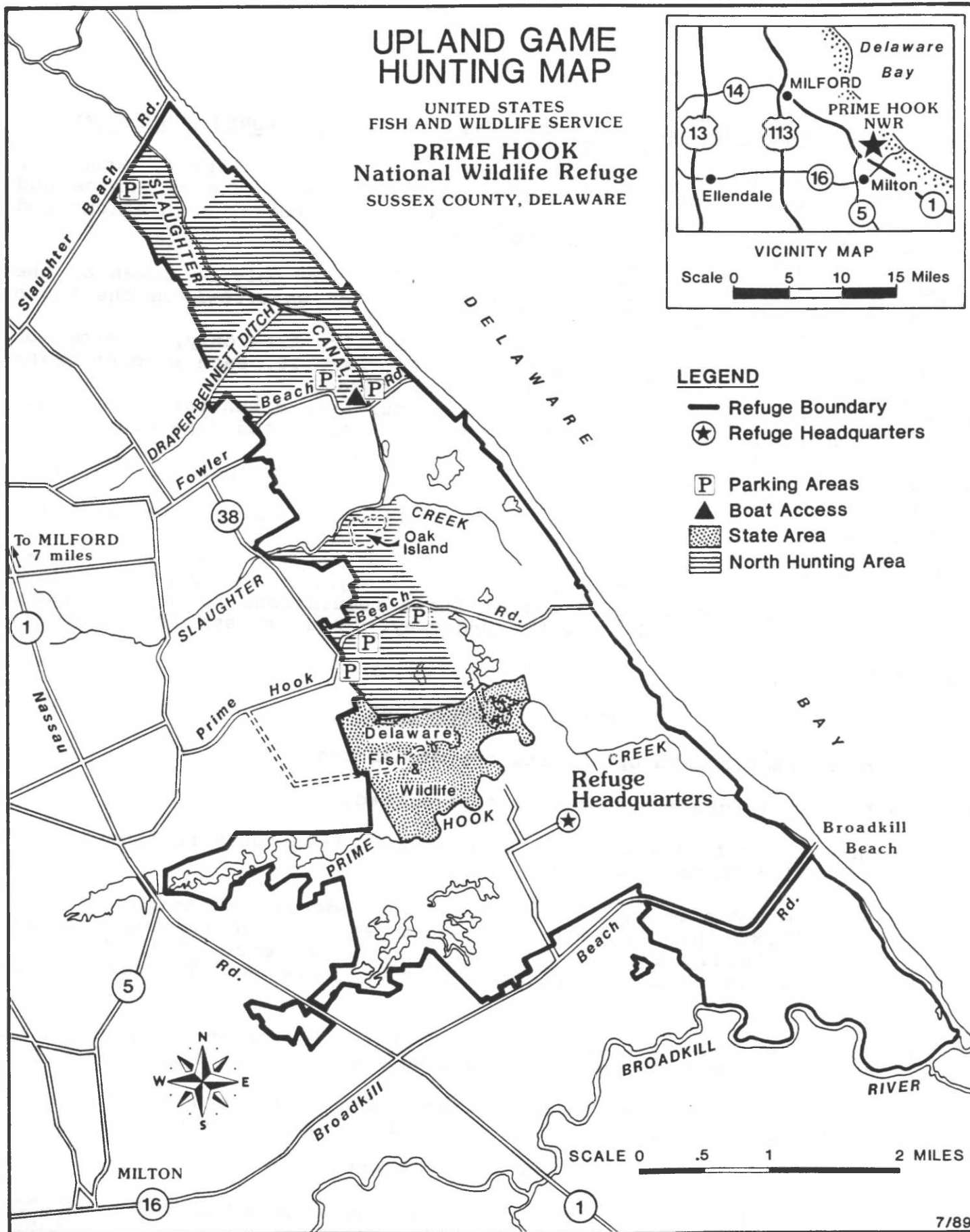
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UNITED STATES
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PRIME HOOK
National Wildlife Refuge
SUSSEX COUNTY, DELAWARE



-  Refuge Boundary
-  Refuge Headquarters
-  Parking Areas
-  Boat Access
-  State Area
-  North Hunting Area





1989 - 90 Delaware Waterfowl Season Summary

**New Restrictions Set
To Protect Canada Geese
(see details inside)**

	Open Season	Basic Daily Bag Limit	Possession Limit After Opening Day
Ducks	Nov. 2 - Nov. 8		
Coots, and	Nov. 22 - Nov. 25	3	6
Mergansers	Dec. 19 - Jan. 6		

- NOTES:**
- Black Duck:** Bag restriction of one daily.
 - Mallard:** Three may be taken daily, including only one hen.
 - Pintail:** Bag restriction of one daily.
 - Canvasback:** Season closed.
 - Harlequin:** Season closed.

