

REVIEW AND APPROVALS

OHIO RIVER ISLANDS NATIONAL WILDLIFE REFUGE

Parkersburg, West Virginia

ANNUAL NARRATIVE REPORT

Calendar Year 1996

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

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INTRODUCTION

Established in 1990, the Ohio River Islands NWR became the first national wildlife refuge in West Virginia. There are now refuges in all 50 states. The refuge currently consists of all or parts of 19 islands in the Ohio River. As acquisition progresses, the refuge may include up to 35 Ohio River islands. The acquisition boundary stretches nearly 400 river miles from Shippingport, Pennsylvania to Manchester, Ohio and includes four states (PA, OH, WV, KY).

The geologic origin of this unique chain of islands has given them a relatively stable gravel base that has resisted natural erosion forces since the Wisconsin glacier receded 12,000 years ago. The natural character of some islands has been exploited by recent human activity but many are still relatively undisturbed.

The Ohio River islands and their back channels have long been recognized for high quality fish and wildlife, recreation, scientific, and natural heritage values. These areas provide some of the region's highest quality riverine, wetland, and bottomland habitats, and are used by waterfowl, shorebirds, songbirds, warmwater fish, and freshwater mussels. The refuge has potential to protect 2,000 acres of bottomland and wetland habitats and 1,500 acres of riverine habitat associated with the islands.

Refuge management concentrates on increasing the diversity and productivity of the fish and wildlife populations characteristic of the Ohio River Valley. Although some early successional vegetation stages are present, natural succession is being encouraged to benefit wildlife species adapted to the mature forest floodplain and associated wetland and riverine habitats.

Many types of public uses occur on and around the Ohio River islands. The relatively undisturbed nature of many of the islands make them popular spots for nature study, fishing, hunting, picnicking, and pleasure boating.

As land acquisition and planning has progressed, the refuge has developed a public use program which includes such activities as educational workshops, interpretive programs, wildlife exhibits, hunting and fishing programs, and day-use recreational opportunities. These and other wildlife-dependent recreational and educational opportunities benefit school groups of all ages as well as local residents and visitors.

A. HIGHLIGHTS

- Ohio River Islands NWR has embraced wholeheartedly the ecosystem approach to resource management. During 1996, the refuge has made significant contributions to the accomplishment of action strategies under all seven resource priorities for the Ohio River Valley Ecosystem. The Resource Priorities are listed here below, and those sections of the narrative which address the accomplishments in detail are cross-referenced thereunder.
- * Resource Priority #1: In cooperation with partners, reverse the decline of native aquatic mollusks within the Ohio River Valley Ecosystem with emphasis on endangered, threatened and candidate species and species of concern. (See Sections G-10 and H-1)
- * Resource Priority #2: In cooperation with partners, reverse the decline and maintain stable populations of migratory landbirds and other bird species of concern. (See Sections F-3, G-1, G-4, G-6, and G-7)
- * Resource Priority #3: In cooperation with partners, reverse the decline of native fishes with emphasis on interjurisdictional listed and candidate species and species of concern.
- * Resource Priority #4: In cooperation with partners, protect and restore karst/cave habitat supporting listed and candidate species and species of concern. (See Section G-2)
- * Resource Priority #5: In cooperation with partners, protect and restore wetland, riverine and riparian habitat in the Ohio River watershed for the protection and enhancement of migratory waterbirds and other wetland dependant species of concern. (See Sections F-3 and H-1)
- * Resource Priority #6: In cooperation with partners, promote and support sustainable fish and wildlife-dependent recreational uses while maintaining the long-term health of the ecosystem and the Service's trust resources. (See Sections H-8 and H-9)

- * Resource Priority #7: In cooperation with partners, reduce the decline and promote the recovery of rare resources identified as listed/proposed threatened and endangered species, candidate species and species of concern not otherwise addressed in Resource Priorities 1-6 (e.g., plants, reptiles, amphibians, etc.). (See Sections G-2 and H-1)
- The Andrew Arkin family, donors of 89 acres of Muskingum Island in 1995, donated \$5000 to the refuge as part of a Challenge Cost Share Agreement targeting public use and volunteers.
- The first of eight floods of 1996 hit the Ohio Valley in late January. (See Page 4)
- Donation of 17.82 acres on head of Wheeling Island. (See Page 6)
- The National Tree Trusts contributes 4200 trees to the refuge for habitat restoration on Middle Island. Twenty-two acres were reforested by staff and volunteers.
- Refuge participates in Job Training Placement Assistant Program administered by Community Resources.
- Refuge receives \$631,000 flood damage funds.
- Paddlefish Study funded in conjunction with R3 Ecological Services.
- Refuge receives \$1 million Land and Water Conservation Funds for FY 97. (See Page 6)
- ORP Butler serves as leader for the outreach subgroup of the Ohio River Valley Ecosystem. (See Page 54)
- In cooperation with eight Ohio River Valley Ecosystem partners, refuge conducts zebra mussel monitoring at eight mainstem Ohio River sites for the second year. (See Page 40)

B. CLIMATIC CONDITIONS

The Ohio River valley experienced record precipitation in 1996, with over 54 inches of rain and eight separate high water events. Rain was above long-term means in ten of the

months, and May rainfall broke another record - over nine inches. January brought the worst flooding, with river levels more than 20 feet above normal due to an early thaw of significant snow pack in the mountains. January floods created severe debris and erosion problems for many of the islands, necessitating extensive clean-up efforts and bank stabilization studies.



Figure 1. Much of Middle Island was under water during the January flood. The kiosk withstood its baptism well, requiring only a superficial cleaning. (JD)



Figure 2. January floods deposited tons of trash and debris on refuge islands. (PM)

Repetitive high water events throughout the summer, and associated turbidity and high current velocities, hampered freshwater mussel work in the upriver portion of the refuge. Collection by qualitative diving was impossible, and even quadrat excavations were not completed. Due to a combination of lower air temperatures and significant freshwater inflow due to precipitation, water temperatures barely reached 80 degrees in 1996, compared with 88 degrees at the bottom of the river in 1995. There were only 18 days in which the air temperature reached or exceeded 90 degrees in 1996.

Table 1 - 1995 Weather Data for the Ohio River Valley, Taken at Parkersburg, WV.

	Precipitation (inches)		Temp (°F)		
	Rain	Snow	Min.	Max.	Mean
January	5.04	0.2	5	69	29.5
February	3.97	1.0	-5	73	32.3
March	4.3		8	70	36.8
April	3.26		26	84	51.9
May	9.06		32	91	61.8
June	4.69		46	91	72.3
July	7.43		52	93	72.9
August	2.53		56	92	73.3
September	5.79		46	87	66.1
October	1.53		34	79	55.3
November	3.26	2.0	19	76	38.2
December	3.29	1.0	11	65	39.4
TOTAL	54.15	4.1	-5	93	Annual Extremes

C. LAND ACQUISITION

1. Fee Title

Support from U. S. Senator Robert C. Byrd's office resulted in \$1 million Land and Water Conservation Funds appropriated in October for utilization to purchase additional islands in FY 97.

Fee title acquisition for 1996 are as follows:

- In January the final paperwork for donation of 17.82 acres on the head of Wheeling Island was recorded. A letter of appreciation was sent to Paul McIntire, Sr., Director, Department of Development, for his efforts in securing donations of these lands to the Service.
- The addition of the above island brings the total refuge acreage to 1,126.82 acres which includes complete ownership of 16 islands and partial ownership of three others. This acreage does not include underwater parcels in respect to the Riparian Rights Laws. Currently, the Realty Division is completing GIS mapping of the islands to include this acreage.



Figure 3. 18 acres of mature bottomland on Wheeling Island becomes part of the refuge. (PM)

2. Easements

Currently the refuge administers just one Farmers Home Administration Easement. The property consists of 8.37 acres located in Belleville, Wood County, West Virginia.

3. Other

The West Virginia Department of Highways owns 0.6 acres on Middle Island and the associated bridge to the island. This year they completed a variety of structural repairs in order to make the bridge safe for public travel.

On March 6 after the Annual Tri-State Fisheries Conference, refuge staff met with the states of Kentucky, Ohio and the U. S. Army Corps of Engineers to discuss the recently approved Embayment/Wetland Expansion Package to the refuge. West Virginia Division of Natural Resources chose not to attend. A package of information was forwarded to the representative from the state of Pennsylvania. The first initial scoping meeting was scheduled for October 30 with West Virginia Division of Natural Resources at the refuge office. However, unjustified concerns by the West Virginia Division of Natural Resources resulted in the Regional Director requesting the briefing be canceled. This situation was rectified in a meeting on November 15 with representatives from the West Virginia Division of Natural Resources, Regional Director, Geographic ARD, geographic Associate and Refuge Manager. The meeting has since been rescheduled for January 20, 1997. Gib Chase and Steve Johnson, Regional Office Realty, will be implementing the NEPA Planning Processes.

In March a request was made to the U. S. Army Corps of Engineers, Pittsburgh District, for transfer of 18 acres of immature bottomland habitat consisting of a 2000' riparian corridor along Buffalo Creek near Wellsburg, West Virginia for inclusion into the refuge. This transfer was still pending at the close of the report period.



Figure 4. The Corps of Engineers' Buffalo Creek access site has potential to become part of the refuge. (PM)

Rick Jorgensen, Realty Specialist; Paul Trianoski, The Nature Conservancy; and Manager Wilson met with Jerry Buckley, owner of Marietta Island and associated mainland property and Kevin Ramsey representing Ohio Valley College concerning Captina Island and associated wetlands. Discussion occurred several times during this report period in relation to the above properties. The Nature Conservancy is proceeding with the necessary appraisals, etc., to prepare an offer to both parties which will occur in early 1997.



Figure 5. The mainland adjacent to Captina Island is a large tract of undisturbed bottomland hardwood forest. (PM)



Figure 6. The Buckley mainland property includes upland forests, hayfield, and bottomland forest. (PM)

Rick Jorgensen and Manager Wilson also met several times with Gene McPherson and Richard Butcher, both partial owners of the Sandy Creek Embayment, concerning the Service's interest in acquiring/protecting this area. Discussions and a possible donation were still underway at the close of this report.



Figure 7. The Sandy Creek wetlands are some of the most diverse in the Ohio River Valley. (PM)

D. PLANNING

1. Master Plan

This station has not been Master Planned. However, during the week of March 25-29 a Refuge Objective Setting Session was conducted. Those in attendance included: Pam Rooney and Tom Comish, Technical Services; Gib Chase and Steve Johnson, Realty; Scott Butterworth, West Virginia Division of Natural Resources; Bill Tolin, Endangered Species Biologist, West Virginia Field Office; Hal Laskowski, Southern Zone Biologist; and the entire refuge staff. The recent approval of the expanded Wetland/Expansion Package and Realty participation, the final report of this session will identify those acres as important habitats for enhancement of refuge objectives in support of Ohio River Valley Ecosystem Resource Priorities.

2. Management Plan

Annual Hunt Plan submissions were modified to include dove hunting on Middle Island.

4. Compliance With Environmental and Cultural Resources

The flood of January 1996 on the Ohio River crested several feet above flood stage. As a result, debris of all sorts was carried down river. Many of the refuge islands were topped over with the flood waters and a significant amount of trash, driftwood and other debris were deposited onto refuge lands.

