

MASON NECK NATIONAL WILDLIFE REFUGE
Lorton, Virginia

MARUMSCO NATIONAL WILDLIFE REFUGE
FEATHERSTONE NATIONAL WILDLIFE REFUGE
Woodbridge, Virginia

ANNUAL NARRATIVE REPORT

Calendar Year 1984

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

REVIEWS AND APPROVALS

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<u><i>James W. Stewart</i></u>	<u>2/28/85</u>	<u><i>Anthony D. Legé</i></u>	<u>3-22-85</u>
Refuge Manager	Date	ACTING Refuge Supervisor Review	Date

<u><i>Edward S. Moss</i></u>	<u>8/20/85</u>
ACTING Regional Office Approval	Date

INTRODUCTION

The Mason Neck National Wildlife Refuge is located in Virginia, 18 miles south of Washington, D.C. Nestled on an 8,000 acre boot-shaped peninsula jutting out into the Potomac River, the refuge is dominated by mixed hardwood/evergreen forests, high bluffs, and about 300 acres of freshwater marshes. From the initial acquisition of 845 acres in 1969, Mason Neck has grown to 1,980 acres, including 789 acres leased in 1982 from the Northern Virginia Regional Park Authority. Only one private inholding of 296 acres remains.

The refuge was established in 1969 as the Nation's first bald eagle refuge using funds provided under the Endangered Species Act. Eagles have nested and wintered on the peninsula since before the 1700's. Currently, only one nest, located on the leased land, is active and an average of ten eagles use the refuge each winter.

Though located within easy driving distance for approximately 10 million residents of Virginia, Maryland, and Washington, D.C., the refuge has an annual visitation of under 10,000 people. This is due to limited public use facilities and competition from over 400 nearby Federal, state, regional, county and city parks.

Until 1974, Mason Neck National Wildlife Refuge was a subunit of Blackwater National Wildlife Refuge. It then became an independent unit with a manager and two subunits of its own, Featherstone National Wildlife Refuge and Marumsco National Wildlife Refuge totalling 164 and 63 acres respectively.

The office is located in Woodbridge, Virginia, less than 9 miles from Mason Neck and only a mile from Marumsco and Featherstone refuges.

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A. HIGHLIGHTS

The production of two eaglets occurred this spring. (Section G.1.).

Buildings were razed. (Section I.2.).

Acquired 59.37 acres with 296 acres remaining in inholding.
(Section C.1.).

B. CLIMATIC CONDITIONS

Total annual precipitation was 42.42 inches, approximately 4 inches above normal. Precipitation was rather evenly distributed throughout the year. July was the wettest month with 6.63 inches and December was driest with 1.25 inches. Snowfall totalled 10.40 inches, all of it occurring during January, February, and March.

The average yearly flow of the Potomac River was 25 percent above normal in 1984. The refuge's Great Marsh borders the Potomac River and is directly affected by river conditions.

Temperatures exceeded 90° on 20 days and dropped below 0° on 2 days during 1984. Temperature extremes were 98° on June 9 and -9 on January 22.

C. LAND ACQUISITION

1. Fee Title

Progress was made this year towards acquiring 355 acres of private inholdings. Two tracts of land were acquired during 1984. Tract 19, -I, R, containing 14.74 acres was purchased from The Nature Conservancy and Tract 10g, R, totaling 44.63 acres was purchased from Ludlow King.

The acquired tracts and the remaining inholding are depicted on Map 1, page 34. A development plan for Tract 18, owned by Mrs. Jan King Evans, has been prepared with the area divided for single family dwellings. A recent soil perk test indicated less than 25 percent of the area will adequately percolate. Negotiations between the Regional Realty Office and the landowner continued throughout 1984, with little progress being made. The presence of a housing development within 1/4 mile of an eagle nest site is not tenable and the only viable solution to protect the area may be condemnation.

3. Other

In 1982, 789 acres of land belonging to the Northern Virginia Regional Park Authority were leased to the refuge for a period of 60 years. However, the lease is contingent on our acquiring the private inholdings previously discussed and can be revoked by the Park Authority at any time until such acquisition.

D. PLANNING

2. Management Plan

Fire Management plans were prepared and approved for Mason Neck, Marumsc, and Featherstone refuges. No prescribed burns will be conducted on these areas.

5. Research and Investigations

Mason Neck NR84 - "Long-term ecological studies of Box Turtles, Terrapene carolina, at the Mason Neck Wildlife Refuge" (51610-5)

Carl Ernst, Ph.D., of George Mason University began the above titled study in 1984. The population dynamics of the box turtles will be studied over a 20 year period. The determination of factors such as size and age classes, sex ratios, juvenile/adult ratios, longevity, population turnover, growth patterns, movements, etc., will be conducted.

