

Great Swamp National Wildlife Refuge

Basking Ridge, New Jersey

Annual Narrative Report

Calendar Year 1992

U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

GREAT SWAMP NATIONAL WILDLIFE REFUGE

Basking Ridge, New Jersey

ANNUAL NARRATIVE REPORT

Calendar Year 1992

<u>William Koch</u>	<u>3-17-93</u>	<u>Donald N. Fricker</u>	<u>5-5-92</u>
Refuge Manager	Date	Associate Manager Review	Date

Donald N. Fricker 5-28-93
Regional Office Approval

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INTRODUCTION

Creation of the Great Swamp began roughly 25,000 years ago, where the Wisconsin glacier stopped at its furthest point south. In time, the melting glacier retreated northward with entrapped melt water forming Lake Passaic which was approximately 30 miles long by 10 miles wide. The lake eventually drained leaving areas where marshes and swamps formed. One of these areas, a shallow basin 7 miles long and 3 miles wide is known today as the Great Swamp Basin. This 14,000-acre basin is surrounded on all sides by low-lying ridges 50-200 feet high.

Great Swamp is located in the Piedmont Plateau of the Appalachian Province. The Plateau and the area surrounding the swamp is characterized by gently rounded hills separated by broad valleys with hills rising from 200 to 400 feet above the surrounding land. The refuge averages 230 feet above sea level.

The Great Swamp National Wildlife Refuge is situated within the Great Swamp Basin, and is located in Chatham, Harding and Passaic Townships of Morris County in north central New Jersey. Morristown, the County Seat of Morris, is seven miles to the north and New York City is twenty-five miles to the east.

Great Swamp National Wildlife Refuge, presently 7,262 acres, comprises the largest land ownership, being 50% of the basin. Remaining lands are predominantly held in private ownership with the exception of Somerset County Park and Environmental Education Center (854 acres) and Morris County Outdoor Education Center (40 acres).

Great Swamp is situated within a 55 square mile watershed comprised of portions of 11 municipalities in Morris and Somerset counties. It is located in the headwaters of the Passaic River basin and is bordered on the west by the upper Passaic River. The swamp drains 29.2 square miles of watershed northeast of Millington Gorge and receives waters of Primrose, Loantaka, Great and Black Brooks. In short, it drains all of the southern area of the Passaic River watershed above Millington Gorge. Great Swamp normally floods during spring runoff and occasionally during late summer hurricane rains; however, flooding in recent years is occurring more frequently and with greater magnitude due to the urbanization of the Great Swamp Watershed, and conversely low flows of tributaries are lower during dry periods. Increasing watershed development also yields higher non-point source pollutant loads in refuge tributaries impacting refuge water quality.

Swamp woodland, hardwood ridges, cattail marsh and grassland typify this 7,262-acre refuge. Plant species of both the northern and southern botanical zones are present. The refuge is characterized as a brush and timbered swamp with meandering brooks and low ridges or knolls rising from five to 15 feet above the surrounding swamp. In several places, the swamp opens into small marshes. Bottomland vegetation is composed of ash, red maple, highbush blueberry, swamp rose, willow and a wide variety of ground cover types. Many of the low ridges support a forest association of beech, oaks, gray birch, sugar maple, black gum, white ash and shagbark hickory.

Predominant vegetation types within the refuge are: 2,759 acres forest; 608 acres field; 585 acres brushland; 3,252 acres swamp, marsh and other wetlands, and 58 acres administrative land. This acreage may vary as additional land is acquired and through various habitat management activities.

Thirty-two species of mammals have been observed on the refuge, with some of the highly visible ones being white-tailed deer, muskrat and gray squirrel. Two hundred and eleven species of birds have been recorded, twenty of which are waterfowl. The predominant waterfowl are Canada goose, mallard, wood duck and black duck. Twenty-one species of reptiles, 18 species of amphibians and 29 species of fish are present. There are two Federally listed endangered species and 25 State listed endangered and threatened species.

In 1708, for a barrel of rum, 15 kettles, 4 pistols, 4 cutlasses plus other goods, and 30 pounds cash, the Delaware Indians deeded a 30,000 acre tract including the Great Swamp to English investors. Later, settlements dotted the area and during the Revolutionary War, local settlers fashioned wagon-wheel parts with wood cut from the Great Swamp. By 1844, farms appeared on logged-off uplands; farmers drained marshlands, and "foul meadow hay" became a major crop. Small farming operations such as these became uneconomical and gradually disappeared. Consequently, much of the cleared upland returned to woods and the lower flat areas reverted to swampland.

There have been various modern uses planned for the Great Swamp; flood control in the 1920's; drainage projects in the 1930's; and a jet airport proposal in 1959. It was the threat of the jetport which enabled the Great Swamp Committee of the North American Wildlife Foundation to muster the aid of a significant number of volunteers. This impressive effort raised more than a million dollars to purchase nearly 3,000 acres which was donated to the Department of the Interior. These acres formed the nucleus of the Great Swamp National Wildlife Refuge. Through the years, additional acres have been added to the original tract bringing the refuge to its present 7,262 acres. Approximately 2,200 acres, within the

approved refuge acquisition boundary, are still in private ownership.

New Jersey is the most densely populated state in the country with the northern part of the state containing the majority of the population. Great Swamp is situated in the heart of this area and is literally an island of wildlife habitat totally surrounded by suburbanized communities and rapidly encroaching urbanization. There is intense pressure to develop remaining land around the Swamp. Great Swamp offers one of the last refuges for wildlife and wild habitats in northern New Jersey and becomes increasingly important to man and wildlife as other natural areas are destroyed.



A monarch at work. (JH)

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A. HIGHLIGHTS

National Gypsum, the responsible party of the asbestos Superfund Site filed for bankruptcy. The Dept. of Justice submitted a claim for natural resource damages. National Gypsum files counter suit. A post litigation settlement agreement of \$3.5 million in general unsecured funds is made. (see Sec. J.1.)

Forty different local, state and national organizations join forces forming a coalition called "Save the Great Swamp Again." (see Sec. J.1.)

The Great Swamp Watershed Advisory Committee nears its final recommendation to NJ Department of Environmental Protection and Energy after 40 months and much controversy. (see Sec. J.1.)

B. CLIMATIC CONDITIONS

Month	Temperature (Degrees F)		Precipitation (inches)		Snowfall (inches)	
	Max	Min	1992	Normal	1992	Normal
January	61	11	4.09	3.71	----	7.50
February	64	6	1.66	3.16	2.00	7.67
March	63	13	2.12	3.89	12.04	2.66
April	76	26	1.01	4.33	----	0.39
May	93	30	2.97	5.33	----	----
June	86	38	6.05	4.86	----	----
July	90	51	8.44	5.14	----	----
August	89	43	1.82	4.39	----	----
September	84	30	3.27	4.80	----	----
October	77	22	1.17	4.01	----	0.05
November	67	16	7.24	3.92	----	0.60
December	59	9	8.51	3.86	----	3.68
Max/Min/Total	93	6	48.35	51.41	14.04	22.55
Average	75.75	24.58	4.03	4.28		
	50.16					

C. LAND ACQUISITION

1. Fee Title

Specific appropriations for land acquisition in fiscal years

1992 and 1993 were as follows: FY92 - \$1,000,000 and FY93 - \$750,000. Refuge Manager Koch and Deputy Refuge Manager Villanueva worked with the Regional Realty Office, the Trust for Public Lands and the New Jersey Conservation Foundation throughout the year on land acquisition priorities, strategies, and contaminant issues.

Passaic Township formally changed its name to Long Hill Township in hopes of eliminating problems it had from being confused with Passaic County and the City of Passaic.

The following tracts totalling 120.34 acres were added to refuge ownership during the calendar year:

Tract Number	Seller	Township	Date Acquired	Acres	Refuge Total
378	Odell	Long Hill	1/15/92	3.00	7144.26
401	Mahon	Harding	3/31/92	58.59	7202.85
401a	GRK Assoc.	Harding	3/31/92	35.30	7238.15
401b	DeMarco	Long Hill	12/9/92	23.45	7261.60

Tracts 401, 401a, and 401b were acquired with the assistance of the Trust for Public Lands acting as an intermediate landowner.

Seventeen acres of Tract 401 were being actively farmed by an individual leasing the land when the government acquired the property. To prevent any hardships, and maintain good relations with neighbors and the local farm bureau, an agreement was worked out prior to our taking title. A cooperative farming agreement will be considered for next year.

The refuge size at the end of the calendar year was 7261.60 acres.

D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates

A request for a historical assessment of the house on Tract 129 was submitted to the Regional Historian and forwarded to the Deputy State Historic Preservation Officer at the Office of New Jersey Heritage. Both determined that the structure was of no historical significance and it could eventually be removed.

In January, Manager Koch reviewed and prepared comments to New

Jersey Department of Transportation (NJDOT) on the second draft E.A. for NJDOT's Route 24 mitigation proposal on the refuge. The proposal involved construction a sediment basin on Primrose Brook within Pool # 2 as part of a mitigation plan for wetlands destroyed in the construction of Route 24 (outside the refuge watershed). USFWS Regional Office Engineers reviewed the NJDOT feasibility study and determined that the project was not feasible and the project was dropped.

5. Research and Investigations

Great Swamp NR-92 "Barred Owl Nesting Habitat Study" (RS-12).

Conducted by Giselle C. Smisko, Wantage, NJ. This study is in its second year and is aimed at providing a more detailed analysis of the barred owl's (*Strix varia*) habitat requirements around the nest site. The first stage involved a survey to determine the number of owls inhabiting specific areas in the Great Swamp NWR, and an effort to develop techniques for locating active nests. This year nine evening and five daytime surveys which crossed through portions of the Management and Wilderness Areas of the Great Swamp NWR, and adjacent parks operated by Somerset and Morris Counties, were conducted over a 17-week period from January 27 to May 28, 1992. Tape recordings of the owl's calls were played to elicit responses and determine their location. Barred owls were observed at four different locations. One barred owl nest was located on Somerset County property with young that later fledged. Two adult barred owls were observed with one fledgling in the Management Area.

Great Swamp NR-92 "Mist Netting Study of Spring Migration at the Great Swamp NWR" (RS-01).

Conducted by Dr. Joseph J. Mahoney, Kean College, NJ. This ongoing study was initiated in 1983. Data was collected in the spring of 1992 to continue assessing relative abundance and habitat use by migrating Neotropical passerines and to document the temporal pattern of change in species composition and diversity. Using exactly the same net sites as in the past nine years, Mahoney had 139 first time captures resulting in a capture rate of 0.39 birds per net-hour. This tied with 1984 as the highest net success as indicated in the following ten year table:

YEARS	CAPTURE RATE/HOUR	YEARS	CAPTURE RATE/HOUR
1983	0.24	1988	0.27
1984	0.39	1989	0.34
1985	0.22	1990	0.28
1986	0.26	1991	0.31
1987	0.28	1992	0.39

The most common netted species in order of abundance were: palm warbler, gray catbird, yellow-rumped warbler, common yellowthroat, veery, and tufted titmouse. Spring 1992 completed the ten year study but some netting will be done over the next few years to monitor life-longevity of previously captured birds.

Great Swamp NR-92 "Monitoring Avian Productivity (MAP) Project" (RS-11).

In 1990 Glenn and Eileen Mahler established a banding station in the Management Area of the refuge to participate in the MAP Project that is being coordinated by the Institute for Bird Populations. This cooperative venture is attempting to monitor the productivity, survivorship and population trends in North American landbirds through the establishment of 180 constant effort breeding season banding stations across the continent. A study site of approximately 12.5 acres has been established on the refuge. Mist netting banding efforts were conducted once during each designated ten-day period from May 21 through August 15. A total of 218 birds comprising 31 species were banded in 1992. During the nine visits 85 species were either seen or heard.

Great Swamp NR-92 "Plant Identification on the GSNWR"(RS-13).

For partial fulfillment of a Master's Degree, Elaine Smith identified plant species in both wetland and upland habitats on the Great Swamp NWR. Ms. Smith identified 123 plants, and submitted a plant list to the refuge.

Great Swamp NR-92 "Epiphytic Lichens of the Great Swamp NWR"(RS-14).

For partial fulfillment of a Master's Degree, William Yardley began collecting and identifying lichens, bryophytes, algae, fungi and insects on the Great Swamp NWR. The research will result in baseline information on the present status of air quality in the Great Swamp.

E. ADMINISTRATION

1. Personnel



1, 2, 21, 3, 8, 5, 10, 7, 4, 6, 9.
(Timer)

1. William Koch, Project Leader, GM-13, EOD 2/19/84 PFT
2. Lydia T. Villanueva, Deputy Refuge Manager, GS-12, EOD 2/29/90 PFT
3. Craig R. Bitler, Biologist, GS-11, EOD 11/17/91 PFT
4. Thomas A. McFadden, Outdoor Recreation Planner, GS-11, EOD 07/12/81 PFT
5. Rosemary Klimas, Office Assistant, GS-6 EOD 10/27/74 PPT
6. Melvyn F. Smith, Maintenance Mechanic, WG-9, EOD 6/16/91 PFT
7. Sharon D. Vaughn, Biological Technician, GS-5, 4/21/91-10/03/92 PFT
8. Suzanne T.D. Toke, Office Automation Clerk, GS-4, 9/29/91-10/03/92 PFT
9. John J. Nicely, Engineering Equipment Operator, WG-8, EOD 4/21/91-03/07/92 TFT. Maintenance Worker, WG-7, EOD 03/08/92 TFT
10. Richard E. Olsen, Biological Aid, GS-4 01/06/92-03/13/92 TFT
11. Lawrence A. Balsamo, Laborer, WG-3, 2/23/92-06/27/92 TPT
10/01/92- TPT
12. John M. Arnold, Biological Aid, GS-4, EOD 11/30/92 TFT

13. Craig Moore, Watershed Biologist, GS-12, EOD 11/89, PFT
(stationed at FWE, Pleasantville, NJ, Field
Office)

Youth Conservation Corps



19, 20, 17, 15, 16, 18, 14 (JA)

14. Lawrence A. Balsamo, YCC Crew Leader, GS-5, 06/28/92-
09/30/92 TFT
15. Peter B. Alesi, YCC Youth Leader
16. Robert W. Bigelow, Enrollee
17. Lauren I. Bierbaum, Enrollee
18. John M. Krayniak, Enrollee
19. Virginia E. Holt, Enrollee
20. Drew W. Emmert, Enrollee

Student Conservation Association

21. Robert Curtis, Volunteer, 01/06/92-03/27/92
22. John M. Arnold, Volunteer, 06/15/92-09/04/92



SCA Volunteer and Biological Aid John Arnold (LB)

Biological Aid Rich Olsen began a ten-week appointment on January 6th. Rich was instrumental to this year's wood duck nest box program.

On January 6, Student Conservation Association Volunteer Robert Curtis began a 12-week assignment at the refuge. He is a student at Penn State University. One of Rob's primary duties was to assist refuge staff in collecting biological data and maintaining 515 wood duck box compartments.

On February 23, Larry Balsamo began temporary part-time appointment as laborer. Larry's primary responsibilities were to construct handrails for one of the boardwalk trails at the Wildlife Observation Center. On June 28, Larry was converted to the YCC Group Leader position, which he has ably filled for the past two years. Upon completion of the YCC program, he was once again converted back to the temporary laborer position.

On March 8, temporary Engineering Equipment Operator John Nicely was converted to temporary Maintenance Worker, a position which had been vacant since June 29, 1991 and which had a more secure funding source.

Assistant Manager Villanueva was promoted from Assistant Refuge Manager GS-11 to Deputy Refuge Manager, GS-485-12, effective April 5 as a result of a reclassification of her PD

based on the New Position Classification Standards for the 485 series.

On June 15, John Arnold started a 12-week Student Conservation Association (SCA) assignment. John assisted completing several public use related maintenance and biological projects and supervised the YCC enrollees when the Group Leader was on sick leave.

Biological Technician Sharon Vaughn transferred, effective 10/03/92, to the Service's Rocky Mountain Arsenal near Denver, CO. She will be working as a biologist for FWE monitoring contaminants in wildlife populations. The Bio Tech position remains vacant at the close of CY 92.

Office Automation Clerk Toke resigned, effective October 3, after being on maternity leave since May 26. This position and the Biological Technician position have not been filled due to a hiring freeze imposed by the regional office.

The temporary Biological Aid position was advertised and John Arnold was selected, effective November 29th. John's primary duties were assisting with the annual deer hunt and the wood duck box program.

<u>Year</u>	<u>Permanent Full-Time</u>	<u>Part-time</u>	<u>Temporary</u>	<u>Total FTE</u>
1992	7	1	4	8.97
1991	7	2	4	8.21
1990	7	2	3	8.11
1989	8	2	4	9.96
1988	8	2	6	10.04

2. Youth Programs

This was the 17th year that a YCC camp was in operation at the Great Swamp NWR. Six (6) enrollees were supervised by one Group Leader and on occasion by a Student Conservation Association (SCA) volunteer.

This year's camp was again very successful with many worthwhile projects being completed. These projects included installing several new signs; trail maintenance; assistance with duck banding operations; weekly cleaning of the headquarters and the Wildlife Observation Center; painting government quarters #205; renovating an existing drainage ditch; cleaning up an old house site; assisting The Raptor Trust in painting flight cages; washing and waxing refuge vehicles; stream cleaning and clearing to prevent localized flooding; vegetation clearing along roadways; painting pipe gates and fuel oil tanks and assisting with other projects.

Environmental awareness activities were incorporated into all work projects. Enrollees went on a working field trip with the National Park Service where they canoed a portion of the Delaware River National Recreation Area and removed an assortment of trash found along the river. This was the ninth year that this type of interagency cooperation has occurred.

Tailgate safety sessions along with the camp's Safety Plan and Regional Safety Policy paid off this year with no physical injuries occurring for the fifth year in a row! All enrollees attended a Standard First Aid and CPR course and received Red Cross Certification.

This year's Open House was attended by 25 parents and relatives of the enrollees. The program featured an excellent slide show prepared and conducted by the enrollees showing this summer's projects and activities. Guest speaker Len Soucy, President of The Raptor Trust, gave a informative program on birds of prey and presented a wildlife poster to each enrollee. With all the projects completed, the cost benefit ratio was \$2.18; an excellent return on the dollar.

The enrollees showed tremendous enthusiasm in their work which was reflected in the number of completed projects and the high standards of quality maintained throughout the program. The "Take Pride in America" theme was demonstrated throughout the entire camp by the Group Leader, the enrollee's attention to detail and their sustained desire to "do the job right the first time".



YCC cleaning debris from brooks. (LB)



YCC cleaning blockages in designated areas to reduce flooding on refuge neighbors. (LB)



YCC maintaining trails (LB)



YCC painting Q-205

4. Volunteer Program

The 1992 Volunteer Program was very successful with 127 active volunteers donating a total of 2,410 hours of service. This was up 7 volunteers and 807 hours from 1991. Since the program's reorganization in 1982, a total of 14,833 hours of service have been contributed by 701 volunteers who have ranged in age from Tiger Cub Scouts to senior citizens. This time would have amounted to \$108,278 in salaries. Great Swamp takes much pride in its Volunteer Program and the volunteers take much pride in their contributions. Some of the activities that volunteers were involved in included visitor assistance; deer hunt assistance; trail patrol; litter pick-up; hunter safety education along with firearm range instruction; trail maintenance and facility maintenance; YCC assistance; wood duck box checks and construction; computer assistance; waterfowl banding; bluebird box checks and construction; receptionist duties; boundary clearing and posting; mowing; grassland seeding; Bog turtle surveys; photography; and guided bird walks.

The 11th Annual Great Swamp Clean-Up was conducted with 31 volunteers picking up an estimated 1,200 lbs. of trash along refuge roads and trails. This included an estimated 400 lbs. of glass and 50 lbs. of cans. Passaic Township assisted by hauling away the trash and transporting the recyclables to their recycling center.



Volunteer Al Cosa greeting and assisting refuge visitors. (TM)



Morris Co. Vo. Tech. thanked by ORP Mcfadden for constructing wood duck box mounting



Annual Volunteer recognition dinner (TM)

The 6th Annual Volunteer Recognition Dinner was held on April 3 at Refuge Headquarters honoring volunteers. In appreciation for their service to Great Swamp Refuge, volunteers received Duck Stamp T-Shirts and "Certificates of Appreciation". Special awards were presented to the top four volunteers who contributed the most hours of volunteer service at Great Swamp Refuge and to those volunteers who have contributed in excess of 100 hours since becoming a volunteer at Great Swamp Refuge. Approximately 35 people were able to attend the event.

5. Funding

(FY-92)

Refuge Operations	\$255,546
Refuge Maintenance	220,796
Fire	500
Quarters Operation & Maintenance	18,410
Transferred from US Dept. of Agriculture	1,200*
Contaminants	50,000**
Deer hunt permit fees (30% of \$8910 collected)	2,673
Special sign order paid thru RO account	8,000

* Interagency agreement adding \$1,200 to our annual budget in return for providing USDA's Animal and Plant Health Inspection Service (APHIS) office space.

** Transferred to FWE to complete tasks identified in the annual Watershed Biologist scope-of-work between refuge and FWE.

FY	Refuge Operations & Maint.	Quarters Operations & Maint.	YCC	Fire
1992	\$538,715	\$18,410	\$16,732*	\$ 500*
1991	\$492,413	\$15,206	\$16,665*	\$10,000*
1990	\$523,658	\$28,463	\$14,280*	\$61,650*
1989	\$884,881	\$28,779	\$14,280*	\$ 500*
1988	\$573,558	\$26,420	\$13,600	----

*Amount is included in refuge O&M total and is not in addition to it.

6. Safety

In January, a new safety committee was formed for the calendar year with Deputy Refuge Manager Villanueva as chairperson and Biologist Bitler and Maintenance Mechanic Smith on the committee. They developed an annual schedule of safety

meetings for the calendar year.

Safety meetings were held on a monthly basis. Some of the topics included: woodstove safety, home fire safety, fire drill procedures, proper use of fire extinguishers, working on iced-over impoundments, how to respond to encountering potential hazardous waste in the field, safe operation of four-wheeled ATV's, safe operation of riding and push mowers and string trimmers, safe use of chain saws, tractor safety, hand tool safety, vehicle safety and accident reporting, health and nutrition, office safety including avoiding repetitive strain injuries, safe use of video display terminals, and fire hazards in offices, and winter driving.

All staff including YCC participated in organizing meetings. Outside speakers, hands on practice, and visual aids were used whenever practical.

Tailgate safety sessions were beneficial again this year for the YCC program with no accidents occurring to any of the enrollees or group leader.

Maintenance Mechanic Smith attended Basic Fire Fighter Training- S-130/S-190, held at Wallops Island, Virginia on February 24 to 28.

On May 5, Maintenance Worker Nicely successfully passed the NJ State CDL written exam.

On June 3, Maintenance Mechanic Smith attended Forklift Safety training at Eastern Shore of Virginia NWR.

On June 10-11, Maintenance Mechanic Smith attended Farm Tractor, Loader/Backhoe and Dozer training at Erie NWR.

On July 7, refuge staff and YCC enrollees completed and became certified in Red Cross Standard First Aid and CPR course which was sponsored by the Somerset County Park Commission.

In July, the YCC installed protective sleeves on fluorescent lighting in the shop to correct a potential safety hazard.

In September, Maintenance Worker Nicely reviewed Fork Lift Safety video tapes as part of the annual required refresher.

On September 1, Mike Picerelli, Assistant Manager at Erie NWR, conducted a safety inspection at Great Swamp with Deputy Mgr. Villanueva.

Unfortunately, there were staff accidents this year which required medical attention including:

On April 1, Maintenance Mechanic Smith sustained severe lacerations of his left forearm when the Dado blades on the radial arm saw came off when shutting the saw down.

In August, Biologist Bitler contracted an eye infection which may have been caused by debris which got into his eye while banding waterfowl.

Three staff members were diagnosed as having Lyme disease. The refuge located physicians experienced in treating this disease and employees were able to get a better diagnosis despite the absence of the "textbook" rash. The refuge notified the Regional Safety Officer of a recent study sighted by one of the physicians indicating that the lab used by FWS was one of the lowest ranked in terms of controls and reliability.

7. Technical Assistance

Refuge and FWE personnel attended 10 full committee and 3 sub-committee meetings of the Great Swamp Watershed Advisory Committee during the year (see Sec. J.1).

In January, Manager Koch reviewed and prepared comments to New Jersey Department of Transportation (NJDOT) on the second draft E.A. for NJDOT's Route 24 mitigation proposal on the refuge. The proposal involves construction a sediment basin on Primrose Brook within Pool # 2. After several years of involvement with this project the Service's hydraulic engineer made a final determination that it would not be feasible in the area proposed.

On January 31, Manager Koch and Enhancement Biologist Chezik attended a meeting of the Morris 2000 Issues Committee for a briefing about Service concerns for the refuge watershed. Morris 2000 is an advisory group to the County Planners.

On February 3, Biologist Bitler met with staff at Somerset County Environmental Education Center to advise them on wood duck nest box placement. The center plans to start a full scale nest box program.

On March 11 Refuge Manager Koch met with Mr. Kozachek and Ms. Dolack of N.J. Department of Environmental Protection & Energy and Mr. Molino, a refuge neighbor. The meeting was to discuss Molino's wetland fill violation that extended onto land recently acquired for the refuge. Molino indicated a willingness to cooperate and remove the fill.

On March 11, Manager Koch inspected the site of Morris County's proposed mitigation for filling wetlands as a result of their anticipated replacement of three bridges on Long Hill

Road. The mitigation involves refuge lands. Ms. Dolack and Mr. Kozachek from NJDEPE accompanied Manager Koch.

On March 11 and 18, Assistant Manager Villanueva represented the US Fish and Wildlife Service at meetings for planning the First Day of Sale Ceremony for the 1992-93 Federal Duck Stamp. The event will take place on July 1 in Jackson, NJ, hometown of Joe Hautman, the winning duck stamp artist. Other members of the committee included representatives from the town of Jackson, the Post Master of Jackson, Joe Hautman, and FWS representatives from RO-PAO, WO-Duck Stamp Office, Edwin B. Forsythe NWR, and FWE Pleasantville, NJ.

Refuge Manager Koch and Assistant Manager Villanueva met with Harding Township Engineer Bob Fox on March 13 on Pleasantville Road to look at proposed road improvements. The proposed project is to widen the road an average of three feet for a final width of 20 feet. Existing drainage ditches would be replaced with cross drains. No curbing would be installed. The major concern of the refuge is to avoid increased storm water run off into the swamp while meeting the needs for public safety. Another meeting with engineer Fox was held on March 26 to review existing road right-of-ways.

On April 3, after two meetings with the Township engineer, Manager Koch expressed the refuge's concerns about the proposed resurfacing and possible widening of Pleasantville Road to the Harding Township Environmental Commission.

On April 29, Manager Koch inspected a 12 acre parcel in Mount Freedom, for possible acquisition and addition to Great Swamp. The property was not recommended for refuge inclusion, but referred to the N.J. Conservation Foundation for protection by other means.

On May 13, Manager Koch attended a meeting in Regional Director Lambertson's office with the RD and Candace Ashmun, chairwoman of the Great Swamp Watershed Advisory Committee (GSWAC) to discuss the Service's partnership in implementation of the GSWAC's recommendations. Also in attendance were DRD Kaufman, ARD Young and Chief of Realty Miller.

On May 13, refuge staff met with Pat Gormley of the Morris County Prosecutor's Office to listen to a tape of a phone conversation as part of their ongoing investigation into the disappearance of the Vice-President of Exxon International.

On May 22, Assistant Manager Villanueva met with Paul Wehn of the Great Swamp Watershed Association to provide him with information about the refuge for a "fact book" about the Great Swamp Watershed.

On June 3, Biologist Bitler, Biological Technician Vaughn, and Assistant Manager Villanueva met with NJ waterfowl biologists, representatives from other New Jersey Refuges, and Janet Sillings from APHIS to coordinate waterfowl habitat management and banding efforts. Biological Technician Sharon Vaughn presented a summary of refuge waterfowl management programs. The meeting was held at the States' Assunpink Wildlife Management Area.

On June 10, Manager Koch attended a brainstorming meeting in the regional office to suggest ways for Refuges to continue operations during austere fiscal constraints.

On June 24, Manager Koch attended a coordination meeting in Trenton with ARD Young and N.J. Division of Fish, Game and Wildlife Director McDowell. Also in attendance were McDowell's key staff, Associate Manager Frickie (RFN), acting Associate Manager Fuert (RFS), Regional Biologist Gavutis and other project leaders for N.J. refuges. The meeting encouraged federal-state coordination and communications with emphasis on hunting programs.

On July 1, refuge staff, YCC enrollees, volunteers, and Zone Biologist Pelizza assisted NJ Department of Fish, Game and Wildlife (NJDFG&W) with a Canada goose "round-up" and collaring for a study on resident geese. A total of 118 adult geese were collared and fitted with USFWS leg bands.

On July 8, Biologist Bitler assisted Flavia Rutkosky of the FWE Pleasantville NJ field office in her meeting with New Jersey Transit (NJT) which took place in Manhattan, NYC. NJT is requesting a permit to build a new train track which would require the filling of a small wetland. Bitler commented on the NJT proposed mitigation project to compensate for the wetland loss.

On July 21 and 22, Outdoor Recreation Planner McFadden participated in a two day Master Planning workshop with the Morris County Parks Department to determine the direction their four Environmental Centers will follow for the next 10 years.

On July 28, Outdoor Recreation Planner McFadden attended a meeting for the Wallkill River National Wildlife Refuge to assist in developing its Station Management Plan.

On August 24 to September 1, Maintenance Worker Nicely was detailed to a private land restoration project outside of Allentown, Pennsylvania in cooperation with the FWS Enhancement Office in State College, PA.

The Great Swamp Hydrologic Area Project began in 1991 when three United States Department of Agriculture (USDA) agencies joined together with conservation groups, business organizations and citizens to begin to assess the impacts of increasing quantities of storm runoff and nonpoint-source contaminants on Great Swamp, located in Morris and Somerset counties, New Jersey.

The proposed five-year cooperative USDA Great Swamp Project will provide federal funding from 1991-1995 to help understand better the effects of increasing stormwater runoff of nutrients and sediment. The Project is examining stormwater impacts on the Swamp's biological productivity and diversity as well as its capacity to moderate flood waters, filter pollutants, absorb nutrients and provide unique natural habitats for a diversity of species, including 10 endangered and threatened species.

The Great Swamp lies near the bottom of its 55.4-square-mile watershed. The refuge is impacted by land uses in the eleven municipalities that make up the watershed.

The Project has five overall goals: First, to determine the sources, amount, and rate of sedimentation in the watershed. Second, to develop, demonstrate, and transfer geographic information system technology in order to develop alternative solutions for nonpoint-source problems. Third, to develop and implement a management plan for prevention, reduction, and remediation of nonpoint contributions made by agricultural and urban sources. Fourth, to develop a comprehensive public information and education program for nonpoint-source control in the watershed. And fifth, to develop and implement a monitoring program with the NJ Department of Environmental Protection and Energy and U.S. Geological Survey to evaluate the effectiveness of the management plan.

This project seeks the participation of agricultural landowners, homeowners, public officials, business/industry, public-interest groups and constituencies. The Refuge manager is a member of this projects' technical advisory committee (TAC). Meetings were attended on Feb. 19, Sept. 9 and Nov. 14.

On September 23, Deputy Refuge Manager Villanueva met with Ted Sheldon and Mike Olanahan of the USDA Great Swamp Hydrologic Unit Area Project to coordinate an October 14 visit of 100 New Jersey educators and legislative aids as part of a tour of several sites in the state. Deputy Villanueva represented the refuge when the group visited the refuge.

8. Other Items

In January, ORP McFadden began a course on Word Perfect.

On January 10, Refuge Manager Koch and Assistant Villanueva attended a training course entitled "How to Handle Difficult People".

On January 22, Assistant Manager Villanueva and Office Assistant Klimas attended a training course on Time Management.

On January 22 and 23, Manager Koch attended a Project Leader Meeting for RF-N in Orono, Maine.

Maintenance Mechanic Smith attended Basic Fire Fighter Training S-130/S-190, held at Wallops Island, Virginia on February 24 to 28.

Biologist Bitler attended the Region 5 Biologist Workshop from February 24-28 held at Eastern Shore of Virginia NWR.

ORP McFadden attended a course on DOS and Biologist Bitler attended an introduction to computers class throughout March.