The refuge received a call from Don Heney, Department of Interior, Philadelphia, Pennsylvania concerning the flood damage and if any contaminant related items washed onto refuge lands. He suggested if contaminants were found, CERCLA (Superfund) monies were available for removal purposes. Initial review by refuge staff and EPA personnel indicated a tremendous amount of trash and debris on most islands, but contaminants were only found on a few of the islands. Following is a list by island of items requiring containment and removal.

Phillis Island - One 55 gallon drum containing flavoring concentrate (corrosive - class 8).

Wheeling Island - Two 55 gallon drums containing unknown substances. 75 gallon fuel tank half full of heating fuel. This tank was removed by the West Virginia Department of Environmental Protection.

Grape/Bat Island - Two propane gas cylinders, chlorine gas cylinder labelled as "Poison Gas" - inhalation hazard. Three empty gas cylinders, one 55 gallon drum containing transmission fluid, three 55 gallon drums containing unknown substances, one 55 gallon drum leaking a tar like substance, one 35 pound sealed plastic pail containing texaco 904 grease, one 500 gallon unleaded fuel tank (full), one 250 gallon empty heating fuel tank and a two gallon lacquer thinner container.

Paden Island - One sealed cylinder containing an unknown liquid.

Williamson Island - Eight 55 gallon drums full of concrete.

Grandview Island - One 5 gallon pail of waste oil.

Muskingum Island - One gas cylinder.

Neal Island - One 55 gallon drum containing approximately 5 gallons of fuel.

Middle Island, due to road access, was set up as the consolidation area for contaminants, prior to disposal by the EPA selected contractor. Total cost funded entirely by the CERCLA Account was \$114,000.

E. ADMINISTRATION

1. Personnel

The refuge remained at five FTEs until August when Refuge Operations Specialist, Mitchell Ellis, transferred to Imperial NWR in Region 2. His efforts over the last four years were a great asset in getting this new station up to operational status. The refuge did enjoy the assistance of two student interns Brad Murphy and Melanie Lewis who worked for the refuge during the summer months of 1996. This program helps tremendously, providing assistance to refuge staff during the busiest time of year. We hope to continue with this sort of summer internship program in the years to come.



Figure 8. Refuge Manager Jerry Wilson, preparing to do "outreach" with the locals. (JB)



Figure 9. Larger than life, Asst. Mgr. Mitch Ellis towers over refuge boundary signs. (JB)



Figure 10. Neither snow nor mud will deter this hardworking crew. Left to right—Office Assistant Cindy Bloomer, ORP Janet Butler, and Biologist Patricia Morrison. (CC)

Table 2 - Ohio River Islands NWR Staff Information.

1996 Staff Information		
Jerry Wilson	GS-12	Refuge Manager (PFT) (EOD 3/91)
Mitchell Ellis	GS-11	Ref. Oper. Spec. (PFT) (EOD 1/92)
(transferred to Region 2, 8/96)		
Patricia Morrison	GS-11	F & W Biologist (PFT) (EOD 1/92)
Janet Butler	GS-11	Outd. Recr. Plan. (PFT) (EOD 6/93)
Cynthia Bloomer	GS-5	Office Assistant (PFT) (EOD 7/91)

Staffing History				
Year	Perm Full Time	Perm Part Time	Temporary	FTEs
1991	2	0	0	2.0
1992	4	0	0.5	4.5
1993	4.5	0	0.8	5.3
1994	5	0	0	5.0
1995	5	0	0	5.0
1996	5	0	0	5.0

3. Other Manpower Programs

On April 29, the first of two workers funded through the Job Training/Placement Assistance Program, administered by Community Resources, reported to work. Each individual worked for six months at \$7/hour to assist the refuge staff with cleanup and repair of facilities associated with the floods of 1996. The State of West Virginia received "Flood Damage" funds and the refuge was able to participate in the program. These individuals are provided a vehicle and funds for supplies/materials, etc. The program lasts until February 1997.



Figure 11. JTPAs John Kerby and Glenn Cogar removing flood debris from refuge islands. (JB)

4. Volunteer Program

Public interest in the refuge volunteer program continues to increase. In addition to individual participation, school groups and other organizations contacted the refuge for service projects to fulfill school or organization objectives. Two-hundred-eighty-six individuals participated in the volunteer program, contributing as few as one hour to as many as 500 hours. Collectively, 2056 volunteer hours were documented.



Figure 12. Parkersburg area Girl Scouts built and erected 6 bluebird boxes on Middle Island. (JB)



Figure 13. Refuge staff and volunteers participated in the annual Ohio River Sweep. Muskingum Island yielded plenty of trash. (BB)



Figure 14. Tree planters young and old contributed to the reforestation of 22 acres of bottomland hardwood forest on Middle Island. (JB)

During the two years prior to 1996, the refuge participated in the Student Conservation (SCA) program as a means of recruiting volunteers for full-time, twelve-week refuge service. Although our experience with SCA was good, their overhead costs per volunteer consumed a significant amount of our volunteer budget. In 1996 we decided to forgo SCA services and recruited two full-time volunteers ourselves for the summer months.

Through a Challenge Cost Share Agreement with the refuge and the Andrew Arkin family of New York, the refuge engaged two local college students, Melanie Lewis and Brad Murphy, for twelve-week volunteer "summer intern" positions. Each was awarded an \$85/week stipend to help with living expenses. This arrangement was very successful for both the refuge and the interns. The refuge gained two intelligent and motivated staff members who provided sorely needed assistance during the busy field season, and the students gained valuable experience and earned college credit.

We're finding additional benefits from these students who, after returning to school, have brought refuge programs to the attention of many others. Brad Murphy inspired an educator at Marietta College in Marietta, Ohio to contact the refuge and ask about involving their students in internships also, a potentially inexhaustible source for volunteers.



Figure 15. Refuge intern, Melanie Lewis preparing a mist net for bat monitoring. Melanie found herself enjoying many new experiences during her 12 week commitment at the refuge. (JB)



Figure 16. Ecosystem support of mussel projects brought refuge intern Brad Murphy to the Allegheny River in Pennsylvania. (PM)

A volunteer appreciation picnic was held on Middle Island in August for about thirty of our most committed volunteers. In addition to the student interns who each contributed 500 hours to the refuge, there were other highly committed individuals who donated considerable time and skills. Jim Dotson and Lee Ridge of St. Marys, WV gave 240 and 118 hours respectively on Middle Island. They replaced water lines, mowed grass, planted trees, and made building repairs, requiring supervision that consisted of little more than directions to the next task! John and Carol Sue Bell of New Martinsville, WV accomplished all wood duck banding that occurred on the refuge for the second consecutive year. Larry Steele of Belmont, WV volunteered 80 hours and his welding skills to remove metal debris left from farming operations on Middle Island.

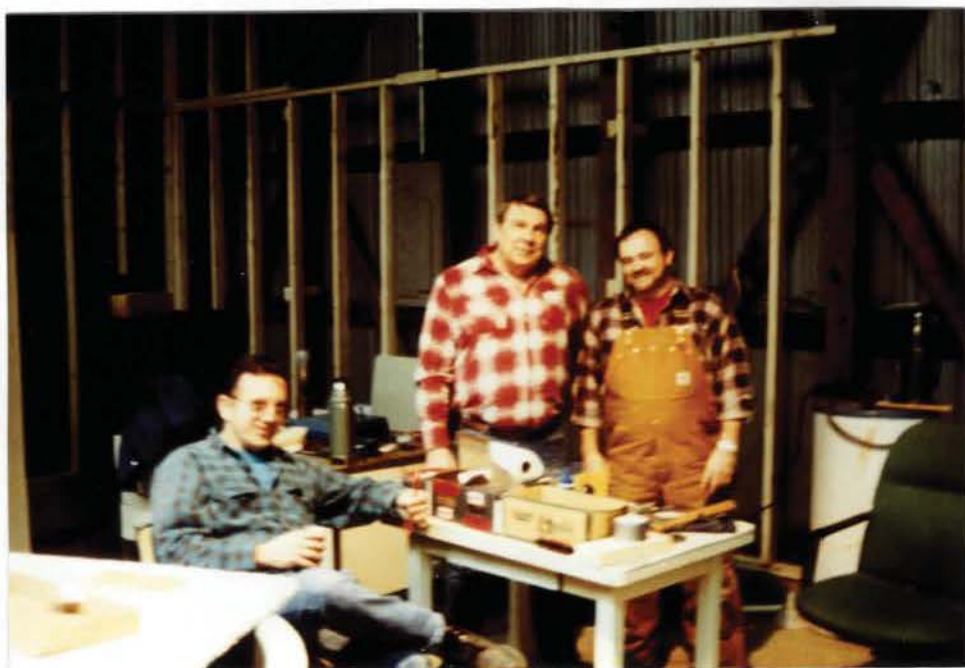


Figure 17. Volunteers Lee Ridge and Jim Dotson, along with JTPA worker Greg Lynch, dedicated themselves to refuge projects indoors and out. (JW)

A major volunteer effort was planned for flood debris clean-up on Grape Island in early March, but had to be cancelled at the last minute due to weather. The event could not be postponed because of potential disturbance to nesting great blue herons followed by virtually impenetrable vegetation later in the season. A lot of pre-planning with local scout leaders, St. Marys, WV city officials, Pleasants County personnel, and the West Virginia state highway department had been required only to have the forces of nature remind us who has final say over the river! A more modest event for the refuge, the Ohio River

Sweep sponsored each year by the Ohio River Valley Water Conservation Commission and various industries, brought out nine volunteers who assisted with clean-up on Muskingum Island.

ORP Butler worked with Sarah Stout, a Sierra Club volunteer trip leader, to arrange a project for a national Sierra Club volunteer outing in July 1997 which will take place over a seven-day period on Middle Island.

Table 3 - Summary of 1995 Volunteer Programs

ACTIVITY CATEGORY	# VOLUNTEERS	#VOL. HOURS
MAINTENANCE:		
Ohio River Sweep	9	32
Building maintenance	2	112
Fence and barrier repair	2	16
Mowing	2	120
Metal trash removal	1	80
Other	5	119
HABITAT MANAGEMENT:		
Middle Island reforestation	273	571
Sprayer assemblage	1	18
Tree survival surveys	2	82
RESOURCE SUPPORT:		
Wood Duck banding	2	160
Freshwater mussels	5	300
Bluebird boxes	9	54
Bat surveys	2	62
Bird surveys	8	74
Other	2	63
PUBLIC USE:		
Kiosk & sign installation	1	33
Environmental education	6	87
Photography	3	18
Public use surveys	2	35
ADMINISTRATIVE:		
Data input	3	28
TOTAL HOURS		2064

5. Funding

The refuge budget was \$294,405. This included \$223,777 for salaries, \$10,000 for maintenance, \$12,545 flexible funds, \$5,000 for work boat (actual cost \$14,371 - \$4,000 funded by R5 through Ecosystem team support and remainder absorbed from refuge discretionary funds), \$8,400 for public use/recreation projects, and \$34,683 in other fixed expenses.