Mason Neck NR84 - "Biological studies of Peoriine Moths (Lepidoptera: Pyralidae)" (51610-6)

Jay Shaffer, Ph.D., of George Mason University began observation in June. He hopes to determine the life histories and establish host plants for five (5) species of moths.

E. ADMINISTRATION

1. Personnel

Temporary maintenance worker John Weller resigned in March to accept a position with the Department of Defense.

Robert Westerman entered on duty in late May to fill the position vacated by John. Mason Neck is without a permanent maintenance position.



4 2 3 1

1. Thomas W. Stewart, Refuge Manager, GS-11, EOD 10/28/84, PFT
2. Yvonne M. Schultz, Outdoor Recreation Planner, GS-9, EOD 10/31/83, PFT
3. Barbara Mitchell, Secretary, GS-5, EOD 12/14/80, PFT
4. Robert B. Westerman, Maintenance Worker, WG-6, EOD 5/27/84, Temp., PT
5. Domenick R. Ciccone, Refuge Manager, GS-11, Transferred 7/6/84, PFT
6. John Weller, Maintenance Worker, WG-6, Terminated 3/4/84, Temp., PT

A summary of refuge staffing over the past 5 years is shown below.

	<u>Permanent Full-Time</u>	<u>Seasonal</u>	<u>Part-Time</u>	<u>Temporary</u>
FY 84	3			1
FY 83	3			
FY 82	2	1		
FY 81	2	1		1
FY 80	2	1		1

2. Youth Programs



8/84 YMS

2 3 1 4 5 6
7 8

1. Robert Westerman
2. Jean King
3. Crystal Good
4. Leo M. Kenney, Jr.
5. Thomas Doran
6. Anne Boyle
7. Boyd Walker
8. Mark Salyer

Mason Neck's 1984 YCC program consisted of a 7 enrollee, 8 week non-residential camp. Four males and three females were selected by lottery from 71 applicants. Recruitment was through a news release to 18 newspapers and 7 radio stations, direct mailings to 14 high schools, and at a county-wide career night booth. Enrollees chosen represented two counties and one independent city and included two 15 year olds, four 16 year olds, and one 18 year old who was issued a Government driver's license. Supervision was provided 4 days a week by a part-time maintenance worker and on the fifth day by the ORP.

The enrollees started the season in high spirits tackling a first aid course and clearing a new environmental education trail with equal enthusiasm. They moved on to the rehabilitation of the combination YCC



#1 Enrollees training for what we always hope won't happen--accidents. The threat of being tied up by a fellow enrollee is enough to deter many accidents.

6/84 YMS



#2 Jean King, the only 18 year old could swing a mean pulaski when a cameraman came close. 6/84 YCC Enrollee

headquarters (garage) which included taking down and moving over 400 feet of 8 foot chain link fence and barbed wire. As the weather warmed and the flies grew thick, they tackled repair of two foot bridges and construction of their monument project, an observation platform overlooking the marsh and a beaver lodge. The end of the camp was highlighted by hosting visiting enrollees from Prince William Forest National Park and a trip of their own to the Shenandoah National Park. Along the way, environmental awareness training was worked in during the field trip, a heron rookery survey was conducted, they were shown refuge films and slide shows in poor weather, and discussed the importance of each project during their breaks. Staff took advantage of every opportunity such as



#3 Maintenceman Westerman shows enrollee Kenney how to space the boards on a foot bridge that the enrollees repaired. 8/84 YCC Enrollee

finding turtle eggs in a gravel pile being excavated to point out facts about the animals' lifestyles and man's impact. Enrollees worked in small and large groups with each being given a chance to be in charge of a phase of a project or being given independent assignments. Their only project off the refuge came when the refuge was told to vacate a storage area on short notice after GSA decided not to renew the lease. The YCC's availability and enthusiasm helped complete the move in only 3 days including a full inventory of materials.



#4 Enrollee Boyd takes a break to show off new observation platform overlooking marsh and beaver lodge.
8/84 YCC Enrollee



#5 During breaks, staff discussed safety and environmental topics with the enrollees.
6/84 YCC Enrollee

Morale was high even though two enrollees suffered from delayed or incorrect paychecks. (As of the writing of this narrative, one enrollee still has not yet received her last paycheck.) Because of some absenteeism, the camp was extended for a week but most enrollees had other plans so only two stayed on for a ninth week. This was fitting since the contract on the rental car ran out after the eighth week and only two could ride with the maintenance man in the pickup. An exit interview with most of the enrollees revealed they were satisfied with the job and had enjoyed the summer.