During March 2 to 6, Associate Manager, Don Frickie; Assistant Associate Manager, Stan Skutek; Zone Biologist, Charlie Pelizza; Regional Public Use Specialist, Tom Comish; Sunkhaze Meadows Refuge Manager, Mark Sweeny; and Personnel Management Specialist, Judy Driscoll conducted a station evaluation at the refuge.

Refuge Biologist Bitler attended a BEST training workshop at Montezuma NWR March 9 - 13.

Office Assistant Klimas attended a retirement seminar March 16-20 in Nashua, New Hampshire.

Maintenance Worker Nicely attended the Regional Wetlands Restoration Workshop held on March 31 to April 3 at Montezuma National Wildlife Refuge.

On April 6 to 11, Refuge Manager Koch and ORP McFadden attended the Annual Law Enforcement Refresher Training held at Eastern Shore of Virginia NWR. Koch remained for the second session held the next week because he was the Chairperson of the Law Enforcement Refresher Training Committee. This year's training included semi-automatic pistol transitional training.

On April 13 to 18, Assistant Manager Villanueva attended the Annual Law Enforcement Refresher Training held at Eastern Shore of Virginia NWR. All Great Swamp refuge officers turned in their revolvers and were issued .40 caliber semi-automatic pistols.

On April 22 and 23, the refuge hosted a training session on the use of the computer software applications Vegdata and The Moist Soil Advisor conducted by Zone Biologist Laskowski. Attenders included Biologist Bitler, Bio Tech Vaughn, Assistant Manager Villanueva, Zone Biologist Pelizza, Regional Biological Data Manager Steblein, Biologist Taylor (E.B. Forsythe NWR) and Assistant Manager Scherer (E.B. Forsythe NWR).

During May, Outdoor Recreation Planner McFadden received the Service's Scouting Award for Region 5. Tom received \$500 and a Special Achievement Award Certificate signed by Director Turner.

On May 5, Maintenance Worker Nicely successfully passed the NJ State CDL written exam.

Manager Koch presented revenue sharing checks to appropriate municipal officials in Chatham Township (\$24,182.00) on June 1, Passaic Township (\$49,005.00) on June 16, and Harding Township (\$66,500.00) on June 16. An explanation of the refuge revenue sharing program was also given.

On June 3, Maintenance Mechanic Smith attended Forklift Safety training at Eastern Shore of Virginia NWR.



Manager Koch presenting ORP McFadden with the Annual Region 5 Scouting Award. (JA)

On June 10-11 Maintenance Mechanic Smith attended Farm Tractor, Loader/Backhoe and Dozer training at Erie NWR.

ORP McFadden and Manager Koch attended the training seminar "Managing Priorities" on June 3.

On July 23, Biologist Bitler took and passed the NJ State Core Pesticide Exam for certification as a pesticide applicator.

Deputy Refuge Manager Villanueva attended Small Purchases training in Philadelphia, PA on August 3 to 7.

Biologist Bitler attended Basic Supervision training in Philadelphia, PA on August 24 to 28.

From August 25 to 27, Refuge Manager Koch attended a Project Leader (RFN) meeting at Montezuma NWR.

On September 17, Biologist Bitler successfully completed the State Aquatic Pest Control exam for state pesticide applicator certification.

On September 29 and 30, Outdoor Recreation Planner McFadden attended Total Quality Management training "TQM" at Great Meadows National Wildlife Refuge. He is serving as Team Leader for the Public Use Team that will evaluate the effectiveness of the public use management goal on refuges.

On October 14, Maintenance Mechanic Smith and Maintenance Worker Nicely attended Bombardier tracked ATV Training conducted by a representative from the company.

Maintenance Worker Nicely was detailed at Eastern Neck National Wildlife Refuge from October 1 to 19 operating the Hydro-ax.

On October 29, Deputy Refuge Manager Villanueva received her appointment for a Level 1, exception, Contracting Officer.

The North American Waterfowl Management Plan: An international agreement signed between the U.S. and Canada in 1986 to protect, enhance and restore wetland habitats across the continent presents a number of new opportunities and challenges for NWRs. The Plan establishes conservation goals for wetland habitats in specific regions of the continent; sets objectives for restoring waterfowl populations; and provides a framework for accomplishing local, regional and international goals.

In the United States, six key waterfowl breeding, migration and wintering habitat regions called Joint Ventures (JVS) have been established to implement the Plan. In Region 5, The

Lower Great Lakes/St. Lawrence Basin and the Atlantic Coast JVS have coalitions of Federal, State and private partners working together to restore waterfowl populations.

The Great Swamp National Wildlife Refuge lies within the Atlantic Coast JV and is playing an active role in achieving the objectives of the JV and North American Waterfowl Management Plan.

Great Swamp National Wildlife Refuge was established as an area to provide migration, nesting and feeding habitat for migratory birds. Most habitat management is directed toward improving habitat for waterfowl and other wetland species. Particular emphasis is placed on black duck, wood duck and American woodcock. Consistent with other important management needs and habitat limitations the refuge also provides and preserves habitat to ensure the perpetuation of many other indigenous species.

Wood ducks and mallards are the most common waterfowl on the refuge while Canada geese, black ducks, pintail, blue-winged and green-winged teal are also found in abundance especially during migration. Peak waterfowl numbers during migration range from 10-15 thousand. The wood duck breeding population is estimated at 1,000 pairs with annual nest box production figures ranging from 700 to 2,500 fledged young. Wood duck production is only reported from data obtained from nearly 600 artificial nest box compartments, so overall production estimates are conservative. Natural cavities in wood duck habitat also appear to be abundant; however, production data from these cavities have not been obtained.

Water levels are manipulated in five refuge impoundments, encompassing 571 acres, to favor growth of a desirable mix of native aquatic and emergent plant communities and open water. These habitat types are managed to provide conditions preferred by waterfowl during spring and fall migrations and the summer nesting season.

North American Waterfowl Management Plan Highlights

-The North American Waterfowl Management Plan (NAWMP) theme was incorporated into 37 programs and reached 1,436 individuals (See section H.7).

-A total of 357 wood duck nest boxes (515 nest compartments) were checked and maintained (see section G.3).

-Wetlands located in the Management Area were managed for waterfowl through a series of impoundments (see section F.2).

On March 17-23, Maintenance Worker Nicely was detailed to a private land restoration project in Lehigh County, PA to help construct a 2,000 foot dike. This was done in cooperation with the FWS Enhancement Office in State College, PA.

On August 24 to September 1, Maintenance Worker Nicely was detailed to a private land restoration project outside of Allentown, PA in cooperation with the FWE Enhancement Office in State College, PA.

-Refuge spraying operations were conducted to control phragmites and purple loosestrife and to encourage growth of plants more beneficial to waterfowl and other wildlife (see section F.10).

F. HABITAT MANAGEMENT

1. General

Habitat management at Great Swamp National Wildlife Refuge involves two different general approaches. The Wilderness Area's 3,660 acres, is more passively managed because of its restrictive legislation while more active management of various habitats is performed in the remaining 3,601 acres of the refuge. This non-wilderness portion of the refuge is generally referred to as the "Management Area."

2. Wetlands

Wetland habitat occurs throughout the refuge; however, the Management Area is the only portion of the refuge where active water level management takes place. The Wilderness Area is left to more natural processes.

Wetland management activities within the Management Area generally take place in the five refuge impoundments. Refuge objectives dictate that the impoundments serve as feeding areas during migrations, especially for dabbling ducks such as mallards, black ducks and wood ducks. A secondary objective is management for waterfowl production.



Typical spring scene in the Great Swamp. (GH)

The five refuge impoundments (Pools 1, 2, 3A, 3B and Middle Brook) total 571 acres or 8% of the total refuge and 16% of the Management Area. Water level management in 1992 concentrated on attempting an April drawdown of Pools 1, 2 and Middle Brook, but only Middle Brook went down. Pools 3A and 3B maintained normal operating levels throughout the year to provide optimum feeding, resting and brood rearing habitat for waterfowl. Various management activities are directed at sustaining stands of a variety of preferred waterfowl plants such as buttonbush, smartweed, cattail, bulrush, arrow arum, pickerelweed, etc.. These plants along with other submergent and emergent vegetation interspersed throughout the impoundments provide excellent waterfowl habitat, especially for wood ducks. Further description of specific impoundment characteristics and management is as follows:

Pool 1: Pool 1 is essentially an open marsh characterized by populations of arrow arum, arrow head, pickerelweed and

buttonbush. Some live and standing dead timber can be found around the edge. Pool 1 receives water from Loantaka, Great and Saw Mill Brooks through the Wilderness Area. By comparing vegetative transect data collected in Pool 1 during the early 1980's to current general observations, it appears that vegetative diversity and abundance has declined in Pool 1 and the impoundment is slowly becoming a more open water type habitat. Water Control Structure #14, the main outlet structure, has been unable to handle the increasing watershed runoff flowing into the swamp making drawdowns more difficult. The stoplogs for this WCS were removed in May, 1986, and have not been replaced. Still, this pool remains slightly above the normal operating water level (229.3 ft) throughout the year.

Middle Brook: The objective of the 17 acre Middle Brook impoundment is to provide food and cover for waterfowl during migration. The pool is mainly comprised of buttonbush in the upper portions while large stands of smartweed dominate the lower portion of the brook. The pool receives water from Pool 1 through WCS #5, a 100 foot emergency spillway between Pool 1 and Middle Brook, and from small regulated ponds in the Wildlife Observation Center area through WCS #1 and 10.

The boards were pulled for Middle Brook on April 1 to help draw down Pool 1. Although the effort did not succeed in helping Pool 1 to draw down, it did result in an excellent stand of smartweed in Middle Brook. The boards were not replaced in the Fall because the present water level at 227.8 was perfect for feeding ducks. Duck use was excellent.

Pool 2: The objective of Pool 2, the largest of the refuge's impoundments (295 acres) is to provide nesting and brood rearing habitat and resting and feeding areas for waterfowl during the spring and fall migrations. The pool is an open marsh characterized by dense stands of arrow arum, cattail, bulrush, marsh mallow, buttonbush, pickerelweed and willow. Some live and standing dead timber remain around the perimeter of the impoundment. The pool receives water from Primrose Brook and Great Brook through WCS #14 and #12, and during high water, from the 200' spillway between Pool 1 and 2.

Complete drawdowns of Pool 2, without success, have been attempted in recent years by opening one side of the automatic Amill gate (WCS #22). This year both sides of the gate were opened April 1, but still the Pool experienced only a partial drawdown. It is suspected that either silting in or high bottom contours within the pool may be restricting flow through the pool.

Pool 3A: The objective of Pool 3A which totals approximately 55 acres is to provide additional food and cover for waterfowl

during migration and brood habitat during the summer. The pool receives water from Pool 2, WCS #23 via a feeder ditch, flood water from the Passaic River and the Pool 3B cross dike at WCS #34.

Pool 3A was not drawn down this year because there was adequate plant growth at its present elevation of 225.6 ft.. Waterfowl use was good.

Pool 3B: The objective of Pool 3B which is approximately 88 acres is to provide nesting, feeding and brood rearing habitat for waterfowl during the spring and summer as well as resting, feeding and roosting habitat during spring and fall migrations. The pool receives water from Pool 3A through WCS #34, Middle Brook through WCS #15 and flood water from Black Brook across the spillway. The pool is basically characterized by stands of cattail, marsh mallow, bulrush, and buttonbush, with some standing dead timber around its perimeters.

In CY 92, a drawdown was not initiated at WCS #37 (outflow to Passaic River). The aquatic vegetation is not stressed at the normal operating level (average depth 12") and the remaining timber in the pool is beyond rejuvenation and therefore would not benefit from a drawdown. Normal operating levels (at 224.5 ft elev) were maintained throughout the year to provide optimum feeding, resting and brood habitat for waterfowl.

In addition to these impoundments, approximately 35 acres of wetlands have water level management capability. These miscellaneous areas range in size from 1/2 to 4-1/2 acres.



Carpet of green. (GH)

3. Forests

Before the refuge was established, portions of the swamp were drained or cleared to make them suitable for dry land activities. Many woodlands were first cut by 17th century settlers for firewood and house timbers. The remaining fields were then used for farming and as pastures. With the decline of farming in the "swamp" during the latter half of this century, pasture lands have been reverting back into woodlands.

With the establishment of the refuge, many of the areas that had been cleared were allowed to revegetate naturally and have become predominantly red maple, especially in the Wilderness Area. The refuge contains roughly 4,800 acres of forestland. An Upland Habitat Management Plan was developed in 1988. It calls for habitat management on approximately 3,000 acres of uplands, mainly outside of the Wilderness Area, and is

directed toward the creation and maintenance of a multi-aged diversity of upland habitat including forests and grasslands to benefit a variety of species with emphasis on regional priority species such as the American woodcock. Forest habitat management activities in 1992 were a continuation of those initiated in 1989.

The refuge is divided into seven compartments for management and planning purposes. A detailed forest inventory will be completed for each compartment. A forest inventory was completed in Compartment 3 during 1989.

A total of 108 acres of early successional stage forest and brush were cleared by the Hydro-ax in 1992. This included 83 acres designated for woodcock management which will be maintained on up to twenty year cycles and 25 acres of removing encroaching woody vegetation in areas designated as grasslands (fields 46 and 47) to release fruit and mast producing trees. Hydro-ax operations commenced January 24 and ended February 19 with two machines operating on the refuge at the same time to cut sapling to pole size red maple stands to promote dense resprouting for early successional habitat. Blocks consisting mostly of red maple were cleared and will be maintained in various age strips with up to a 20-year cycle. Three areas were cut this year including a 30 acre block near field 16, an 18 acre block on the northwest corner of White Bridge and Pleasant Plains Road, and a 26 acre site on and adjacent to Tract #373 on the north side of White Bridge Road. These were entirely cleared this year because most of the stage of growth (20 years and over) was beyond that used by woodcock. Six acres were cut to complete a 35 acre area near hunter parking lot 5b which was started in 1992. An area near Building # 237 on the south side of White Bridge Road was begun with 3 acres completed. Operations were halted on February 19 when rain and warm weather created unsuitable ground conditions for equipment operation.



The Great Swamp and Iroquois's hydro-axes worked in tandem. Feller-buncher (L) Rotary cutter (R). (TV)



Hydro-Axed area. (TV)

Additionally, approximately 50 acres were cut using the feller buncher to remove large trees left in areas that were cut previous years with the rotary cutter. Chainsawing was also done to remove trees beyond the capability of the feller buncher attachment.

Approximately 138 hours were spent operating the two Hydro-axes in January and February 1992 with an 63 additional hours required for servicing and repairs. On February 24, the Refuge Hydro-ax was moved from Great Swamp to Supawna Meadows NWR to begin operations on several refuges. It was returned on December 17.

There are 10 units incorporated in the brushland management program. They will be mowed on a variable schedule using the Hydro-ax. Each unit will be individually assessed and mowing will occur before woody growth advances beyond pole stage and exceeds our equipment's capability to mow it. The age of units may vary with site growth conditions, but in most instances should not exceed 20 years.

5. Grasslands

The grassland management objective at Great Swamp is to maintain approximately 542 acres of various age fields for habitat diversity, nesting cover and improved wildlife viewing opportunities for the public in support of the Service's Watchable Wildlife Program. The Upland Habitat Management Plan which also incorporates grassland and brushland management practices proposes to increase grass and brush habitat by approximately 90 acres in the future.

There are currently 54 fields incorporated in the grassland management program. Grassland fields are scheduled for mowing on a one-, two, three-, or four-year cycle. A breakdown of rotation schedules and acreage follows:

Rotation Schedule (Years)	Number of Fields	Total Acreage
One	11	162
Two	9	89
Three	0	0
Four	11	49
TOTALS	31	300

Annual grassland mowing began in August and ended September 22, with 300 acres mowed. Most of the fields were on a one-year rotation. The mowing program included using the Hydro-ax to mow 25 acres in two fields that had woody vegetation

encroaching grassland units. All but one of the scheduled fields was completed this year. That field was not completed due to access problems.

In September, refuge staff and volunteers disked, seeded, and cultipacked 13 acres of grassland fields to improve waterfowl nesting cover. Mylar flags were erected to haze geese off the site to permit establishment of the vegetation.

The Grassland Management Program at Great Swamp insures a variety of grassland and old field habitats. The interspersed habitat types substantially increase the availability of ecotones and promote wildlife diversity.

Great Swamp has one of the highest breeding populations of Eastern bluebirds in New Jersey due to available habitats and the nest box program (see Section G.7). Managed grasslands provide green browse for wildlife such as Canada geese and white-tailed deer, nesting habitat for song birds such as the bobolink (State threatened species), "peenting" grounds for the woodcock, and hunting areas for raptors and other predators. Mowed areas also enhance wildlife viewing opportunities for refuge visitors and minimize wildfire damage potential.

9. Fire Management

The Station Fire Dispatch Plan was revised in February and distributed to reflect new phone numbers.

Maintenance Mechanic Smith attended Basic Fire Fighter Training- S-130/S-190, held at Wallops Island, Virginia on February 24 to 28.

On April 15, at approximately 17:15 hours, ORP McFadden received a call that the New Vernon Volunteer Fire Department was responding to a brush fire at the Wildlife Observation Center (WOC). When ORP McFadden arrived on the scene the fire department had already extinguished the brush fire. Arson seems to be the cause of the fire and refuge staff are "fire-ready."

10. Pest Control

Refuge spraying this year was limited to ground applications of the herbicide "Rodeo" to control purple loosestrife and phragmites. Treatment sites remained basically the same as in past years which was essentially spot treatment in and around the impoundments. A total of 22 acres were treated and 6.5 gallons of chemical used.

Hand spraying began on August 5 using a 50-gallon sprayer pulled behind an all-terrain vehicle (ATV), and a 500-gallon sprayer pulled behind a small truck. Refuge herbicide spraying operations concluded on September 2, 1992.

12. Wilderness and Special Areas

In 1966, the National Park Service designated the Great Swamp National Wildlife Refuge as a Registered Natural Landmark under the provision of the Historic Sites Act of 1935. The refuge was incorporated in the registry because it possesses exceptional value in illustrating the natural history of the United States.



Winter in the Swamp (BT)

In 1967, 746 acres in the northeast portion of what is now the Wilderness Area of the refuge were declared a research natural

area by the Director of the U.S. Fish and Wildlife Service. The area is known as the M. Hartley Dodge Natural Area and contains undisturbed, largely unditched natural shrub swamp habitat and numerous small upland islands. The area was the only extensive swamp and forest association of this type in northern New Jersey. Two SAF (Society of American Foresters) cover types make up this area: SAF #39 (black ash, American elm, red maple) 716 acres and SAF #52 (white oak, red oak, hickory) 30 acres.

In 1968, 3,660 acres or about 53% of the current refuge total was the first area designated by the Interior Department as Wilderness under the 1964 Wilderness Act. It was also the first Wilderness Area to be designated in the Interior Department.

13. WPA Easement Monitoring

The Refuge Manager at Great swamp has been designated as the easement manager when interest in lands is conveyed to the Service for inclusion into the National Wildlife Refuge System by the Farmers Home Administration (FmHA) under provisions of the Food Security Act of 1985 (Farm Bill). This responsibility includes all lands in New Jersey. The Fish and Wildlife Enhancement (FWE) Pleasantville, NJ field office is responsible for recommending the conservation easement and assisting the easement manager in establishing administration of the easement. Conservation easements are the result of placing restrictions on wetlands that are presently on FmHA inventory properties.

As a general rule, if a farmer in New Jersey is about to lose his farm, FmHA will advise the farmer to sell all or a portion of the farm so that foreclosure can be avoided. FmHA takes this approach because of the higher than average land values in New Jersey. As a result, New Jersey has only had four properties to review whereas most FWE field offices in Region 5 have had the opportunity to review as many as 40 or 50 inventory properties (New York had over 120 properties). The following two properties have been recommended as conservation easements in New Jersey:

Conservation easement and Fee Title Transfer of an Inventory Property

A conservation easement and a fee title transfer of a 2.0 acre inventory property (Jeffer's property, Cedarville, Cumberland County) had been recommended to the New Jersey Division of Fish, Game and Wildlife in March, 1988. Although the property was small (2 acres), it was of high value to wildlife and can provide boat access to Cedar Creek and the Delaware Bay.

FmHA's new regulations required that the property be offered for sale to the original owners; however, FmHA notified the previous owner that the property would have severe use limitations because of the recommended conservation easement which covered the entire property. The property was deeded to the Division of Fish, Game and Wildlife this year.

Conservation Easement on an Inventory Property

A conservation easement on 27 acres of the Codario Property (Buena Township, Atlantic County) was recommended in November, 1987 (an FmHA inventory property with a willing buyer). Approximately 27 acres of palustrine forest were included in the recommendation to deed restrict the property from future development with no third party management rights assigned. Current status of FmHA actions on Service recommendations is pending. The property is currently tied up in litigation because the previous owner is suing FmHA because they foreclosed on the property. Regardless, the recommended easement (deed restriction) is assumed to be acceptable because FmHA has not indicated anything to the contrary. The easement will not take affect until such time as the legal problems have been resolved.

G. WILDLIFE

2. Endangered and/or Threatened Species

There were two sightings of an adult bald eagle in February.

A number of NJ State Endangered and Threatened species are found at Great Swamp NWR. These include:

- 1) Blue-spotted salamander (Endangered-NJ) - No population estimates have been established; however, the species is known to exist in wooded wetland areas throughout the refuge. Sightings are rare since adults live underground most of the year and only emerge to breed.
- 2) Bog turtle (Endangered-NJ) - Several colonies of bog turtles have existed on the refuge in past years, but sightings of this species are rare because of its secretive nature. Except for three sightings made last year, no sightings have been documented since the releases of three hatchlings in August and a 20-year-old adult in September, 1987.
- 3) Wood Turtle (Threatened-NJ) - This species is probably most visible in June when adults come to management road edges

to lay their eggs. The most recent documented wood turtle found on the refuge was in September, 1987.

4) Red-shouldered Hawk (Threatened-NJ [breeding population Endangered]) - This species is uncommon. There were no known sightings this year.

5) Barred Owl (Threatened-NJ)-This species nests on the refuge and is common.

6) Red-headed Woodpecker (Threatened-NJ) - There were confirmed sightings in January and May. Nesting activity has been observed in the past, but no documented nesting has been recorded since 1987.

7) Bobolinks (Threatened-NJ) - Several bobolinks were observed in nesting habitat during May and June.

8) Osprey (Threatened-NJ) - There was one confirmed sighting in April, another in May, and a final in June.

9) Long-eared Owl (Threatened-NJ) - There were no confirmed sightings this year but this owl is an occasional visitor to the refuge.

Species listed by the State as having only their breeding populations threatened or endangered that were observed on the refuge include northern harrier, short-eared owl, pied-billed grebe and great blue heron.

The Pool 2 great blue heron nesting colony had 22 active nests which produced 52 young for an average of 2.36 young per nest. Last year there were seven active nests which produced 20 young for an average of 2.8 young per nest.

The Black Brook (Rubenstein Marsh) nesting colony had four active nests which produced nine young for an average of 2.25 young per nest. Last year there was a red-tailed hawk nesting in the colony and there were no active heron nests.

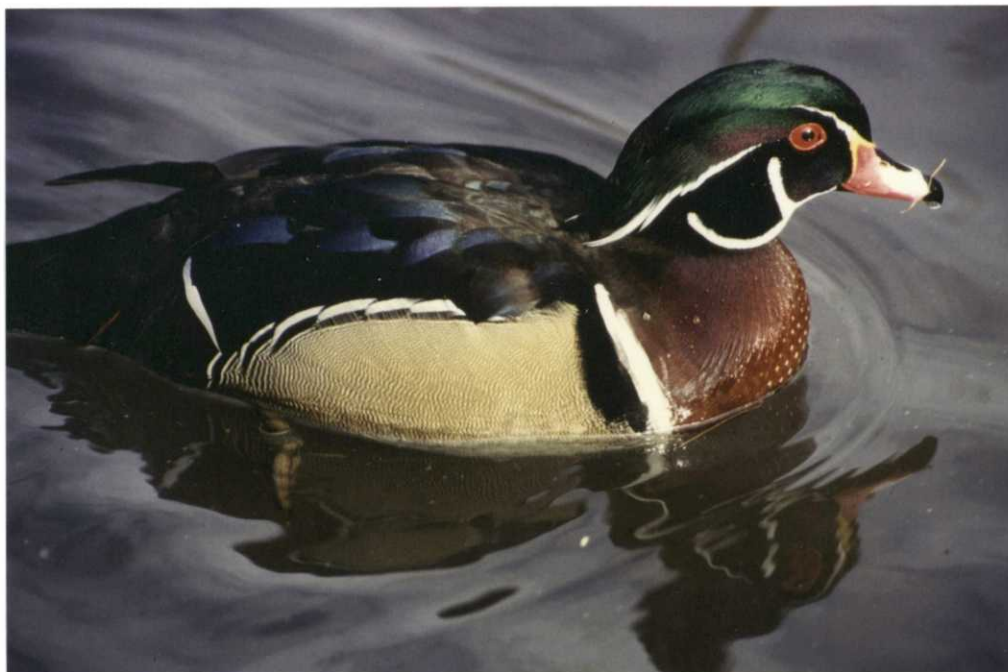


Great blue heron -- a state threatened species
(breeding) which nests on the refuge. (GH)

3. Waterfowl

Major waterfowl concentrations are primarily within the 571 acres of impoundments found in the refuge's Management Area. The five main impoundments are managed to allow for maximum waterfowl resting and feeding potential during migratory periods, and as waterfowl breeding and brooding areas. The pools also serve as roosting areas for many species.

Waterfowl censusing was conducted from February through May and then again from September through December. Some of the highest counts by species from February through May are as follows: Canada Geese 653 (Feb), Mallard 1626 (Mar), Black Duck 1009 (Feb), Wood Duck 605 (Apr), American Wigeon 350 (Feb), Pintail 224 (Apr), Green-winged Teal 148 (Apr) and Gadwall 60 (Apr). Some of the highest counts by species from September through December are as follows: Canada Geese 926 (Dec), Mallard 2,399 (Nov), Wood Duck 1885 (Oct), Green-winged Teal 1,196 (Nov), Black Duck 793 (Nov), Wigeon 505 (Nov), Pintail 387 (Nov) and Blue-winged Teal 99 (Sept). Other waterfowl species occasionally observed on the refuge included Ring-necked Duck, Northern Shoveler, Hooded Merganser, Ruddy Duck, Snow Geese and Mute Swan.



The wood duck is our premier waterfowl species (GH)



Black ducks are abundant on the refuge (GH)

The following graph shows the highest number of mallards, wood ducks and black ducks observed for the year taken from bimonthly counts conducted throughout spring and fall migrations over the past 12 years. Due to staffing shortages there insufficient data for 1991.

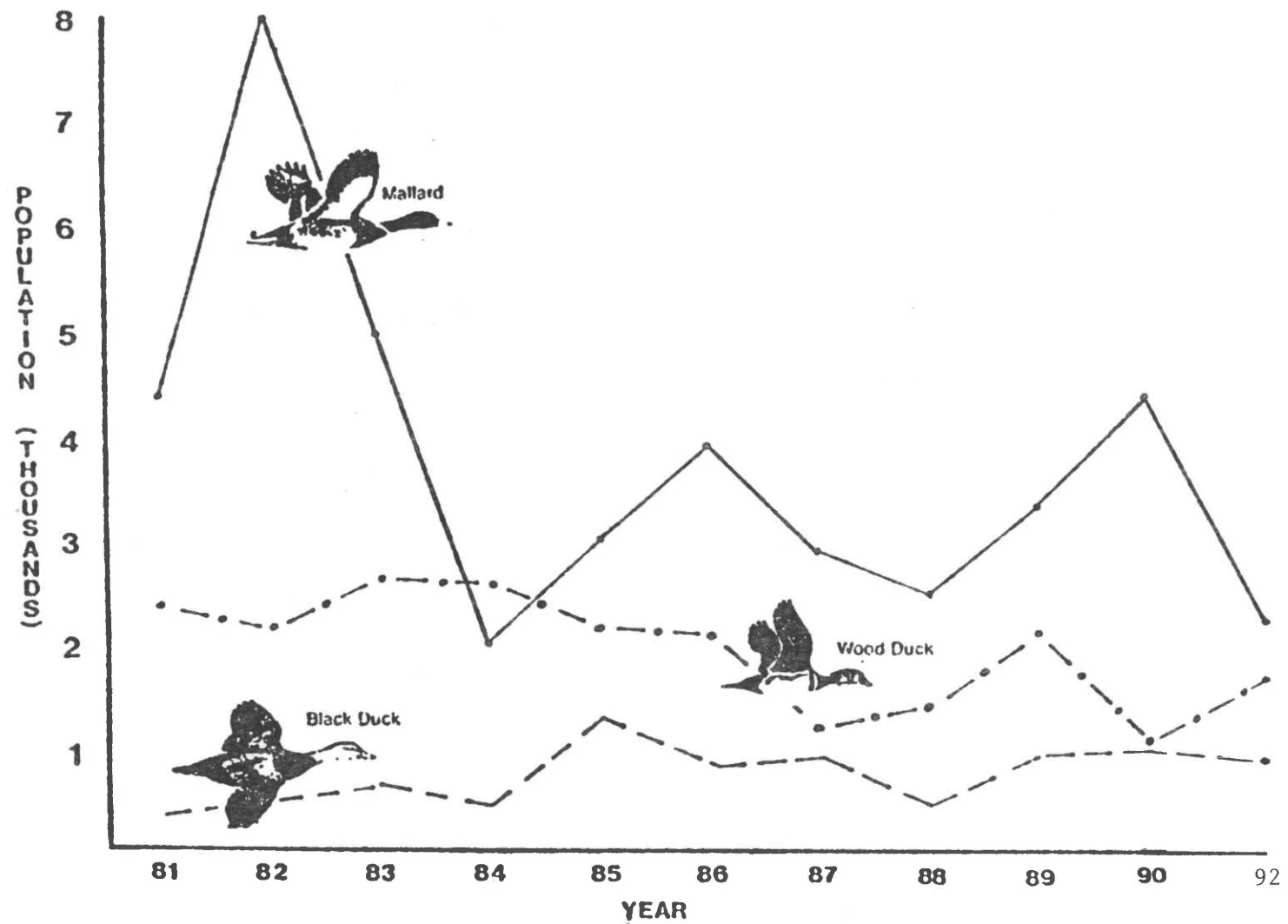
Wood ducks are the refuge's most common breeding duck, while mallards, black ducks, American green-winged teal and blue-winged teal nest on the refuge in limited numbers. Many wood duck broods and several mallard broods were observed on the refuge in the spring. New Jersey has a resident population of Canada geese and approximately 150 pairs nest on the refuge.

Wood duck production is reported only from data obtained from artificial nest boxes so overall production estimates can be considered conservative. Natural cavities in suitable habitat appear to be abundant; however, we have no information on their use, locations or predation rates. Raccoons are an effective nest predator and are abundant.