Daily and Possession Limits: - The daily limit of 3 ducks (excepting mergansers), shall include: 1 black duck; 3 mallards including no more than 1 hen mallard; 1 pintail; 2 wood ducks; 2 redheads; 1 mottled duck; 1 fulvous tree duck. The possession limit is 6 ducks which shall include not more than 2 black ducks, 4 wood ducks, 6 mallards including no more than 2 hens, 4 redheads, 2 pintails, 2 mottled ducks and 2 fulvous tree ducks.

Coots - daily limit 15 Possession limit 30
Mergansers - Daily limit 5 Possession limit 10
(of which 1 daily and 2 in possession may be hooded mergansers)

CANADA GEESE	Nov. 2 - Nov. 8	2	4
	Nov. 22 - Nov. 25		
	Dec. 11 - Jan. 13		
SNOW GEESE	Nov. 2 - Nov. 8	5	10
INCLUDING	Nov. 22 - Jan. 31		
BLUE GEESE			
BRANT	Dec. 2 - Jan. 20	2	4

SHOOTING HOURS

Hours for hunting waterfowl are ½ hour before sunrise until sunset.

QUESTIONS AND ANSWERS ABOUT DELAWARE'S CANADA GOOSE FLOCK

1. Where do Delaware's Canada geese come from?

The vast majority of Canada geese that winter in Delaware breed in sub-arctic eastern Canada, from the Ungava Peninsula in Quebec to Newfoundland. Birds have a very strong tendency to return to specific wintering sites. Affinities to wintering sites are developed more from tradition and familiarity than by weather.

2. How is information about Canada geese collected?

The Division of Fish and Wildlife has conducted monthly counts during the fall and winter since the late 1940's. Counts cover the entire state where geese are normally found. Since 1973, observers, aircraft and techniques have been standardized to provide comparable count data. The state is also participating in a major interstate study to neck-collar and observe more than 30,000 birds in the flyway. The observation of individual birds over a period of time can trace migration as well as provide other information. Leg bands are another source of information as well as a variety of hunter surveys. This information is the largest collection of information about any migratory bird in the flyway and is thought to be reliable by impartial wildlife scientists.

3. Is Delaware's flock really in trouble?

Yes. The wintering population has declined by more than 50% when the past 3 years are compared to a decade ago. Neck collar information shows that Canada geese experience high harvest rates and with low production during the 1980's, losses from hunting are not being offset by recruitment of young. Information gathered on the breeding grounds indicates that production was very poor in the summer of 1989. Since at least the previous three years had poor production, few sub-adults are maturing to replace the breeders that are lost to hunting each year.

4. What's happening in Maryland?

Maryland has also seen a dramatic decline in Canada goose flocks similar to Delaware. The states are working cooperatively to solve the problem.

5. Are Delaware's birds being short-stopped in the north?

No. The neck-collar study shows that most geese observed in Delaware in one year are observed in the state in the following year if they are still alive and are not observed elsewhere in the flyway.

6. Does a lack of refuge areas and food cause Delaware's geese to move elsewhere?

Both factors are important to support wintering geese, but both can be found in sufficient quantities at present on the Delmarva Peninsula. The neck-collar studies show that birds are not presently leaving Delmarva due to a lack of food or habitat.

7. Are snow geese driving Canada geese out of the state?

No. Although snow geese do compete locally for food and habitat, they do not drive Canada's from the Peninsula. There is no evidence to show that snow geese displace Canada geese.

8. Is hunting a factor that affects the goose population?

Yes. Hunting causes 85-90% of the mortality in Canada goose populations. Two factors influence the size of goose populations: breeding habitat conditions and adult survival. Since the sub-arctic habitat has not changed, adult survival is a key factor. Late season (January) hunting is a concern because it destroys pairs at a time when they may not find another mate and the birds are especially vulnerable to hunting under the stress of adverse winter weather. Early hunting in October is also a concern because it may disrupt birds (that have a tradition to winter on Delmarva) before they can become settled.

9. Why is survival rate important?

The survival rate is the likelihood that a bird will survive from one year to the next. We know that Canada geese do not breed until they are three years old and are not usually very successful until they are five. It is crucial, therefore, that they live long enough to reproduce. The very high hunting mortality may be preventing geese from living long enough to be good parents. In years of poor production, adults are the bulk of the harvest, thereby reducing the breeding potential for later years. To increase the survival rate we must decrease the percentage of the goose flock taken by hunting.

10. Do Canada geese respond to harvest management?

Yes. If the harvest rate is reduced to the point where the survival rate is 75% or better, the populations will begin to expand. Experience in the Mississippi Flyway has proven that the Canada goose is manageable through harvest limitations. Although Delaware instituted harvest restrictions in 1986 and 1987, they did not succeed in reducing the number of birds taken. Experience has proved that the regulations must be reduced substantially in order to have a real reduction in the harvest. Restrictions must remain in place for several years in order to allow the birds to reach breeding age.

11. Who is responsible for the excessive harvest?

All hunting plays a part in the problem regardless of whether its commercial hunters, residents or non-residents. The business of goose hunting makes a significant contribution to both local economics and conservation programs that avoid the loss of land to urban development. All parties recognize the various values associated with waterfowl hunting, but the conservation of the resource is the number one concern for the long-term benefit of everyone.