The refuge received \$5,000 contributed funds from Andrew Arkin in support of a Challenge Grant submission. The package was funded for development of interpretative facilities on Muskingum and Middle Island and hiring of two summer interns. Mr. Arkin had previously donated a portion of Muskingum Island to the Service.

Table 4 - Refuge Funding Summary.

Year	1261	1262	8400	1907	Contributed Funds	TOTAL
1991	69,800	-0-	-0-	-0	-0-	69,800
1992	143,571	8,000	40,000	-0-	-0-	191,571
1993	247,405	17,000	52,335	1,983	-0-	318,723
1994	246,511	6,000	-0-	-0-	-0-	252,511
1995	292,672	6,000	-0-	-0-	-0-	298,672
1996	284,405	10,000	-0-	-0-	5,000	299,405

6. Safety

The refuge engaged in a variety of safety-related activities in 1996. Several inspections, training sessions, equipment acquisitions, and safety program implementations were accomplished in addition to staff safety meetings. The refuge dive program has a serious safety component and a large quantity of training and effort was put forth in this regard.

The following safety-related items were accomplished: SCUBA equipment submitted for annual inspection, maintenance and repairs; Refuge Officer Ellis received required medical exam for law enforcement/diving duties; refuge staff received pesticide applicator training and certification for state of West Virginia.

In February, Steve Flanders of Montezuma NWR trained all refuge staff in the safe operation of farm tractors. The 8 hour course satisfied FWS requirements for equipment operation.



Figure 18. Steve Flanders from Montezuma NWR instructs Office Assistant Cindy Bloomer on the safe operation of the refuge farm tractor. (JB)

In March all refuge staff and one refuge volunteer received training and certification in first aide, CPR, and bloodborn pathogens.

In preparation for SCUBA activities in the 1996 field season, several items were accomplished: annual swimming evaluations were passed by all three refuge divers on June 16, medical examinations were received by two divers, and 6-month dive requirements were met by all divers in Key Largo, FL (annual leave, no cost to refuge) in April.

In July, Brad Murphy, Melanie Lewis (summer interns), John Kerby and Eric Jones (JTPA employees) attended Boating Safety sponsored by the West Virginia Division of Natural Resources and CPR and First Aid sponsored by the Red Cross of Parkersburg, WV.

All refuge fire extinguishers were inspected on July 7 with several additional units being purchased for the mussel quarantine facility and equipment storage area.

ORP Butler completed training requirements for DAN Oxygen Provider Recertification on November 9, 1996.

7. Technical Assistance

Refuge staff and two summer interns provided technical assistance to White Sulphur Springs National Fish Hatchery during the summer spawning cycle of their rainbow trout. Refuge staff got some hands on experience in sorting the fish, fertilization and incubation of the eggs.

Refuge staff are beginning a partnership with the Shell Chemical Company in Belpre, Ohio to provide long term protection to the 30 acre embayment and floodplain forest known as Davis Creek. Shell Chemical is starting an environmental awareness team which is identifying its own goals and objectives. One of the goals is to protect existing wetland and open water habitats of Davis Creek, and also enhance its use by wildlife. The Davis Creek embayment has been identified by the refuge as an important backwater area worthy of protection. This partnership with Shell Chemical will likely provide the long term protection and enhancement necessary without the refuge having to purchase or manage the property.



Figure 19. The Davis Creek Embayment contains a diversity of shallow water, emergent and forested wetland habitats. (PM)

The refuge provided significant technical assistance to other partners in the Ohio River Valley Ecosystem doing freshwater mussel work during 1996. These projects are discussed under Section G-10, freshwater mussels.

ORP Butler provided assistance to the Army Corps of Engineers on its West Virginia Comprehensive Study involving the Vienna riverfront park project proposals for a wetland interpretive trail.

8. Other

The following table summarizes the training received by our staff during 1996. Continued training of Service employees is essential to our mission and many hours of quality training were received in a variety of areas.

Table 5 - Summary of training received in 1996 by staff.

Training	Employee	Hours
Tractor Safety	All Staff	40 (8ea)
First Aid, CPR, Bloodborn Pathogen	All Staff	40 (8ea)
Aviation	Wilson	4
Aviation	Morrison	4
Aviation	Butler	4
Law Enforcement Refresher	Ellis	40
Pesticide Application	Ellis	24
Pesticide Application	Butler	24
Pesticide Application	Morrison	24
The Internet	Butler	8
The Internet	Bloomer	8
Total Hours of Training		220

F. HABITAT MANAGEMENT

1. General

A major habitat problem which continues to plague the islands is shoreline erosion. Most islands have lost significant amounts of soil to the Ohio River for various reasons. Under normal (natural?) conditions, the head of an island would be expected to erode somewhat during spring run-off and accretion of soil would be expected at the toe of the island. However, although some accretion of land is occurring at the toe of some islands, most islands now show evidence of erosion from both ends.

Erosion of the islands can be attributed to several causative factors. The construction of dams for navigation purposes, commercial sand and gravel dredging, dredging of the channel for navigation, wave action caused by passing barges and other watercraft, spring flooding, and removal of riparian

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vegetation have all contributed to the erosion of shoreline along the Ohio River to some degree.

In the winter and spring of 1996 water levels in the Ohio River were at or near flood stage eight times. This resulted in considerable erosion on several refuge islands. The refuge documented the damage and responded to a budgetary request from the Washington Office concerning flood damage.

Fortunately, the refuge received \$631,000 flood damage funds. The refuge contacted Michael Spoor, Geotechnical Branch, Engineering Division of the U. S. Army Corps of Engineers, Huntington, West Virginia District Office. Mr. Spoor toured all the islands over a 400 mile stretch of river, some of which are not yet a part of the refuge. He completed an indepth report of the Ohio River Islands including cost analysis, proposed treatments, and photo documentation. The Corps Office, working with Jeff Tubman (Regional Office Engineering), are preparing a "scope of work" whereas the Corps will utilize contractors in place to complete work on Grape, Williamson, and Witten Towhead islands in the spring of 1997. The Corps' projected cost to stabilize the remaining islands over this 400 mile stretch of river was \$10 million. So folks, \$631,000 will not go very far. Some small amounts of the \$631,000 will be utilized for noxious weed control and to gravel the access road on Middle Island.



Figure 20. January floods caused significant shoreline erosion along the refuge. (PM)

2. Wetlands

In April Don Stover, Erie NWR Equipment Operator, traveled to Middle Island to complete several maintenance tasks. One job involved breaking "agriculture drains" in several agricultural fields. The result is period flooding and short-term water holding capacity in these areas, resulting in use by a variety of waterfowl and other marsh and water birds.



Figure 21. The beginnings of a new wetland on Middle Island. (PM)

3. Forests

The refuge continued with reforestation efforts begun on Middle Island in 1995 with the objective of restoring mature bottomland forest habitat. Although some of the 4600 trees planted in 1996 were collected locally (a mix of 400 silver maple, cottonwood, red elm, and sycamore), the majority of the trees came through a donation from the National Tree Trust (NTT). The NTT provided 2000 river birch, 1000 hackberry, 600 green ash, and 600 sycamore, all species native to the Ohio River floodplain.



Figure 22. Trees donated by the National Tree Trust arrived in both seedling and sapling stages. Corporate donations to NTT allow the organization to supply trees to the refuge which participated in the NTT's Community Tree Planting Program. (JB)

Twenty-two acres were reforested in March and April of 1996 on Middle Island compared to five acres in 1995. Because of higher than anticipated survival in 1995, 10' X 10' tree spacing was changed to 15' X 15' in 1996. The refuge acquired a tree planter surplused by Great Swamp NWR which proved to be an excellent tool for planting the smaller stock. Trees too large for the mechanical planter provided a great opportunity to involve volunteers in the project (see section 4). With trees donated by NTT and shovels donated by a local tool manufacturer, out-of-pocket expenses for the project were negligible.



Figure 23. Refuge Biologist Patty Morrison augers holes for trees too large for the tree planter. The little tractor was indispensable in our planting efforts and in follow-up weed mowing. (JB)

Table 6 - Summary results of reforestation plot tree survival.

YEAR SURVIVAL	# TREES PLANTED	1ST YR SURVIVAL	2ND YEAR SURVIVAL
1995	2048	67%	65%*
1996	4600	88%	
*Reflects survival based on original number planted			



Figure 24. Refuge intern Melanie Lewis stands beside a sycamore planted the previous year. Rich island soil and lots of rain allowed the tree to triple in height after less than two growing seasons! (JB)

8. Haying

This was the second year of a haying program on Middle Island. The program consists of one permittee and was established to occupy habitat so certain weedy species would not overtake the island. The effort allowed the refuge to implement a reforestation program toward species endemic to the Ohio River floodplain. Approximately 126 acres of the total 235 acres on Middle Island were put into the program. Beginning in 1997, approximately 20 acres each year will be removed from the program and scheduled for reforestation, essentially terminate the program in the year 2001. The hay fields are restricted to planting of native warm/cool season grasses, which provide an excellent base for reforestation efforts.

In 1996 the permittee was able to take two cuttings of hay off these fields. A significant amount of hay harvested was foxtail grasses which continued to persist in the abandoned corn/soy bean fields. Harvest of the hay fields also provided some limited dove hunting opportunities.

The permittee was allowed to harvest one small alfalfa field which will eventually be reforested.

10. Pest Control

Refuge volunteers cut approximately 19 acres of Japanese knotweed off the head of Wheeling Island. Refuge staff cut several small patches of Japanese knotweed off Middle Island in an effort to curtail spreading and keep the area suitable for reforestation efforts currently underway. Some major control efforts will be undertaken in FY 97 with flood damage funds received in FY 96. Japanese knotweed essentially crowds out native plants and makes re-establishment of anything basically impossible.

G. WILDLIFE

1. Wildlife Diversity

On May 11, three refuge staff members, three refuge volunteers, and 15 members of the Mountwood Bird Club participated in the 5th annual International Migratory Bird Day Count in Wood County and Pleasants County, West Virginia. Because of a shortage of boats this year, the river area covered was not the same as in previous years. A total of 66 species of birds were recorded in and around Blennerhassett Island. The Wood County Survey as a whole recorded 107 species of birds. ORP Janet Butler led a group of volunteers for the second annual count on Middle Island in Pleasants County, documenting 36 species of birds using Middle Island and vicinity. The data for the refuge portion of these surveys appears in Tables 7 and 8.