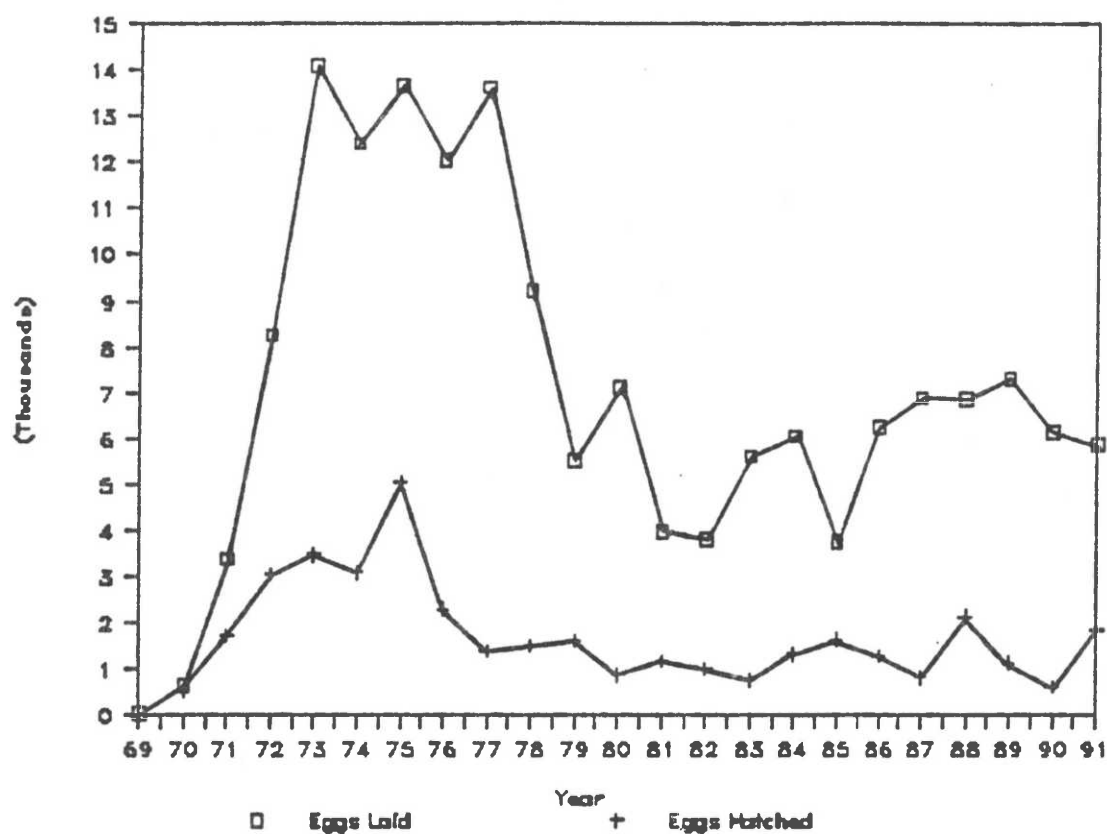
Production data for 1991 which was tabulated too late to be included in the 1991 narrative is as follows: 31% of the 515 available compartments had a successful hatch; 17% of the compartments were unused; 20% of all nests were abandoned; 16% were dump nests; and 16% were classified as dump/hatch. A total of 1,821 ducklings were produced at a cost of \$5.19/duckling compared to \$6.97/duckling last year. This lower cost was due to higher production this year over last. A long term relationship between available nesting compartments and ducklings produced (1969-1991) is represented in the graphs on the following pages.

The servicing of boxes and gathering of 1992 production data began in December, 1992, and as of this writing is not complete. The information for the 1992 nesting season will be reported in the 1993 narrative.

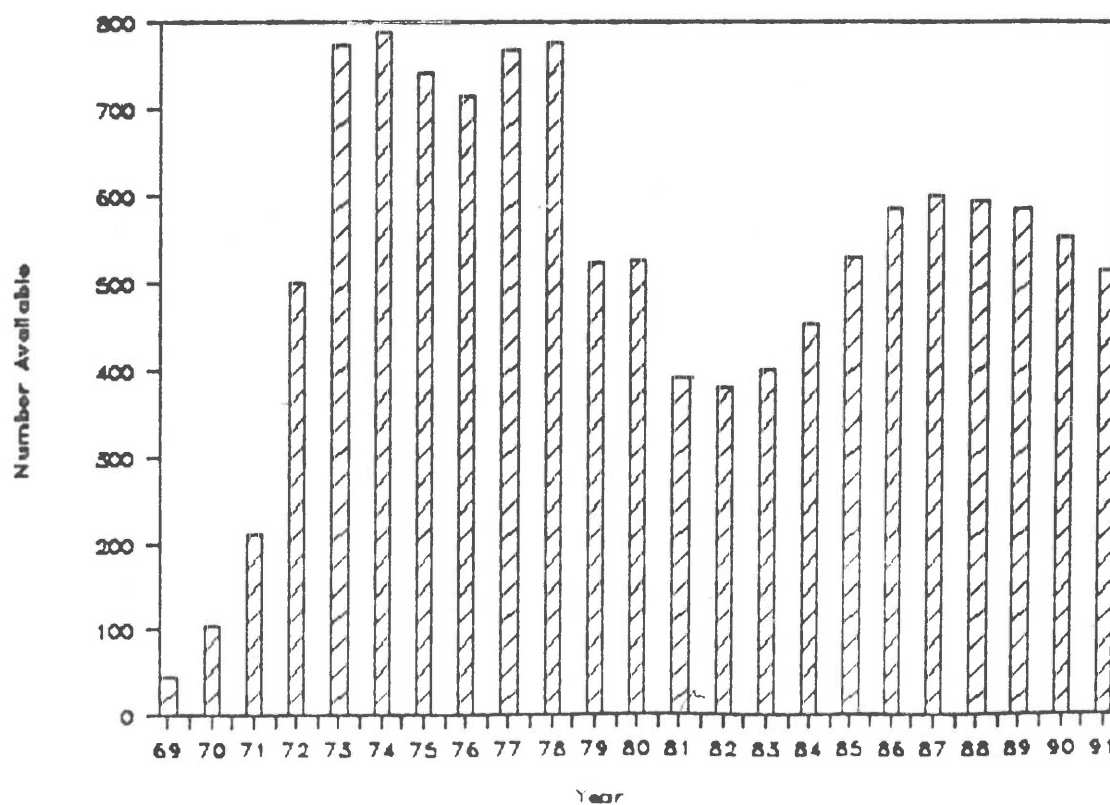
PEAK POPULATION INDEX OF MALLARDS, BLACK DUCKS AND WOOD DUCKS



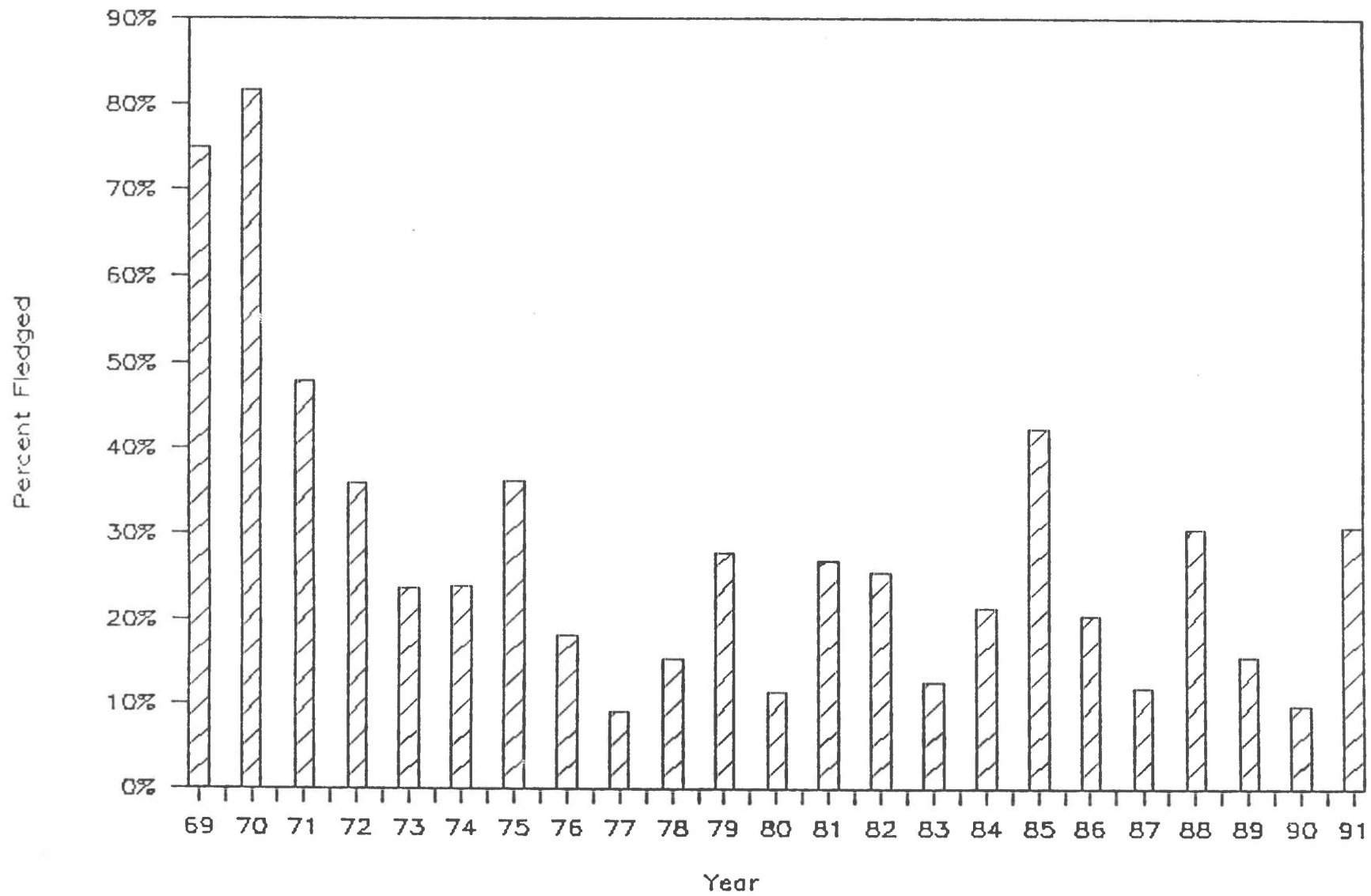
Wood Duck Nesting Success



Wood Duck Nesting Compartments



Wood Duck Hatchability



Management of the nest box program continues to concentrate on reversing the "traditional" nest box program of densely placed and highly visible boxes. Boxes in poor locations are being removed and new boxes are being placed in inconspicuous locations.

The computer continues to be an asset in maintaining the wood duck boxes and analyzing data. With seven years of data on the computer, trends can be examined to determine if any boxes or areas are having better hatching success. We can also look at boxes that are consistently not used or abandoned and consider the possibility of relocating or removing these boxes. Field personnel also use data printouts to determine maintenance needs (ie., new box, lid, predator guard, etc.) which helps with daily planning and reduces the number of return trips to boxes. Since the acquisition of an IBM compatible computer in 1987, all the wood duck data has been transferred over to the Rbase computer program from Dbase II (see Section I.6).

For three days a week from September 11 thru October 2, volunteer Bernie Tulman conducted Canada goose neck collar observations at numerous locations in Morris County. The USFWS will be analyzing the data to determine if an early non-migratory Canada goose hunt could be conducted in NJ without harvesting a significant number of migratory Canada geese.

4. Marsh and Water Birds

Nineteen species of marsh and water birds are presently known to use the refuge. This year 16 species were observed. Sightings included king, yellow, sora and Virginia rails; cattle, snowy and great egrets; great blue, green-backed and black-crowned night herons; American and least bitterns; common gallinule, American coot, pied-billed grebe and double-crested cormorant.

There are two historic great blue heron nesting colonies on the refuge. The Pool 2 colony had 22 active nests which produced 52 young for an average of 2.36 young per nest. Last year there were seven active nests which produced 20 young for an average of 2.8 young per nest.

The Black Brook (Rubenstein Marsh) nesting colony had four active nests which produced nine young for an average of 2.25 young per nest. Last year there was a red-tailed hawk nesting in the colony and there were no active heron nests.

5. Shorebirds, Gulls, Terns and Allied Species

Species recorded this year were greater yellowlegs, killdeer, and ring-billed gull; yellow-billed, spotted and solitary



Green-backed heron (GH)



Len Soucy from The Raptor Trust
releasing rehabilitated egret. (TM)

sandpipers; common snipe and woodcock.

Refuge woodcock singing surveys counted an average of 3.8 singing males/survey route. Last year's average was 6.67. Since the count was established in 1985, the highest average was 8.8 in 1988 and the low was 3.0 in 1986. These figures are well above the average for the eastern region which is 1.92 males heard per route.

6. Raptors

Sixteen of the total 22 species of raptors on the refuge bird list were sighted and recorded on the refuge during 1992. Red-tailed hawks and kestrels were most commonly observed. In winter, northern harriers were often seen working fields around refuge headquarters.

Two bald eagles, one golden eagle and three osprey were observed on the refuge this year. One active great horned owl nest was observed during the year producing one young. The red-tailed hawk, broad-winged hawk, kestrel, screech owl, and barred owl are also known to nest on the refuge. Sightings are primarily incidental and formal surveys are not conducted.

The Raptor Trust, a local bird rehabilitation center, released seventy-seven (77) raptors this year on the refuge or at The Raptor Trust which is adjacent to the refuge. Releases were as follows:

Screech owl	19
American Kestrel	13
Broad-winged Hawk	5
Red-tailed Hawk	26
Cooper's Hawk	7
Sharp-shinned Hawk	3
Turkey Vulture	1
Northern Harrier	2
Red-shouldered Hawk	1
TOTAL	77

7. Other Migratory Birds

The Bluebird Management Program continued to be successful this year. A total of 115 nest boxes were available for use and are located throughout the Management Area in suitable habitats. Nest building began in mid-April resulting with 35 pairs utilizing nest boxes. Approximately 110 young fledged of which 43 were banded. Tree swallows nested in 69 of the boxes.

Volunteer Bernie Tulman spent approximately 75 hours checking boxes on a bi-weekly basis.



Bluebirds are very popular on the refuge. (GH)

8. Game Mammals

A number of game mammals are found at Great Swamp including white-tailed deer, cottontail rabbit, red and gray fox, raccoon, gray squirrel, muskrat, striped skunk, opossum, mink, river otter and occasionally beaver. The only population which is presently manipulated; however, is white-tailed deer. No other hunting or trapping occurs on the refuge.

The refuge's deer hunting program has been conducted annually since 1974 to control the deer herd, improve herd health, reduce habitat damage, reduce deer-auto collisions and other local deer depredation.

This year's program was a five day hunt occurring on December 3-5, 10 & 11. The harvest totalled 210 deer which was second to last year's record of 212. For the second year hunters were allowed to take two deer per day. The weather for Dec. 3-5 was partly cloudy, with lows in the 20's and highs in the 40's, and wind from 0-30 m.p.h.. December 10 began partly cloudy, but by noon snow followed by rain and strong winds arrived. December 11 was a miserable day with rain and wind gusts up to 60 m.p.h.. Very few hunters showed up to hunt. Trees and electric wires came down every where and flood

waters made some roads impassible. The refuge lost power that morning and it took over two days to be restored. A tree knocked down a power line on Pleasant Plains Road and blocked the main access to the headquarters and the hunter check station. For safety and logistical reasons the refuge manager began shutting the hunt down at 2:00 p.m.. This was accomplished by not allowing any more hunters to check in and alerting all those who could be contacted to check out as soon as possible. Had it not been for the severe weather on the last day,

the deer harvest probably would have exceeded last year's record. A comparison of hunt and harvest information is presented in the following table:

Hunt and Harvest Information (1980-1992)

YEAR	ACRES OPEN TO HUNTING	TOTAL HARVEST	TOTAL# OF DAYS HUNTED	TOTAL HUNTER HOURS AFIELD	HUNTER HRS/DEER HARVESTED
1980	5,270	148	10	11,441	77.30
1981-82	6,019	152	8	11,706	77.00
1982-83	6,019	126	7	10,822	85.90
1983-84	6,019	116	7	8,592	74.06
1984-85	6,019	144	6	7,705	53.50
1985	6,019	150	6	7,167	47.78
1986-87	6,023	179	6	8,524	47.62
1987-88	6,111	149	5	7,710	51.74
1988-89	6,098	143	6	8,942	62.53
1989-90	6,098	153	6	8,216	53.70
1990-91	6,098	164	6	8,873	41.91
1991	6,200	212	5	7,833	36.94
1992	6,243	210	5	7,964	37.92

Physical condition of the herd was examined at the refuge check station. All deer were aged, weighed and antler measurements taken. Age and sex structure of the 1992 deer harvest depicts a healthy herd as evidenced by the large proportion of deer less than 1-1/2 years old in the harvest presented in the following table:

Age & Sex Structure of 1992 Great Swamp Deer Hunt Harvest

AGE	1/2 # (%)	1-1/2 # (%)	2-1/2 # (%)	3-1/2 # (%)	4-1/2+ # (%)	TOTAL # (%)
MALE	56 (26.66)	40 (19.04)	12 (5.71)	2 (0.95)	0 (0.00)	110 (52.38)
FEMALE	41 (22.38)	19 (9.04)	23 (10.95)	15 (7.14)	2 (0.95)	100 (47.62)
TOTAL	97 (46.19)	59 (28.09)	35 (16.66)	17 (8.09)	2 (0.95)	210 (100)

The average antler beam diameter for each buck 1/2 years old and older and total number of points were collected. Due to small sample sizes for the older age deer, data analysis was restricted to the 1/2 year age class. Average antler beam diameter increased from 15.70mm last year to 15.94mm this year. The mean number of antler points increased from 2.69 last year to 3.22 this year.



Field dressed weights were taken for all deer brought into the refuge check station during the 1992 hunt. The average combined weight for all deer was 69.60 pounds compared to 76.09 pounds last year. All harvest data was entered into the Rbase computer program to aid in analysis.

The sixth annual mammal scent station surveys were conducted on April 30 and September 24, 1992. This census data provides the refuge with an index with which to monitor mammal populations such as raccoon and fox. A scent station consists of a three foot circle cleared of all rocks and debris, topped with sifted lime or sand, and a scented disk placed in the center to attract mammals. A scent station line is made with 10 of these stations located 0.3 miles apart. The spring survey yielded four fox visits and one river otter. During the fall survey a total of five stations were visited by red fox and two stations by raccoons. The index for each species was calculated by the formula (from South Carolina Wildlife Resources Department):

Total Visits by a Species
----- X 1000 = Species Index
Number of Operative Stations



"Are you talking to me?" (JH)

10. Other Resident Wildlife

During January and February, 1988, a total of 22 wild turkeys were released on the refuge by the N.J. Division of Fish, Game and Wildlife as part of its goal of reintroducing the wild turkey to most of its former range in New Jersey.

This year, there were again a number of reported sightings of turkeys in and around the refuge. Repeated observations, including hens with poults, is continued evidence of this project's success.

15. Animal Control

Raccoons have historically been a problem during waterfowl banding at Great Swamp. They frequently find baited areas and discourage ducks from the banding site, rendering it useless for waterfowl trapping. Moving duck traps to new sites only provides temporary relief, since the raccoons quickly discover new baited areas. Once raccoons find bait, they will continue to revisit the site. In 1986, eleven (11) raccoons were documented at one (1) baited site at one time and all the banding sites that year were found and used by raccoons. If raccoons do not discover the site during prebaiting, but find it after traps are set and ducks are captured, then there is the possibility, and usually a certainty, that the raccoons will kill all captured ducks.

In June, 1990, an Animal Control Plan was approved which calls for destroying troublesome raccoons. In 1992, a total of 8 raccoons were captured in live traps at the banding sites and dispatched. In addition, one red fox was caught and released.

16. Marking and Banding

The 1992 preseason wood duck banding program began on 7-1-92. Seven floating and two Montezuma traps were placed at different locations and prebaited with whole corn for up to four days. All traps were checked twice a day and bait was replenished as needed. Traps were set when sufficient numbers of ducks were using the sites. The first ducks were banded on 7-8-92.

During the banding period traps were occasionally moved when there was little or no activity at a particular site, or when captured ducks were mostly recaptures. When traps were moved to a new location they were prebaited until ducks began feeding on the bait and using the site. This usually took several days, at which point the trap was set. If no use occurred, the trap was moved to another location. Preseason banding concluded on August 24 when trapping success significantly dropped off. A total of 181 wood ducks, and 55

mallards and one black duck were banded in 1992.

The final results of the 1992 preseason banding project are as follows:

	<u>Wood Duck</u>	<u>Mallard</u>	<u>Black Duck</u>
AHY-F	26	1	0
AHY-M	25	0	0
HY-F	39	1	0
HY-M	48	0	0
L-F	23	30	1
L-M	<u>20</u>	<u>23</u>	<u>0</u>
TOTAL	181	55	1

On July 1, refuge personnel, YCC enrollees and volunteers assisted the New Jersey Division of Fish, Game and Wildlife with their resident Canada goose banding program. A total of 118 geese were banded and also fitted with neck collars for the Atlantic Flyway Study.

Forty-three eastern bluebirds were banded in 1992.



Annual goose round-up and banding -- YCC, Volunteers and Refuge staff assisting state personnel. (SV)

17. Disease Prevention and Control

The 18th Annual Deer Hunt was held in December, 1992, with 210 deer harvested. All deer were brought to the refuge check station and examined. Physical condition of the animals was good, indicating the success of the hunt in meeting its objective of maintaining a healthy herd (see Sections G.8 and H.8).

H. PUBLIC USE

1. General

Visitation for 1992 was approximately 186,500 which is a decrease of about 0.5% compared to the 187,400 visits in 1991. Approximately 42% of total visits occurred during the peak months of April, May, September and October. The majority of this visitation occurred on spring and fall weekends at the Wildlife Observation Center (WOC) when the parking area frequently exceeded capacity and vehicles were found parked along the roadside, in the field, and at times waiting in line on the main road for a parking space to open up.

Outdoor Recreation Planner McFadden met with George Howard, President of the New Jersey Federation of Sportsmen's Club's, and Jean Howard, Thomas Vanderhoof and Madaline Picone of the Morris County Farmers Sportsman Federation about the possibility of fund raising to replace the wooden observation blind at the Wildlife Observation Center. A donation box fashioned from a bluebird nest box was also installed in the headquarters reception area for this project.

2. Outdoor Classrooms - Students

The majority of the environmental education (EE) programs deal with refuge management programs, principles of wildlife management and impacts of development on the swamp. Two EE centers are adjacent to the refuge which are involved in EE programs dealing with topics other than wildlife management. Our efforts are directed toward complimenting and not duplicating their programs. These two centers often utilize the refuge for their EE programs. Our outdoor environmental education programs this year served 318 students which resulted in 878 hours of environmental education. This was up 10% from last year's outdoor classroom student visits. This was mainly attributed to the environmental education programs that were established between the refuge and two local high schools.

3. Outdoor Classrooms - Teachers

National Wildlife Education Teacher Packets were distributed

to four local schools and a local Veterans Administration Hospital during National Wildlife Week.

4. Interpretive Foot Trails

The Wildlife Observation Center (WOC) located off of Long Hill Road on the eastern side of the Management Area is the refuge's primary interpretive facility. Interpretive displays, a recently rehabilitated information kiosk and several trails are available. A 1/4-mile elevated interpretive boardwalk trail leads the visitor through field and open marsh to an observation blind. The elevated boardwalk trail and blind are wheel chair accessible.

6. Interpretive Exhibits/Demonstrations

Refuge personnel and volunteers staffed an exhibit on National Hunting and Fishing Day at a local sports shop. The exhibit was viewed by numerous people and many inquiries were made concerning the refuge and employment opportunities with the U.S. Fish and Wildlife Service. A total of 5 Duck Stamps were sold at the event making the yearly sales total 41 for CY 1992. This was down 35% over 1991 sales.

7. Other Interpretive Programs

Public inquiries concerning regulations, trails, areas for observing wildlife and general information totalled over 4,500 during the year.

Thirty-seven (37) programs were conducted in which 1,436 visitors received slide/movie/walk presentations. This was a increase of 15% from last year.

Seven (7) off-site presentations were conducted this year which was two less than last year. Programs consisted mainly of a general slide presentation on the refuge followed by a discussion.

Seven (7) bird walks were conducted by volunteers from the Summit Nature Club. This was three more than last year. Volunteers not only discussed birds, but also current refuge management practices. These walks have become a yearly event.

During May, "The Common Wealth of New Jersey Inc." and the New Jersey State Board of Agriculture sponsored bus tours of the refuge for 100 individuals. ORP McFadden participated as a guide.

Also during May, Refuge Manager Koch, Deputy Refuge Manager Villanueva and Outdoor Recreation Planner McFadden attended and assisted with the Wallkill River NWR dedication. McFadden conducted a walking tour for 60 individuals and Villanueva

guided a bus tour for 50 individuals, discussing future management plans and the importance of the Wallkill River Valley. McFadden also assisted with the Ohio River NWR dedication ceremony in May.

During September, Outdoor Recreation Planner McFadden attended Total Quality Management "TQM" training at Great Meadows National Wildlife Refuge. McFadden served as Team Leader for the Public Use Team evaluating the effectiveness of the public use management goal on refuges.

During October Outdoor Recreation Planner McFadden assisted in the Great Bay NWR dedication ceremony.

The video "A Home For Pearl" along with the workbook was used throughout a local elementary school.

8. Hunting

The annual refuge white-tailed deer shotgun hunt occurred on December 3-5, 10 & 11, 1992. Hunter orientations and shotgun certification sessions were held on November 21 & 29, 1992. A total of 206 hunters attended these sessions.

A federal permit fee is required of all hunters over 16 years of age in addition to their State Zone 38 shotgun permit and hunting license. This year we initiated an exemption to the federal permit fee for refuge hunters under the age of 16. This was done to encourage more younger hunters. The federal permit cost \$20.00 (\$10.00 to persons possessing either a golden age or golden access passport). The total number of federal permits sold was 450. A total of \$8,910.00 was collected from the sale of these permits. The refuge share is 30% (\$2,673.00).



Refuge deer check station. (JH)



Annual refuge deer hunt protest. (JH)

Not more than 250 hunters were allowed afield at any one time, yielding a maximum hunter density of one hunter per 24 acres. A total of 210 deer were harvested during the five day hunt (see section G.8). A total of 7,964 hunter-hours were required to harvest the 210 deer. This averages 38 hours per deer.

The Humane Society of the U.S. held their annual anti-hunting demonstration at the refuge's south gate entrance on the first day of the hunt. A Special Use Permit was issued and the demonstration was orderly and without serious incident.

11. Wildlife Observation

The Wildlife Observation Center (WOC) located off of Long Hill Road on the eastern side of the Management Area is the refuge's primary interpretive facility and wildlife viewing area. Interpretive displays, a recently rehabilitated information kiosk and several trails are available. A 1/4 mile elevated interpreted boardwalk trail leads the visitor through field and open marsh to an observation blind while a spur trail off of the boardwalk trail leads visitors through open marsh and woods to a observation platform. Another 1/2 mile of elevated boardwalk trail takes the visitor from the parking lot through marsh, swamp and forest to an elevated observation blind and handicapped accessible platform for wildlife observation. They overlook fields, marsh, ponds and forest edge. These facilities continue to be some of our main attractions!

Many other visitors also toured the Management Area along Pleasant Plains Road and/or made use of the 7.7 miles of foot trails in the Wilderness Area. An informational sign designating the refuge portion of Pleasant Plains Road as a "Wildlife Tour Route" was installed this year.

The Summit Nature Club conducted their annual woodcock watch on March 1. Many woodcock were observed.

On May 15, the refuge was again heavily censused during N.J. Audubon's annual "World Series of Birding" (WSB) competition. During this 24-hour competition, twenty-one teams representing such groups as the Nature Conservancy, New Jersey Conservation Foundation, local Audubon and birding clubs visited the refuge. Some of the species observed were a long-eared owl, barred owl, pied-billed grebe, savannah sparrow, red-headed woodpecker and a bobolink. Several teams that participated in the WSB utilized the event to raise funds from sponsors for a variety of conservation projects and activities.

The Summit Nature Club conducted its Christmas Bird Count on December 19 with a total of 62 species counted on the refuge.

Total species observed on the refuge were the same as last year.



Artist at Wildlife Observation Center (TM)

12. Other Wildlife Oriented Recreation

Photography and painting continue to remain popular on the refuge. Local clubs conduct art classes at the Wildlife Observation Center and in the Wilderness Area. These areas offer scenic viewing opportunities as well as wildlife observation.

16. Other Non-Wildlife Oriented Recreation

Pleasant Plains Road is an auto tour route that is used mainly for wildlife viewing and photography by visitors in their automobiles; however, there has also been a large increase in pedestrian traffic such as joggers, walkers and bicyclists. In the spring on Sundays an average of 600 bicyclists and walkers will pass by Refuge Headquarters on Pleasant Plains Road! We are monitoring these activities to see how much they disturb wildlife and hinder wildlife observation opportunities from automobiles to determine if regulation is necessary.

17. Law Enforcement

The majority of law enforcement activity on the refuge occurs during the spring and fall months when visitation is heaviest.

Hunting still occurs on the refuge periphery for waterfowl and deer which sometimes results in law enforcement problems as well.

In addition to numerous verbal warnings, thirteen (13) violations were recorded this year compared to (19) nineteen in 1991. Citations were issued for the following offenses:

OFFENSE	NO. OF CASES
Illegal Parking	10
Entering a Closed Area	1
Careless Driving	2

Total	13

On January 20, Refuge Officers Terry Villanueva and McFadden responded to a call with Chatham Police about a man camping in the Wilderness Area. Upon investigating they found a 49 year old male that had been camping on the refuge for a couple of weeks. It was determined that the individual was homeless. He was offered transportation to a shelter, but refused it. The individual packed up his belongings and went on his way. It was later found out that he was a Yale graduate with a Masters Degree!

On January 28, Harding Township Police reported that a burglary had just occurred near the refuge and the two suspects had run onto the refuge. Officers McFadden and Villanueva responded by closing Pleasant Plains Road and assisting Harding and Passaic Township Police by patrolling the area. Pleasant Plains Road was closed to public traffic during the search. After an extensive search with tracking dogs and a State police helicopter the search was called off by the police. It was later discovered that the suspects had stolen approximately \$500,000 in jewelry from a private residence and also stole a car for their getaway.

On April 19, the control box and key pad for the electronic gate at the South Gate entrance to refuge was stolen. Vandalism to the key pad box continued to be a problem until the key pad was encased with heavy metal plate.

During the summer months vandalism at the Wildlife Observation Center continued to be a problem. A bench seat was torn off the boardwalk twice.

On October 17, opening day of waterfowl season Refuge Officer McFadden and State Conservation Officer Robert Fiorentino patrolled and checked hunters. Two state violations were

written and several verbal warnings were given.

During the refuge deer hunt law enforcement assistance was provided from Wallkill River NWR, FWS Special agents from Newark, NJ and State Conservation Officers. The Special agents were available primarily for the anti-hunt protest. No special problems were noted during the protest, however several state violations notices were issued to refuge hunters.

Overall refuge officer enforcement activity was generally reduced due to other excessive demands placed on the station's collateral duty officers from personnel cut backs.

Refuge Manager Koch served as Chairman of the annual Law Enforcement Refresher training planning committee.

I. EQUIPMENT AND FACILITIES

1. New Construction

In July, Maintenance Mechanic Smith and Maintenance Worker Nicely began construction of a pole building kit purchased a couple of years ago. Construction had been delayed due to staff vacancies, higher priority projects, over the past two and a half years and lack of funding for having the building construction contracted out. Materials were moved to the site and the building location was marked off. Progress continued throughout the year as time permitted. All of the vertical poles and many of the horizontal framing were in place by the end of the year. From October 26 to 30, Don Lema of Stewart B. McKinney NWR was detailed to assist Maintenance Mechanic Smith and Maintenance Worker Nicely with construction.

During August, several new signs were placed at the WOC and on Pleasant Plains Road including hours open to the public and permitted and prohibited activities.

2. Rehabilitation

Maintenance Mechanic Smith designed, constructed and installed replacement panels for the kiosk at the WOC. The new panels are a major improvement for this primary visitor contact point. It is estimated that the site is used by 90,000 visitors each year. New professionally made fiberglass embedment interpretive displays conveying the Station Message were installed. The Summit Nature Club donated funds to assist with the purchase of one of the display panels.



Maintenance Mechanic Smith designed and constructed new display panels for kiosk at WOC -- a big improvement! (TM)

Installation of handrails on one of the Wildlife Observation Center boardwalks was initiated this year. Parts of the support structure for the handrails were pre-fabricated in the shop.

Several new pipe gates were fabricated and installed this year, replacing existing chain gates.



Rehabilitated kiosk at WOC with 2 sided display panels. (TM)



Professionally made interpretive panel donated by the Summit Nature Club. (TM)



Laborer Balsamo and Volunteer Detizio adding handrails to elevated boardwalk. (TM)

From November 2 through 11, an asbestos removal contractor, "Tomorrow's Engineering", removed asbestos containing materials from Building 376 (roof and bathroom floor tile), Building 378 (transit sheets), and Building 402 (kitchen linoleum and driveway). Detail Associates was contracted for asbestos abatement project inspection and air monitoring. These buildings are scheduled for demolition.

New Wilderness Area map sign holders were fabricated by Maintenance Worker Nicely. These are an improvement over the existing structures.

Several refuge informational signs were replaced this year bringing them up to standards.

Maintenance Mechanic Smith constructed shelves for a computer work station for the Office Automation Clerk.

The control box and key pad for the electronic gate at the South Gate entrance to the refuge was replaced on April 21 after they were stolen. Maintenance Worker Nicely fabricated a metal box to make the control more vandal resistant. He also fabricated a metal strap to protect the timer box. In August, he fabricated a heavy metal front



New style signs at WOC. (LB)



New WOC sign. (TM)

plate on the control box. He later replaced the keypad when it was damaged by a firecracker.