12. Will more liberal regulations ever come again?

More liberal regulations will return when the resource can withstand more harvest. Season restrictions are not irreversible or permanent.

The Canada goose needs everyone working together to bring it through a troubled period. Without the support of hunters to restrict harvest, the resource has a dim future. The Division of Fish and Wildlife welcomes your comments and ideas concerning the Canada goose. For suggestions or further information contact:

Delaware Division of Fish and Wildlife
P.O. Box 1401, Dover, Delaware 19903



MIGRATORY GAME BIRD SEASONS

1989 - 1990

Species	Season	Limit
Mourning Dove Hours: Noon to sunset	Sept. 2 - 23 Oct. 16 - 28 Dec. 11 - Jan. 13	12 (24 in possession)
King & Clapper Rails Hours: ½ hour before sunrise to sunset	Sept. 1 - Nov. 9	10 (singly or in the aggregate of the two species) 20 in possession
Sora & Virginia Rails Hours: ½ hour before sunrise to sunset	Sept. 1 - Nov. 9	25 (singly or in the aggregate of the two species) 25 in possession
Woodcock Hours: ½ hour before sunrise to sunset	Nov. 20 - Jan. 3	3 (6 in possession)
Common Snipe Hours: ½ hour before sunrise to sunset	Nov. 20 - Jan. 31	8 (16 in possession)
Gallinules Hours: ½ hour before sunrise to sunset	Sept. 1 - Nov. 9	15 (30 in possession)
Crows Hours: ½ hour before sunrise to sunset	June 22 - March 31 (Thurs., Fri., & Sat. only)	No limit
Sea Ducks* Hours: ½ hour before sunrise to sunset	Sept. 23 - Jan. 6	7 (14 in possession in addition to regular duck limits)

*Scooters, eiders and old squaw ducks may be taken not less than 800 yards (½ mile) seaward from the Delaware Bay shore or Atlantic Ocean shore beginning at an east-west line between Port Mahon and the Elbow Cross Navigation Light, south to the Delaware-Maryland line. The shooting of crippled **sea ducks** from a motorboat under power will be permitted in the designated sea duck hunting area.

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WATERFOWL HUNTING AREA

The Waterfowl Hunting Area as designated on the reverse side will be open to hunting of migratory waterfowl by written permit subject to applicable current State and Federal regulations and the following special regulations and provisions:

1. PERMITS - Permits will be issued by a lottery basis. The lottery drawing will be held 2 hours before shooting time on hunting days. All members of the hunting party must be present at the drawing. Hunters not selected in the lottery will be issued permits on a first-come, first-served basis until 12:00 noon. Permits will be surrendered at the check station by 4:00 pm. When leaving the blind unoccupied for any reason, the permit must be turned in and a new permit must be completed at the check station before hunting again. The permit must be retained with the party at all times while hunting. The names of all occupants of the blind must be written on both the permit and register sheet at the check station prior to hunting.
2. SHOOTING TIME - Hunting is permitted from sunrise until 3:00 pm. (if this time is changed it will be posted at the check station).
3. AMMUNITION - Steel shot is required for all gauge shotguns. No person shall use or have in their possession lead shot shells.
4. BLINDS - Hunting is permitted only from government blinds. The possession of an uncased gun or shooting while outside of a blind is prohibited except when in active pursuit of crippled waterfowl. In such cases the hunter may fire at only the crippled bird. No more than three persons may occupy a blind.
5. BOATS - A boat is necessary to reach all blinds. Permit holders must use designated launching sites to launch their boats. Small outboard motors and stout poles are recommended. All boats must have applicable safety equipment, as required by State law, on board at all times. Boats propelled manually must display a fixed white light at all times when underway between sunset and sunrise.
6. SEASON - Prime Hook is open only during the duck season. Blinds on the Federal and State areas will be open to hunting on Mondays, Wednesdays, Fridays and Saturdays only.
7. CLOSED - The area may be closed, completely or in part, without notice, when wind, ice, abnormal water levels, or other factors make entry and use hazardous.
8. Hunters, when requested by Federal and State enforcement officers, must display for inspection all game, hunting equipment and ammunition.
9. Hunters are reminded that Title 50 Code of Federal Regulations (50 CFR 27.81) prohibits persons from entering or remaining in any national wildlife refuge when under the influence of alcohol to a degree that may endanger oneself or other persons. This regulation will be strictly enforced.
10. Hunters are requested to remove all trash and spent ammunition from the blind prior to leaving the area.

Copies of current regulations are available at the check station and at the Refuge Headquarters. For further information, contact Refuge Manager, Prime Hook National Wildlife Refuge, RD3, Box 195, Milton, DE 19968. Tel. (302) 684-8419.

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WATERFOWL HUNTING MAP

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SUSSEX COUNTY, DELAWARE