**Table 7 - International Migratory Bird Day - May 11, 1996:
The Birds of Blennerhassett Island and Vicinity.**

SPECIES ENCOUNTERED AND NUMBERS			
Mallard	12	Tree swallow	8
Mourning dove	4	Killdeer	2
American robin	2	Canada goose	15
Chimney swift	4	Barn swallow	8
European starling	8	American crow	14
Purple martin	20	Cliff swallow	3
Baltimore oriole	4	Hooded warbler	1
Red-tailed hawk	1	Song sparrow	4
Red-eyed vireo	10	Northern cardinal	6
Tennessee warbler	30	Wood duck	20
Cedar waxwing	65	Great blue heron	2
Yellow warbler	12	Blackpoll	9
Downy woodpecker	2	Common grackle	3
Red-bellied woodpecker	2	Scarlet tanager	2
Yellow-billed cuckoo	4	Spotted sandpiper	6
Common yellowthroat	7	Tufted titmouse	2
Eastern kingbird	3	Black-and-white warbler	2
Bay-breasted warbler	5	Prothonotary warbler	2
Magnolia warbler	1	Bluejay	2
Swainson's thrush	3	Yellow-rumped warbler	6
Wilson's warbler	2	Turkey vulture	3
House wren	3	Indigo bunting	5
Bald eagle (imm)	1	American coot	1
American black duck	1	Common flicker	2
American goldfinch	4	Yellow-breasted chat	4
House sparrow	8	Chipping sparrow	2
Grey catbird	4	Pileated woodpecker	2
Chestnut-sided warbler	2	Palm warbler	1
Carolina wren	2	Sharp-shinned hawk	1
Brown-headed cowbird	4	Yellow-throated vireo	1
Yellow-throated warbler	2	Warbling vireo	2
Red-winged blackbird	2	Double-crested cormorant	1
Bobolink	4	Eastern meadowlark	6

**Table 8 - International Migratory Bird Day - May 11, 1996:
The Birds of Middle Island and Vicinity.**

SPECIES ENCOUNTERED AND NUMBERS			
Double-crested cormorant	1	Great blue heron	7
Canada goose	9	Wood duck	6
Turkey vulture	1	American kestrel	1
Rock Dove	2	Mourning Dove	12
Black-billed cuckoo	1	Chimney swift	18
Downy woodpecker	1	Yellow-bellied sapsucker	1
Yellow shafted flicker	3	Pileated woodpecker	1
Eastern kingbird	13	Barn swallow	25
Blue jay	2	American crow	9
Carolina chickadee	2	White breasted nuthatch	2
American robin	20	Gray catbird	18
Cedar waxwing	8	Warbling vireo	8
Red-eyed vireo	14	Yellow warbler	8
Common yellowthroat	6	Northern cardinal	8
Indigo bunting	4	Song sparrow	49
White-crowned sparrow	2	Bobolink	14
Red-winged blackbird	30	Eastern meadowlark	2
Common grackle	16	Baltimore oriole	2

The 1996 annual Christmas Bird Count was conducted on Saturday, December 28th. A total of 53 birders participated in the count circle, including three refuge staff and two of the refuge's summer interns from 1996. Although the total species count for the circle was only 53 this year, it was a record year for great blue herons, mallards, belted kingfishers, and yellow-rumped warblers. The bald eagle was also a bright spot on the count. Complete data for the refuge portion of the Christmas Bird Count appears in Table 9.

**Table 9 - Christmas Bird Count 1996 - The Birds of
Blennerhassett and Neal Islands.**

SPECIES ENCOUNTERED AND NUMBERS			
Great blue heron	58	Canda goose	325
American black duck	8	Mallard	290
Bald Eagle (adult)	1	Coopers hawk	1
Red-tailed hawk	6	American kestrel	1
Wild turkey	2	Ring-billed gull	17
Gull species	3	Rock dove	139
Mourning dove	101	Great horned owl	1
Belted kingfisher	12	Red-bellied woodpecker	2
Downy woodpecker	18	Hairy woodpecker	5
Northern flicker	17	Pileated woodpecker	11
Blue jay	2	American crow	91
Carolina chickadee	36	Tufted titmouse	7
White-breasted nuthatch	5	Brown creeper	3
Carolina wren	29	Golden-crowned kinglet	3
American robin	1	European starling	227
Yellow-rumped warbler	36	Northern cardinal	74
Rufous-sided towhee	2	American tree sparrow	6
Song sparrow	57	White-throated sparrow	16
Eastern meadowlark	1	American goldfinch	36

2. Endangered or Threatened Species

On January 17, Biologist Morrison and Office Assistant Bloomer conducted the second mid-winter Bald Eagle Survey which covers a continuous 29 mile route along the Willow Island Pool of the Ohio River. Two adult bald eagles were recorded this year, in the vicinity of Broadback Island and Middle Island.

In July, two refuge summer interns Brad Murphy and Melanie Lewis assisted the West Virginia Field Office, Monongahela National Forest, West Virginia DNR, NRCS, National Speleological Society, American Cave Conservation Association, and The Nature Conservancy in completing construction of gates on five known entrances to the Arbogast/Cave Hollow Cave System in order to protect a large winter and summer colony of the endangered Virginia big-eared bats, and a winter colony of the endangered Indiana bats. The cave system harbors the second largest summer colony of the Virginia big-eared bat in the world, and is listed as critical habitat for the species. This project was supported by ecosystem money from the Ohio River Valley Ecosystem, and was the second highest priority project listed for FY 1996.

During the first week of August, refuge staff and its two summer interns, the West Virginia Field Office, and the West Virginia DNR-Non-Game Program conducted four nights of mist netting to characterize the bat community using the islands in the summer, with particular emphasis on searching for the endangered Indiana bat (*Myotis sodalis*). This was only the first year of a multi-year investigation to determine which bats summer along the Ohio River floodplain, and whether the endangered Indiana bat has maternity colonies and roosts along this big river system. Similar surveys in Kentucky have confirmed the presence of the Indiana bat in summer. Grape Island and Muskingum Island were the locations for the 1996 pilot studies. Five species of bat were actually trapped during the four nights of mist netting, and many more were identified on the ultra sonic bat detectors/recorders used by the West Virginia DNR Non-Game Biologists. Refuge staff intend to continue screening island locations for heavy use by bats (both roosting and feeding) and will continue with mist netting after the bat "hot spots" are identified. The five species of bats documented so far are: the little brown bat, big brown bat, eastern red bat, eastern pipistrelle, and hoary bat.



Figure 25. Mist netting along the interior wetland slews is a good technique for catching riparian bats. (JB)



Figure 26. Net sets along the open river were surprisingly productive. (PM)



Figure 27. A male and female red bat grin for the camera. (PM)

Under the current Federal salvage permit signed by the U. S. Fish and Wildlife Service and cooperating states in the Ohio River Valley Ecosystem, one live endangered orange-foot pimple back (*Plethobasus cooperianus*) was collected from the heavily zebra mussel infested lower Ohio River near Paducah, Kentucky, transported and held at the Middle Island Quarantine Facility, and then transported for long term holding at the Leetown Science Center in Kearneysville, West Virginia. "Cooper" joins the male pink mucket pearly mussel (*Lampsilis abrupta*) that was collected in 1995 under the Federal salvage permit.

4. Marsh and Water Birds - Heron Rookeries

During 1996, refuge staff continued to monitor the two known great blue heron rookeries on the Ohio River Islands: Fish Creek Island and Grape Island. In addition, during the 1996 mid-winter bald eagle survey, refuge staff located a new "splinter rookery" on the Ohio mainland below Wells Island. There are only six nests in one large tree on the mainland, but there is now evidence that the great blue herons are expanding to new rookery sites off-island.



Figure 28. Nesting great blue herons find plenty to eat in the shallow waters surrounding the refuge islands. (ME)

The 1996 post-nesting season surveys revealed that active nests and total structures are up from 1995 levels on both islands (35% increase in active nests on Grape Island, and 24% increase in active nests on Fish Creek Islands). The decrease in nesting activity which was recorded in 1995 was due to significant storm damage that year which took down a number of trees and major limbs of trees in both rookeries. Although 1996 was a record year for flooding, this did not seem to affect nesting activity in the rookeries to any great extent. The five years of monitoring data for the two island rookeries is summarized in Table 10.

6. Raptors

Refuge staff and its two summer interns monitored the progress of a pair of osprey nesting, for the second year, on top of a power line tower at the toe of Neal Island near Parkersburg, West Virginia. Although the pair attempted to nest there last year, no eggs or young were ever observed. This year, however, the pair was successful. Three osprey chicks hatched, and all birds eventually fledged from the nest. The adult birds (at least one was banded) nesting in the valley are the result of a six-year osprey re-introduction project spearheaded by the DuPont Wildlife Enhancement Committee in cooperation with the West Virginia DNR and U. S. Fish and Wildlife Service. There were no other confirmed reports of osprey nests along the river during 1996.

HERON ROOKERY NEST COUNTS - 1992 TO 1996

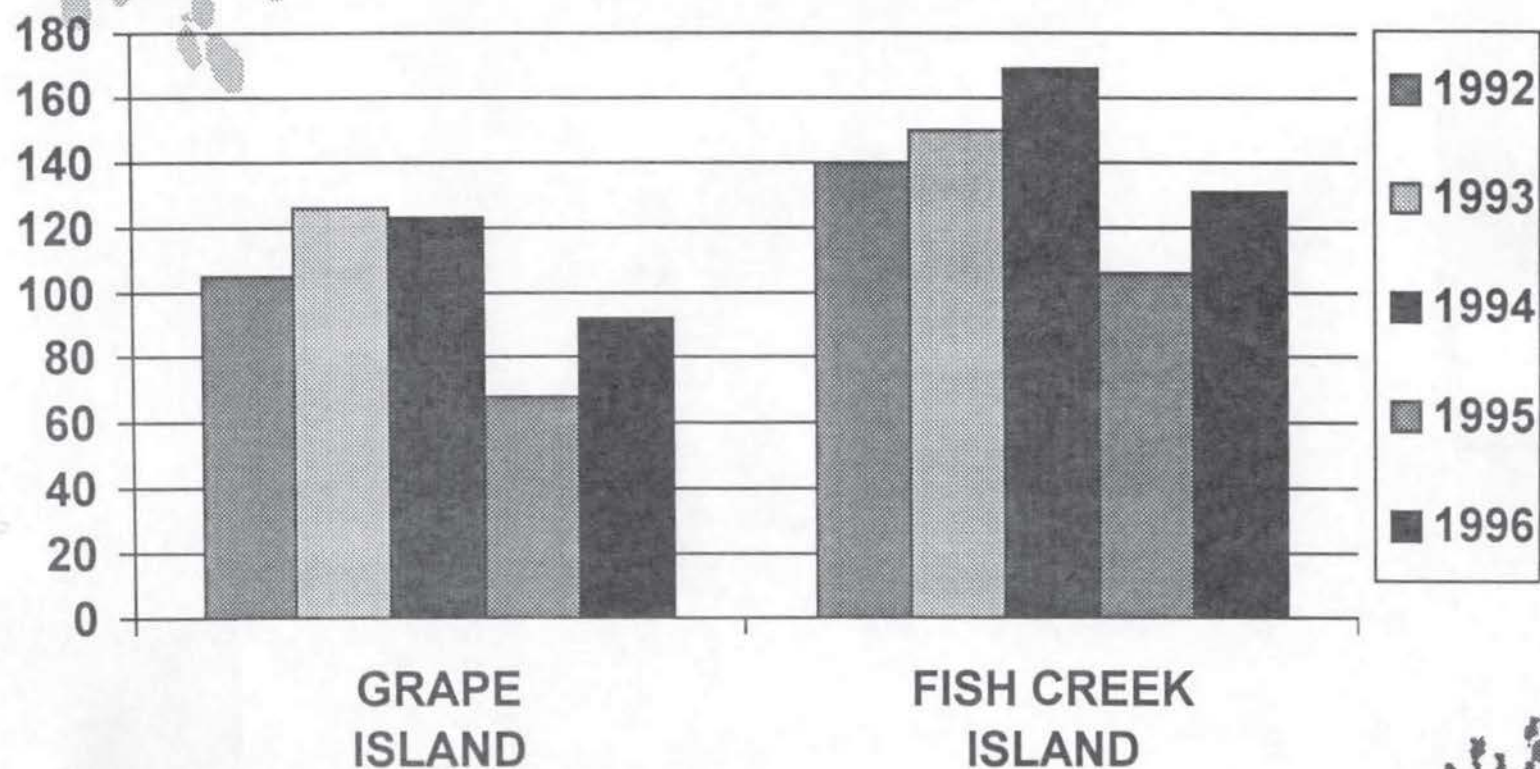


Table 10 - Heron Rookery Nest Counts.