Biologist Bitler and Maintenance Worker Nicely installed a Water Control Structure (WCS) for Pond #1, near the Metal Observation Blind. The plan is to manipulate water levels and plant millet in the pond to promote "Watchable Wildlife" near the blind.

Progress was made in reorganizing equipment and materials stored at Building 237.

Quarters work performed by refuge staff, YCC or local contractors during the year included the following:

- Q-1: Replaced gutters and downspouts.
- Q-7: Replaced furnace.
- Q-91: Replaced rotten window sills and thresholds.
Repaired furnace.
- Q-99: Repaired dormitory door.
Replaced cracked pipe for gray water drainage system.
- Q-205: Replaced downspouts.
Scraped and repainted exterior.

Replaced rotten wood siding, window sills, and threshold.

In January, major rehabilitation was completed on the Baker Forklift brakes, alternator, gauges, and shift linkage.

Maintenance Worker Nicely replaced the fender, repaired dents, and painted the Dodge 4 X 4 pick up truck after the vehicle was damaged while on loan to Supawna Meadows Refuge for use on Hydro-ax operations.

Wiring on the Eager Beaver Trailer and GSA Dump Truck were repaired to correct a short in the system.

During July, a malfunctioning trail counter was removed and sent to the manufacturer for repair. It was reinstalled in one of the Wilderness Area trails and is now functioning properly.

Other equipment maintenance included repairing the locking mechanism on the automatic gate at the southern entrance to Pleasant Plains Road, periodic maintenance on push mowers, riding mowers, International semi-truck, GSA dump truck, and fork lift, servicing and repairing farm tractors and mowers, repairing flat tires on tractors and mowers, and repairing the pump on the 500 gallon tank pesticide sprayer.

Vehicle maintenance included replacing the thermostat, fan, lower radiator hose, alternator, and water pump on the Jeep, completing periodic maintenance on the GSA Bronco and Dump Truck, and installing new bed liners in the Dodge Dakota and Chevy Crew Cab.

Boundary posting was completed on Tracts # 290, 372, 378, 401, and 401b.

Boundary posting began on the recently acquired Tracts # 141a, 189. Some corners and lines must be located by Regional surveyors before posting can be completed.

Blow downs were cleared on the orange trail in the Wilderness Area. A boy scout group assisted with maintaining the Laurel Trail.

3. Major Maintenance

The Hydro-axes had frequent breakdowns and was expensive to maintain and operate. Repairs included welding major cracks forming at welded points on the rotary head, replacing the shaft on the rotary head after it sheared off, replacing worn bushings on the steering pivots, and replacing leaking hydraulic hoses.

4. Equipment Utilization and Replacement

The Great Swamp Hydro-ax was returned to the refuge on January 21 after operating at several refuges. The Iroquois NWR Hydro-ax arrived at Great Swamp on January 24. Regional Equipment Operator Dave Nicely (Erie NWR) arrived for a two week detail on January 24. Regional Equipment Operator Kevin Lamm (Iroquois NWR) was detailed to the refuge beginning on January 30. Despite several major breakdowns, both machines were operated almost continuously through February 19th because the rotary cutter and feller-buncher heads were alternately switched as one needed repairs.

Total hours operated for the two machines was 138 hours with 63 hours down for repairs and maintenance. Approximately 1620 gallons of fuel were used. The Great Swamp Hydro-ax was transported to Supawna Meadows NWR on February 24. It was moved and operated around the Region several times and returned on December 17.

On March 6, the Iroquois NWR Hydro-ax was returned to Iroquois after five weeks of operation at Great Swamp.

The Dodge 4 X 4 truck with fuel tank was also loaned to Supawna Meadows for several weeks in February and March to support of Hydro-ax operations.

The John Deere 550G dozer was loaned to the Pennsylvania Fish & Wildlife Enhancement Field Office for use on private lands restoration sites in Chester, Pennsylvania in April and Allentown, Pennsylvania in September.

In July, a new refrigerator was installed in Q-1 to replace the existing unit which was worn out and not worth repairing.

In August, the refuge traded in a GSA rental 5 passenger sedan for a seven passenger mini-van. This vehicle will be much more useful in transporting small groups for tours and carrying exhibits for off-site events.

In September, the refuge acquired an excess forklift from Eastern Shore of Virginia NWR.

The 1947 Caterpillar motor grader was transferred to Erie NWR and picked up on December 17.

On December 30, the refuge John Deere 550G Dozer was loaned to E. B. Forsythe NWR for use on the Brigantine NWR dike construction project.

5. Communication Systems

The radio from the GSA rental sedan was installed into the GSA mini-van.

A multi-channel radio was installed in the Ford Bronco which is used for law enforcement back up.

Repairs were completed on the radio in the Dakota pick up and three portable handheld units.

6. Computer Systems

A printer sharing device was installed in the Hewlett Packard Laser Jet printer linking five computers to one printer through the existing phone wiring.

A worn tape back up system was replaced on the PC Limited 286 computer.

Maintenance Mechanic Smith built shelves in reception counter to install a computer for use by the Office Automation Clerk. Assistant Manager Villanueva set up the computer. Shortly afterwards, the computer started to have problems with various keys locking up. A call to University Systems resulted in a number of possibilities which must be sorted through to determine if the problem is due to software, the key board chip, or the mother board. This is a continuation of a number of malfunctions that have occurred with desktop units from University Systems.

The refuge acquired a new Gateway 2000 486 desktop computer. Deputy Manager Villanueva installed the new work station in her office including (with assistance from Refuge Volunteer Gid Honsinger) installing a tape back up drive. Villanueva also installed a work station at Office Assistant Klimas's work area.

The following computer programs are used:

Rbase - Deer Hunt Program
Wood Duck Box Program
Budget
IPW's
Refuge Management Information Profile (RMIS)
Time Management

Lotus - Waterfowl Surveys
Bluebird Box Program
Fire Extinguisher Maintenance Program

XTalk - Electronic Mail

Pulp and Saw - Forest Management

Word Perfect - Word Processing

Norton Utilities - Data Recovery

7. Energy Conservation

Energy conservation measures included installing a new furnace Q-7 and replacing the storm door at Q-205.

Shopping trips to pick up supplies and materials were consolidated to save time and fuel.

J. OTHER ITEMS

1. Cooperative Programs

Operable Unit 3 of the Millington Asbestos Dump NPL Site, also known as the Dietzman tract, is located entirely within the Wilderness Area of the Great Swamp NWR. The Dietzman tract, and associated contamination, was purchased by the Service in 1968. Operable Unit 3 is divided into 2 sites. Site A is an approximately 5-acre peninsula of asbestos debris, drums and other refuse that protrudes into the Great Brook emergent wetlands directly above Waterfowl Impoundment #1. Site B is an approximately 1-acre area of friable asbestos debris and household refuse located in palustrine forested wetlands approximately 500 feet north of site A.

The U.S. Government eventually reached a settlement agreement of \$3.5 million in general unsecured funds, for restoration of a natural resource damage claim against the National Gypsum Company for Operable Unit 3. The National Gypsum Company, a potentially responsible party (PRP), declared Chapter 11 bankruptcy/reorganization.

Throughout the month of January, information was gathered as requested by the Solicitor and the Services's Engineering Consultant to support the Service's claim for damages in the pending litigation with National Gypsum regarding the Asbestos Superfund Site on the refuge.

On January 6, the Department of Justice toured the Asbestos Superfund Site with EPA and FWE personnel.

On January 28, Special Assistant to the Director (FWS) and Regional Director Ron Lambertson received a briefing of refuge contaminant problems and Refuge and FWE coordination and

cooperation efforts. Special emphasis was placed on the Asbestos Superfund Site. The briefing and site tour were conducted by Manager Koch, Field Office Supervisor Day (FWE) and Refuge Watershed Biologist and Contaminants Specialist Moore (FWE).

On January 29 and 30, ground water monitoring test wells for the

Asbestos Superfund Site on the Dietzman Tract were surveyed by a contractor.

On February 3, Manager Koch attended the third regional office briefing meeting on the status of the pending National Gypsum litigation concerning the Asbestos Superfund site.

On February 12, Watershed Biologist Moore and Assistant Supervisor Chezik (FWE, Pleasantville, NJ) met with Department of Justice attorneys Jeff Gordon and Susan Lacampagne, in Washington, DC to review NJ Field Office files on Operable Unit 3 of the EPA Asbestos Superfund Site (Dietzman Tract) in preparation for the National Gypsum bankruptcy litigation and giving sworn depositions.

On February 13 and 14, Biologist Moore and Assistant Supervisor Chezik, with DOJ counsel Jeff Gordon and Susan Lacampagne present, were deposed by National Gypsum legal counsel David Williams, regarding the Service's activities, plans, and claims involving Operable Unit 3 (Dietzman Tract).

On March 2-6, Assistant Supervisor Chezik and refuge Watershed Biologist Moore (FWE, Pleasantville NJ) held a Natural Resources Damages Assessment (NRDA) task group meeting at the Somerset County Environmental Education Center. The purpose of the meeting was to begin work on estimating the natural resource damages of the Dietzman Tract on the Great Swamp NWR in preparation for the May 18, 1992, bankruptcy litigation. Refuge Manager Koch participated in this effort on March 4.

In March, Refuge Manager Koch was deposed by National Gypsum's attorney in Washington, D.C. with DOJ attorney Jeff Gordon present.

On April 10, a permit was issued to McClaren/Hart, consultant for National Gypsum, for access to the Dietzman Tract. They were providing a tour of the site in preparation for bankruptcy litigation.

On April 15, 1992, Watershed Biologist Moore and Assistant Supervisor Chezik (FWE, Pleasantville, NJ) completed and transmitted to the Regional Office the Service's Final Draft Report on Determination of Injuries to Natural Resources and

Restoration Replacement Requirements, Asbestos Dump Site, Operable Unit 3 (Dietzman Tract), Great Swamp NWR, Morris County, NJ. The Final Draft Report represents the Service's position on the claim for natural resources damages at the Site for the National Gypsum bankruptcy litigation.

On April 20, Biologist Moore met with Jeff Gordon, DOJ, and DOJ "lost services" expert witness Richard Bishop, Natural Resource Economist, University of Wisconsin, at the Great Swamp NWR. Moore gave a detailed briefing on the Dietzman Tract and took the group on a reconnaissance inspection of the site. From April 21 to 22 Biologist Moore underwent deposition in Washington D.C. as an expert witness regarding the Service's determination of injuries to natural resources and restoration replacements for Operable Unit III (Dietzman Tract), Great Swamp NWR, Morris County, New Jersey.

In May, Assistant Supervisor Chezik (FWE) submitted a declaration to the Department of Justice supporting their responses to defendants admissions concerning the National Gypsum litigation.

On May 5, the NJFO Enhancement transmitted two supplemental reports to the Service's April 15, 1992, report regarding the National Gypsum litigation to the Department of Justice (DOJ). The first report was transmitted to Jeff Gordon, Environmental Enforcement Section, DOJ, to supplement the Service's April 15, 1992 report, and clarifies and strengthens the Service's claim for natural resource damages at Unit III (Dietzman tract). The second report was transmitted to Brud Rossmann, Environmental Defense Section, DOJ, and clarifies and strengthens the Service's position on the counterclaim by National Gypsum against the Service for natural resource damages at Unit III. Both report supplements were coordinated with the DOJ.

On May 7, Refuge Manager Koch was deposed by National Gypsum's attorney regarding the Governments' suit against National Gypsum and their counter-suit involving the asbestos Superfund site. Manager Koch was also previously deposed in March.

On May 11, Refuge Manager Koch and ORP McFadden met with Rich Bishop, one of the Justice Departments consultant /expert witnesses to provide information for the pending National Gypsum litigation.

Manager Koch met with Matthew Low, another of DOJ's expert witnesses, on May 15.

From May 18 to 20 Biologist Moore attended the National Gypsum bankruptcy litigation hearing in Dallas, Texas and provided expert witness testimony regarding the Natural Resources

Damages Assessment claim for Dietzman tract at the Great Swamp NWR.

On July 14, Watershed Biologist Moore reviewed the draft letter regarding the Service's position on the National Gypsum settlement agreement involving six of the sites included in the National Gypsum proof of claim. Following review, Moore transmitted the NJFO's concurrence with the draft letter regarding the Service's position on the National Gypsum settlement agreement for the Millington, New Jersey Main Asbestos Site (Operable Unit I).

On July 15, NJFO Biologist Moore prepared follow-up comments to the Regional Director, R-5, regarding Natural Resource Damage Assessment litigation preparations for Operable Unit III (Dietzman Tract).

On November 17, Watershed Biologist Moore reviewed and surmised the draft Department of Interior, Fish and Wildlife Service position on a proposed settlement agreement for the National Gypsum Proof of Claim. The draft Department / Service position will result in \$3.5 million dollar settlement in compensation for site remediation costs and damages to natural resources for the Operable Unit 3 Asbestos Superfund Site at the refuge in return for granting Covenants not to Sue for the OU-2 and OU-3 sites.

Watershed Biologist Moore transmitted a follow-up memorandum to Shelly Hall, Solicitor's Office, Washington D.C., requesting a meeting regarding initiation of a Fiscal Year - 1994 funding request for response costs associated with the Operable Unit 3 (Dietzman tract).

On October 23, NJFO Biologist Moore participated in an on-site tour / meeting of the Operable Unit(s) 2 and 3, Asbestos Dump Sites, at the refuge, with representatives from the NJ Dept. of Environmental Protection & Energy and U.S. Environmental Protection Agency (EPA). The participants were interested in the evaluating existing site conditions and the ecological settings of the proposed remediation projects in preparation for review of the EPA contractor's remediation plans.

On July 30, Watershed Biologist Moore and Refuge Manager Koch attended an on-site meeting at the Operable Unit 2, Asbestos Dump Sites (Major and Tielman properties) with the EPA Site Manager, the EPA contractor, and some members of the EPA, Region 2, Biological Technical Assistance Group (BTAG). The purpose of the meeting was to review the wetlands delineation for the two sites. Both properties are adjacent to the refuge. Asbestos contamination on the Major's property extends onto the Refuge. Moore and Koch reiterated the Service's concerns regarding remediation of the sites

particularly the Majors property, which will involve Refuge lands.

On August 5, Watershed Biologist Moore distributed copies of the draft Treatability Study Report for the Operable Unit 2, Asbestos Superfund sites to Refuge Manager Koch and Mike Chezik, Interior Dept. Office of Environmental Affairs for information and review.

On August 19, Watershed Biologist Moore returned a telephone call to Judy Shapero, of "TRC Environmental" (EPA Contractor), regarding the Service's concerns and permit requirements for planned remediation activities at the Operable Unit 2, Asbestos Superfund Sites. Moore also instructed her to contact Refuge Manager William Koch.

On August 20, Watershed Biologist Moore attended a Biological Technical Assistance Group meeting at EPA, Region 2 to discuss the Operable Unit 2, Asbestos Superfund sites. Concerns with the draft Treatability Study Report were discussed. Accurate delineation of wetlands and characterization of their habitat values prior to remedial activities was an issue for the sites; this will guide restoration requirements. Proximity of the sites to the Great Swamp NWR make Service involvement at these sites especially important.

On September 8, Refuge Manager Koch and Watershed Biologist Moore met with Conrad Lezkiewicz, Senior Project Manager, TRC Environmental Consultants (EPA Contractor) to present and discuss the Service's concerns regarding potential impacts from the planned remediation of the Operable Unit 2 Asbestos Superfund Sites. Both of the sites are directly adjacent to the Refuge. Remediation at one of the sites (White Bridge Road) will involve some Service's lands including wetlands.

On September 14, Watershed Biologist Moore (NJFO) provided the US EPA, Region II, with technical assistance comments on the Preliminary Reports entitled, "Draft Treatability Study Report and Draft Report(s) on the Delineation of Freshwater Wetlands and Open Waters for the Asbestos Dump Superfund Site, Operable Unit 2, New Vernon Road and White Bridge Road Sites, Morris County, New Jersey." Remediation and restoration of these sites is especially important given the proximity of the sites to the ecologically sensitive wetlands of the refuge.

On July 23, Watershed Biologist Moore and Deputy Refuge Manager Villanueva attended a New Jersey Department of Environmental Protection and Energy (NJDEPE) public hearing, which was attended by approximately 350 concerned citizens and officials. Biologist Moore presented a Service statement opposing the Chatham Township Wastewater Management Plan. The

Plan would allow expansion of the Chatham Township Sewage Treatment Plant #1 from 0.75 million gallons per day (mgd) to 1.0 mgd to accommodate existing and proposed sewer service areas. The Plant discharges into a sewer ditch which flows into the Wilderness Area of the refuge. Since there was standing room only at this public hearing a second hearing was scheduled for November 12.

On August 7, Refuge Biologist Bitler, Manager Koch and Watershed Biologist Moore attended a briefing meeting regarding State required water quality monitoring of Black Brook and the Chatham Township sewage treatment plant. Representatives from N.J. DEPE, Chatham Township and the Township's engineering consultant Metcaff & Eddy attended. After a briefing at refuge headquarters, proposed sampling sites were inspected. Six sites are located on the refuge.

On August 31, Watershed Biologist Moore provided a draft response to an inquiry from Senator Lautenberg's office regarding the Chatham Township Wastewater Management Plan. The Service has steadfastly opposed the proposed plan as it would adversely affect the Great Swamp NWR, Wilderness Area and associated resources.

In September, over 40 different local, state, and national organizations formed a coalition called "Save the Great Swamp Again!" The organizations are for the common purpose of preserving the water and community resources within the Great Swamp Watershed. The coalition is led by the Great Swamp Watershed Association and chaired by Julia Somers of Green Village Civic Association. This coalition and "movement" was spawned primarily because of the Chatham Township STP expansion issue.

In September, Refuge Manager Koch prepared a draft response to a Congressional inquiry for Congressman Zimmer regarding flooding in the Great Swamp and its relationship to refuge management activities and the proposed expansion of Chatham Township's sewage treatment plant.

On October 23, Refuge Manager Koch coordinated with Congressman Zimmer's office on setting up a refuge tour focusing on water management activities. The tour was primarily for Mr. Peter Hofmann, a candidate for Chatham Township Committee who favored the town's proposed sewage treatment plant expansion proposal. Without an actual understanding of the refuge and its programs, Mr. Hofmann was publicly criticizing refuge water management practices and involving the Congressman. On October 23, Manager Koch met with Mr. Hoffmann and Chatham Township Administrator Ken Hetrick. Congressman Zimmer's aide had to cancel attending the meeting at the last minute. The meeting and tour ended

Mr. Hofmann's criticism and the congressional inquiries he was generating.

On September 11, Deputy Refuge Manager Villanueva met with a Ms. Helen McMahon, a resident of Chatham Township, to discuss Refuge water management programs and the potential impact of the proposed Chatham Township Sewage Treatment Plant expansion. Ms. McMahon is a concerned citizen who wanted to better understand refuge management programs and fortunately didn't necessarily believe all that she had read in the newspapers.

On September 22, Refuge Manager Koch attended a public information meeting regarding the proposed Chatham Township sewage treatment plant expansion and its impact on refuge management activities. The meeting was sponsored by Chatham Township. Manager Koch was one of seven panelists that responded to questions from the public and local officials. Approximately 50 people attended including the news media.

On Sept. 30 Refuge Manager Koch met with two refuge neighbors concerned with the Chatham Township sewage treatment plant expansion proposal. Potential impacts to the refuge and refuge management activities were discussed and observed on a tour.

On October 21, Refuge Manager Koch was interviewed by a New York Times reporter regarding the Chatham Township Sewage Treatment Plant expansion issue.

On November 6 and 11, Watershed Biologist Craig Moore assisted Refuge Manager Koch in preparing another Service statement opposing the Chatham Township Wastewater Management Plan. On November 12, Refuge Manager Koch delivered this statement at a NJ Dept. of Environmental Protection & Energy public hearing regarding the Chatham Township sewage treatment plant expansion proposal. Over 600 people attended the hearing despite very inclement weather. There was a tremendous expression of opposition to the proposal. T-shirts advocating the saving of the Great Swamp were sold and worn by many in attendance. Some of the "Save the Great Swamp Again" activists present were originally involved in the saving of the Great Swamp from the NY Port Authority which planned to build a major jetport in the late 1950's and early 1960's. There were also a large number of grade and high school students present expressing their concern to protect the Great Swamp. Much of the publicity and coordination was orchestrated by the "Coalition to Save the Great Swamp Again," a group of approximately 40 conservation organizations and Helen Fenske who was much in the middle of things. Out of forty statements made that evening only three were in favor of the sewage treatment plant expansion proposal.

On December 23, Watershed Biologist Moore returned a telephone call to Kerry DeMackiewicz, of Metcalf and Eddy (engineering consultants to Chatham Township) and informed her the results of the Service's stream monitoring program were not available yet. Moore requested information on current status of Metcalf and Eddy's water quality study for Chatham Township.

The Great Swamp Watershed Advisory Committee (GSWAC) was established in September 1989 by NJDEPE Commissioner Christopher Dagget's Administrative Order #51. The administrative order was issued to focus public attention and resources on the Great Swamp National Wildlife Refuge and on development of a program to protect the Refuge.

The Great Swamp Watershed Advisory Committee was directed to 1) review existing water quality and quantity studies, and other environmental studies involving the Great Swamp, 2) conduct other studies as appropriate, and 3) advise the New Jersey Department of Environmental Protection and Energy (NJDEPE) on appropriate amendments to the Northeast New Jersey Water Quality Management Plan that would protect the Great Swamp National Wildlife Refuge (GSNWR) and other public lands in the watershed, and on amendments to the Surface Water Quality Standards that would provide enhanced protection to streams in the watershed.

The 32 member Great Swamp Watershed Advisory Committee was constituted with representation from local, county and federal government entities, from environmental groups and from business groups and other interested parties. With the notable exception of Chatham and Morris Townships, which are currently seeking expansions of their sewage treatment facilities, most townships have been supportive of the GSWAC recommendations.

Since September 1989, the GSWAC met for 40 months and nearly 30 times in an exhaustive effort to establish a plan for protection of the Great Swamp National Wildlife Refuge and other public lands within the Great Swamp Watershed.

After a preliminary review of the most readily available Great Swamp related data, the GSWAC determined that additional professional expertise would be critical to the successful attainment of the GSWAC's assigned tasks and attainment of the GSWAC's adopted goals. The GSWAC solicited private donations from donors to assist in the development of a watershed management plan and for public outreach.

In a public bidding process the services of environmental consultant CH2M Hill were obtained. CH2M Hill completed a

series of reports synthesizing available information concerning existing ecologic conditions and problems within the refuge and watershed.

In addition to the technical assistance provided by CH2M Hill, numerous presentations were made to the GSWAC by NJDEPE staff and private professional experts on a wide-ranging variety of subjects. Presentations were made on the geologic and cultural history of the watershed, the status of the Buried Valley Aquifer, stormwater control mechanisms and stormwater impacts in the basin, basis and background of nearly every NJDEPE regulatory and planning programs, the Delaware and Raritan Canal Commission, the State Planning Process, the Pinelands Commission, the functions and related efforts of the Soil Conservation Service, the history and management of the Great Swamp National Wildlife Refuge, land use planning and alternative designs, and a host of other vital topics.

The GSWAC bases its recommendations, on its collective personal and professional expertise, on the verbal and written reports submitted to the GSWAC over the last three years, and on the contracted work of CH2M Hill.

The NJDEPE is awaiting recommendations from the GSWAC to enhance protection of the Great Swamp watershed and Great Swamp National Wildlife. The GSWAC final report to NJDEPE is expected to be completed in late March or April 1993.

Representing the Service on the GSWAC have been Refuge Manager Koch or Deputy Manager Villanueva and Supervisory Biologist Chezik or Watershed Biologist Moore from the Fish and Wildlife Enhancement N.J. field office. At most meetings, refuge and FWE personnel were present. Full committee meetings were attended on Jan. 21, Feb. 11 & 25, Mar. 24, June 11, Sept. 29, Oct. 22, Nov. 10, and Dec. 1 & 14. Sub-committee meetings were attended on Feb. 19, Mar. 12 and April 22.

On May 13, Manager Koch attended a meeting in Regional Director Lambertson's office with the RD, Deputy RD Kaufman, Assistant RD Young (Refuges & Wildlife), Chief of Realty Miller and GSWAC chairwomen Candace Ashmun. Ms. Ashmun gave a briefing on the current status of the GSWAC's efforts and discussed the Services' partnership in implementation of pending recommendations.

On April 20 to April 24 Environmental Contaminants Specialist Burr (FWE) arranged and conducted with assistance of Watershed Biologist Moore an aerial reconnaissance of the 130-acre Miele Landfill (AKA Rolling Knoll Landfill) that is adjacent and part of the Refuge. The observations will be used to direct sampling efforts planned for May 1992. The sampling goal is

to determine the extent of migration from the landfill into the refuge of hazardous substances shown by earlier studies to be leaving the landfill.

On June 1, Great Swamp Watershed Biologist Moore completed Service review and comment on the revised draft U.S. Geological Survey Report entitled, "Water-Quality Reconnaissance and Electromagnetic Survey of the Great Swamp National Wildlife Refuge Property Adjacent to the Rolling Knoll Landfill near Green Village, New Jersey, 1989."

On June 16, Watershed Biologist Moore (NJFO) prepared Service review comments on the draft U.S. Geological Survey (USGS) press release for the revised draft USGS Report. The review comments were a compilation of comments from biologist Moore (NJFO), Refuge Manager Koch, and acting Public Affairs Specialist Fred Caslick.

On June 26, Watershed Biologist Moore completed Service review and comment on the draft U.S. Geological Survey administrative letter report from Herbert T. Buxton, Assistant District Chief, transmitting the final information and data on the installation and sampling of three ground water observation wells at the Great Swamp National Wildlife Refuge property adjacent to the Rolling Knoll Landfill.

In July, Watershed Biologist Moore called Julia Barringer, U.S. Geological Survey (USGS), to discuss the Service's suggested revisions to the USGS press release for the USGS Rolling Knoll (Miele) Landfill report.

On January 13, Manager Koch met with New Jersey Division of Fish, Game, and Wildlife's Waterfowl Biologist Paul Castelli to coordinate cooperative efforts regarding the Atlantic Flyway Canada Goose Management Study. It was requested by the State and agreed to that instead of banding any birds, refuge personnel put a greater emphasis on obtaining off-refuge observations. The State would in turn band the refuge's quota of geese.

In January and February, Biological Aid Olsen spent one day per week conducting goose observations on the refuge and within a 20 mile radius of the refuge for the Atlantic Flyway Canada Goose Management Study.

On February 10, Assistant Manager Villanueva and Assistant Supervisor Chezick (FWE, Pleasantville, NJ) attended a public meeting in Harding Township to provide Service comment on a proposal to widen and resurface a portion of Pleasantville Road which borders the refuge.

On April 9, the Stirling and Gillette Volunteer Fire Departments conducted a smoke exercise in the McDonough house under a Special Use Permit granted by the refuge. The McDonough house is scheduled for demolition.

On April 22, Assistant Manager Villanueva met with Assistant Supervisor Chezik (FWE, Pleasantville, NJ) to discuss the proposed location of and wetlands permit requirements for the new refuge pole building scheduled for construction this year.

May 18 to 22, Maintenance Worker Nicely assisted with moving heavy equipment for wetlands restoration in Pennsylvania. This also provided him some on-the-job training in preparation for the practical exam for his CDL.

On May 27, Biologist Bitler gave FWE Biologist Flavia Rutkosky (NJFO) a familiarization tour of wood duck habitat.

On June 11, Biologist Bitler and Assistant Manager Villanueva met with John Cochran (NJFO-FWE) to review permit requirements for several refuge projects.

Watershed Biologist Moore transmitted a follow-up memorandum to Refuge Manager Koch, for concurrence, regarding their June 6, 1992, coordination meeting to discuss resumption and prioritization of FY-1992 Scope-of-Work activities.

Watershed Biologist Moore met with Dan Leahy, (R-5, Realty), to discuss a proposal for a Level II Preacquisition Contaminant Survey for the Bardy tract.

After coordinating with Manager Koch, Watershed Biologist Moore attended an on-site fact finding meeting of the Harding Township Zoning Board to review the site plans for the proposed activity on the Weichert property adjacent to the Refuge.

On July 24, Watershed Biologist Moore made a reconnaissance site visit to the Bardy tract in preparation for submitting a proposal for a Level II Preacquisition Contaminant Survey.

On August 11, Watershed Biologist Moore returned a letter to Leonard Hamilton, an environmentally concerned Passaic Township resident, (cc: Passaic Township Planning Board) noting the Service's concerns with the potential nonpoint source pollution loads from the proposed development (19 houses on 25 acres) of the Einseidler Estate property in the already beleaguered Great Swamp watershed.

On August 11, a hydrogeologist contractor took samples from two sites where underground fuel storage tanks had been

removed two years ago and leakage or spillage was suspected. The sites are located at the headquarters maintenance area, and the Willean House in the Wilderness Area. Regional Engineer Yee was present during sample collection.

From August 17-18, Watershed Biologist Moore prepared and submitted an analytical catalog for processing sediment samples from the Harding dump Bioassessment Study at the GSNWR.

On August 21, Wallkill River NWR Manager Pelizza and Great Swamp Watershed Biologist Moore met at Great Swamp with NJDEPE and Sussex County engineering consultants regarding the Sussex Municipal Sewage Treatment Plant modification proposal.

On September 11, Biologist Bitler conducted a level 1 contaminants survey of Tract 401b at the request of the Regional Realty Office.

On September 23, Watershed Biologist Moore went to the Passaic Township Hall and reviewed the Planning Board file and the applicant's site plans for the proposed Long Hill Estates development on the Einseidler Estate property in Passaic Township. The Service is concerned with the potential increased runoff and nonpoint source pollution loads from the proposed intense development (19 houses on 25 acres). The Einseidler Estate is one of the few remaining large parcels of land in Passaic Township; however, the property is not contiguous with the Refuge and falls outside the approved Refuge acquisition boundary. Einseidler approached the Service and offered to sell the property, however, the Service's decision was not to buy it.

On October 19, Watershed Biologist Moore transmitted a sampling proposal and cost estimate for a Level II Preacquisition Contaminant Survey for Tract 171a (Bardy Tract), in response to a request from the Office of Realty. The Service has an option to buy the 65 acre tract of land, which contains excellent upland and wetland habitat, provided the pesticide and fertilizer storage / mixing area tests free of significant levels of contaminants.

On October 21, Watershed Biologist Moore returned a telephone call to Valerie Ross, CH2M/Hill (Great Swamp Watershed Advisory Committee Consultant), to discuss and clarify statements, in the consultant's final Data Assessment Needs and Recommendations Report, regarding the source of metals contamination to the GSNWR.

On October 21, Watershed Biologist Moore called Mary Louise Blanchard, Harding Township Environmental Commission, to get information on the (10/26/92) meeting of the Harding Township

Planning Board regarding the proposed Kalkin (Shops at Primrose Brook) development. Ms. Blanchard informed Moore that the Board will only be addressing technical and legal issues regarding extension of the already approved preliminary site plans and not environmental concerns associated with the project.

On October 24, Watershed Biologist Moore responded to a letter from Thomas Hays (Madison, New Jersey resident), to Regional Director Lambertson, expressing his concerns regarding the potential adverse impacts of four proposed development projects in the Great Swamp watershed. The four proposed projects are the Chatham Township Wastewater Management Plan, the Kalkin mall development (Shops at Primrose Brook), the Giralda Farms (Prudential) development, and the road widening of Loantaka Way and Shunpike Way.

On October 27, Refuge Biologist Bitler, Deputy Refuge Manager Villanueva and Refuge Manager Koch met with Biologist Dennis Jorde of Patuxent Research Center and Zone Biologist Charlie Pelizza to discuss refuge research needs.

On November 12 & 13, Watershed Biologist Craig Moore and Supervisor Cliff Day participated in the two day Covenants Not to Sue (CNTS) / Natural Resource Damage Assessment (NRDA) Meeting held at the Regional Office (RO). The meeting was attended by Mike Brennan and Mike Spear of the Director's Office, Regional Director Lambertson and many other RO staff, Division of Environmental Contaminant (DEC) staff, R-5 field office(s) environmental contaminant staff, Regions 1-7 Environmental Contaminants / Damage Assessment Coordinators, staff from the Regional and Washington Solicitor's Offices, and staff from the offices of the Department of Interior / Office of Environmental Affairs. The purpose of the meeting was to reach a consensus on goals, procedures, and timeliness to be used in developing trustee positions regarding potential damages to natural resources. The ensuing discussion was both spirited and productive and will be summarized in writing by R-5 staff. A working committee, headed by DEC, will be convened to develop guidance / action recommendations on the important items that were identified at the CNTS / NRDA meeting.

On November 18, Refuge Manager Koch made a presentation to the supervisory body of the Morris County Soil Conservation District at the request of County Manager Joe Dunn. The refuge perspective of the GSWAC and impacts to the refuge from development within the watershed were discussed.

On November 20, Deputy Refuge Manager Villanueva met with Penny Hinkle, of the Great Swamp Watershed Association and the Harding Township Environmental Commission to show her the

management area and talk about refuge programs. Ms. Hinkle led a tour for a group of college age students from Audubon Expeditions on November 27th. Terry took advantage of the opportunity to explain about management of refuge impoundments and hydro-axing.

On November 24, Deputy Refuge Manager Villanueva met with Pete McLain, an outdoor writer for Outdoor Life Magazine, and Bill Vibbert, Park Superintendent at Island Beach State Park. Mr. McLain is writing an article about woodcock habitat management on national wildlife refuges in the Northeast. They visited sites that were cut with the Hydro-ax and discussed woodcock habitat management at Great Swamp.

On December 2, Watershed Biologist Moore attended a NJDEPE public hearing on the proposed new Surface Water Quality Standards and Stream Classifications for the waters of New Jersey. The proposed new water quality standards and stream classifications will affect water quality on both streams flowing into and within refuges in the State.

Watershed Biologist Moore transmitted Refuge Manager Koch a copy of the Service's April 1, 1991 public statement requesting denial of the proposed amendment to the Northeast Regional Water Quality (208) Plan for the proposed Shops at Primrose Brook Development, in Harding Township, as requested.

The USDA APHIS staff moved their office from the refuge in Q-99 to Pittstown, NJ during the week of December 7.

On December 9, final soil samples were taken for testing from excavated fill at former underground fuel storage tank sites by the Service's contractor.

On December 11, Watershed Biologist Moore telefaxed review comments / revisions to Karen Day, Delaware Bay Estuary Project, on the follow-up summation for the Public Outreach Workshop, regarding the controversy surrounding the Chatham Township Wastewater Management Plan and the GSNWR.

On December 15 & 16, Watershed Biologist Moore completed field sampling for a Level II Pre-acquisition Contaminant Survey for Tract 171a (Bardy property), in response to a request from the Office of Realty.

On December 16, Watershed Biologist Moore visited Long Hill (formerly Passaic) Township Hall and reviewed the Planning Board file and site plans for the proposed Long Hill (Einseidler) Estates development. The Service is concerned with the potential increased runoff and nonpoint source pollution loads from the proposed intense development (19 houses on 25 acres) on the rim of the Great Swamp

approximately 1000 feet from the refuge boundary. The Einseidler Estate is one of the few remaining large parcels of land in Long Hill Township; however, the property is not contiguous with the GSNWR and falls outside the approved Refuge acquisition boundary.

On December 23, Watershed Biologist Moore transmitted a color coded copy of the Service's stream classification map, of the Great Swamp watershed, and key to the New Jersey Department of Environmental Protection and Energy (NJDEPE) 1989 stream classifications to Kent Hardmeyer, USDA-SCS, as requested by Refuge Manager Koch. The USDA-SCS is interested in examining water quality and existing stream classifications in the watershed for the Great Swamp Hydrologic Unit Area Study.

On December 31, Watershed Biologist Moore completed and transmitted the NJDEPE questionnaire regarding surface water and ground monitoring programs being conducted by the Service, as requested by Refuge Manager Koch.

2. Other Economic Uses

A Special Use Permit was re-issued to a local resident for beekeeping privileges on the refuge.

3. Items of Interest

From January through April, refuge staff, especially ORP McFadden, spent considerable time preparing for the Wallkill River NWR dedication ceremony on May 2.

On January 16, Assistant Manager Villanueva and Manager Koch met with a representative from Texas Eastern to discuss and coordinate their gas line maintenance activities on the refuge.

On February 19 through 21, refuge staff met with Regional Biologist Gavutis, Woodcock Biologist Sepik, Zone Biologists Laskowski and Pelizza to review and discuss Hydro-ax operations for woodcock habitat management, the refuge wood duck management program, and on refuge wetland restoration efforts.

On February 21, the first planning committee meeting for dedication ceremonies of the Wallkill River NWR was held at Great Swamp. In attendance were representatives of the NJ Conservation Foundation, Inez Connor, Regional Public Affairs Officer, Wallkill River NWR Manager Pelizza, ORP McFadden, and Manager Koch.

On April 6, Assistant Manager Villanueva met with Karen Fucito, a Photographer from the Daily Record to photograph

several Hydro-axed sites. The newspaper is writing an article about the tree cutting activities on the refuge in reaction to a letter sent to them from Chatham Township Mayor Russomano questioning and criticizing the impacts of the program. Villanueva also responded to several telephone inquiries from the public in response to another newspaper article about refuge Hydro-axing activities.

On April 27-28, Deputy Manager Villanueva participated on a committee in the regional office which is planning a maintenance management workshop.

ORP McFadden assisted with planning and coordinating the May 2 Wallkill River NWR dedication. On May 2 ORP McFadden, Deputy Asst. Mgr. Villanueva and Manager Koch attended and assisted with the Wallkill dedication. Part of Great Swamp's help included McFadden leading a walking tour for 60 people and Villanueva guiding a bus tour.

On May 14, Assistant Manager Villanueva met with Kevin Tucker of Detail Associates to have him sample suspected asbestos containing material in the driveway of the McDonough House. The building is scheduled for demolition after asbestos containing materials are removed from the building and the driveway.

ORP McFadden assisted with the Ohio River Islands NWR dedication ceremony on May 28.

The results of the asbestos survey by Detail Associates were received on May 28 and forwarded to Engineering for developing contract specifications to remove asbestos from the McDonough house and driveway and the Willean house.

On June 26, Deputy Refuge Manager Villanueva was the guest speaker at a Gold Award banquet for the Ocean County Girl Scout Council. The Gold Award is the highest award a girl can earn in Girl Scouts.

On July 28, Refuge Manager Koch and ORP McFadden met with the Superintendent of the Morristown National Historical Park to gather more information on how to deal with support groups.

On August 13, Deputy Manager Villanueva and Manager Koch interviewed Jackie Record for a Masters Cooperative Education Student position. Jackie was selected for the refuge coop position.

On October 6 and 7, the Refuge hosted a meeting of the planning committee for a Regional Maintenance Workshop scheduled for Spring of 1993. Deputy Refuge Manager Villanueva is on the committee along with Joe Williams (RO),

and maintenance staff from five other refuges.

On November 25, Refuge Manager Koch met with a college freshman to discuss careers and the Coop. Program.

In December, Photographer John Hollinsworth, who was working on a special project for the FWS, was on site during the 1st day of the deer hunt taking photos of Service personnel in action. John also visited the refuge in July to obtain photos for a calendar featuring National Wildlife Refuges.

4. Credits

Refuge Manager Koch wrote Section A and edited the entire report.

Wildlife Biologist Bitler wrote the Introduction, Sections B, D 5, E 7 and 8, F 1, 2, 10, and 13, G and 12-17, H 8, and J 1-3.

Deputy Refuge Manager Villanueva wrote Sections C, D 4, E 6 and 8, F 3, 5, and 9, I, and J 4.

ORP McFadden wrote Sections E 2 and 4, H 1-4, 6, 7, 11, 12, 16 and 17 and assembled the information packet.

Office Assistant Klimas wrote Sections E 1 and 5.

Photos: Tom McFadden (TM); Terry Villanueva (TV); John Hollingsworth (JH); Sharon Vaughn (SV); Larry Balsamo (LB); George Hall (GH); John Arnold (JA); Bernie Tulman (BT) and Mel Smith (MS).



A clear-winged sphinx moth adds a flash of color in the Swamp. (GH)

K. FEEDBACK

The refuge continues to depend on computerization for daily operations and to complete tasks. In many cases it has made for more efficient operations such as composing and editing large documents including the annual narrative, plans, programs, and reports and compiling and editing data. Most of the refuge staff has some level of computer literacy and use computers on a regular basis.

However, in an effort to keep up with ever increasing developments in this technology some database applications have been developed that are more of a hinderance than an aid to completing our jobs.

These programs are sent to the field for refuge staff to discover and report the "bugs" after wasting hours trying to work around the problem. Sometimes problems are corrected and sometimes we never hear anything more about it. Meanwhile, we spend more time inputing information several times when programs crash, sending memos with typed data when applications don't allow data entry, or filling out data forms with no hope of getting the software corrected soon enough to have the data be useful.

Computers can be a valuable aid in helping us complete our jobs. However, poor quality software applications can be more of a hinderance and source of increasing demands on our already limited time which impedes us from doing our job of being resource managers.

Let's reevaluate when it is productive to use applications, invest the time and money in developing good quality application programs, and correct "bugs" as they are discovered.

L. INFORMATION PACKET - - - (inside back cover)



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Great Swamp National Wildlife Refuge

R.D. #1, Box 152

Basking Ridge, New Jersey 07920

(201)425-1222

TRIP SUGGESTIONS FOR GREAT SWAMP NATIONAL WILDLIFE REFUGE

1. Films, lectures and slide talks are available at the refuge headquarters auditorium* on Pleasant Plains Road by appointment only. It is best to reserve a program by telephoning the refuge headquarters between the hours of 8:00 AM and 4:30 PM, Tuesday through Thursday.
2. Presentations may be scheduled for Monday through Friday throughout the year, but not for weekends. Guided trail walks are limited to groups of fifteen (15) people.
3. Reservations must be made at least two (2) weeks in advance.
4. Presentations are normally 45 minutes in length. One adult must be present for every 10 people under the age of 18. Minimum group size: 10. Maximum group size: 50.
5. After a brief program and orientation, the group may drive to the trail head at the Wildlife Observation Center on Long Hill Road for a self-guided boardwalk trail walk or explore the Wilderness Area from any one of four (4) primitive access points.
6. Stress appropriate dress for students. Comfortable walking shoes, long pants and long sleeve shirts are recommended during all seasons of the year. Warm jackets, scarves and gloves are needed during the colder months. Mosquitoes, ticks, deer flies and other annoying insects are present from April - November, so instruct students to bring insect repellent (Deep Woods or Off). If you plan to walk in the Wilderness Area, bring boots as it is usually very wet. Noise frightens wildlife. Inform your students that they will see more if they keep their eyes open and their voices quiet.
7. If you wish to cancel a scheduled trip, please telephone the refuge headquarters well in advance.
8. Groups more than 1/2 hour late will have their program automatically cancelled. Group leaders unfamiliar with the area should check on the location of our headquarters, since there are three environmental education facilities within the Great Swamp.

9. At the time of reservation, inform us if there is any special information that you would like the program to include.

10. The refuge has no picnic facilities; however, there are picnic areas at nearby parks.

11. Other public use regulations are in the refuge general brochure under "Regulations". Please be familiar with them.

This is a National Wildlife Refuge where plants as well as animals are protected. Plants may not be picked and animals may not be removed from the location where they are found. Environmental sampling may be permitted by groups expressing an advanced desire to study specific educational functions. Environmental education specialists have found that pre-trip and post-trip awareness units enhance their actual visit to the National Wildlife Refuge.

An outdoor classroom site is available for those teachers who wish to conduct environmental education activities. The area has several different types of habitats that may be used including fresh water marshes, fields, ponds and hardwood forests. We recommend that you limit the number of students to 25.

Teacher Workshops are conducted once a year in conjunction with one of the two county environmental education centers that are adjacent to the refuge. For more information, please contact the Outdoor Recreation Planner at refuge headquarters.

*Restrooms are not available at the auditorium; however, facilities are available at the Wildlife Observation Center and are fully accessible to disabled individuals along with all other refuge programs.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Great Swamp National Wildlife Refuge
RD #1, Box 152 Pleasant Plains Road
Basking Ridge, New Jersey 07920
(201) 425-1222

REGULATIONS FOR GROUPS

All groups entering public use areas of the Great Swamp Refuge by bus are required to make firm confirmation at least two weeks in advance. These requirements and the following regulations will minimize the disturbance to refuge wildlife and vegetation, and, hopefully, will help to assure a high quality visit for your group and for those who follow.

1. Maximum group - 50 persons.
2. One adult must be present for every ten youths under age 18.
3. Groups must stay on the designated trails.
4. Littering is forbidden. It is not only illegal but also destructive to the beauty of the area. Twelve tons of trash were removed from the refuge in 1970. If you bring it, please take it back with you.
5. Noise must be kept to a minimum. Shouting and yelling disturbs wildlife and other refuge visitors.
6. Bus engines must be turned off while standing by in refuge parking areas.
7. Picnicking, collecting, or disturbing any plant or animal is prohibited.
8. Restrooms are not available at the auditorium. Facilities are available at the Wildlife Observation Center.

Groups who do not observe regulations will be asked to leave the refuge.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Great Swamp National Wildlife Refuge
R.D. #1, Box 152 Pleasant Plains Road
Basking Ridge, New Jersey 07920-9616
(201) 425-1222

SLIDE PRESENTATIONS AVAILABLE

Great Swamp Refuge

A slide presentation on current wildlife management techniques being conducted at Great Swamp NWR along with a brief history of the refuge and threats facing the future of the refuge.

(45 minutes) Recommended for ages 16 to adult. Staff narrated.

Freshwater Wetlands

Slide/tape presentation focusing on the wetlands' benefits to plants, animals and people. Also discussed is the abuse wetlands have suffered due to man's development and carelessness.

(10 minutes) Recommended for ages 15 to adult.

Ecology of a Pond

A slide/tape presentation which studies a typical pond ecosystem, its diversity of plants and animals and how they are related. Discusses the importance of these species to man, wildlife and the surroundings.

(45 minutes) Recommended for ages 15 to adult.

Know the Black Duck

A slide/tape presentation which stresses the need for action due to declining black duck numbers. Shows how to identify black ducks from other ducks.

(10 minutes) Recommended for hunters.

Lead Poisoning

A slide/tape presentation of Dr. Milt Friend (National Wildlife Health Lab) explaining lead poisoning in waterfowl and bald eagles.

(30 minutes) Recommended for ages 15 to adult.

America's National Wildlife Refuge System

Describes the role of the U.S. Fish and Wildlife Service and talks about some of the National Wildlife Refuges from Florida to Alaska.

(11 minutes) Recommended for ages 10 to adult.

Wetlands for the Future

A slide/tape program on the efforts of the United States, Canada and conservation organizations to restore waterfowl populations to the levels of the early 1970's by restoring wetlands.

(17 minutes) Recommended for ages 16 to adult.

The North American Waterfowl Plan

A slide/tape program on the efforts of the United States, Canada and conservation organizations to restore waterfowl populations to the levels of the early 1970's.

(17 minutes) Recommended for ages 16 to adult.



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MOVIES

Two Little Owls

Traces the lives of Great Horned Owls from birth, as parents care for them. Aspects of daily life are covered from eating to nesting.
(20 minutes) Recommended for ages 8 to 14.

Black Duck Identification

Stresses the importance of identification and the need for hunting regulations for Black Ducks. Shows how to distinguish black ducks from other ducks. Ends with several "test" identifications.
(10 minutes) Recommended for hunters.

Future of Wildlife

The need for wildlife management is encouraged in order to maintain the number of species and individual numbers due to years of habitat reduction and manipulation.
(10 minutes) Recommended for ages 15 to adult.

The Great Swamp - A Last Wilderness (3-part series)

Part 1 focuses on an introduction to the Swamp and the beauty it offers. Part 2 involves a history of the Swamp through several transitional stages. Part 3 stresses the importance of the Swamp since it houses so many micro- and macroscopic species.
(25 minutes) Recommended for ages 12 to 15.

Bluebirds "Bring Them Back"

Stresses the need for wildlife management to help the Bluebird survive. Watch them struggle against many odds to find nesting places to incubate eggs and raise young.
(20 minutes) Recommended for ages 8 to adult.

The Wood Duck's World

Follows the yearly rituals of the duck including mating, nesting and migrations. Looks closely at newly hatched young who encounter several predators including snakes, turtles, foxes, hawks and man.
(30 minutes) Recommended for ages 15 to adult.

Cry of the Marsh

Unnarrated film focusing on the waterfowl that inhabit marshland. There is a destruction of this land as the need for farmland increases. Fish die, birds are chased out, water is drained and the land is burned. Will any species survive?
(15 minutes) Recommended for ages 16 to adult.

A Question of Hunting

Examines the hunting argument through interviews with people both pro and con hunting. Attempts to answer such questions as "why do people hunt?" and "what impact does hunting have on wildlife?". Covers wildlife restoration throughout the history of hunting.
(30 minutes) Recommended for ages 15 to adult.

A Closer Look

Reviews the benefits of steel shot over lead. Cases of lead poisoning in waterfowl are discussed.

(10 minutes) Recommended for ages 15 to adult.

Wildlife, Wetlands and You - A Duck Stamp Story

The making of the Duck Stamp as well as how its revenues are used.

(15 minutes) Recommended for ages 12 to adult.

To Find a Place

Discusses land use planning processes. Answers question, "how does one decide how to use land to be of the most benefit to people and wildlife while avoiding potential problems?"

(15 minutes) Recommended for ages 15 to adult.

America's Wetlands

Discusses the benefits wetlands offer to waterfowl, mammals and man while serving as a buffer against floods, draught and pollution. Yet despite these benefits, our wetlands are being destroyed.

(30 minutes) Recommended for ages 12 to adult.

The Age of Alaska

Expresses the need to protect and manage Alaska's resources since it offers so much in the way of beauty and life.

(20 minutes) Recommended for ages 12 to adult.

So Little Time

Makes the point that there is "too little time" for waterfowl and mammals facing destruction and encroachment of habitat. Covers some duck identification while maintaining a question-answer form.

(30 minutes) Recommended for ages 12 to adult.

Marshland is not Wasteland

Discusses man's past abuse of marshland and now its value as a nursery for the ocean's marine life.

(15 minutes) Recommended for ages 12 to adult.

America's National Wildlife Refuge System

Describes the role of the U.S. Fish and Wildlife Service and talks about some of the National Wildlife Refuges from Florida to Alaska.

(11 minutes) Recommended for ages 10 to adult.

In Celebration of America's Wildlife

Examines several animal populations found in America and the study of these populations by different organizations. Stresses the importance of the American sportsman and how he has contributed through the Pitman-Robertson Act.

(57 minutes) Recommended for ages 14 to adult.

The Great Blue Heron Story

Traces the lives of Great Blue Herons from birth as parents care for them. Aspects of daily life are covered from eating to nesting. The Great Blue Heron is currently listed as "threatened" by the State of New Jersey.

(20 minutes) Recommended for ages 12 to adult.

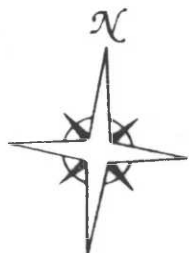
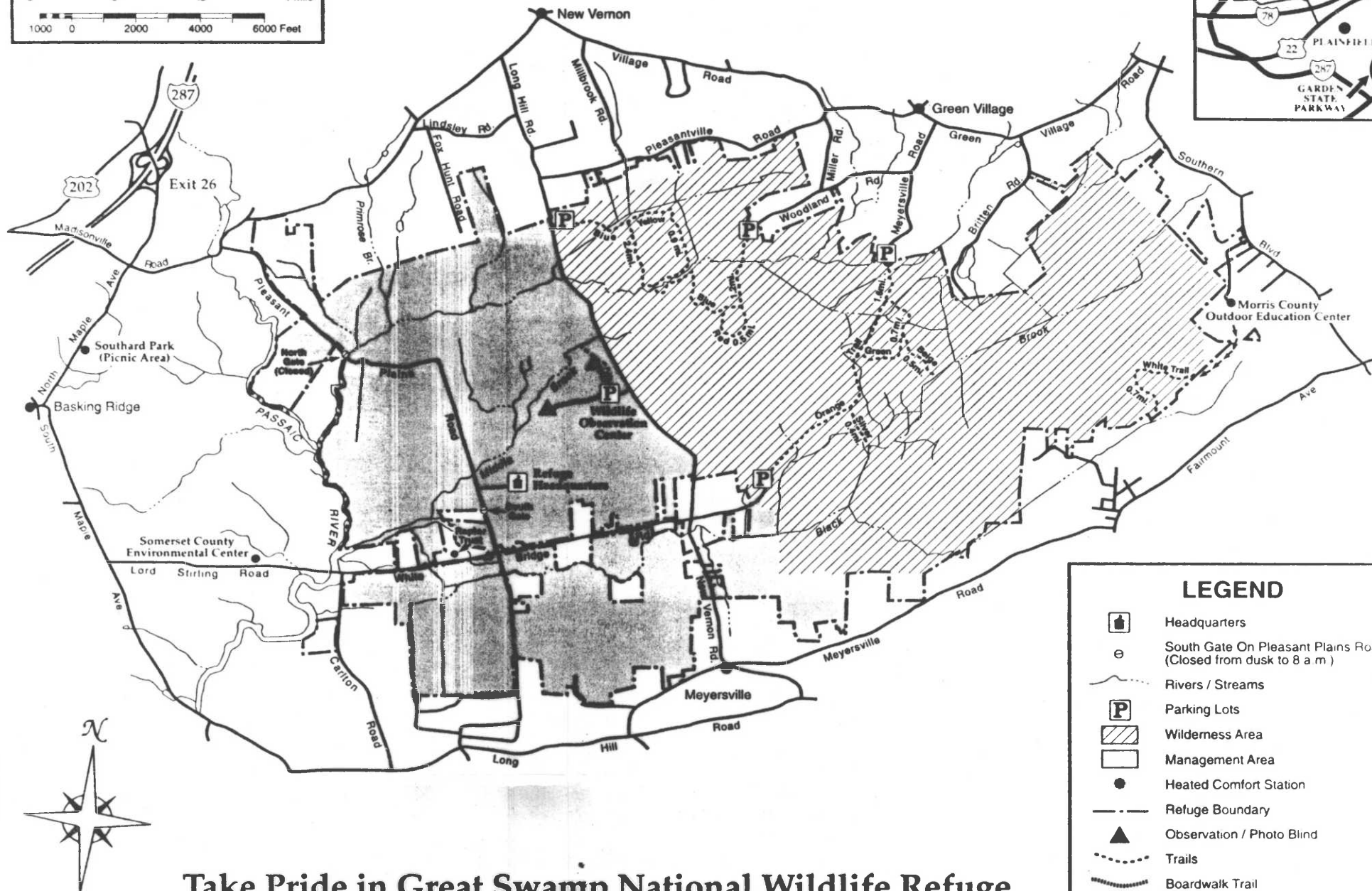
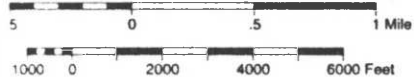
Seasons of the White-tailed Deer

Traces the life and habits of white-tailed deer through all the seasons. Discusses threats to the white-tailed deer such as habitat loss due to development and current wildlife management of the species.

(20 minutes) Recommended for ages 12 to adult.

GREAT SWAMP

NATIONAL WILDLIFE REFUGE
Morris County, New Jersey



Take Pride in Great Swamp National Wildlife Refuge

LEGEND

- Headquarters
- South Gate On Pleasant Plains Road (Closed from dusk to 8 a.m.)
- Rivers / Streams
- Parking Lots
- Wilderness Area
- Management Area
- Heated Comfort Station
- Refuge Boundary
- Observation / Photo Blind
- Trails
- Boardwalk Trail

K. FEEDBACK

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U.S. Fish and Wildlife Service

Great Swamp is one of more than 500 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 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 marine mammals and threatened and endangered species.

For further information, contact:

Refuge Manager
Great Swamp National Wildlife Refuge
152 Pleasant Plains Road
Basking Ridge, NJ 07920
Telephone: (201) 425-1222

Wood duck and bittern illustrations © Julien Beauregard



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

RL-52530-2

★U.S. GPO: 1992-602-140

October 1992

Birds

GREAT SWAMP

National Wildlife Refuge



New Jersey

Great Swamp National Wildlife Refuge contains over 7,200 acres of hardwood swamp, upland timber, marsh and water, brush, pasture, and cropland. This diverse habitat attracts a wide variety of migratory and residential birds. With perpetual protection of its wilderness portion and continued management of the rest, the Refuge will become increasingly important as a haven for birds amidst the surrounding urban areas.

By means of the boardwalks and observation blinds and habitat manipulation in the Management Area, Refuge visitors are provided excellent opportunities to see these wild birds. The best season to see waterfowl and other marsh and water birds is during their early spring migrations, before marsh vegetation emerges to hide them. May is the best time to see warblers and other songbirds.



This folder lists 222 species of birds that have been identified on the Great Swamp Refuge since 1960. Much of the list is from records of the Summit Nature Club and from William Boyle, Richard Kane, Allan Keith, and Robert Lewis. This list is in accordance with the Sixth American Ornithologists' Union Check-list as amended.

Most birds are migratory, therefore, their seasonal occurrence is coded as follows:

SEASON:

s - Spring	March - May
S - Summer	June - August
F - Fall	September - November
W - Winter	December - February

- Birds known to nest on or near the Refuge
Italics indicate threatened/endangered species

RELATIVE ABUNDANCE

a - abundant	a species which is very numerous
c - common	likely to be seen or heard in suitable habitat
u - uncommon	present, but not certain to be seen
o - occasional	seen only a few times during a season
r - rare	may be present but not every year

	s	S	F	W
LOONS - GREBES				
___ Common Loon	u		r	
___ Pied-billed Grebe	u	o	o	r
___ Horned Grebe			r	
BITTERNS - HERONS - IBISES				
___ • American Bittern	c	c	c	o
___ • Least Bittern	u	c	u	
___ • Great Blue Heron	c	c	c	u
___ Great Egret	o	o	o	r
___ Snowy Egret		o	o	
___ Little Blue Heron	o	o	o	
___ Cattle Egret	r	r	r	
___ • Green-backed Heron	c	a	a	
___ Black-crowned Night-Heron	o	o	o	
___ Yellow-crowned Night-Heron	r	r		
___ Glossy Ibis	o	o	o	
SWANS - GEESE - DUCKS				
___ Mute Swan	o	o	o	
___ Snow Goose	r		o	o
___ • Canada Goose	a	a	a	a
___ • Wood Duck	a	a	a	u
___ • Green-winged Teal	c	u	c	u
___ • American Black Duck	c	u	c	u
___ • Mallard	a	a	a	a
___ Northern Pintail	u	r	c	u
___ • Blue-winged Teal	c	c	c	
___ Northern Shoveler	o	o	o	r
___ Gadwall	o	r	o	o
___ American Wigeon	u	r	c	o
___ Canvasback	r		r	r
___ Ring-necked Duck	u			o
___ Common Goldeneye			r	r
___ Bufflehead	r		r	r
___ • Hooded Merganser	o	o		o
___ Common Merganser	r			r
___ Red-breasted Merganser				r
___ Ruddy Duck			r	r
VULTURES - HAWKS - FALCONS				
___ Black Vulture	u	u	u	u
___ Turkey Vulture	c	c	c	c
___ Osprey	o		u	
___ Bald Eagle	o	o	o	o
___ Northern Harrier	u	r	u	u
___ Sharp-shinned Hawk	o		u	u
___ Cooper's Hawk	o	r	o	o
___ Northern Goshawk			r	r

	s	S	F	W
___ • Red-shouldered Hawk	u	u	u	o
___ • Broad-winged Hawk	u	o	u	
___ • Red-tailed Hawk	c	u	c	c
___ Rough-legged Hawk	o		o	o
___ Golden Eagle				r
___ • American Kestrel	c	c	c	c
___ Merlin	r		r	r
___ Peregrine Falcon			r	
GROUSE - QUAIL - TURKEY				
___ • Ring-necked Pheasant	u	u	u	u
___ • Ruffed Grouse	u	u	u	u
___ • Wild Turkey	o	o	o	o
___ Northern Bobwhite	r	r	r	r
RAILS - CRANES				
___ • King Rail	o	u	o	
___ • Virginia Rail	a	a	a	o
___ • Sora	c	c	c	r
___ • Common Moorhen	u	c	c	
___ American Coot	u		u	u
PLOVERS - SANDPIPERS				
___ • Killdeer	c	c	c	o
___ Greater Yellowlegs	o	o	o	
___ Lesser Yellowlegs	u	o	u	
___ Solitary Sandpiper	u	u	u	
___ • Spotted Sandpiper	u	u	u	
___ Upland Sandpiper	r			
___ Semipalmated Sandpiper	o	o	o	
___ Least Sandpiper	u	u	o	
___ Pectoral Sandpiper	u	u	u	
___ Dunlin	r			
___ Short-billed Dowitcher	r	r		
___ Common Snipe	a	r	c	o
___ • American Woodcock	a	c	a	o
GULLS - TERNS				
___ Bonaparte's Gull				r
___ Ring-billed Gull	o		o	c
___ Herring Gull	o	o	o	u
___ Great Black-backed Gull	o			u
DOVES - CUCKOOS - OWLS				
SWIFTS - HUMMINGBIRDS				
___ Rock Dove	u	u	u	u
___ • Mourning Dove	a	a	a	a
___ • Black-billed Cuckoo	u	u	o	
___ • Yellow-billed Cuckoo	u	u	o	
___ Barn Owl	o	o	o	o
___ • Eastern Screech-Owl	u	u	u	u

	s	S	F	W
• Great Horned Owl	c	c	c	c
• Barred Owl	c	c	c	c
Long -Eared Owl	o		o	o
Short-eared Owl				o
Northern Saw-whet Owl			r	r
Common Nighthawk	c	u	c	
Chimney Swift	c	c	c	
• Ruby-throated Hummingbird	u	o	u	
Belted Kingfisher	c	c	c	u

WOODPECKERS - FLYCATCHERS

• Red-headed Woodpecker	o	o	o	o
• Red-bellied Woodpecker	c	c	c	c
Yellow-bellied Sapsucker	o		o	r
• Downy Woodpecker	c	c	c	c
• Hairy Woodpecker	c	c	c	c
• Northern Flicker	c	c	c	u
• Pileated Woodpecker	o	o	o	o
Olive-sided Flycatcher	o	r	o	
• Eastern Wood-Pewee	c	c	c	
Yellow-bellied Flycatcher	o	r	u	
• Acadian Flycatcher	o	o		
• Alder Flycatcher	o	o		
• Willow Flycatcher	c	c	c	
• Least Flycatcher	o	o	o	
• Eastern Phoebe	c	c	c	o
• Great Crested Flycatcher	c	c	c	
• Eastern Kingbird	c	c	c	

LARKS - SWALLOWS - JAYS - CROWS

Horned Lark		o	o	o
• Purple Martin	u	u		
• Tree Swallow	c	a	a	r
Northern Rough-winged Swallow	u	c	u	
Bank Swallow	u	u	u	
Cliff Swallow	u			
• Barn Swallow	c	c	c	
• Blue Jay	a	a	a	a
• American Crow	a	a	a	a
Fish Crow	o	o	o	o

TITMICE - NUTHATCHES - WRENS

• Black-capped Chickadee	a	a	a	a
• Tufted Titmouse	a	a	a	a
Red-breasted Nuthatch	o	o	u	o
• White-breasted Nuthatch	c	c	c	c
• Brown Creeper	c	u	c	u
• Carolina Wren	c	c	c	u
• House Wren	c	a	c	

	s	S	F	W
Winter Wren	u		u	o
• Marsh Wren	c	c	c	r

KINGLETS - THRUSHES - THRASHERS

Golden-crowned Kinglet	u		c	u
Ruby-crowned Kinglet	c		c	o
• Blue-gray Gnatcatcher	c	c	u	
• Eastern Bluebird	c	c	c	c
• Veery	c	c	c	
Gray-cheeked Thrush	u		u	
Swainson's Thrush	c		c	
Hermit Thrush	c		c	o
• Wood Thrush	c	c	c	
• American Robin	a	a	a	u
• Gray Catbird	a	a	a	r
• Northern Mockingbird	c	c	c	c
• Brown Thrasher	c	c	c	r

WAXWINGS - SHRIKES - STARLING

American Pipit	u		u	
Cedar Waxwing	c	u	c	u
Northern Shrike			r	r
Loggerhead Shrike	r			r
• European Starling	a	a	a	a

VIREOS - WOOD WARBLERS

• White-eyed Vireo	c	c	c	
Solitary Vireo	u		u	
• Yellow-throated Vireo	c	c	c	
• Warbling Vireo	u	u	r	
Philadelphia Vireo			o	
• Red-eyed Vireo	c	c	c	
• Blue-winged Warbler	c	c	c	
Golden-winged Warbler	o			
Tennessee Warbler	c		c	
Nashville Warbler	u		u	
Northern Parula	c		c	
• Yellow Warbler	a	a	a	
• Chestnut-sided Warbler	c	o	c	
Magnolia Warbler	c		c	
Cape May Warbler	u		u	
Black-throated Blue Warbler	c		c	
Yellow-rumped Warbler	a		c	u
Black-throated Green Warbler	c		c	
Blackburnian Warbler	u		u	
Yellow-throated Warbler	r			
Pine Warbler	o		o	
Prairie Warbler	o			
Palm Warbler	c		u	

	s	S	F	W
___ Bay-breasted Warbler	u		u	
___ Blackpoll Warbler	c		c	
___ Cerulean Warbler	o	o		
___ • Black-and-white Warbler	c	c	c	
___ • American Redstart	c	c	c	
___ • Prothonotary Warbler	o	o	o	
___ • Ovenbird	c	c	c	
___ Northern Waterthrush	u		u	
___ • Louisiana Waterthrush	u	o	u	
___ Kentucky Warbler	o	r		
___ Connecticut Warbler			o	
___ Mourning Warbler	u		o	
___ • Common Yellowthroat	a	a	a	r
___ Hooded Warbler	o		o	
___ Wilson's Warbler	u		u	
___ Canada Warbler	c	r	c	
___ • Yellow-breasted Chat	o	o	o	

TANAGERS - SPARROWS

___ Summer Tanager	o			
___ • Scarlet Tanager	c	c	c	
___ • Northern Cardinal	c	c	c	c
___ • Rose-breasted Grosbeak	c	c	c	
___ • Indigo Bunting	u	o	u	
___ • Rufous-sided Towhee	a	a	a	o
___ American Tree Sparrow	c		c	a
___ • Chipping Sparrow	c	c	c	r
___ • Field Sparrow	c	c	c	u
___ Vesper Sparrow	o	o	r	o
___ Savannah Sparrow	u		u	r
___ Grasshopper Sparrow	r		r	
___ Fox Sparrow	u		u	o
___ • Song Sparrow	c	c	c	c
___ Lincoln's Sparrow	o		o	
___ • Swamp Sparrow	a	a	a	u
___ White-throated Sparrow	c		c	c
___ White-crowned Sparrow	o		o	
___ Dark-eyed Junco	c		c	c
___ Snow Bunting			r	r

BLACKBIRDS - FINCHES

___ • Bobolink	u	u	u	
___ • Red-winged Blackbird	a	a	a	u
___ • Eastern Meadowlark	u	u	u	o
___ Yellow-headed Blackbird	r	r	r	
___ Rusty Blackbird	c		c	o
___ • Common Grackle	a	c	a	o
___ • Brown-headed Cowbird	c	c	c	o

	s	S	F	W
___ Orchard Oriole	u	u		
• Northern Oriole	c	c	c	
___ Purple Finch	u		u	u
• House Finch	c	c	c	c
___ Red Crossbill			r	r
___ White-winged Crossbill			r	r
___ Common Redpoll	r		r	r
___ Pine Siskin	o		o	o
• American Goldfinch	a	a	c	c
___ Evening Grosbeak	o		o	r
• House Sparrow	a	a	a	a



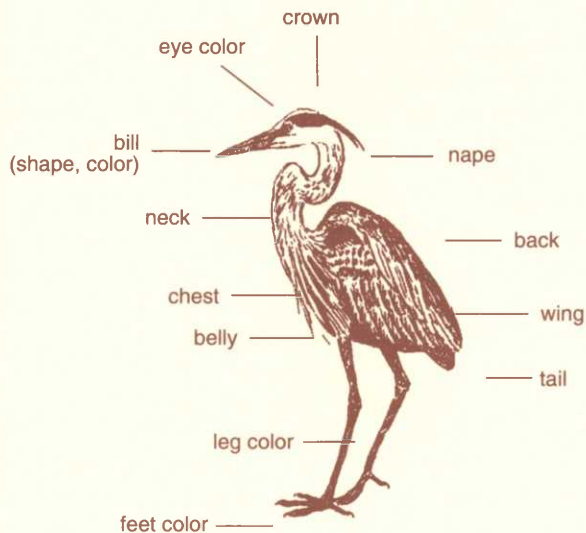
ACCIDENTALS

The following species have been seen on the Refuge one or two times.