Figure 29. A successful osprey nest at the toe of Neal Island produced three young this year. (JB)

Due to the lack of staff and time, the two barn owl nesting boxes on refuge properties were not checked during 1996.

7. Other Migratory Birds

During the month of June, Biologist Morrison and two summer interns established 45 neotropical land bird point count survey plots along seven islands in the refuge, including parts of three West Virginia counties. The breeding bird survey was run over a three day period (visiting 15 points per day). The data will eventually be entered in the Census database, developed by Hal Laskowski, and will also be entered in the West Virginia Partners in Flight Point Count Data Clearing House in Elkins, West Virginia.

Fifty-five species were encountered during the breeding bird surveys, 53 of which are nesting on Ohio River islands. The relative abundance of these breeding birds, by number of individuals and number of points encountered, is summarized in Table 11. The most abundant nesting birds on the islands surveyed are: grey catbird, Canada goose, wood thrush, song sparrow, yellow warbler, common yellowthroat, northern cardinal, warbling vireo, red-eyed vireo, cedar waxwing,

eastern towhee, and American goldfinch. Bald eagles were again sighted during the survey, but there is no evidence that they are nesting in the valley. It was also observed that certain species, such as eastern kingbird, bank swallows, rough-winged swallows, and belted kingfishers are not very early risers; they are often seen, and are quite abundant, later in the day, but very few were encountered during the early morning point count surveys. It is important to recognize the limitations of any surveys in trying to document uses of the refuge by a particular faunal group. The list of breeding birds generated by the point count survey methodology is by no means comprehensive, but rather provides a index that can be replicated and compared year-to-year.



Figure 30. Tree swallows nesting in snags overhanging the river. (ME)

**Table 11 - Relative Abundance of Neotropical Landbirds
Breeding on Ohio River Islands NWR Using Point-Count Survey
Methodology**

SPECIES	TOTAL # INDIVIDUALS	# POINTS ENCOUNTERED
grey catbird	54	35
Canada goose	46	4
wood thrush	40	20
song sparrow	36	27
yellow warbler	35	23
common yellowthroat	32	21
northern cardinal	28	21
warbling vireo	26	17
red-eyed vireo	23	22
cedar waxwing	24	9
eastern towhee	22	18
American goldfinch	22	15
bank swallow	20	1
American robin	20	17
American redstart	17	13
indigo bunting	15	14
yellow-breasted chat	15	11
white-eyed vireo	14	14
acadian flycatcher	13	11
common grackle	13	8
brown-headed cowbird	13	12
northern flicker	20	9
downy woodpecker	27	9
house wren	8	7
Baltimore oriole	8	8
carolina chickadee	7	5
eastern wood peewee	7	6
willow flycatcher	6	5
tufted titmouse	6	5
wood duck	6	4
blue jay	6	5
prothonotary warbler	5	4
yellow-throated warbler	5	4
scarlet tanager	5	4
carolina wren	5	4
yellow-throated vireo	4	4
white-breasted nuthatch	3	3
great-crested flycatcher	3	2
black-and-white warbler	3	3
cerulean warbler	2	1
red-bellied woodpecker	2	2
ruby-throated hummingbird	2	2
mallard	2	1
pileated woodpecker	2	2
red-winged blackbird	1	1
American crow	1	1
hooded warbler	1	1
eastern kingbird	1	1
eastern screech owl	1	1
rose-breasted grosbeak	1	1
great-horned owl	1	1
blue-grey gnatcatcher	1	1
brown thrasher	1	1
yellow-billed cuckoo	1	1
*bald eagle	1	1
*double-crested cormorant	1	1
* not nesting, but encountered during survey		

Of notable interest is the fact that 15 of the 20 species of birds identified by the West Virginia Partners in Flight working groups as species of concern in fact nest on the Ohio River Islands NWR.

During 1996, the refuge continued to monitor prothonotary warbler nest boxes which were placed on the islands as part of the cooperative program with the West Virginia DNR and DuPont Wildlife Habitat Enhancement Committee. Ten of the 74 boxes were lost due to record flooding during the winter of 1996. Of the remaining 64 boxes, prothonotary warblers used one. Other bird species nesting in the boxes included tufted titmice, carolina chickadees, house wrens and carolina wrens. The boxes are also seasonally used by Peromyscus and mud daubers. The refuge staff and West Virginia DNR will continue to monitor the boxes in their original placement for another year, at which time the program will be evaluated.



*Figure 31. WV DNR
Non-Game Biologist
Scott Butterworth
erecting a
prothonotary
warbler nest box
on Wells Island.
(JB)*

10. Other Resident Wildlife - Freshwater Mussels

Ohio River Islands NWR plays a pivotal role in both setting strategies and accomplishing tasks in furtherance of ORVE Resource Priority #1: **"In cooperation with partners, reverse the decline of native aquatic mollusks within the Ohio River Valley Ecosystem with emphasis on endangered, threatened and candidate species and species of concern."** The refuge's contribution is prominent not only because of our geographic location (i.e., with property situated along 365 miles of the Ohio River), but also because of the unique expertise of the refuge in having a dive team which specializes in freshwater mussel work. Since the refuge boundaries actually encompass underwater acreage as well as terrestrial habitat, the refuge has a continuing need for a dive team in order to conduct its own systematic surveys and monitoring of native mussels on the refuge. In addition, refuge staff have embraced the concept of the ecosystem approach to management and actually set aside time to work "beyond the refuge boundary signs" on important freshwater mussel issues in the Ohio River basin. Biologist Morrison is a member of the ORVE Freshwater Mussel Subgroup, and is also the Monitoring Coordinator for all mussel surveys (both native and zebra mussels) in the ORVE. During 1996, refuge staff conducted five mussel surveys on refuge, and seven surveys off refuge in furtherance of ORVE Resource Priority #1. These activities will be discussed below under the headings which parallel the major components of the Ohio River Valley Ecosystem Unionid Conservation Plan.

a. Monitoring

The largest percentage of the refuge's mussel monitoring activities in 1996 was expended in conducting zebra mussel monitoring at eight locations along the Ohio River mainstem. A total of 14 days were taken up in quantitative sampling, by SCUBA diving, to determine the quantitative effect of zebra mussel infestations on native mussel populations at the eight sites sampled. Four of the sites are on refuge, and four of the sites are off refuge along the lower 400 miles of the Ohio River. Sampling at the four downstream sites are the result of a cooperative effort of 19 different individuals and representing seven distinct partners which get together for one week a year to conduct the monitoring at these four sites. Assisting with the field work in 1996 was the Director of Fisheries for Kentucky Department of Fish and Wildlife Resources! Also in 1996, a new partner was initiated into the freshwater mussel subgroup, the U. S. EPA Philadelphia Office, which contributed three divers to assist refuge divers in collecting the samples.



Figure 32. Fifteen individuals representing eight partners cooperate on zebra mussel monitoring at four Ohio River stations. (JB)

The preliminary results from 1996 show serious increases in zebra mussel densities (10 to 30 fold), zebra biomass, and average number of zebra mussels per native at four of the five sites located in the lower 600 miles of the Ohio River. The infestation rate (the percent of live natives infested with zebra mussels) at three of those five sites now exceeds 90%, and a fourth site will probably reach that level soon. Notable increases in mortality of native mussels is being seen at two of the sites, and the biomass of natives is decreasing at three sites. The only good news to report, even if it is short lived, is that the upper 200 miles of the Ohio River so far has no reproducing populations of zebra mussels. There are scattered individuals (so far all adults) found in the upper 200 miles, but no recruitment was noticed in 1996. Table 12 compares both native mussel and zebra mussel data collected in 1995 and 1996.

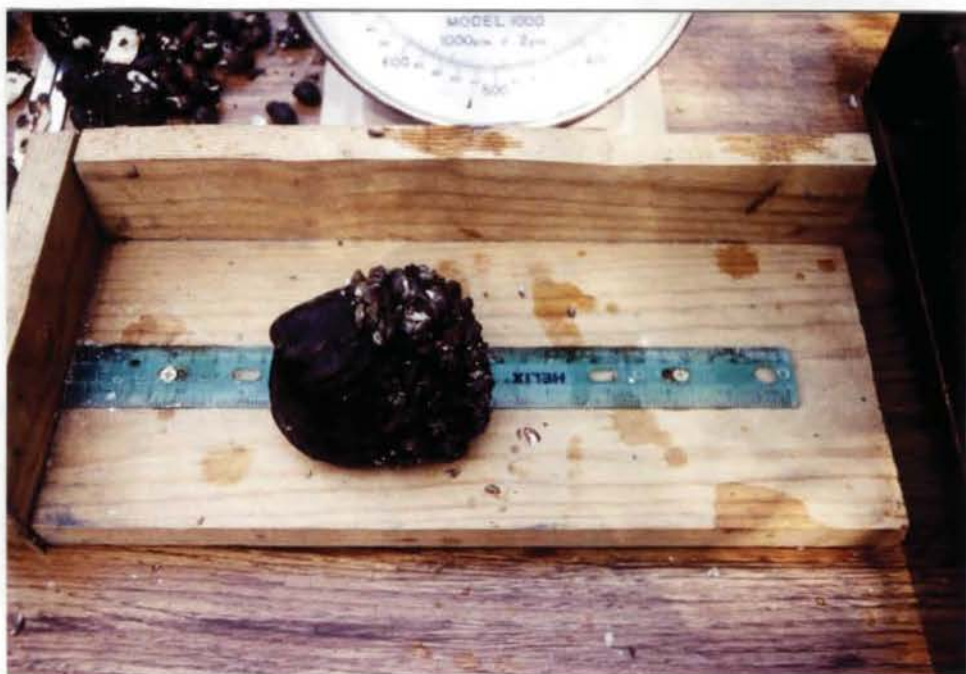


Figure 33. A zebra mussel infested ebony shell from Cypress Bend. (PM)



Figure 34. Kentucky Biologist Marty Barbour weighs the zebra mussel samples. (PM)

Table 12 - Ohio River Zebra Mussel Monitoring Results: 1995 and 1996

NATIVE MUSSEL DATA								ZEBRA MUSSEL DATA					
Location Zebras (RMILE)	Yr	# Species	Live Density #/m ²	Live Biomass g/m ²	* % Live	** Live FD	% <3 years	Live Density #/m ²	Biomass g/m ²	Avg. Per Live Unionid	Max per Unionid	% Live Natives Infested	% Live
RM 131 Paden Is.	96	3	0.4	26	75	<u>75</u> 25	0	0.12	---	0.33	1	33.3	25
RM 175 Muskingum Is.	95	12	11.4	1461	96	<u>96</u> 4	8.0	4.2	---	0.10	2	10.3	100
	96	10	8.9	750	97	<u>97</u> 3	48.4	0.3	---	0.03	1	3.2	50
RM 397 Manchester	95	9	5.7	295	86.2	<u>92</u> 8	35.4	12	negl	1	25	26.8	96
	96	13	9.1	810	79.4	<u>99</u> 1	9.3	360	154	9	92	87.0	98
RM 496 Aurora	95	12	6.4	476	77.9	<u>96</u> 4	11.7	942	588	39	115	96.2	87
	96	12	1.8	128	20.6	<u>78</u> 22	8.8	11,836	2377	253	528	92.9	98
RM 625 Rosewood	95	19	18.0	1412	83.5	<u>96</u> 4	22.6	1211	712	8	51	87.0	89
	96	17	10.7	1036	60.2	<u>85</u> 15	18.0	12,386	1352	76	311	95.0	98
RM 726 Hawesville	95	16	31.1	3147	77.9	<u>92</u> 8	2.0	3540	325	25	121	99.1	98
	96	11	12.1	1030	73.4	<u>87</u> 13	5.8	406	27.4	10	148	59.0	98
RM 814 Cypress Bend	95	18	10.3	1315	27.2	<u>70</u> 30	3.5	1056	264	41	464	94.8	91
	96	20	9.2	1307	44.8	<u>70</u> 30	3.9	14,123	874	445	1293	98.6	98

* includes all specimens collected - live, fresh-dead, and weathered.