- ___ White Ibis
- ___ Tundra Swan
- ___ Brant
- ___ Greater White-fronted Goose
- ___ Lesser Black-backed Gull
- ___ Black Tern
- ___ Monk Parakeet
- ___ Chuck-Will's-Widow
- ___ Varied Thrush
- ___ Lesser Scaup

TIPS FOR FIELD I.D.

The identification of birds is greatly aided by simply noting a few key field marks. The diagram below illustrates several of these. In addition, general size, color, habitat, song and behavior help narrow down the options. Remember, use more than one field mark, as many species are similar and can only be distinguished by using a combination of several marks.



NOTES

Date _____ Time _____

Observers _____

Weather _____

Tides _____



For further information, contact:

Refuge Manager
Great Swamp National Wildlife Refuge
R.D. #1, Box 152
Basking Ridge, New Jersey 07920
Telephone: (201) 647-1222

*A special thanks goes to the artist, Joyce Cloughly, for
her wildflower illustrations.*

***Take Pride in Great Swamp
National Wildlife Refuge***



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

RL-52530-6

August 1986

Common Wildflowers

*of the
GREAT SWAMP*

*National
Wildlife
Refuge*

New Jersey





Containing over 6,793 acres of marsh, hardwood swamp, upland timber, streams and ponds, brush, and grassland, Great Swamp National Wildlife Refuge is home for a great variety of plants and animals. With careful protection and management, the refuge, surrounded by urban and suburban areas, is becoming increasingly important for many kinds of wildlife.

By means of trails, blinds and habitat manipulation, refuge visitors are provided excellent opportunities for wildlife observation and study. So that others may enjoy the wildlife of Great Swamp, now and in the future, your attention to our posted regulations will be appreciated.

Surveys of Great Swamp plant life have identified several hundred species of trees, shrubs, aquatic plants, ferns, sedges, grasses and other forms of plant life. This folder lists 215 of the more common flowering plants in order of their seasonal appearance and according to the color of their blossoms. Some varieties occur in more than one season. Though Oxeye Daisy, for example, is listed here with spring flowers, this plant also frequents fields and roadsides during summer.

The following list was prepared in cooperation with Drs. Robert K. and Florence M. Zuck, professors at Drew University and longtime amateur botanist Robert J. Johnson. References for both common and scientific names were the guide books of Rickett, Newcomb, Peterson and Niering.

SPRING
March, April, May

White/Green

Anemone, Rue.....*Anemonella thalictroides*
Anemone, Wood.....*Anemone quinquefolia*
Bedstraw.....*Galium palustre*
Blackberry.....*Rubus allegheniensis*
Bloodroot.....*Sanguinaria canadensis*
Blueberry.....*Vaccinium corymbosum*
Campion, White.....*Lychnis alba*
Chickweed.....*Stellaria media*
Clover.....*Trifolium repens*
Cuckooflower.....*Cardamine pratensis*
Daisy.....*Chrysanthemum leucanthemum*
Dogwood.....*Cornus florida*
Fleabane.....*Erigeron annuus*
Foamflower.....*Tiarella cordifolia*
Garlic Mustard.....*Alliaria officinalis*
Ginseng.....*Panax trifolium*
Hellebore, False.....*Veratrum viride*
Jack-in-the-pulpit.....*Arisaema triphyllum*
Lily-of-the-valley.....*Mianthemum canadense*
Mayapple.....*Podophyllum peltatum*
Pussytoes.....*Antennaria neodioica*
Saxifrage.....*Saxifraga pensylvanica*
Shadbush.....*Amelanchier canadensis*
Solomon's Seal, False.....*Smilacina racemosa*
Spring Beauty.....*Claytonia virginica*
Starflower.....*Trientalis borealis*
Star-of-Bethlehem.....*Ornithogalum umbellatum*
Strawberry.....*Fragaria virginiana*
Trailing Arbutus.....*Epigaea repens*
Trillium.....*Trillium grandiflorum*
Viburnum.....*Viburnum acerifolium*
Violet, Northern White.....*Viola pallens*
Violet, Lance-leaved.....*Viola lanceolata*

Yellow/Orange

Bellwort.....*Uvularia perfoliatum*
Bladderwort.....*Utricularia vulgaris*
Buttercup.....*Ranunculus acris*
Buttercup, Swamp.....*Ranunculus septentrionalis*
Buttercup, Creeping.....*Ranunculus repens*
Celandine.....*Chelidonium majus*
Cinquefoil.....*Potentilla simplex*
Cinquefoil, Rough-fruited.....*Potentilla recta*
Coltsfoot.....*Tussilago farfara*
Cynthia.....*Krigia biflora*
Dandelion.....*Taraxacum officinale*
Golden Ragwort.....*Senecio aureus*
Iris.....*Iris pseudocorus*
King Devil.....*Hieracium praetense*
Marsh Marigold.....*Caltha palustris*

Spatterdock.....*Nuphar advena*
Trout Lily.....*Erythronium americanum*
Wild Indigo.....*Baptisia tinctoria*
Winter Cress.....*Barbarea vulgaris*
Wood Sorrel.....*Oxalis stricta*

Pink/Red

Geranium.....*Geranium maculatum*
Ginger.....*Asarum canadense*
Lady's Slipper.....*Cypripedium acaule*
Pinxter Flower.....*Rhododendron nudiflorum*
Wood Betony.....*Pedicularis canadensis*

Purple/Blue

Bluebell.....*Mertensa virginica*
Blue-eyed Grass.....*Sisyrinchium angustifolium*
Ground Ivy.....*Glechonia hederacea*
Hepatica.....*Hepatica americana*
Iris, Blue Flag.....*Iris versicolor*
Iris, Slender.....*Iris prismatica*
Periwinkle.....*Vinca minor*
Purple Dead Nettle.....*Lamium purpureum*
Skunk Cabbage.....*Symplocarpus foetidus*
Spiderwort.....*Tradescantia virginiana*
Vetch.....*Vicia cracca*
Violet.....*Viola affinis*
Violet, Arrow-leaved.....*Viola sagittata*
Violet, Marsh Blue.....*Viola cucullata*

SUMMER
June, July, Early August

White/Green

Arrowhead.....*Sagittaria latifolia*
Beardtongue.....*Penstemon digitalis*
Bindweed.....*Convolvulus sepium*
Boneset.....*Eupatorium perfoliatum*
Bouncing Bet.....*Saponaria officinalis*
Bugleweed.....*Lycopus virginicus*
Bur-reed.....*Sparganium americanum*
Buttonbush.....*Cephalanthus occidentalis*
Elderberry.....*Sambucus canadensis*
Honeysuckle, Swamp.....*Rhododendron viscosum*
Honeysuckle, Japanese.....*Lonicara japonica*
Indian Pipe.....*Monotropa uniflora*
Indian Hemp.....*Apocynum cannabinum*
Laurel.....*Kalmia latifolia*
Lizard's Tail.....*Saururus cernuus*
Mallow.....*Hibiscus palustris*
Mallow, Musk.....*Malva moschata*

Meadow Rue.....*Thalictrum polygamum*
Meadowsweet.....*Spirea latifolia*
Mountain-mint.....*Pycnanthemum virginianum*
Multiflora Rose.....*Rosa multiflora*
Orchid, Fringed.....*Habenaria lacera*
Pepperbush.....*Clethra alniflora*
Plantain, English.....*Plantago lanceolata*
Plantain, Rattlesnake.....*Goodyera pubescens*
Plantain, Water.....*Aiisma subcordatum*
Pokeweed.....*Phytolacca americana*
Queen Anne's Lace.....*Daucus carota*
Rattlesnake Root.....*Prenanthes alba*
Sarsaparilla.....*Aralia nudicaulis*
Solomon's Seal.....*Polygonatum biflorum*
Sweet Cicely.....*Oxmorhize claytoni*
Sweet Clover.....*Melilotus alba*
Water Arum.....*Calla palustris*
Water Hemlock.....*Cicuta maculata*
Wintergreen.....*Chimaphila maculata*
Yarrow.....*Achillea millefolium*

Yellow/Orange

Agrimony.....*Agrimonia parviflora*
Bartonia.....*Bartonia virginica*
Birdsfoot Trefoil.....*Lotus corniculatus*
Black-eyed Susan.....*Rudbeckia hirta*
Butter-and-eggs.....*Linaria vulgaris*
Butterfly Weed.....*Asclepias tuberosa*
Canada Lily.....*Lilium canadense*
Cucumber Root.....*Medeola virginiana*
Day Lily.....*Hemerocallis fulva*
Evening Primrose.....*Oenothera biennis*
Goatsbeard.....*Tragopogon pratensis*
Hawkweed.....*Hieracium aurantiacum*
Hop Clover.....*Trifolium agrarium*
Hop Clover, Smaller.....*Trifolium procumbens*
Jewelweed.....*Impatiens capensis*
Loosestrife, Fringed.....*Lysimachia ciliata*
Loosestrife, Whorled.....*Lysimachia quadrifolia*
Moneywort.....*Lysimachia nummularia*
Mullien.....*Verbascum thapsus*
Mullien, Moth.....*Verbascum blattaria*
St. Johnswort.....*Hypericum perforatum*
Scarlet Pimpernel.....*Anagallis arvensis*
Seedbox.....*Ludwigia alternifolia*
Sneezeweed.....*Helenium autumnale*
Sow Thistle.....*Sonchus oleraceus*
Stargrass.....*Hypoxis hirsuta*
Sundrops.....*Oenothera fruticosa*
Sundrops, Small.....*Oenothera perennis*
Tansy.....*Tanacetum vulgare*
Swamp Candles.....*Lysimachia terrestris*
Sweet Clover.....*Melilotus officinalis*
Turk's-cap Lily.....*Lilium superbum*
Golden Alexander.....*Zizia aurea*



Pink/Red

Azalea, Flame *Rhododendron calendulaceum*
 Bergamot *Monarda fistulosa*
 Clover, Alsike *Trifolium hybridum*
 Deptford Pink *Dianthus armeria*
 Knapweed *Centaurea maculosa*
 Mallow *Hibiscus palustris*
 Milkweed *Asclepias syriaca*
 Milkweed, Swamp *Asclepias incarnata*
 Milkwort *Polygala sanguinea*
 Partridgeberry *Mitchella repens*
 Smartweed *Polygonum pennsylvanicum*
 Steeplebush *Spirea tomentosa*
 Swamp Rose *Rosa palustris*
 Teasel *Dipsacus sylvestris*
 Thistle, Bull *Cirsium vulgare*
 Thistle, Field *Cirsium discolor*
 Thistle, Canada *Cirsium arvense*
 Thistle, Pasture *Cirsium pumilum*
 Tick Trefoil *Desmodium canadense*
 Tick Trefoil, Panicked *Desmodium paniculatum*
 Woundwort *Stachys palustris*

Purple/Blue

Bittersweet *Solanum dulcamara*
 Burdock *Arctium minus*
 Chicory *Cichorium intybus*
 Clover *Trifolium pratense*
 Dayflower *Commelina virginica*
 Forget-me-not *Myosotis scorpioides*
 Indian Tobacco *Lobelia inflata*
 Lobelia, Spiked *Lobelia spicata*
 Loosestrife *Lythrum salicaria*
 Milkweed *Asclepias purpurascens*
 Mint *Mentha arvensis*
 Monkey flower *Mimulus ringens*
 Phlox *Phlox paniculata*
 Pickerelweed *Pontederia cordata*
 Selfheal *Prunella vulgaris*
 Skullcap, Mad-dog *Scutellaria laterifolia*
 Skullcap, Marsh *Scutellaria epilobiifolia*
 Venus' Looking-glass *Specularia perfoliata*
 Vervain *Verbena hastata*
 Viper's Bugloss *Echium vulgare*

AUTUMN

Late August, September, October

White/Green

Aster, Small-flowered *Aster vimineus*
 Aster, White Wood *Aster divaricatus*
 Aster, Calico *Aster lateriflorus*
 Aster, Heath *Aster pilosus*
 Aster, Tradescant's *Aster tradescanti*
 Hempweed *Mikania scandens*
 Ladies' Tresses, Grass-leaved *Spiranthes vernalis*
 Silver-rod *Solidago bicolor*
 Turtlehead *Chelone glabra*
 Water-horehound *Lycopus americanus*
 White Snakeroot *Eupatorium rugosum*

Yellow/Orange

Beggar Ticks *Bidens aristosa*
 Goldenrod, Canada *Solidago canadensis*
 Goldenrod, Early *Solidago juncea*
 Goldenrod, Grass-leaved *Solidago graminifolia*
 Goldenrod, Rough-stemmed *Solidago rugosa*
 Goldenrod, Tall *Solidago altissima*
 Goldenrod, Broad-leaved *Solidago flexicaulis*
 Jerusalem Artichoke *Helianthus tuberosus*
 Sunflower, Giant *Helianthus giganteus*
 Witch Hazel *Hamamelis virginiana*

Pink/Red

Cardinal Flower *Lobelia cardinalis*
 Gerardia, Purple *Gerardia purpurea*
 Gerardia, White *Gerardia albiflora*
 Spotted Joe-Pye Weed *Eupatorium maculatum*
 Joe-Pye Weed *Eupatorium dubium*

Purple/Blue

Aster, New England *Aster novae-angliae*
 Aster, Purple-stemmed *Aster puniceus*
 Aster, Smooth *Aster laevis*
 Blazing Star *Liatris spicata*
 Gentian, Closed *Gentiana andrewsii*
 Ironweed *Veronia noveboracensis*



U.S. FISH AND WILDLIFE SERVICE

Great Swamp 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 marine mammals and threatened and endangered species.

For further information contact:

Refuge Manager
Great Swamp National Wildlife Refuge
RD #1, Box 152
Basking Ridge, New Jersey 07920
Telephone: (201) 647-1222



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

August 1988

RL-53520-7

Reptiles, Amphibians and Fishes



Piercing eyes and trembling tongues, croaking and peeping in spring, and a ripple in a pond. These are the animals listed in this leaflet. They can be found on the Great Swamp Refuge.

Great Swamp National Wildlife Refuge

The following list includes the reptiles, amphibians and fishes known to be present on the refuge. The common names, scientific names, and order of listing follow Roger Conant's A Field Guide to Reptiles and Amphibians of Eastern North America, 1975.

Numerous reptiles and amphibians are permanent residents of the Great Swamp. During the warm months a careful observer will catch a glimpse of many of them as they scurry for cover.

* Species listed as "Endangered" (E) or "Threatened" (T) by the New Jersey Department of Environmental Protection.

REPTILES

Snapping Turtle (*Chelydra serpentina*). Common. Inhabits any permanent water but most abundant in swamp. Snapping turtles feeding on ducklings is a matter of concern, and some local control is exercised. Some specimens weigh 30 to 40 pounds.

Stinkpot (Musk Turtle) (*Sternotherus odoratus*). Common. Inhabits still water or sluggish streams. Feeds on bottom where brown shell blends with mud, making it inconspicuous.

Eastern Mud Turtle (*Kinosternon subrubrum*). Uncommon. Inhabits still, shallow areas of swamps, marshes, and ponds.

Spotted Turtle (*Clemmys guttata*). Common. Inhabits shallows in swamps or small ponds.



* **Bog Turtle** (*Clemmys muhlenbergi*). Rare. (E) One of the rarest species of turtle in the eastern United States. Inhabits swamps, *Sphagnum* bogs, and slow-moving streams.

* **Wood Turtle** (*Clemmys insculpta*). Uncommon. (T) Although often found on land, it also lives in swamps. May be seen in almost any habitat in the area during the summer. Hibernates under water.

Eastern Box Turtle (*Terrapene carolina*). Common in woods and fields, usually in drier uplands but may also be found along water.

Eastern Painted Turtle (*Chrysemys picta*). Very common. Most conspicuous when sun-bathing. Lives in permanent and temporary bodies of water, usually where vegetation is thick and the bottom muddy.

Five-lined Skink (*Eumeces fasciatus*). Rare. Inhabits woodlands with dry-leaf litter and rocks. Lives in or under rotted logs or under stones and is therefore seldom observed.

Northern Water Snake (*Natrix sipedon*). Common. Found in all aquatic habitats in the refuge. Best observed swimming or basking in the sun during spring and summer.

Northern Brown Snake (*Storeria dekayi*). Common. Lives under logs or rocks or woods but most often at the edges of fields and meadows.

Eastern Ribbon Snake (*Thamnophis sauritus*). Common. Inhabits all aquatic situations and seldom wanders far from water. Forages in vegetation at edges of ponds, streams, and swamps.

Eastern Garter Snake (*Thamnophis sirtalis*). Common. Most easily observed in aquatic habitats but also occurs in meadows and woodlands.

Earth Snake (*Virginia valeriae*). Very rare. Inhabits wooded areas where it lives under logs or rocks. May spend most of its time underground.

Eastern Hognose Snake (*Heterodon platyrhinos*). Uncommon. Open, sunny woods, especially with sandy soil, are preferred but also found in fields and meadows.

Northern Ringneck Snake (*Diadophis punctatus edwardsi*). Uncommon. Very secretive, lives under bark, rocks and in or under logs. Most abundant on wooded slopes.

Eastern Worm Snake (*Carphophis amoenus*). Uncommon. Burrows in rich moist soil, humus, or rotted wood in wet woodlands or moist areas of upland woods.

Northern Black Racer (*Coluber constrictor*). Uncommon. Found in all terrestrial and swamp habitats. In the spring it abounds in fields but prefers open woods during the summer.

Eastern Smooth Green Snake (*Opheodrys vernalis*). Rare. Inhabits grassy areas of woods but most common in fields and meadows.

Black Rat Snake (*Elaphe obsoleta*). Uncommon. Inhabits wooded and rocky areas.

Eastern Milk Snake (*Lampropeltis triangulum*). Uncommon. Lives in most terrestrial habitats using logs and rocks for cover. Some refuge visitors mistake this harmless snake for the Copperhead, which is not found here.

AMPHIBIANS

* **Blue-spotted Salamander** (*Ambystoma laterale*). Common but secretive. (E) Adults live underground most of the year but emerge to breed during the first thaw (March). Eggs deposited in small ponds. Larval period from April to July. Juveniles common in woodlands from August to November. Known only from Essex, Morris and Somerset Counties in New Jersey.

Red-spotted Newt (Red Eft, land stage) (*Notophthalmus viridescens*). Common. Adults and larvae inhabit all standing water habitats. Terrestrial eft found in woodlands with moist leaf litter.

Northern Dusky Salamander (*Desmognathus fuscus*). Uncommon. Found along small streams or near springs. Adults and larvae found under rocks or logs in water at edges of streams.



Red-backed Salamander (*Plethodon cinereus*). Common. Found under logs, bark, or rocks in moist wooded areas. In many individuals the dorsal red color is lacking.

Slimy Salamander (*Plethodon glutinosus*). Uncommon. Inhabits drier slopes in wooded areas where it lives in or under rotted logs or under rocks.

Four-toed Salamander (*Hemidactylium scutatum*). Rare. Inhabits *Sphagnum* bogs. Most abundant March through May.

American Toad (*Bufo americanus*). Common. Breeds in ponds and pools during March and April. Adults common in moist woods.

Fowler's Toad (*Bufo woodhousei fowleri*). Common. Breeds in meadows, shallow ponds or pools, and swamp margins during April and May. Adults common in meadows and woodlands.

Northern Cricket Frog (*Acris crepitans*). Common. Breeds in May or June at shallow margins of any standing water. Prefers open areas but also found in woods.

Northern Spring Peeper (*Hyla crucifer*). Very common. Breeds during March and April in any shallow, standing water. Adults climb in low vegetation, usually grasses and reeds, during non-breeding season.

Gray Treefrog (*Hyla versicolor*). Common. Breeds during late April or May in ponds or at edge of swamp. Adults live in trees during the remainder of the year.

New Jersey Chorus Frog (*Pseudacris triseriata kalmi*). Common. Breeds during March or early April in grassy areas of any standing water. Adults secretive when not breeding.

Upland Chorus Frog (*Pseudacris triseriata feriarum*). Uncommon. Inhabits grassy swales, moist woodlands, river bottom swamps, ponds, bogs, and marshes.

Bullfrog (*Rana catesbeiana*). Common. Breeds during May and June in deeper, permanent water. Adults widespread in all aquatic habitats.

Green Frog (*Rana clamitans melanota*). Very common. Breeds in any standing water during late April or early May. Adults abundant along streams, swamps, ponds, and marshy areas.

Northern Leopard Frog (*Rana pipiens*). Very common. Breeds in swamp, ponds, and meadows during April. Adults are common near any water during summer.

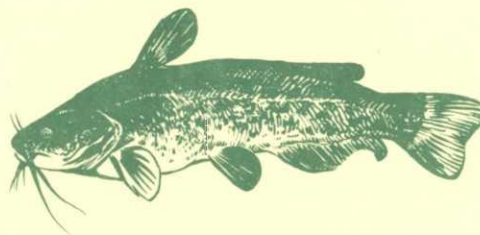
Pickereel Frog (*Rana palustris*). Uncommon. Breeds during March or April in permanent ponds or deeper, open portions of swamp. Adults remain in or near water.

Wood Frog (*Rana sylvatica*). Common. Breeds in shallow woodlands ponds during March (first thaw). Adults common in leaf litter of wet woodlands.

FISHES

The fish on the Great Swamp Refuge are warmwater, freshwater species. Most are of the type that can tolerate shallow water with fluctuating levels, low in oxygen. Game fish are not numerous. There are 29 species of fish on the refuge.

White Sucker (*Catostomus commersoni*)
Creek Chubsucker (*Erimyzon oblongus*)
Carp (*Cyprinus carpio*)
Golden Shiner (*Notemigonus crysoleucas*)
Brown Bullhead (*Ictalurus nebulosus*)



Chain Pickerel (*Esox niger*)
Eastern Mudminnow (*Umbra pygmaea*)
Redfin Pickerel (*Esox americanus*)
American Eel (*Anguilla rostrata*)
Smallmouth Bass (*Micropterus dolomieu*)
Largemouth Bass (*Micropterus salmoides*)
Banded Sunfish (*Enneacanthus obesus*)
Pumpkinseed (*Lepomis gibbosus*)
Bluegill (*Lepomis macrochirus*)
Black Crappie (*Pomoxis nigromaculatus*)
Tessalated Darter (*Etheostoma olmstedii*)
Redbreast Sunfish (*Lepomis auritus*)
Fallfish (*Semotilus corporalis*)
Common Shiner (*Notropis cornutus*)
Spottail Shiner (*Notropis hudsonius*)
Yellow Bullhead (*Ictalurus natalis*)
Bluespotted Sunfish (*Enneacanthus gloriosus*)
Satinfin Shiner (*Notropis analostanus*)
Mud Sunfish (*Acantharchus pomotis*)
Spotfin Shiner (*Notropis spilopterus*)
Green Sunfish (*Lepomis cyanellus*)
Blacknose Dace (*Rhinichthys atratulus*)
Creek Chub (*Semotilus atromaculatus*)
Brook Trout (*Salvelinus fontinalis*)

U.S. Fish and Wildlife Service

Great Swamp is one of more than 470 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 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 marine mammals and threatened and endangered species.

Illustrations by Mary Friel O'Connor



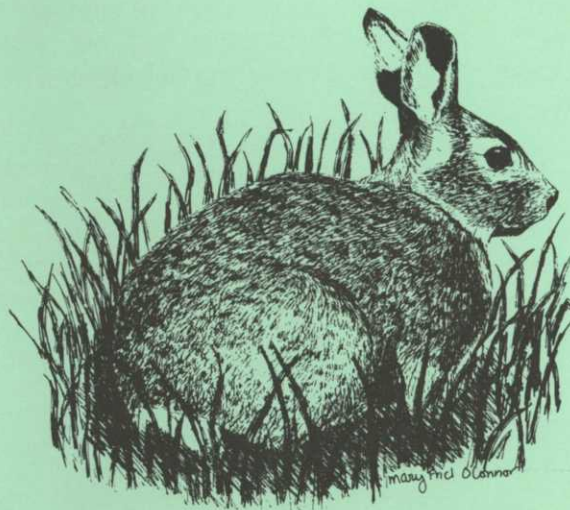
DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

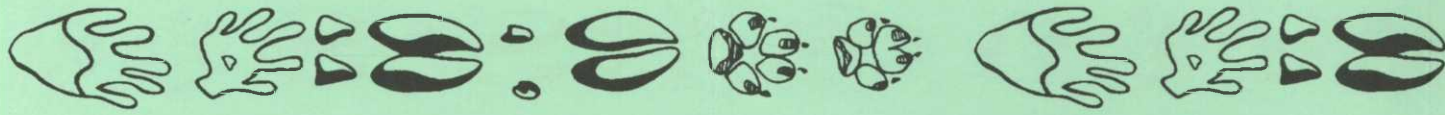
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August 1991

Mammals of Great Swamp

National Wildlife Refuge





Mammals of the Great Swamp National Wildlife Refuge

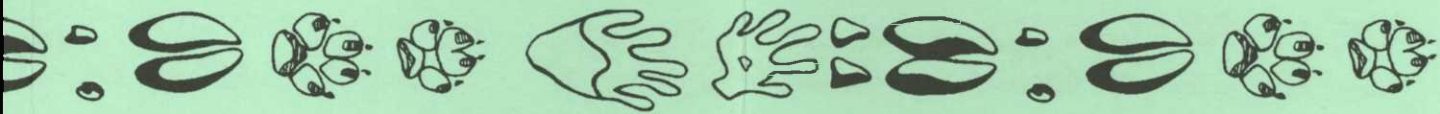
Great Swamp National Wildlife Refuge is in north-central New Jersey in Morris County. The Refuge contains approximately 7,200 acres of hardwood swamp, upland timber, brush, marsh and ponds, and poorly drained pasture. In 1968, the eastern half of the Refuge was designated as a Wilderness Area - to be left forever wild.

Although established primarily to preserve habitat for migratory birds, there is an abundance of other wildlife, including many mammals. Toward evening visitors are likely to see whitetail deer grazing in fields. The red fox and raccoon are common but rarely seen during daylight hours. Muskrats are frequently seen in wet areas at dawn and dusk - especially during the spring.

The following list was prepared in cooperation with the Biology Department at Fairleigh Dickinson University. Scientific names generally follow Hall, *The Mammals of North America, Second Edition*. Common names and order of listing are given in Burt and Grossenheider, *A Field Guide to the Mammals*.

- **Opossum**
(*Didelphis virginiana*)
Common along streams and marshes near woodland.
- **Masked Shrew**
(*Sorex cinerus*)
Found in poorly drained fields.
- **Smoky Shrew**
(*Sorex fumeus*)
Inhabits moist fields.
- **Short-tailed Shrew**
(*Blarina brevicauda*)
Common in wooded and swampy areas.
- **Starnose Mole**
(*Condylura cristata*)
Abundant in vicinity of swamps and brooks.
- **Little Brown Myotis (Bat)**
(*Myotis lucifugus*)
Numerous but rarely seen. Roosts in hollow trees and under eaves.
- **Red Bat**
(*Lasiurus borealis*)
This solitary creature is occasionally seen during the day flying along wooded streams.
- **Black Bear**
(*Ursus americanus*)
Rarely observed on the Refuge.





— **Raccoon**
(*Procyon lotor*)
Very numerous over the entire Refuge.

— **Longtail Weasel**
(*Mustela frenata*)
A common but infrequently seen inhabitant of upland areas.

— **Mink**
(*Mustela vison*)
Fairly common in wet areas but rarely seen.

— **River Otter**
(*Lutra canadensis*)
Extirpated in the Great Swamp until it reappeared in the 1970's. Now present in small numbers and thought to be reproducing.

— **Striped Skunk**
(*Mephitis mephitis*)
Common but seldom seen.

— **Red Fox**
(*Vulpes vulpes*)
Very common throughout the Refuge.

— **Gray Fox**
(*Urocyon cinereoargenteus*)
Fairly common in brushy woodlands.

— **Woodchuck**
(*Marmota monax*)
Occasionally seen near their burrows in dry upland fields and woodlands.

— **Eastern Chipmunk**
(*Tamias striatus*)
Commonly found in upland woods.

— **Eastern Gray Squirrel**
(*Sciurus carolinensis*)
Very common in upland hardwoods. When hollow trees are in short supply, look for their round, leaf nests constructed high in the tops of trees.

— **Red Squirrel**
(*Tamiasciurus hudsonicus*)
May be seen in evergreen trees or surrounding hardwoods.

— **Southern Flying Squirrel**
(*Glaucomys volans*)
Fairly common, but seldom seen during the day.

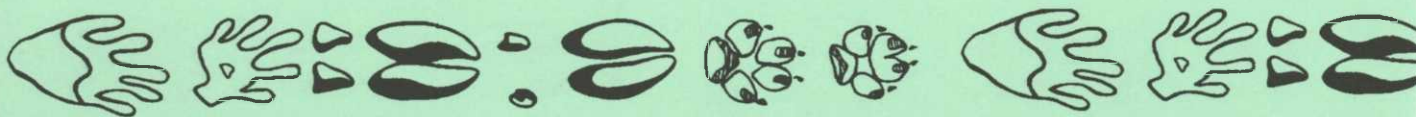
— **Beaver**
(*Castor canadensis*)
Rarely seen throughout the Refuge.

— **White-footed Mouse**
(*Peromyscus leucopus*)
Abundant in woodland areas.

— **Gapper's Redback Vole**
(*Clethrionomys gapperi*)
A ground-dwelling vole of damp and cool forests.

— **Meadow Vole**
(*Microtus pennsylvanicus*)
Common in fields and grassy areas.





— **Pine Vole**

(*Microtus pinetorum*)

Found primarily in hardwood areas, in contrast to common name.

— **Muskrat**

(*Ondatra zibethicus*)

Abundant where there is water. Look for their mound-shaped houses in swamps and marshes.

— **Norway Rat**

(*Rattus norvegicus*)

Found in and around old farm buildings.

— **House Mouse**

(*Mus musculus*)

Present in buildings and fields.

— **Meadow Jumping Mouse**

(*Zapus hudsonius*)

Occasionally seen in fields. May be mistaken for frogs when seen jumping through the grass.

— **Woodland Jumping Mouse**

(*Napaeozapus insignis*)

Found in wet and heavily wooded areas.

— **Eastern Cottontail**

(*Sylvilagus floridanus*)

Seen frequently in brushy upland areas.

— **Whitetail Deer**

(*Odocoileus virginianus*)

Very common throughout the Refuge. Viewing opportunities best in early morning and early evening.

— **Human Being**

(*Homo sapiens*)

Often neglected as belonging to the kingdom of animals. Like other mammals, this species requires clean air to breathe, pure water to drink, unpoisoned food, and open space in which to roam.

Other species are probably present on the Refuge but have not yet been verified. Reports of additional species are welcome. Please contact:

Refuge Manager
Great Swamp National Wildlife Refuge
Pleasant Plains Road, RD 1, Box 152
Basking Ridge, New Jersey 07920-9615
Telephone (201) 425-1222





Newsletter of the USDA Great Swamp Hydrologic Unit Area Project

Vol. 2 No. 3 February 1993

Great Swamp HUA Project and business

by Madalene Curie Bruun
and Sabine von Aulock

During the fall of 1992, an inventory was made of businesses within Great Swamp's 55-square-mile watershed by project cooperators assisting the U.S. Department of Agriculture (USDA) Great Swamp Hydrologic Unit Area (HUA) Project. The purpose was to add businesses to the Swamp Sounds mailing list.

As part of its public participation efforts, the USDA and cooperating agencies are actively seeking the input and cooperation of diverse audiences, including watershed businesses and industry.

For businesses, the Great Swamp Project offers specific benefits including:

1) **Providing this free** newsletter Swamp Sounds, which offers news about ongoing/planned project activities in your watershed;

2) Providing demonstration projects which show methods that

promote water quality enhancement such as beneficial lawn-care practices, and riparian forest buffers;

3) **Providing a forum for** discussion of business concerns through the project's Technical Advisory Committee; and

4) Providing a mechanism (such as an article in Swamp Sounds) by which your concerns can be voiced.

In addition, the following

(see BUSINESS on page 7)

Forest buffers improve runoff

by Roxane Palone
Watershed Specialist
USDA Forest Service

Residents of Morris and Somerset counties who live in the 55-square-mile Great Swamp watershed take much pride in their homes and communities, and great care to maintain beautiful landscapes.

Yet residents can still have beautiful lawns and gardens and enhance water quality flowing to Great Swamp. This may be accomplished by retaining/establishing riparian forest buffers



Boardwalk trails snake through Great Swamp National Wildlife Refuge. Photo: Michael T. Olohan

along tributaries that flow into Great Swamp National Wildlife Refuge.

Simply put, a riparian forest buffer is an area of vegetation designed specifically to intercept water flowing above and below ground, usually between cropland and an adjacent stream. However, in urban areas a forest buffer may minimize the effects of lawn chemicals, septic systems, and stormwater runoff.

Forest buffers offer many benefits to Great Swamp watershed and its residents. They include reduced flood damage, retention of wildlife habitat, reduced air and noise pollution,

(see BUFFERS on page 7)

Great Swamp HUA: Here's the beef

by **Michael T. Olohan**
Public Information Manager
USDA Great Swamp HUA Project

The Great Swamp Hydrologic Unit Area (HUA) Project - one of less than 12 urban HUAs out of 74 nationwide - is focused on field studies and developing hands-on tools to control nonpoint sources of contamination in Great Swamp watershed.

Specific Great Swamp
HUA Project results so far include field activities to investigate and address nonpoint source problems. This past summer, USDA developed a current baseline on in-stream water quality by conducting a macroinvertebrate sampling survey of Great Swamp tributaries. The survey findings were disseminated and discussed widely at local public meetings and reported in media coverage. A followup survey will be conducted in 1993.

Currently, a watershed-

WATERSHED WATCH

wide hydrology study is underway to collect data on stream flow conditions. This water quantity information will be useful in modeling efforts that could help indicate where future nonpoint source remediation

efforts might be better focused for short- and long-term improvements in local water resources.

One of the pilot efforts initiated by Rutgers Cooperative Extension of Morris County will feature plots of different types of lawn grasses at Frelinghuysen Arboretum, Hanover Avenue, Morris Township. Ed Milewski, Morris County agricultural agent, has planted seven different grass varieties, ranging from common Kentucky bluegrass to perennial ryegrass and tall fescues.

Milewski will vary the fertilizer amounts and applications for each type of grass to give home landscapers the opportunity to compare the low-input (less water, fertilizer, maintenance, and cost) versus the high-input grass types

"...these efforts are providing new information and hands-on tools that are subtly influencing people's thinking about local land use ... and regional environmental issues..."

(continuous watering, fertilizing, maintenance and expense.)

Another accomplishment is data acquisition and development for use in a geographic information system (GIS). The GIS is a computerized software system that combines mapping analysis and data storage.

The GIS can analyze the data graphically via maps and tabularly via data tables. The maps can show highly detailed depictions of subwatersheds while the data tables provide the actual numbers that are illustrated on the maps.

Other 1992 accomplishments include: interagency meetings with local sanitarians, environmental commissioners, and planners; a Great Swamp bibliography; a watershed detention basin inventory report; a public participation effort that addresses major constituencies; a survey of selected watershed homeowners' lawn-care practices; further refinement of a watershed nonpoint source water quality model; and compilation of municipal nonpoint source ordinances for local dissemination.

All of these efforts are providing new information and hands-on tools that are subtly influencing people's thinking about local land use, lifestyles, and regional environmental issues. Those are results that will pay big dividends for years to come.



Swamp Sounds is published quarterly by Rutgers Cooperative Extension, New Jersey Agricultural Experiment Station, Cook College, with participation from the USDA Soil Conservation Service, and USDA Agricultural Stabilization and Conservation Service.

The views expressed here do not necessarily represent Rutgers Cooperative Extension (RCE), USDA Soil Conservation Service (SCS), or the Agricultural Stabilization and Conservation Service (ASCS). Moreover, no endorsements for any causes or products are implied or intended by RCE, SCS, or ASCS.

Theodore B. Shelton

Theodore B. Shelton, Ph.D.
Extension Specialist in Water Resources Management
Project Director

Michael T. Olohan, Editor and Designer
Swamp Sounds
Public Information Manager
USDA Great Swamp Hydrologic Unit Area Project

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Desktop publishing assistant: Susan Lance.

Great Swamp Contacts

Michael T. Olohan
Public Information Manager
Department of
Natural Resources
P.O. Box 231
Cook College
New Brunswick, NJ 08903
908-932-9634
FAX: 908-932-8644

Thomas Drewes
Assistant State
Conservationist (WR)
USDA Soil
Conservation Service
1370 Hamilton Street
Somerset, NJ 08873
908-246-1662 (x-124)

Joseph Dunn
District Director
Morris County Soil
Conservation District
Morris County Courthouse
P.O. Box 900
Morristown, NJ 07963-0900
201-538-1557

Peter DeWilde
Executive Director
USDA Agricultural
Stabilization and
Conservation Service
Mastoris Professional Plaza
163 Route 130
Bldg. 1, Suite E
Bordentown, NJ 08505
609-298-3446

TECHNOLOGY

Great Swamp GIS: Mapping options

A new tool that may help planners, developers, citizens, public officials and environmental activists work together is being developed by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as part of the USDA Great Swamp Hydrologic Unit Area Project.

The new tool is a geo-graphic information system - a computerized software system that combines mapping analysis and data storage. The data may be stored spatially so that a variety of databases may be accurately portrayed geographically on a computer-generated map.

USDA's Great Swamp GIS has four major components. Phase I includes the data acquisition and development. So far, a soils data layer (based on SCS county soil surveys), present land cover data layer (with Morris County Planning Board assistance), and hydrography data layer (showing stream networks) have been input into the Great Swamp GIS.

For example, the Great Swamp GIS - using GRASS (Geographic Resource Analysis and Support System) software - will include data layers for the following: soils, current land cover, future land cover, aquifer recharge areas, freshwater wetlands, sewage and water infrastructure, the 1992 stream macroinvertebrate survey, subwatersheds, topography, detention basins, population density, and 1988 and 1992 classified satellite imagery for watershed land cover, according to Joanne Vogel, state geographer, SCS.

The databases, often called "layers" of information, may be called up by computer commands

and overlaid one on top of another. This enables a planner or citizen to visually grasp the interconnections between natural and man-made variables.

The GIS allows local/ regional community leaders to examine local land-use decisions from a "watershed perspective" since a GIS can depict graphically the extent and spatial distribution of any specific data that can be represented on a map, said Vogel.

Phase II in GIS development is data analysis - the capability to ask questions of the data and to show the spatial distribution of the data on maps. Portraying the data on maps and producing maps will enable planners and residents to get a first-hand look at where potential problems may occur or be occurring.

Phase III will be using the GIS data layers in a spatial model to help assess and identify existing/potential water quality situations. The Water Resources Assessment Tool (WRAT) model developed at Rutgers University will be used to provide a "first cut" prediction of nonpoint source "hot spots" for further follow-up.

Phase IV will include putting the GIS information together in a user-friendly format for interested watershed groups and individuals. This may include a video, demonstration diskette, or portable computer demonstration, Vogel said.

Vogel said SCS could develop cooperative agreements with parties interested in developing a data layer or exchanging existing data with SCS for input into the Great Swamp GIS.

For more information on GIS, phone Tom Drewes, USDA SCS Assistant State Conservationist for Water Resources, at 908-246-1205, extension 124.

HUA reports '92 progress

The 1992 USDA Great Swamp Hydrologic Unit Area Project "Accomplishments Report" submitted in November to USDA, Washington details progress in eight key areas.

The three USDA agencies that initiated the HUA effort - Soil Conservation Service, Rutgers Cooperative Extension and Agricultural Stabilization and Conservation Service - conducted/coordinated most activities described in the 11-page summary.

The report describes the HUA project, identifies water quality problems and baseline conditions, lists HUA project objectives, and details a comprehensive HUA project evaluation strategy. It also provides detail on annual accomplishments.

The 1992 accomplishments include:

- * HUA and nonpoint source information/education activities
- * creation/implementation of a public participation plan
- * database development for a geographic information system
- * analysis of soil test results in watershed vicinity
- * survey of septic system numbers, status, and trends
- * numbers, types, locations of domestic/agricultural animals by municipality
- * macroinvertebrate survey of streams
- * interagency coordination/cooperation

A major HUA project accomplishment was a macroinvertebrate survey to determine water quality in Great Swamp's five major tributaries. This biological survey - conducted last sum-

1992 PROGRESS REPORT

mer - identified numbers and diversity of pollution intolerant and pollution tolerant organisms in each stream segment sampled. The scientific method used, Beck's Biotic Index, provided an overall ranking of each tributary based upon the biota living there.

To spread the word about HUA project news, Rutgers Cooperative Extension conducted information and education activities including production of a quarterly newsletter Swamp Sounds (this is the seventh issue), targeted mailings to specific audiences, (environmental commissions, agricultural landowners, local mayors), news releases to local/regional media, audiovisual presentations to local groups, business organizations, and civic groups, placement of six portable HUA displays, updating of a growing mailing list, and development of fact sheets on low/no-phosphorous fertilizers, registered septic system cleaners, and questions for lawn-care services.

In addition, a HUA project logo and letterhead were created, and planning for a 1993 "Great Swamp Forum" to address regional HUA nonpoint source (NPS) issues is underway.

Interagency HUA working groups produced a "Public Participation Plan" in May 1992 and began outreach activities to agriculture, business/industry (see article p.1), homeowners, public officials and public-interest groups to inform them of the HUA effort and its benefits.

Another important accomplishment was development and inputting of data for a Great Swamp geographic information system (see article p. 3).

To get a better handle on soil phosphorous levels in the Great Swamp watershed vicinity, Dr. Harry Motto, Rutgers Univer-

sity Department of Environmental Science provided 1990-1991 soil test results. Based on these, HUA staff concluded that 76% of watershed homeowner soil samples were high to very high in phosphorous.

Following up on these findings, another FY 1992 accomplishment was implementation of a low-input lawn care demonstration project. The effort - being conducted at Frelinghuysen Arboretum, Morris Township by Rutgers Cooperative Extension - will exhibit and compare the water, fertilizer, and maintenance needs for different grass varieties.

Another accomplishment included consultations with local health officials to detail the variety, extent, and causes of septic system problems in Great Swamp watershed. Septage haulers operating in the watershed were also interviewed to determine the level of regular maintenance among septic system owners.

Continuing to collect data on sources of nutrients to Great Swamp, HUA staff obtained domestic animal populations via a survey of local clerks. Agricultural animal numbers were determined based upon state farmland assessment records. Moreover, HUA staff determined where pooper-scooper laws currently exist. (See "The 'scoop' on dogs" on page 8.)

Four quarterly HUA Technical Advisory Committee (TAC) meetings were held in 1992 and minutes of the meetings are available via the local sponsors or HUA public information manager.

Copies of USDA's 1992 Great Swamp HUA Project "Accomplishments Report" are available free from: Irene Lieberman, public information officer, USDA Soil Conservation Service, 1370 Hamilton Street, Somerset, NJ 08873.

Stopping stormwater pollution at its source

by Larry A. Roesner, Ph.D., P.E.
and Marlene A. Hobel

The recent federal stormwater regulations, released by the U.S. Environmental Protection Agency in late 1990, are changing the way municipalities and industries manage stormwater runoff.

Municipalities with populations greater than 100,000 and all industries are being required to obtain National Pollutant Discharge Elimination System (NPDES) permits for their stormwater discharges. As part of these permitting requirements, these entities must develop a stormwater management program that will reduce stormwater discharges to the maximum extent practicable.

Urban land areas, even residential areas, introduce pollutants into runoff: heavy metals, chemicals, nutrients, oil and grease, bacteria, and sediments. The sources of these pollutants are the atmosphere, fertilizers, pesticides, and herbicides applied to the planted urban landscape, vehicular activity, and the disposal of waste products in the drainage system.

There are two types of best management practices (BMPs) for controlling pollution in urban runoff: 1) source controls, which prevent pollutants from ever coming into contact with urban runoff, and 2) structural controls, which remove pollutants from the runoff.

The various structural BMPs for treating stormwater pollution - detention basins, infiltration devices, swales and filter strips - are more properly applied during new development and redevelopment, since they

RUNOFF LAWS/BMPs

generally require dedication of land, acquisition of rights-of-way, and construction.

Source controls, however, are often considered the more cost-effective practice in developed areas because they preclude the cost of retrofitting structural controls. Source controls are practices that prevent or minimize contact between pollutants and stormwater runoff. According to the U.S. Environmental Protection Agency, source controls include any practice that:

- * Excludes inappropriate discharges to storm drains;
- * Reduces the amounts of accumulated pollutants on the land surface available for washoff by rainfall;
- * Regulates the amount of impervious area to reduce runoff.

The NPDES stormwater permit requires dry weather screening of outfalls to identify "inappropriate connections" to the storm drainage system. Inappropriate connections are direct connections of non-stormwater discharges to the storm drainage system.

These can include sanitary sewers, septic tanks, industrial washwater drains, and cooling water discharges. Some of these connections may be the result of incorrect plumbing, illegal connections, or connections that were approved in the past but are no longer accepted practice.

In addition to eliminating any inappropriate connections to the storm drainage system, commercial and industrial businesses can control rainfall from contacting any potential pollutants used or stored at their facilities. These include:

- * **Covering chemical**

storage areas at warehouses loading docks and retail outlets, and any chemical stockpiles, such as de-icing chemicals;

- * Providing adequate spill control and containment measures;

- * **Collecting and recycling** waste products such as used motor oil solvents, and photographic chemicals.

While source controls reduce, to some extent, pollutants in urban runoff, EPA notes that the overall effectiveness of source controls for stormwater quality management is unknown.

In the interim, however, source controls are probably the most cost-effective measures that can be taken on existing urbanized areas and can be considered valuable tools for stormwater quality management.

Roesner is Senior Vice President and Hobel is a Principal, at Camp Dresser and McKee Inc., Orlando, FL. This excerpt is from an article that originally appeared in Public Works magazine, September 1992 issue.

Runoff guide available now

New Jersey's Department of Environmental Protection and Energy has issued the draft Stormwater and Nonpoint Source Pollution Control Best Management Practices Manual that provides a list of recommended BMPs for urban/suburban areas.

To receive a copy, write to NJDEPE, Environmental Regulation, Office of Regulatory Policy, CN029, 401 E. State Street, Trenton, NJ 08625.

Owls and hawks: A status report

by Jim Stamey, Trustee
The Raptor Trust

(Editor's Note: The previous issue featured an article on the barred owl. Here's another view of the barred owl and its cousin, the red-shouldered hawk, two raptors that share common habitat.)

The red-shouldered hawk (*Buteo lineatus*) is a medium-sized hawk measuring approximately 18-24 inches in height and having a wingspan of 3 1/2 to 4 feet. Red-shouldered hawks inhabit low, wet, open woodlands, usually near a river or a swamp.

The barred owl (*Strix varia*) is also medium sized and lives in deciduous woodlands, moist hardwood forests, swamps and wooded marshy areas. It usually selects a cavity in a tree or an old crow, squirrel or hawk nest in which to lay its eggs and raise its young. This site is often used year after year, so long as it remains intact and usable.

The habitat of the barred owl coincides with that of the red-shouldered hawk, the owl hunting the same area at night that the hawk hunts by day. Both raptors breed in the same area as well.

According to the Hawks of New Jersey, (Hausman, 1938) the nests of the red-shouldered hawk were more common than those of any other hawk, and the barred owl was a common, permanent resident found everywhere in the state.

Since then, however, the status of these two species has changed drastically as habitat in the state, including the area in and around the Great Swamp

National Wildlife Refuge, has been altered.

No longer common by any means, the barred owl is now a threatened species in New Jersey and the red-shouldered hawk is endangered in the state as a breeding species, largely because of the destruction and loss of needed habitat.

Red-shouldered hawks and barred owls both inhabit the Great Swamp National Wildlife Refuge. The owls breed there regularly, and the hawks have been known to breed there, although much less frequently now than in even the recent past.

With proper nesting habitat becoming increasingly more rare, there is a real problem with any increase in the water level in the Great Swamp. Since the nest sites are used year after year, an increase in water level could cause an increase in the mortality of the young birds.

Studies have shown that when suitable nest sites are not available, sites over water may then be used. Young birds not yet old enough to fly but old enough to climb out of the nest (a normal raptor activity known as "branching") can and do drop into the water and drown.

A National Wildlife Refuge should be a safe haven for all native flora and fauna. When threatened and endangered species are involved, activities in and around the area that will alter habitat and are therefore likely to further jeopardize survival should not be permitted.

Dr. Leonard Soucy, President, The Raptor Trust, Millington, conducted research used in preparing this article. The Raptor Trust is a private, non-profit, tax-exempt corporation formed in 1982 and dedicated to the preservation and well-being of birds of prey.

Further Reading

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PAGE ONE STORIES

(BUSINESS...from page 1)

project publications are available; the price and source of each publication is given in parentheses:

1) Swamp Sounds. 1991-1992 back issues (Free: Michael T. Olohan, public information manager. Listed on p. 3)

2) Low/No-Phosphorous Fertilizer Sources, Septic Cleaning Companies, Questions to Ask a Lawn-Care Company. Fact sheets. (Free: Olohan.)

3) Improving Water Quality in New Jersey: The USDA Great Swamp HUA Project. (Free brochure: Olohan.)

4) 1992 Water Quality Inventory: Macroinvertebrate Sampling Study. (Free: Irene Lieberman, public information officer, USDA SCS, 1370 Hamilton Street, Somerset, NJ 08873.)

5) Great Swamp USDA Hydrologic Unit Area Project Bibliography. October 1992. (Free: Lieberman.)

6) Septic Systems: A Background Paper of the USDA Great Swamp HUA Project. February 1993. (Free: Lieberman.)

7) Soil Phosphorous Levels: A Background Paper of the USDA Great Swamp HUA Project. January 1993. (Free: Lieberman.)

8) Morris County Detention Basin Inventory of 1992. (Charge: Morris County Soil Conservation District, Morris County Courthouse, PO Box 900,

Morristown, NJ 07963-0900.)

9) Supporting and Sustaining Agriculture in New Jersey: The USDA Great Swamp HUA Project. (Free brochure: Kent Hardmeyer, SCS District Conservationist, Morris County Courthouse, Box 900, Morristown, NJ 07963-0900.)

10) Great Swamp Watershed Hydrology Study. (Free information sheet: Hardmeyer.)

11) A Municipal Guide To Pointless Pollution. Developed Section 3 on NPS-Related Ordinances. (Free: Clean Ocean Action, Box 505, Highlands, NJ 07732.)

For information about the Great Swamp HUA Project in Morris County: Joseph Dunn, Morris County Soil Conservation District, **201-538-1557**. In Somerset County: Ernest Thurlow, Somerset-Union Soil Conservation District, **908-526-2701**.

Bruun is an Economist at USDA SCS and **von Aulock** is an Environmental Planner at Morris County Planning Board.

Clean water brochures

A series of 14 water quality brochures - the Clean Water Information Series - has been produced by the USDA Soil Conservation Service, NJ Department of Environmental Protection and Energy, Rutgers Cooperative Extension and State Soil Conservation Committee. Contact these agencies or call the local HUA sponsors listed above for details.

(BUFFERS...from page 1)

streambank stabilization, recreational opportunities and sediment control.

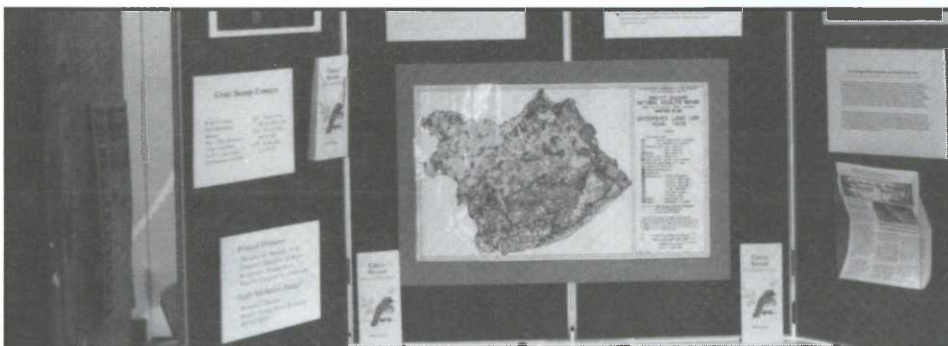
Here's how a forested buffer helps in the filtering of urban runoff. Trees with deep roots help aerate the soil and increase its infiltration capacity. Forest litter (leaves, dead plants) and humus (decomposed matter) soak up runoff and add to the ability of forest vegetation to slow and filter runoff.

This results in a more gradual release of water from the forested area, improves groundwater recharge, and helps to stabilize the dry- and wet-weather flows of nearby waterways. Well-established forest buffers may also reduce total runoff volumes, the possibility of flooding, and seasonal shortages of water.

Currently, representatives from NJ Department of Environmental Protection and Energy Parks and Forestry, USDA Forest Service, Morris County Soil Conservation District, Somerset-Union Soil Conservation District, USDA Soil Conservation Service, Rutgers Cooperative Extension, and Harding Township Environmental Commission are exploring potential sites for several riparian forest buffer demonstration projects in Great Swamp watershed.

Forest buffers also offer substantial property and community benefits. Some buffer benefits include adding value to a property by enhancing privacy, draining water away from a home, and making the neighborhood appear stately and established.

If you're interested in beginning a riparian forest buffer on your property, contact Joseph Dunn, Morris County Soil Conservation District, listed on page 3.



The USDA Great Swamp Hydrologic Unit Area Project exhibit shows a map of the watershed and describes this unique effort to reduce stormwater runoff impacts. To get the exhibit at your event, phone 908-932-9634. Photo: Michael T. Olohan

Rock salt melts ice, hurts plants

Sodium chloride (i.e. rock salt) is the de-icing compound most commonly used on New Jersey streets. Up to 1/2 inch of road salt is applied during the winter to road surfaces annually to prevent or melt ice. Some potential impacts to vegetation/plants nearby include root zone stress, soil becomes denser and compaction increases, and nutrient deficiencies.

Signs of salt-induced plant stress: branch die-back, early defoliation/browning of leaf edges. Possible solutions: leach salt through soil by adding fresh water; apply activated charcoal or gypsum at depth of 6 inches; apply abrasives (sand, cinders, gravel, sawdust) when treating a driveway or sidewalk. A note to



Keeping NJ roads clear of ice and snow requires hundreds of tons of rock salt yearly. This rock salt affects nearby vegetation. Credit: Jack Shepherd, National Wildlife Federation.

public works/private spreaders: carefully train equipment operators and calibrate equipment properly to reduce salt waste and save dollars.

More information: request Rutgers Cooperative Extension fact sheet number 663 from: Publications Distribution, P.O. Box 231, Cook College, New Brunswick, NJ 08903.

The 'scoop' on dogs

Six of 11 communities within the Great Swamp watershed have local pooper-scooper ordinances requiring pet owners to clean up after their dogs.

Samples of pooper-scooper ordinances are available from Joseph Dunn or Ernest Thurlow, local project sponsors, listed on page 3.

Rutgers Cooperative Extension
New Jersey Agricultural Experiment Station
Box 231, Cook College
Department of Natural Resources
Rutgers - The State University of New Jersey
New Brunswick, NJ 08903

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

BULK RATE
POSTAGE & FEES PAID
USDA
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OFFICIAL BUSINESS

Inside Swamp Sounds

Pages 1 and 5 in this issue feature articles focusing on business benefits under the HUA project and their role in managing nonpoint source/runoff contamination. Other articles include:

Forest buffer benefits p.1
Here's the beef! p.2
GIS: Mapping options p.3
Project accomplishments p.4
Two species: A status report p.6
Further reading p.6

Printed on recycled paper



GREAT SWAMP

National Wildlife Refuge



NEW JERSEY

WELCOME

Great Swamp National Wildlife Refuge, established in 1960, lies 26 miles west of New York City's Times Square and seven miles south of Morristown, New Jersey.

Swamp woodland, hardwood ridges, cattail marsh, and grassland typify this approximately 7,000-acre Refuge. The Swamp contains many large old oak and beech trees, stands of mountain laurel, and species of other plants of both northern and southern botanical zones.



The Refuge bird leaflet lists more than 222 species of birds according to their seasonal occurrence. Mammals found on the Refuge include the white-tailed deer, river otter, muskrat, raccoon, skunk, red fox, woodchuck, grey squirrel, opossum, and cottontail rabbit. An interesting variety of fish, reptiles, and amphibians, including the State endangered bog turtle and the blue-spotted salamander, are also found on the Refuge.

ORIGIN OF GREAT SWAMP

Roughly 25,000 years ago, where the Wisconsin glacier reached its furthest point south and stopped, the creation of Great Swamp began.

The melting glacier withdrew northward leaving a barren landscape of sand and gravel strewn in long ridges that blocked the outlet of an ancient river basin. Water, melted from the glacier, flowed into the basin behind this natural dam to form a giant lake, 30 miles long and 10 miles wide.

Eventually the retreating glacier uncovered a second outlet at what is now Little Falls Gap, and the lake waters drained out along the Passaic River. The lake disappeared and was replaced by extensive marshes and swamps which would be named Black Meadows, Great and Little Piece Meadows, Troy Meadows, Hatfield Swamp, and Great Swamp.

HISTORY

For a barrel of rum, 15 kettles, 4 pistols, 4 cutlasses plus other goods, and 30 pounds cash, the Delaware Indians in 1708 deeded a 30,000-acre tract, including the Great Swamp, to English investors.

Later, settlements dotted the area and during the Revolutionary War local settlers fashioned wagon wheel parts with wood cut from the Great Swamp. By 1844, farms appeared on cleared uplands; farmers drained marshlands; and "foul meadow hay" became a major crop.



Small farming operations such as these became uneconomical and gradually disappeared. Consequently, much of the cleared upland returned to woods and the lower flat areas reverted to swamp-land. Various modern uses have been planned for Great Swamp: flood control in the 1920's; drainage projects in the 1930's; and a jet airport proposal in 1959.

It was the threat of the jetport which enabled the Great Swamp Committee of the North American Wildlife Foundation to muster the aid of a significant number of volunteers. This effort raised more than a million dollars to purchase nearly 3,000 acres which were donated to the Department of the Interior. These acres formed the nucleus of the Great Swamp National Wildlife Refuge. Through the years, additional acres have been added to the original tract.

REFUGE MANAGEMENT

Wilderness Area - The eastern half of the Refuge was designated as a Wilderness Area by Congress in 1968. Generally, no permanent structures, motorized vehicles, or equipment are allowed. The Wilderness Area serves as an outdoor laboratory and provides a more primitive outdoor experience for the general public. Hiking on almost eight miles of trails is permitted. By limiting use in this sensitive area to foot travel, the wilderness experience can be preserved. Great Swamp was established as an area to provide migration, nesting and feeding habitat for migratory birds.

Wildlife Management Area - The western half of the Refuge is intensively managed to maintain optimum habitat for a wide variety of wildlife. Water levels are regulated; grasslands and brush are mowed periodically to maintain habitat and species diversity; shrubs are planted; nesting structures for wood ducks, bluebirds, and other birds are provided; other habitat management practices are employed; and research studies are conducted. Public access in this area is limited to the Wildlife Observation Center and Pleasant Plains Road to minimize disturbance to wildlife.



VISITOR ACTIVITIES

People are encouraged to observe, study, photograph, and just walk with nature in designated public areas. The best times for observing wildlife are early morning and late afternoon. Because of large numbers of visitors, wildlife viewing on Sunday afternoon is often less rewarding.

Waterproof footgear or old sneakers are recommended during most seasons in the Wilderness Area. Mosquitoes, ticks, and deer flies may be numerous from May to September so insect repellent and protective clothing are advisable. Ticks can transmit Lyme disease which has been found in the area.

Visitors who are driving through the Refuge on public roads are requested to stay in their cars so the wildlife they see will remain in view for those who follow.

Wildlife Observation Center - The Center, located in the Management Area off Long Hill Road, is particularly good for photography and wildlife observation. It has approximately one mile of trails, interpretive displays, an unstaffed information booth, blinds for observing wildlife, and restrooms. Please stay on the boardwalk to avoid disturbing wildlife so that others may have a chance to view the wildlife.

Tours - To prevent groups from disturbing one another and wildlife, all groups are encouraged to schedule their visit with the office. Groups of 10-15 individuals may schedule a guided tour. Movies and slide talks can also be scheduled for groups of up to 50. There are no regularly scheduled programs.

REGULATIONS

Wildlife have no restrictions. They have free run of the entire Refuge, day and night, because this is their home; people, as visitors, must be regulated.

Hours - Visitors are permitted only in the designated areas during daylight hours.

Trails are open to foot travel only.

Pets must be on a leash and remain in parking areas.

Vehicles may be parked only in designated areas.