** live and fresh-dead only (ignores weathered)

Refuge divers also conducted an underwater survey of the physical habitat adjacent to Phillis Island, Pennsylvania, rivermile 35. Mussel diversity and populations are still relatively low in the upper Ohio River, most likely because of the relatively great distances to the next available seed source and number of obstructions to the fish who may be carrying mussel glochidea. For these reasons, Phillis Island would make an ideal location for restoration of the historic mussel communities by reintroduction. The physical habitat is excellent, water quality has improved, and fish monitoring data (courtesy of the Duquesne Power and Light Generating Stations at Shippingport) show over 120 species of fish now inhabiting the waters near Phillis Island. The refuge will work through the ORVE Freshwater Mussel Subgroup to prepare a proposal for restoration.

Paden Island - 1996 was the first year of sampling at this island in the Willow Island Pool, to try to get a better handle on zebra mussel infestation in the upper reaches of the WV portion of the Ohio River. Only 1 live zebra and 3 dead zebras were handled in 34 quadrats of large cobble, gravel and sand substrate.

Muskingum Island - 1996 sampling was incomplete due to the uncooperative nature of the river this year. Only 14 quadrats were collected, but zebra densities are down from last year, and there is no evidence of recruitment of new zebra mussels at all during 1996. These observations are confirmed by other qualitative sampling conducted here in 1996. Now 28 species of native mussels inhabit the beds around Muskingum Island, the highest diversity of any single known bed in the Ohio River.

Manchester Islands - Thirty-fold increase in zebra mussel density, and at least two successful zebra mussel recruitments since August 1995.

Aurora - Many of the native mussels are stressed, and a few actually expired in our hands. Greater than a ten-fold increase in zebra density, and four-fold increase in zebra biomass. Wide range of zebra age and size classes present, all abundant. Free-rolling zebra balls seen on the bottom of the river, not attached to substrate. At least two recruitments so far this year. Zebra mussel biomass highest of any site sampled. Serious declines in native mussel parameters are probably underway. Nearly 30% of the live native mussels had attached zebra biomass exceeding their own.

Rosewood - More than a ten-fold increase in zebra mussel density, and we're beginning to see notable decreases in

native biomass, density, and live:fresh dead ratio. Lots of new recruitment of zebra mussels - three settlements already in 1996. However, last year's cohorts are mostly absent - few >20 mm.

Hawesville - A very interesting site - zebra numbers down to less than 12% of last year's density, and infestation rate down from 99% to 59%. Last year's adult and juvenile zebra mussels did not survive (none > 19 mm) but there is a lot of new settlement occurring. Are there physical or chemical factors affecting zebra mussels at this site? Nearly 40% of the live native mussels had empty byssal threads. Some decrease in native density and biomass noted. In 1995, Dr. Sickel compared dry tissue biomass of *F. ebena* collected near this site to same species from the Tennessee River and found that the Ohio River animals were, on the average, more than 30% underweight. They're slowly starving to death.

Cypress Bend - Recall from last year, evidence that 1995 zebra levels appeared to have decreased from prior year (witness lots of empty byssal threads). In 1996, zebra densities and biomass are back up significantly, with lots of new recruitment in addition to survival from last year. Ignoring weathered shells, the live:fresh dead ratio is unchanged, but still the highest mortality (30%) of any site. There were a lot more weathered dead shells in the samples last year.

In addition to the native mussel monitoring being coordinated by refuge staff, the systematic surveys along the river are turning up another mollusk group that is apparently at risk due to zebra mussels--aquatic snails. During 1995 and 1996, the mussel monitoring crew has collected aquatic snails incidental to the mussel surveys. In both years, four species of aquatic snails have been collected at the four downstream sites: *Lithasia verrucosa*, *Lithasia armigera*, *Pleurocera canaliculatum*, and *Campeloma decisum*. However, during 1996, there were no live specimens of any snails collected at either Cypress Bend or Aurora! These aquatic snails are being decimated by zebra mussel infestation at a rate far exceeding the apparent effect on native mussels. Both *Lithasia armigera* and *Lithasia verrucosa* were at one time listed as C-2 candidates for Federal protection. If zebra mussels continue their march upriver, these two species of snails may very soon be seriously imperiled.

In addition to the on-refuge work and off-refuge zebra mussel monitoring, the refuge staff also provided technical assistance to the West Virginia Field Office

and State College Pennsylvania Field Office in conducting mussel surveys in the Greenup Pool of the Ohio River, the Belleville Pool of the Ohio River, and two pools in the Allegheny River. The Allegheny River surveys involved the Pennsylvania Fish and Boat Commission, the Western Pennsylvania Conservancy, the Pennsylvania Department of Environmental Protection, the State College Field Office, West Virginia Field Office, and refuge staff and summer interns in conducting two days of brailling and two days of diving in pools 8 and 9 of the Allegheny River. Fourteen species of mussels were collected, including the endangered *Epioblasma t. rangiana*, and two species of concern.



Figure 35. Refuge staff teamed up with five other ecosystem partners to conduct mussel surveys in the Allegheny River (refuge divers are underwater!) (JB)

b. Focus Areas for Protection and Restoration

The Ohio River Valley Ecosystem Mollusk Subgroup has identified 17 rivers in the basin as interim focus areas for protection of important existing high diversity mussel communities and for the restoration of historic important mussel communities. The mainstem Ohio River is one of the 17 focus areas screened from the thousands of miles of streams which occur within the Ohio River Valley Ecosystem.

c. Propagation and Holding

The Ohio River Valley Ecosystem Unionid Conservation Plan has an aggressive propagation and holding component. For those species of big river mussels which are at risk due to zebra mussels, off site holding and propagation may provide an important management tool for restoring these populations once the zebra mussels run their course (if ever) and also for reintroduction into areas historically occupied by these species basinwide. The refuge has collected specimens from the mainstem Ohio River for captive rearing studies at Leetown Aquatic Ecology Laboratory and White Sulphur Springs National Fish Hatchery. The refuge also assists in propagation and holding studies by operating and maintaining a freshwater mussel quarantine facility on the Middle Island tract of the refuge. Funding from a VPI study which was comparing the condition of native mussels collected from areas infested with zebra mussels versus uninfested areas helped pay for a part-time caretaker to oversee the quarantine facility and monitor the condition of native mussels during their quarantine period. Refuge staff assisted in scrubbing and inspecting the native mussels after their mandatory quarantine period to insure that they are zebra free before transporting them to their long-term holding facilities. During 1996, approximately 1,000 mussels went through the Middle Island Quarantine Facility on route to either Leetown or White Sulphur Springs National Fish Hatchery. Based on two years of experience now, the refuge is suggesting modifications to the quarantine protocol to make the process less stressful on native mussels and more likely to exclude zebra mussels from entering the facility at all.



Figure 36. The Middle Island quarantine facility housed over 1000 native freshwater mussels during

d. Meeting Research Needs

During 1996, the refuge participated actively in four research projects which are pertinent to the long term survival of native freshwater mussels in the Ohio River Valley Ecosystem. These four projects are summarized below.

Sampling the Bacterial Flora of Freshwater Mussels. The refuge is cooperating with researchers at the National Fish Health Research Laboratory in Kearneysville, West Virginia to characterize the bacterial communities which inhabit freshwater mussels and whether any of these bacteria have the potential for infecting fish in places where fish and mussels are held together. In response to new initiatives being implemented by federal, state and private partners to capture and hold native mussels for future reintroduction, and the entrance of federal fish hatcheries into the mussel conservation pictures, questions arose regarding the potential for transmission of pathogenic microorganisms from mussels to fish, or fish to mussels. During 1995 and 1996, refuge staff collected 200 native mussels from the Ohio River for subsequent bacteriological assessment. This cooperative research study will continue into 1997. Initial results indicate that the major bacterial groups inhabiting native mussels were the nonfermenting organisms and members of the motile Aeromonas species. Only one potential salmonid pathogen was isolated, on day 0, but it was found that the bacterial flora of the mussels changes very quickly when placed in new water. After an obligatory quarantine period this bacteria would no longer be of significance.

Timing of Gametogenesis in Wild Versus Captive Populations. Refuge staff assisted researchers at Virginia Polytechnic Institute in Blacksburg, Virginia investigating the timing of gametogenesis in mussels in the Ohio River versus those which have been collected in previous years and are being held in pond environments in Kentucky, Virginia, and West Virginia. Refuge staff assisted in collecting native mussels from the Ohio River at monthly intervals during 1996, and the animals were examined for the development of mature gametes. During those same time intervals, mussels were taken from captive holding locations and their tissues similarly examined for gamete development. Preliminary results indicate that some species are reproducing in captivity, but others are not.



Figure 37. Researchers at the Leetown Aquatic Ecology Lab check mussels being held in suspension in pocket nets. (CG)

Fitness of Native Mussels From Zebra Infested Waters Versus Noninfested Waters. The refuge is assisting with another research project at Virginia Polytechnic Institute looking into the health of native mussels in the mainstem Ohio River in areas which are infested with zebra mussels versus those areas which are not. Matt Patterson, a graduate student at VPI, is comparing glycogen levels of mussels sampled from infested and uninfested areas. Preliminary results indicate that there is a significant difference in glycogen levels of mussels collected from these two different sample groups. This confirms other observations and work being done in the basin which has indicated that native mussels in areas heavily infested with zebra mussels are seriously underweight when compared to native mussels collected from uninfested waters. Poor fitness of a mussel going into the winter torpor may result in significant increases in mortality the following spring.

Captive Holding and Propagation of Ohio River Native Mussels. Refuge staff continued to collect native mussels for captive holding at Leetown Aquatic Ecology Laboratory and White Sulphur Springs National Fish Hatchery. Unfortunately, 1996 was a very poor collecting year due to numerous and extended periods of high water in the Ohio River. Both facilities have target lists of species which they have permits to hold, and refuge staff

keeps the list handy when out in the field collecting for other purposes. All animals collected for captive holding are first taken through the mandatory 30 day quarantine procedure to ensure that zebra mussels are not inadvertently introduced into the pond systems at the off-site holding facilities. Thus far, the quarantine process has worked well. Native mussels must be certified zebra-free before they can be moved out of the quarantine facility; if zebra mussels show up at the end of the first 30 day period, they are rescrubbed, cleaned, and put in clean water and kept another 30 days until they are certified zebra-free. During 1996, native mussels collected from Paducah, Kentucky appeared to be free of adult zebras, but apparently were carrying zebra mussel veligers in them. Zebra mussels kept popping up in quarantine for the first 90 days. They were subsequently held an additional 60 days at 70 degrees fahrenheit and heavily fed with algal cultures to ensure that any small zebras would be sufficiently large after the holding period to be visible and removable. No additional zebras showed up during the final 60 day quarantine period.



Figure 38. Freshwater mussel holding pond at White Sulphur Springs National Fish Hatchery. (KD)



Figure 39. Freshwater mussels are also being held at the Leetown Aquatic Ecology Laboratory in Kearneysville, West Virginia. (CG)

e. Outreach

The refuge provided background information for the March/April 1996 Endangered Species Bulletin entitled "Rescuing Ohio River Mussels." Biologist Morrison gave a scientific presentation at the Tri-State Fisheries Conference in March of 1996 on the status of zebra mussel infestations based on 1995 survey results from six mainstem Ohio River stations. The October 1996 Fish and Wildlife News highlighted the ORVE Mussel Subgroup activities as an example of the ecosystem approach to management. Biologist Morrison taught the South Parkersburg High School Statistics and Biology Class, using native mussel and zebra mussel population dynamics as an example of using statistics in real world resource management. The refuge arranged television interview concerning native mussels and their threats to coincide with National Wildlife Refuge Week. ORP Janet Butler arranged numerous interviews with local newspapers, television and radio about native freshwater mussels. ORP Butler also gave numerous tours of the quarantine facility to school classes and gave a presentation at a teacher's workshop in Marietta, Ohio on native mussels.

16. Marking and Banding

Refuge volunteers again made a contribution to the Office of Migratory Bird Management's regional wood duck population initiative by continuing wood duck banding on Fishing Creek near Pine Grove, West Virginia. John and Sue Bell banded 26 wood ducks in 1996. This is their fourth year as refuge volunteers in the wood duck banding program. Without the help of these dedicated volunteers, the refuge would not have accomplished any wood duck banding this year.



Figure 40. Biologist Morrison and volunteer John Bell banding wood ducks on Fishing Creek, West Virginia. (DE)

H. PUBLIC USE

1. General

The nineteen islands in the refuge include only two that are accessible by car: Middle Island near St. Marys, WV; and Wheeling Island at Wheeling, WV. Public use of refuge islands will always be limited by its largely boat-dependent access. Providing more opportunities for the public to enjoy wildlife-dependent activities, as directed by Executive Order 12996 issued in 1996, is a challenge requiring creative solutions.

The refuge needs to enlist the support of partners to enhance wildlife-dependent recreation opportunities. There is

potential to work with a local paddle-wheel tour company to develop environmental education and interpretive programs that could bring refuge messages to a broader audience.

A Challenge Cost Share Agreement with the Andrew Arkin family, donors of a large part of Muskingum Island in 1995, provided funds to develop a self-guided interpretive boat tour around Muskingum Island as well as an information kiosk on the island. While a boat tour won't provide opportunities for people lacking boat access, interpretation of the island's wildlife and cultural resources to an audience initially present for activities such as beach use and boating, could help modify expectations about island values that aren't refuge-compatible or wildlife dependent.

The refuge also purchased a large entrance sign for Middle Island through funds identified in the Challenge Cost Share Agreement which will be installed in 1997.

Ecosystem Management Participation - With the designation of an outreach subgroup for the Ohio River Valley Ecosystem in 1996, the refuge became involved with developing outreach strategies for the ecosystem's identified resource priorities. ORP Butler served as subgroup leader. Freshwater mussels were selected as the source priority on which to begin planning. Subgroup members compiled a list of outreach tools currently available on the subject (including zebra mussels, a major threat to native mussels) to identify gaps that might require additional tool development. The refuge made contacts with various Sea Grant offices and state divisions of fish and wildlife to explore potential partnerships on tool development and implementation. The subgroup submitted a budget proposal to the ecosystem team for tools desired for 1997 outreach, including zebra mussel awareness posters and brochures for boaters and scuba divers, freshwater mussel fact sheets, and boater registration inserts.

In further support of ecosystem outreach, the refuge participated in development of an aquatic "traveling trunk" project initiated in R4 at the Asheville Field Office. This educational tool targets a K-12 audience with the intent of increasing awareness and appreciation of lesser-known aquatic animals including mussels, crayfish, and non-game fish. It will also tie in the importance of maintaining healthy aquatic ecosystems for the benefit of wildlife and people.



Figure 41. Refuge ORP Butler, ORP Janet Marvin from Erie NWR, and Outreach Specialist Hilary Vinson from the Asheville Field Office work on the development of an "aquatic treasure trunk" as part of Ohio River Valley Ecosystem outreach. (PM)

Refuge kiosks were re-installed in May on Phillis, Williamson, Grape and Manchester II islands after being removed for the winter. We found that leaving the mounting posts in place on the islands, secured in concrete, worked well despite the repeated flood events. Broken plexiglass on one of the kiosks was the only vandalism that occurred during the entire recreation season.



Figure 42. Refuge kiosks installed on high use beach areas are removed for the winter and spring months to avoid loss from flood events. (JB)

2. Outdoor Classrooms - Students

Outdoor classrooms were conducted on Middle Island for students from Pleasants and Wood County schools in West Virginia and from St. Marys School in Marietta, OH. The island reforestation project has been the focus of these classrooms, teaching students about refuge habitat management objectives while involving them in hands-on tree planting, weeding, and survival surveys. The logistics of transporting students to the island are complicated by bridge weight restrictions which prohibit school bus crossings, and usually require teachers to enlist the help of parents to shuttle students to reforestation sites further up on the island. After refuge reforestation objectives are met in several years, outdoor classroom sites should be developed within a short walking distance from the bridge, possibly incorporated into an interpretive trail that would meet additional public use objectives.



Figure 43. Students from Pleasants County Middle School, WV participate in a tree planting activity as part of an outdoor classroom on Middle Island. (PM)

3. Outdoor Classrooms - Teachers

The refuge did not offer any outdoor classrooms for teachers in 1996 and probably will not initiate any until reforestation projects are near completion on Middle Island. With limited staffing, developing and providing staff-led outdoor classrooms for both students and teachers is not currently

feasible. As in the past, the refuge will attempt to provide assistance for teachers' workshops when requested, and will ultimately emphasize teacher-led outdoor classrooms. ORP Butler participated as a presenter at a Project WET workshop sponsored by the Washington County, Ohio Extension Service in March.

6. Interpretive Exhibits/Demonstrations

Requests and opportunities for refuge participation in off-refuge events exceeded available staff time. The refuge was represented at three events at the state capitol building in Charleston, WV: an endangered species event sponsored by environmental groups, "E" Day for environmental awareness, and Non-Game Wildlife Day organized by the WV DNR. The refuge also participated in Earth Day at the Parkersburg Mall and National Hunting and Fishing Days sponsored by the WV DNR. Each event included an exhibit and outreach materials pertinent to the subject of the event.

A new display structure purchased from Panelglide Exhibits in 1996 allowed refuge staff to keep the office exhibit in place when providing exhibits for events off-refuge.



Figure 44. ORP Butler and White Sulphur Springs NFH Manager Kari Duncan staff a Service display at a WV DNR sponsored National Hunting & Fishing Day event.

7. Other Interpretive Programs

The majority of refuge interpretive programs took place at schools, often as part of a larger event sponsored by the schools. For example, 26 programs that consisted of a "Jeopardy" type game involved 400 7th grade students over a two-day period as part of "Youth in Science and Engineering (YES) Days in Marietta, OH. More often, a refuge slide program was used, both in schools and at presentations to civic clubs and other organizations. On-site programs included interpretation of the refuge's mussel quarantine facility and interpretation of habitat management on Middle Island. A total of 59 programs serving 1358 participants kept refuge staff busy in 1996.



Figure 45. Youth In Engineering and Science Days, held every year at Marietta College in Marietta, OH has become an important outreach activity for the refuge. ORP Butler had a lot of fun playing "Jeopardy" with 26 school groups. (CB)

The refuge commemorated National Wildlife Refuge Week in October with an outdoor classroom on Middle Island attended by 102 students and teachers from Pleasants County Middle School. As in the previous year's recognition of the event, a commemorative tree was planted on Middle Island, this time a cottonwood in memory of Mollie Beattie, Director of the Fish and Wildlife Service who passed away in 1996.



Figure 46. National Wildlife Refuge Week brought 102 students to the refuge for outdoor classrooms. (JB)

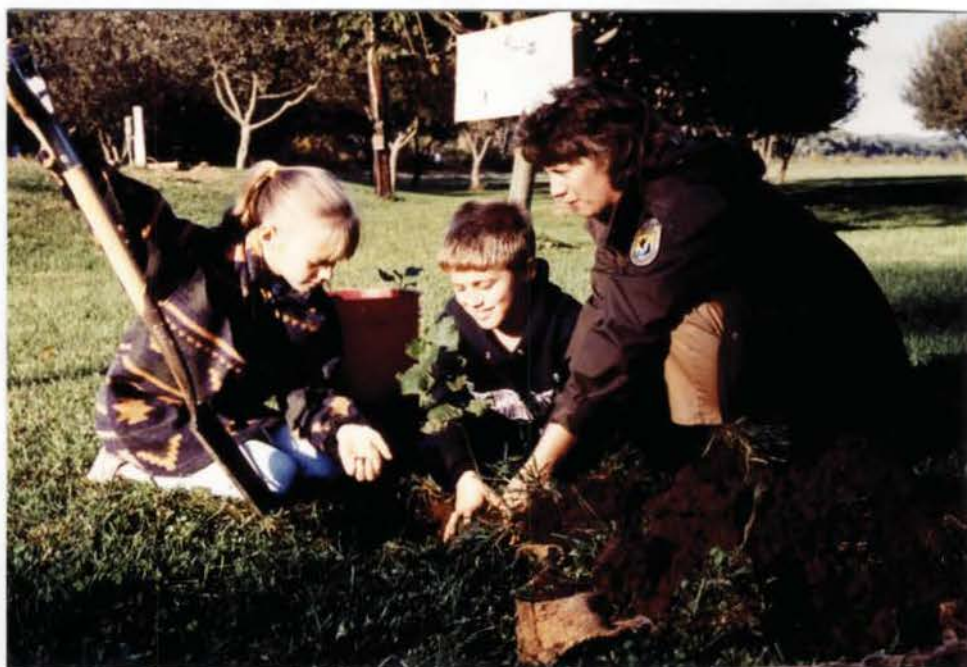


Figure 47. Office Assistant Cindy Bloomer assists with planting a cottonwood in memory of Mollie Beattie. Each year, the refuge plants a tree during National Wildlife Refuge Week in honor of someone who has made a difference to the refuge or the Service. (JB)

Media coverage of refuge activities consisted of newspaper, television and radio features. Newspaper articles appeared on the donation of \$5000 to the refuge from the Andrew Arkin family, Middle Island tree planting volunteer day, outdoor classrooms on Middle Island, zebra mussel problems in the Ohio River, habitat restoration on Middle Island, and Manchester 2 Island. Ohio Public Television interviewed Biologist Morrison and ORP Butler about zebra mussel threats to native mussels, producing both television and radio spots. WTAP television in Parkersburg covered osprey nesting on Neal Island.