Collecting, disturbing, or destroying plants, animals, or parts thereof, is strictly forbidden.

Camping - Picnicking and camping are not permitted on the Refuge. Two county parks in the area that do allow camping by permit are Mahlon Dickinson and Lewis Morris. For information, contact the Morris County Park Commission.

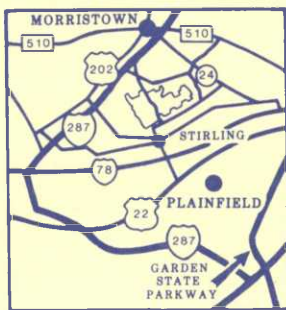
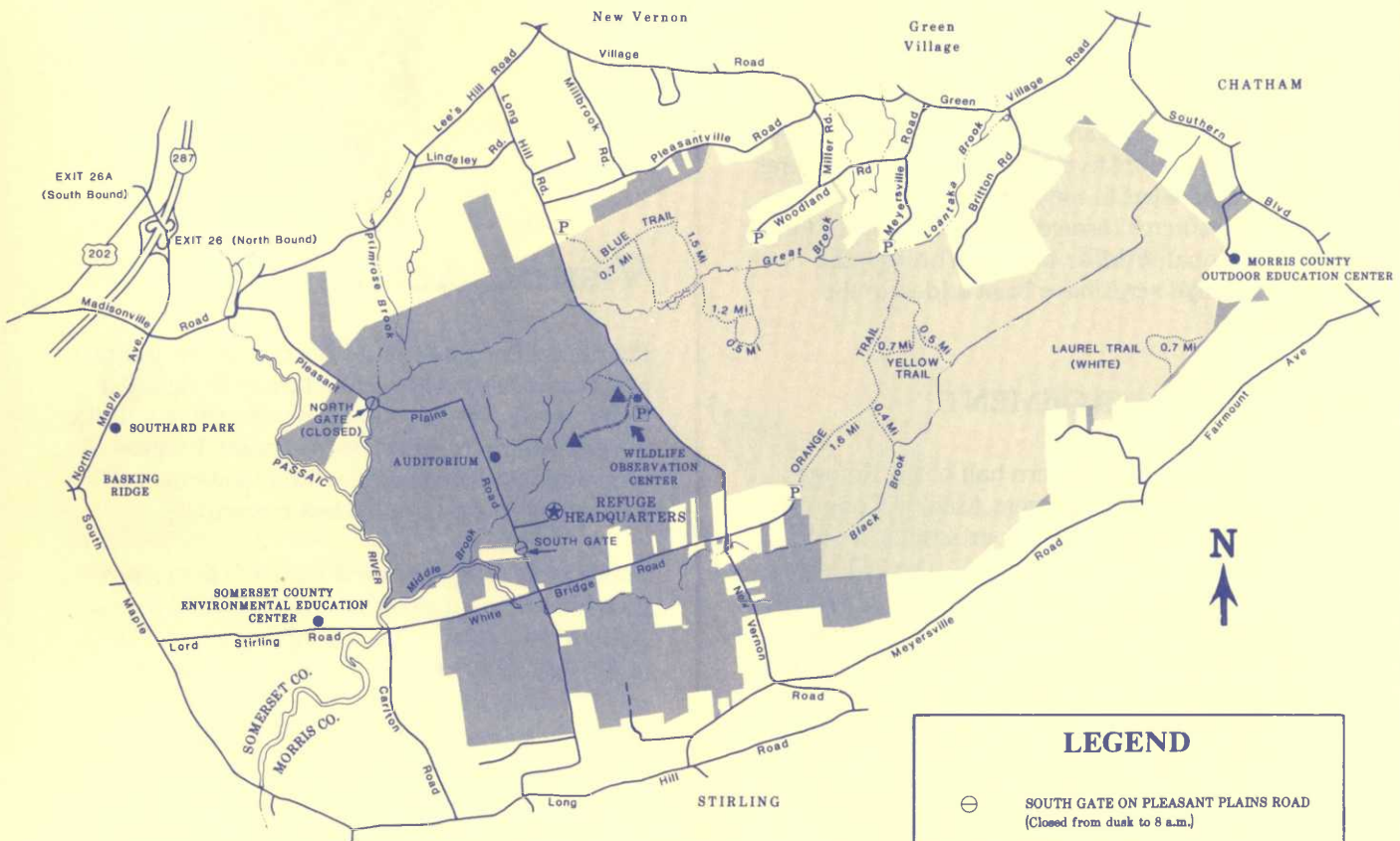
Litter - PLEASE DON'T - maybe you can recycle it!

You are responsible for knowing all Refuge regulations. If you are unsure, please inquire at headquarters.

Great Swamp National Wildlife Refuge
exists today because people care what
happens to wild animals and natural places.

GREAT SWAMP

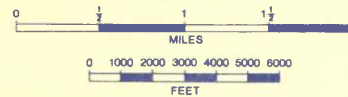
National Wildlife Refuge



LEGEND

- SOUTH GATE ON PLEASANT PLAINS ROAD
(Closed from dusk to 8 a.m.)
- RIVERS AND STREAMS
- PARKING LOTS
- WILDERNESS AREA
- MANAGEMENT AREA
- HEATED RESTROOM
- OBSERVATION/PHOTO BLIND
- TRAILS
- SELF-GUIDED INTERPRETED BOARDWALK TRAILS

SCALE

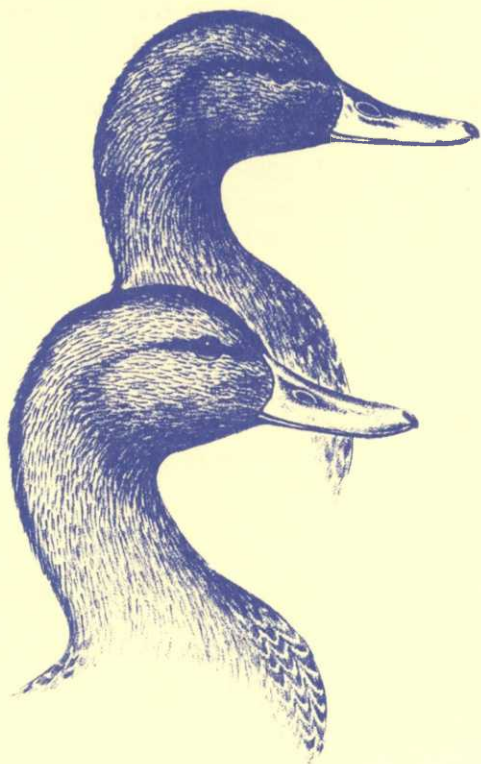


VISITOR INFORMATION

Refuge Headquarters is located on Pleasant Plains Road. Office hours are from 8:00 a.m. to 4:30 p.m., Monday through Friday. During spring and fall the refuge headquarters may be open on Sundays. Please call ahead for information.

Great Swamp Outdoor Education Center, Morris County Park Commission, is located on the eastern side of the refuge off Southern Boulevard in Chatham. The Center offers a varied natural science program of classes and guided tours, and provides one mile of trail and boardwalk for the public. Details can be obtained at the center. Telephone (201) 635-6629.

The Environmental Education Center, operated by the Somerset County Park Commission, is located on the western border of the refuge in Lord Stirling Park. The park has a varied program of environmental education courses, guided field trips, and 8-1/2 miles of walking trail. For details, telephone (201) 766-2489.



Mission: As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.

For further information contact:

Refuge Manager
Great Swamp National Wildlife Refuge
R.D. #1, Box 152
Basking Ridge, New Jersey 07920
Telephone: ~~(908) 647-1222~~

(201) 425-1222

The cover illustration of the Eastern Bluebird was donated by the North American Bluebird Society.

Take Pride in Great Swamp
National Wildlife Refuge



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

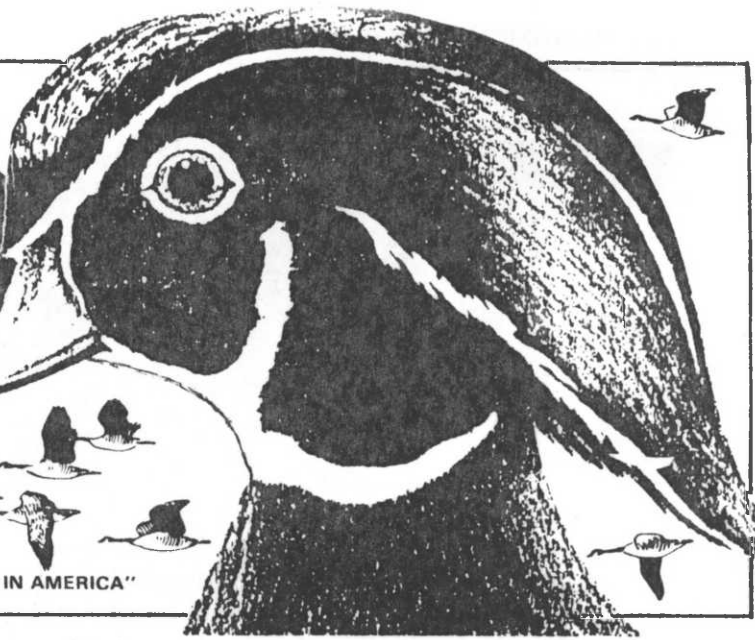
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October 1990

SWAMP TALK



"TAKE PRIDE IN GREAT SWAMP NATIONAL WILDLIFE REFUGE AND TAKE PRIDE IN AMERICA"



VOL. V, NO. I

SPRING/SUMMER 1993

GREETINGS!

New administration ideas will soon be felt by us all. What ever those ideas are we must give them our full support as we have in the past. Only this way will our country remain strong.

Budget cuts and hiring freezes are a fact of life. Although no one likes them we survive thanks to American ingenuity! To cut the deficit we will all need to make some type of sacrifice so that our children won't inherit our mistakes.

Here at Great Swamp we rely more and more on Volunteers, especially during budget cuts! We could not accomplish our tasks without your help. You play a vital role at this refuge! We appreciate your thoughts and ideas on how to improve the "system", that's American ingenuity! Keep up the good work and may you all have a healthy and prosperous 1993.

-Tom McFadden

VOLUNTEER PROGRAM UPDATE

During 1992, volunteers contributed 2,410 hours of service resulting in a 50% increase from the previous year! This is the fourth year in a row that the volunteer contributed hours have increased.

Since the program's reorganization in 1982, a total of 14,833 hours have been contributed by 701 volunteers who have ranged in age from Tiger Cub Scouts to senior citizens. This effort is equivalent to \$108,278 worth of donated time. Your continued contributions are much appreciated. Keep up the good work!



Volunteers separate recyclables from last years clean-up.

A well-deserved round of "thanks" again to all those volunteers who were active in 1992:

Richard Anderson, John Arnold, Larry Balsamo, Craig Bitler, Carmine Borzelli, Barbara Brennan, Josh Brooks, Dick Burk, Mark Caloza, John Carel, Roger Castellano, Dale Champ, Joy Champ, Carolyn Childs, Ian Childs, Maria Clinger, Allan Cossa, Sarah Cossa, Margeret, Curley, Robert Curtis, Jim Czepiel, Ken Dennis, Jim Detizio, Tom Dolce, Frances Duggan, Madge Dragon, Matthew Dragon, Tak Eng, Allan Finn, Nancey Forman, June Gazek, Mike Grego, Shirley Hamilton, Dale Holland, Lou Hinds, Charles Horvath, Gid Honsinger, Andy Jimcosky, Odette Kane, Lauretta Koch, John Kunkel, Mary Kunkel, Gary Looft, Judy Marchland, Nicole Martinez, Scott Martinez, Mike Mazur, Ruth McFadden, Dan McGuinness, Marge McGuinness, Celine Meding, Robyn Mendelsohn, Ken McNally, Alberta Mount, Ocean County Girl Scouts, Mark Payne, Mike Peluso, John Perkins - Boy Scout Troop 28 in Chatham NJ, Paul Ritter, Liz Rotella, Blaine Rothauser, Bill Ruppel - Morris County Vo-Technical School, Judy Schmidt, Martin Schwalbaum, Jean Sebesta, Marvin Sebesta, Charlie Seesselberg, Marie Shearin, Willard Shearin, Robert Shedd, Sari Shedd, Irv Tanzer, Bruce Terzulo, Bill Teobald, Mim Teobald, Robert Thopson, Liza Truffeli, Jonathan Tsang, Philip Tsang, Bernie Tulman, Marge Tyndall, Tim Waugh, and Cliff Zimmer.

Our Annual Volunteer Recognition Dinner is planned for Friday, April 16, 1993 at 6:00 PM. The pot luck dinner will be held at Refuge Headquarters. All active volunteers and their spouses are invited. Volunteers that plan to attend are asked to bring a dish if possible and RSVP by March 29 by calling Refuge Headquarters at 201-425-1222.



Volunteers enjoyed good food and good company at the 1992 Annual Volunteer Dinner

VOLUNTEER PROGRAM UPDATE - CONTINUED



Volunteer Al Cossa assists visitors with a smile! Nice Vest All!

Some of the activities that volunteers were involved in last year included deer hunt assistance; visitor assistance; trail patrol; litter pick-up; hunter safety education along with firearm range instruction; trail maintenance and facility maintenance; YCC assistance; wood duck box checks and construction; computer assistance; waterfowl banding; bluebird box checks and construction; receptionist duties; boundary clearing and posting; mowing; grassland seeding; Bog turtle surveys; photography; and guided bird walks.

Great Swamp Takes much pride in its Volunteer Program and the volunteers take that same pride in their contributions.



Don Messmer from Morris County Vo-Tech receives an award for a job well done.

♫ STAFF NOTES ♪

Robert Curtis, a Student Conservation Association (SCA) volunteer, arrived at the refuge January 6, 1992 and completed his 12 week assignment in March. Robert attends Pennsylvania State University and plans to graduate with a B.S. degree in Wildlife and Fisheries in 1994.

Rich Olsen arrived January 6, 1992 to fill the temporary Biological Aid Position and completed his appointment on March 13, 1992. Rich was involved mostly in the wood duck nest box program. Rumor has it that he is currently living in Cajun country and speaks with a French accent.

Larry Balsamo arrived February 23, 1992 to fill a temporary part-time appointment as a laborer. Larry's primary job was to construct handrails for one of the boardwalk trails. Larry was then converted over to his favorite position as YCC Group Leader and then back to a Laborer.

John Arnold, a Student Conservation Volunteer arrived at the refuge on June 15, 1992 and completed his 12 week assignment in September. John assisted greatly in YCC due to Larry's illness. John worked out so well that we hired him as a temporary Biological Aid!

Sharon Vaughn transferred to Rocky Mountain Arsenal on October 10, 1992. Sharon will be working as a Biologist monitoring contaminants in wildlife populations. Sharon recently got engaged and will now be near her fiancé and John Denver.

Susan Toke resigned as Office Automation Clerk on October 3, 1992. Sue had been on maternity leave since May 26. She did not return to work because she found that her salary was not much greater than the cost of child care.

♫ TRAIL MAINTENANCE WALKERS NEEDED! ♪

Trail maintenance is an important issue for the Great Swamp National Wildlife Refuge, as our trails are often the only visible evidence of the great work being done by the service. Visitors walking the trails and boardwalks form impressions that can foster a lifetime habit of environmental responsibility.

Each boardwalk and trail requires a dedicated volunteer to walk its length once a month, year round. The trails are now marked according to the Appalachian Trail Standards, and divided to make it easier to cover the area.

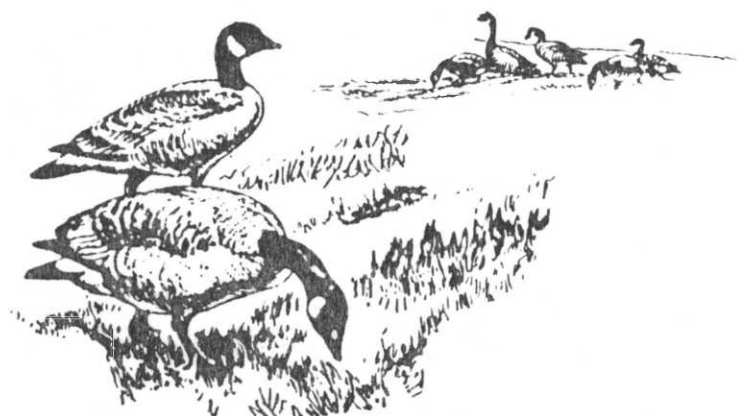


Bill Ruppel accepting an award for construction of wood duck boxes at Morris County Vo-Tech.

Since Tom is so busy with other swamp duties, I have volunteered to coordinate this effort. Please call me (908-234-8058 days, 908-771-0393 evenings until 9:00 PM) or send a note (17 Colony Court, New Providence, NJ 07974) for trail sections and which trail you choose.

Leave your telephone number and I'll get back to you to confirm your assignment. As you walk, note the condition of the trail and report any damage, fallen trees, vandalism, or anything else of note. Please report by telephone, or send me a note. It doesn't matter when you walk your trail, as long as it's once a month and I receive your report. Looking forward to hearing from you.

-Robyn Mendelsohn



THE DISASTER OF 1992

Why should the 11th clean up be any different than the past 10? It shouldn't, but it was! I had become a pro at organizing these clean-ups, or at least I thought I had.

I should have known something was a miss when during the clean-up I returned to the staging area where all the trash was being deposited and found a locked car parked right in the middle. Of course there were "No Parking" signs all around, but who reads them any more? How could the town truck get into the lot now and pick up the trash? I quickly panicked and drove down Pleasant Plains Road and found the culprit who received a violation notice and of course a brochure on the refuge! Wow, with that out of the way I was ready for the town truck which was due to arrive soon.

The clean-up continued faster than I had planned and we were soon ahead of schedule. All the volunteers were now back at the staging area and I was trying to get them to wait for the truck so that I could get a picture of everyone as I had for the last 10 years. Not this year! Soon everyone had left and I began to close up headquarters after a hectic day when Al Cossa and Mark Caloza came in and told me they had both locked their keys in their cars! I could see one person locking their keys in their car, but two! I contacted the police who came up to headquarters and successfully opened Marks car but could not open Al's as he had power locks!

What could we do now! John Kunkel stepped forward and volunteered to drive him home to get his extra keys. I volunteered to take Al's daughter Sarah and John's wife Mary home with me till they got back.

Well, with the headquarters locked up, I was finally ready to go home! As I got to the end of the driveway I saw the town truck coming down the road to pick up the trash. I then drove over to the staging area and stopped on top of the treadles when it appeared to me that the truck would back into me. I immediately put it in reverse and slammed on the brakes at the same time, but it was to late, the treadles had claimed me! I'll never forget that sound I heard as the rear tires went flat. Sarah and Mary just sat there not saying a word as they could see by the expression on my face that I had reached the end of my rope. Totally feeling defeated, I drove the truck to my house to wait for John and Al with the flat tires going flip flop, flip flop. As I sat in a comfortable chair I said "10 clean-ups with a perfect record had to come to an end sometime. Oh what the heck" as I poured myself some much needed liquid refreshment!

-Tom McFadden



LAUREL TRAIL SCOUT PROJECT

In November, Scouts from Troop 28 (BSA) in Chatham undertook and completed a trail project in the Refuge. The project was planned and directed by 17 year old John Perkins as part of his qualification requirement for Eagle Scout. He organized a group of Scouts of different ages and experience levels who worked together with two adults for six sessions putting in 84 hours.

Laurel Trail is at the east edge of the Wilderness Area with access from the Morris County Outdoor Educational Center parking lot. Some of the trail may have been an old wagon trail for old home sites that may have existed in the swamp. It follows dry sandy ridges just a few feet higher than the surrounding heavily forested wetlands. Pure communities of laurel occur in an understory of beech, oak and red maple along the trail. Since homes in the area were abandoned, portions of the trail closed in, with much of the way made difficult for human visitors.

The main objective of the Scout Project was to brush out as needed to a width of four feet. For long-lasting effect and for aesthetic reasons, the preferred method was to cut the plants at ground level, rather than snip the branches. To discourage illegal use, deadfall that could be walked over was not disturbed. The work on the trail was performed with hand tools and with a light touch. The place still has the character of a game trail.



A view of Laurel Trail



Volunteer Martin Schwalbaum with Boy Scout Troop 28

At one point where deadfall had blocked the trail and a detour loop was created, the blockage was removed, restoring the trail to its original path. The false trail was covered up with logs and brush. An illegal campfire ring was broken up. Logs and rocks which had been collected were dispersed. Beer cans, bottles and other trash were removed. Finally a brand new trail sign was installed.

Access to Laurel Trail is from the parking lot at the Morris County Outdoor Educational Center on Southern Boulevard in Chatham. Take the "self-guided nature loop to the farthest point (.5 mile), continue on an unmarked trail in a southerly direction to the Public Service gas and electric power line right-of-way (.3 mile), then taking the right-of-way southwesterly (.3 mile) to the northerly trailhead of Laurel Trail. The trail itself is blazed white (.7 mile) leading in a westerly, southeasterly and finally a southerly direction to finish at the southerly trailhead on the power line right-of-way. To return take the right-of-way northeasterly past the northerly trailhead of Laurel Trail (.5 mile) and retrace the path to the Morris County Outdoor Educational Center, a 3 to 4 mile walk in all distances approximate.

Aside from the Laurel Trail itself, the trail has much beauty. There are numerous mature specimens, kettle holes and active game trails inviting exploration. Deer, fox, turtle and turkey abound. So take a hike and enjoy the beauty and serenity of the Laurel Trail in late May when the Laurel is in bloom.

- Martin B. Schwalbaum

TRANSITION

The summer of 1991 I felt the urge to retire. What to do with my new found time? No more suits, shirts and ties. No more commuting to the big city.

Having an affinity for the outdoors I called the nearest facility that might need a volunteer. I called Tom, not knowing what I would be getting into, but willing to do anything he could throw at me.

Well, it's nineteen months later, where they've gone I don't know, but I've surely been around. This city guy forgot what sidewalks and crowds are like. They've been turned in for muddy roads and game trails.

I seem to thrive on activity, checking and marking trails so those city slickers, like me, won't get lost. For someone who has never been on a farm I soon became a farmer, however not a 20th century one. Sharon and I attempted to plant various grasses for dense nesting cover. After the first day I was thoroughly exhausted. Lifting bags of seed, spreading by hand and walking in muddy fields was a real test for me. Failure was our reward. We tried again several weeks later only to fail again. The geese we were sent to feed couldn't wait until next season and consumed every last seed we had put out.

Safety flagging the perimeter of the refuge was my next challenge. Coping with thigh high water, sucking mud and sharp thorns took a little getting used to. I often wonder if the hunters appreciate this effort and do they really venture into these areas. If they do they are nuts.

Working the deer check station was fun except when most of the hunters showed up at closing time and the temperature dropped rapidly. Those might have been the coldest few hours of my life.

Taking data from wood duck boxes was a nice day out in the fresh air. Several times we disturbed a sleepy screech owl or field mice. When is the ice going to come? Everyone waited in anticipation. Well, it finally came and our experienced crew headed out to pool 2. Sharon, my partner for this excursion led the way, she no more than 125lb., me a hefty 180lbs. plus. The ice was splintering all around us. She walked and I followed. Swimming in mid winter is not my idea of fun! However, we survived, none the worst for wear.

Bluebird boxes had to be serviced next. Whoever thought I would be chasing field mice out of their warm bluebird nesting box? Can you imagine the first time these "cute little things" came darting out, one running up my arm?



Volunteers Bernie Tulman and Irv Tanzer help Mel Smith put up the new interpretive panels in the Kiosk at the Wildlife Observation Center.

Summer came and I was visiting the blue birds every two weeks. Seeing eggs hatch and mature over the next few weeks was very exciting. My main concern was - "Will I be Able to catch them for banding before they fledge?" Handling the fledges was another challenge. Keeping 4-5 excited birds in check, putting tiny bands on tiny legs and dealing with protective parents taxed my capabilities.

Probably the most fun time had by young and older adults was the goose roundup one morning in June. Who could anticipate the hysteria? Who ever thought I would find myself sitting on a feisty goose while my partner glued a collar on its neck. The feathers and down were flying, the geese were honking and I couldn't stop laughing.

The next swimming lesson came in mid-summer near north gate. Sharon and I set out to inspect an area that needed to be sprayed. Tipping a canoe in calm, shallow water on the bank was no small effort, but we did it. It was a hot sunny day anyway and we needed to cool off.

Well, by now I was tried and tested. Nothing was too difficult. I learned carpentry, farming, boundary posting, trapping, banding and all sorts of other neat things. In September the state came calling. They needed assistance in collecting goose data. What started out as a once a week project turned into three times a week, covering an area of 250 miles per week. I got to see parts of Morris County I never knew existed. The project is ongoing and I guess I'm stuck with it. Any volunteers out there ... I could use some help!

So you see what can happen to someone who makes a transition from the humdrum world of work in the big city to the great outdoor life of the Great Swamp. I have no second thoughts on the subject. I enjoy every moment and am eagerly looking forward to the next challenge!

-Bernie Tulman



A VOLUNTEERS INTERPRETATION OF THE 1992 CLEAN UP

On March 21, 1992 the Great Swamp Refuge held it's annual spring clean-up. I was volunteering after one of my fathers sermons during dinner about keeping the environment clean. He also reminded me that he had helped me at my schools fall clean up. I guess it was pay back time.

After convincing him that I needed water proof boots, I said I would help. That morning I got a first hand look at what my father was talking about. The roads along the refuge property were littered with tons of bottles and paper everywhere. We really had our work cut out for us.

Tom dropped my father and I along with some other people off with plastic bags. Three hours later, we all met at the entrance gate by the headquarters to separate the bottles from the other litter. I was amazed by what everyone had picked up in that time period.

My father took a group photo of everyone next to the heap of garbage everyone had picked up, and another clean-up for the year. Hopefully next year it won't be so bad.

-Sarah Cossa

THE 100 HOUR PLUS CLUB

To qualify for the 100 HOUR PLUS CLUB, you must have been an active volunteer within the last two years and have acquired at least 100 hours of volunteer service since you became a volunteer.

THE CLUB WOULD LIKE TO WELCOME THE FOLLOWING NEW MEMBERS:

Dick Burk - 150 hours
Jim Detizio - 122 hours
Irv Tanzer - 120.5 hours
Celine Meding - 106 hours
Charles Seesselberg - 100.5 hours

SEASONED MEMBERS OF THE CLUB ARE AS FOLLOWS:

Bernie Tulman - 735.5 hours
John Kunkel - 527 hours
Dan McGuiness - 350 hours
Marvin Sebesta - 331.5 hours
Bill Ruppel-Morris County Vo-Technical School - 326 hours
Al Cossa - 193.5 hours
June Gazek - 172 hours
Judy Schmidt - 163 hours
Robyn Mendelsohn - 161 hours
Larry Balsamo - 133.5 hours
Ken Dennis - 114 hours
Barbara Brennan - 107 hours



MOSQUITO

*In the middle green of seasons this mayday
I find the little meadow spread in sun
To read write or roam in a leisure
Which expands into the intervals between birdsongs*

*Seated beneath the lowbranched decorative maple
Free from everyday activities and pursuits
And invisible to the jogger the dogwalker
The slowdriving curious neighbor in the road.*

*Across the field which shines and buzzes
A sea of brome blue sudan and timothy
Containing islands of onion buttercup and milkweed
Upon a cool uprising of oak within the swamp*

*Extending into the air their ballet slow-motion
On fine wings in high-pitched whine at earshot
Newformed but already pregnant with semen and eggs
A hungry swarm follows an instinct for blood.*

*Resisting the urge to slap and crush
I permit one her tentative alightings
The numerous subtle choices and the pause
Legs taut body arched mindeyes intent*

*Experiencing the probe and exquisite puncture
Head bended all else delicately upraised
Until a translucent slender abdomen
Fills up and distends itself blackred.*

*At 62 finding myself at the outer limits of potential
Upon a path without future alternatives of consequence
Studying with interest the mechanisms of nature
Which have brought me to this satisfactory district*

*I cross a sandy ridge in the expanse of muck
Past a familiar kettlehole of black water
The meltdown of glacial icerock ages old
Where at Midday up ahead a redfox jumps in the trail.*

- Martin Schwalbaum



Refuge Volunteer Jim Detizio helps Refuge employee Larry Balsamo construct hand rails on the Refuge boardwalk.

UPCOMING VOLUNTEER ACTIVITIES

Save This Page For Future Reference

MARCH 20TH SATURDAY: 12TH ANNUAL SWAMP CLEAN-UP (Rain date is March 27th). Last year, 31 volunteers picked up approximately 1,200 lbs. of litter. It was estimated that 400lbs. of glass and 50lbs. of aluminum cans were collected and taken to the local recycling center. All the materials collected were transported by Passaic Township. Lend a hand if you can make it. Your help is needed! Come to the Refuge Headquarters for an 8:30 AM. start. The clean-up lasts until 12:30 PM. Bring your friends, family, co-workers. Please give Tom McFadden a call at 201-425-1222 and let him know if you can help out this year.

MARCH 21ST - MAY 16TH: Volunteers are needed for **WEEKEND COVERAGE**. Hours will be from 11:00 AM. to 5:00 PM. Spring weekend coverage will continue to May 16th, and then start up again in the Fall. With increasing visitor volume, it becomes more important to establish the presence of uniformed Refuge volunteers, not only to answer questions and guide folks to trails and blinds, but to help explain the mission of the Refuge. Most people are happy to obey the rules, but when they understand the reasons for having them, their support is usually greater. Introducing the Refuge to someone for the first time can be a joy! Many visitors are regulars and are familiar with some or all of the birds and other wildlife. It's great fun talking with them.

Volunteers usually rotate between Headquarters and the Wildlife Observation Center (WOC) but if there is enough help Tom would like some of us to walk the Wilderness Trails, so bring your boots!

Spring weekend coverage will include all Sundays from March 21st to May 16th, inclusively, except Easter (April 11th). Volunteers are needed from 11:00 AM. to 5:00 PM. Please call Tom McFadden at 201-425-1222, and let him know when you're available.

APRIL 16TH FRIDAY: VOLUNTEER RECOGNITION DINNER at Headquarters from 6:00 PM. to 7:30 PM.

APRIL - MAY



BOG TURTLE SURVEY. Volunteers are needed to help look for these elusive State endangered species.

MAY - JUNE

BREEDING BIRD CENSUS. If you can identify birds by their song as well as by sight, then we can use you. This is a once a week commitment for 8 weeks.

BLUEBIRDS - Check and maintain nest boxes.



1992 Annual Swamp Clean Up Crew

MAY - SEPTEMBER

LANDSCAPING REFUGE HEADQUARTERS. volunteers are needed to assist with mowing the lawn, pruning shrubs, pulling weeds and spreading wood chips.

VEGETATIVE SURVEY. Volunteers are needed to assist with vegetative surveys of the Refuge impoundment's.



NOVEMBER

MUSKRAT SURVEY. One or two volunteers will be needed to assist in this survey. We will be walking our dikes looking for damage caused by muskrats.

DECEMBER

DEER HUNT PREPARATION. We will need volunteers to assist with flagging Safety Zones before the hunt. Assistance is also needed during the hunt at the Hunter Check-In and Check-Out Station.



JANUARY - FEBRUARY

WOOD DUCK NEST BOX CHECKS. Volunteers are needed to assist in servicing wood duck boxes by repairing, replacing, and cleaning boxes and checking nest success.

YEAR - ROUND



FOREST MANAGEMENT. Volunteers are needed to help with timber stand improvement activities, such as removing competitive vegetation from around apple trees.

COMPUTER INPUT. Volunteers are needed to input data into refuge computers.



TRAIL PATROL. Volunteers are needed to help in patrolling trails to insure they are kept in a safe and clean condition. (See article entitled "Trail Maintenance")

OFFICE ASSISTANT VOLUNTEERS are needed to answer the phones, photocopy, send out information, and answer Visitor questions during the week.

If you are interested in any of the upcoming activities, please contact Tom McFadden at 201-425-1222. The above is a listing of some of the activities, but not all that are available for volunteers. Other activities do become available during the year. Please call for more information.



WE NEED YOUR HELP...

If you can assist in putting Swamp Talk together, please call Tom McFadden at Refuge Headquarters (201-425-1222). A special thanks goes to volunteers Charles Seesselberg, Odette Kane and Martin Schwalbaum who helped get this issue of Swamp Talk to all the Great Swamp volunteers. We would also like to thank volunteer Robyn Mendelsohn for her article entitled "Trail Maintenance" and Sarah Cossa for her piece entitled "A Volunteers Interpretation of the 1992 Clean-up"