Figure 48. Refuge Biologist Morrison becomes a star of radio and TV as she interviews for Ohio Public Television and Radio. (JB)

8. Hunting

Limited hunting occurs on the refuge mostly due to the lack of accessibility. Restrictions such as dog-use for retrieval purposes only and steel shot-only may deter some hunters, while others are attracted to the relative seclusion of the islands.

The refuge is open on an island-by-island basis to archery deer hunting, migratory bird hunting, rabbit hunting and squirrel hunting. Middle Island remained closed to hunting except for a special week of mourning dove hunting on part of the island. The early successional habitat currently on much of the island provided favorable conditions for doves. Less than a dozen hunters took advantage of this opportunity, and

after the first day, most of the doves found refuge off-refuge.

Hunters are required to carry a refuge hunt brochure while hunting on the refuge. There is no registration of hunters specific to the refuge. Hunting use is estimated at 200 visits for 1996, including 50 visits for deer, 120 visits for waterfowl, 20 for doves, and 10 for rabbit and squirrel.



Figure 49. Middle Island was open for a special week of dove hunting in 1996, attracting a few hunters. (JB)

9. Fishing

Refuge specific regulations are limited in relation to sport fishing. This was due to adequate state fishing regulations and most fishing activities occurring from a boat along the perimeter of islands. Currently the refuge is in the process of developing GIS mapping defining underwater acreage associated with island now in the refuge system. This data will strengthen the Service's position if adjustments are ever needed in the fishing program. Current fishing activities on refuge properties are compatible and pose no impact to refuge resources. Total fishing visits in 96 was estimated at 25,700. The logistical layout of this refuge makes accurate assessment of any public use activity almost impossible.

13. Camping

Camping is not a permitted use on the refuge. One incident in 1996 on Paden Island left ample evidence of the "maximum-impact" approach to camping that occurred on some of the islands before refuge acquisition. In addition to the garbage these campers left behind, refuge staff found two machetes and significant damage to island vegetation.



Figure 50. Camping a-la-traditional style. Fourth-of-July weekend left a few reminders on Paden Island that not everyone interprets refuge wildlife values the same as the Service does. (BM)

14. Picnicking

Facilities for picnicking are not provided on any of the refuge islands. This activity occurs in conjunction with other public use and is included in "beach-use" figure in Table 13.

16. Other Non-Wildlife Oriented Recreation

The 1996 recreation season contrasted markedly from the previous hot, dry summer with cooler air and water temperatures and increased rain and high water. The water temperature peaked at 80 degrees, almost ten degrees lower than 1995! High water conditions in late May nearly eliminated recreational use on Memorial Day weekend, traditionally a high-use period. These environmental conditions probably accounted most for the decrease in

recreational use of the refuge, particularly in non-wildlife dependent use.

Estimating refuge public use is difficult. There are no designated entry points, and the nineteen refuge islands are scattered along 362 miles of river. Public use data is collected while refuge staff are on the river engaged in other work as well as during trips targeted for visitor contacts. Although statistically invalid, this data is used for making "best guess" estimates on public use.

Table 13 - Refuge Recreational Use - 1996.

MONTH	BEACH USE	BOAT USE	*OTHER	FISHING	TOTALS
March	-0-	-0-	300	700	1,000
April	-0-	-0-	450	2,500	2,950
May	**200	5,500	550	5,500	11,750
June	6,000	6,800	1,400	5,500	19,700
July	9,000	10,200	2,200	3,000	24,400
August	8,000	8,600	2,600	3,000	22,200
September	6,000	7,500	4,000	3,500	21,000
October	-0-	1,000	100	2,000	3,100
TOTALS	29,200	39,600	11,600	25,700	106,100
*bicycling, jogging, walking, auto touring, picnicking					
**high water covered most beaches or left them mucky					

17. Law Enforcement

Refuge Officer Mitch Ellis attended the Annual Law Enforcement In-Service training from March 31 - April 5 at Eastern Shore National Wildlife Refuge, Cape Charles, Virginia.

On June 6 several small barricades were installed on Middle Island to prevent visitors from driving off the main road.

On November an unsuccessful attempt was made to break into the storage barn on Middle Island. The incident was reported to the local Pleasants County Sheriff Department, no one was apprehended. The sheriff's department has been very

cooperative in providing periodic visits to the island at night and on the weekends.

Law Enforcement Special Agent Emerson Gorham visited the refuge on the opening of dove season. However, turn out for the refuge dove hunt on Middle Island was less than 10 people and everyone was in compliance with the steel shot and refuge specific "zoning" regulations.

Visitor contact patrols were conducted over select holidays and weekends. Refuge staff Wilson, Ellis, Butler and Morrison shared the responsibilities of contacting individuals on all 19 refuge islands scattered along 362 miles of the Ohio River. This station's key role in the Ohio River Valley Ecosystem Team and transfer of Refuge Operations Specialist, Mitch Ellis, in August has provided less opportunity for the staff to conduct these patrols. Fortunately, through previous contacts, brochures, and interpretative kiosks on select islands has resulted in exceptional visitor compliance. The transfer of Refuge Operations Specialist, Mitch Ellis, in August resulted in the loss of the only law enforcement person on staff.

I. EQUIPMENT AND FACILITIES

3. Major Maintenance

Boundary sign maintenance continues to be a "major" task. Factors including high water, vandalism, and lush Japanese knotweed growth required periodic inspection, replacement, and weed clearing. Each sign has to be inspected/weeded 2-3 times per year, however, keeping the signs visible to the public is critical in order to enforce refuge regulations and distinguish which islands are in the refuge system.

One additional partial island was added in 1996--18 acres on the head of Wheeling Island. The refuge now has full ownership of 16 and partial ownership of 3 islands with approximately 175 sign locations that need to be maintained.

The refuge's maintenance work has increased significantly with the acquisition of Middle Island in 1995. Maintenance activities centered around the two mile access road which was graded in June by a local contractor for \$400. Upon completion of grading, 200 tons of crushed run gravel was applied at a cost of \$2,500.

Several minor modifications were made to the mussel quarantine facility constructed in 1995 to assist with Ohio River Valley Ecosystem Goals/Resource Priorities. Plans are to enclose the facility, install a drop ceiling, and repair faulty electrical wiring in FY 97.

The annual Ohio River Sweep, a clean-up campaign sponsored each year by the Ohio River Sanitation Commission (ORSANCO) brought nine volunteers to Muskingum Island on June 15. Working with refuge staff, volunteers "swept" the island and accomplished a huge amount of garbage/debris removal.

4. Equipment Utilization and Replacement

A total of \$7,910 were expended to purchase fuel, maintain and replace equipment related to three trucks, two boats, building improvements on Middle Island and other more equipment repair/supplies. Equipment purchased included a John Deere Lawnmower (\$3,775); portable generator (\$772); portable sprayer (\$230); and a 115 H.P. boat motor (\$4,604). The boat motor will be utilized on a new boat equipped for diving activities, to be delivered in January 1997.

A total of \$6,376 was expended to maintain SCUBA capability for aquatic surveys and ecosystem related activities.

Overall \$14,286 were related to equipment utilization and replacement expenses in FY 96. Fortunately, our maintenance funding in FY 96 increased to \$10,000 from \$6,000 received since the refuge was established in October 1990.

This year a new 20' aluminum boat with 115 H.P. motor designed for the refuge dive team activities and large river activities was ordered. Unfortunately, Duck Trail Ecological Incorporated will not deliver the boat until January 1997, as opposed to an earlier June 1996 delivery date. Purchase of this boat was an example of Regions 3, 4 and 5 working together in the spirit of cross-regional ecosystem activities of the Ohio River Valley Ecosystem Team in meeting high priority resource issues. Region 4 contributed \$4,000 toward the purchase of the boat/motor/trailer which totaled \$14,471. The boat is essential to fulfilling the mission of the refuge and implementation of numerous research projects associated with the Ohio River Valley Ecosystem and other field stations in Regions 3, 4 and 5.

To those not familiar, basically all field work involves boat usage. Therefore, our 15' Boston Whaler and 16' Alumicraft boats are beginning to show signs of serious wear after five years of continuous use.

A tree planter was obtained from Great Swamp NWR to assist in reforestation efforts on Middle Island. After the addition of a few minor parts and some repairs, it has been a great asset to our reforestation efforts.

The tires on the Massey Ferguson farm tractor were replaced at a cost of \$1,000. This tractor was transferred from White

Sulphur Springs National Fish Hatchery in FY 95 with turf-special tires, too small overall diameter for effective utilization of the three-point hitch set-up.

5. Communications System

The refuge communications system consists of marine radios/telephones in both boats, cellular phones in the trucks which are portable, and two hand-held radios for various purposes. The office phone system is a "Norstar Meridian" system featuring three lines (one dedicated for fax/computer), an intercom system, paging, memory dialing, and other functions.

6. Computer Systems

The refuge computer inventory is as follows: a Gateway 2000 486 PC, an AST 386 PC, an Epson Equity IIe 286 PC, a Dell 386 notebook computer, a Compaq 386 notebook computer, and an HP LaserJet III Printer. Software used at the station include MSDos, Windows, WordPerfect, RBase, Microsoft Powerpoint, and electronic mail.

7. Energy Conservation

Because the refuge office is a "GSA rental" we have no energy information available with regard to our office specifically. Table 14 outlines our vehicle energy data for 1996.

Table 14 - Energy Data for the Refuge Vehicles for 1995.

Vehicle	Miles (1995)	Fuel (Gal.)	M.P.G.	Cost (Gas & Maint.)
Chev. Blazer (4WD)	7,518	590	12.7	\$ 761.86
Chev. Truck (4WD)	10,840	739	14.6	\$1,592.30
Chev. Suburban	13,850	829	16.7	\$1,544.55
Boston Whaler	----	200	--	\$126.81
Alumicraft Boat	----	25	--	\$1,483.16
TOTALS	32,208	2,383	--	\$5,508.68

J. OTHER ITEMS

4. Credits

The entire refuge staff participated in the preparation of the annual narrative. Photo credits are given in parenthesis under each photograph: ME=Mitch Ellis, PM=Patty Morrison, JB=Janet Butler, CB=Cindy Bloomer, CC=Camille Collins, BB=Bill Butler, CG=Catherine Gatenby, DE=Drew Ellis, and KD=Kari Duncan.