There were three documented accidents during the camp. One girl cut herself with a sandvik axe resulting in a small incision on her finger, one enrollee driving home missed a curve and ran off the road leading out of the refuge resulting in some minor damage to his car, and a third enrollee got a split lip when he missed a chalkline that another enrollee was throwing to him. None were lost-time accidents but two enrollees did get 1 day suspensions for horseplay.

In all, the camp was considered a great success with much being accomplished. With such a small staff, a station like Mason Neck depends a lot on the YCC for projects where several people are needed and this year's crew came through for us on every project.



#6 Enrollee Doran models what the best dressed YCC's are wearing this year as he shovels gravel into potholes. Don't worry--the truck is not moving while he's up there because the driver is also the photographer.

7/84 JK

4. Volunteer Program

In the past, volunteers (mostly friends of refuge staff or ex-employees) have occasionally donated time to help band ducks or assist in surveys, but no major effort was made to recruit people. With only two or three staff members, no one had time to sit down and design a volunteer program beneficial to both the volunteer and the refuge. Sending enthusiastic volunteers out without an orientation and some form of guidance resulted in misdirection and failure to accomplish objectives. The volunteer was frustrated and the refuge gained nothing.

Volunteer work during the early part of 1984 included two Costa Rican exchange students who helped with duck banding, an ex-employee continuing a bluebird nesting box program, and a graduate student monitoring eagle usage of the refuge.



#7 Costa Rican Liz Brenes Cambronero assisting our staff with banding. Dr. Hester also joined in on the fun and helped document our operation. 3/84 YMS

In the fall, a project came up that was perfect for trying to utilize volunteers without tying up much staff time. The refuge needed woodchips spread along trails accessible only by foot. Scout groups are constantly calling to ask about public service projects. Three of these were contacted and quickly volunteered to spread woodchips. Each group worked 1 day and received an orientation by an employee and then general supervision to ensure quality work. In return for less than 24 staff hours (approximately four for the paperwork), the refuge received 136 activity

hours of labor from 35 individuals and covered about 800 feet of trail up to 1/2 mile from the nearest vehicle access point. The scouts earned credit towards badges, had a feeling of accomplishment, and learned a lot about refuge management.

Because of the success with these groups and full staffing permitting employees to have more time for the volunteer program, the refuge is planning a much larger volunteer program in 1985.

5. Funding

The funding situation in FY 85 was much improved over previous years, largely because of available Accelerated Refuge Maintenance Management (ARMM) monies. This should permit Mason Neck to complete many badly needed maintenance projects.

The following table predicts the status of refuge funding over the last five fiscal years.

Table 1

<u>Fiscal Year</u>	<u>Appropriation</u>	<u>Source</u>
1985	230,500:	
	197,000	1260
	33,500	1520
1984	124,000:*	
	113,800	1260
	10,200	1520
1983	84,000:	
	32,000	1210 (MB)
	2,000	1220 (MNB)
	46,000	1240 (I&R)
	4,000	1400 (SE)
1982	75,000:**	
	30,000	1210 (MB)
	1,000	1220 (MNB)
	40,000	1240 (I&R)
	4,000	1400 (SE)
1981	71,000:	
	22,000	1210 (MB)
	1,000	1220 (MNB)
	44,000	1240 (I&R)
	4,000	1400 (SE)

*Reduced from 149,360

**Reduced from 82,000

FY 85 funds include a special appropriation of \$20,000 for public use projects at Mason Neck.

6. Safety

No serious or lost-time accidents occurred on the refuge during 1984 but there were five minor accidents. Three involved YCC enrollees which were covered in Section E.2., Youth Programs. The other two involved the maintenanceman who sprained his wrist trying to catch a falling truck battery, and a backhoe involved in building demolition on the refuge clipping a parked car.

Safety meetings were conducted monthly through June and then sporadically as Manager Ciccone left and staff had to juggle the YCC and various unfamiliar duties. Topics covered included winter driving hazards, jump starting cars, chain saw operation, safe canoe handling, auto accidents, poisonous plants and animals, heart attack, and artificial respiration.

All staff are certified in basic first aid.

8. Other Items

Manager Ciccone attended the Wildlife Resources Project Leaders meeting at Wallops Island on January 9 through 12.

Secretary Mitchell attended training on the Service's PAY/PERS system in the Regional Office on March 29 and 30.

F. HABITAT MANAGEMENT

1. General

Located along the Potomac River, 18 miles south of Washington, D.C., the refuge covers 1,980 acres, a portion of which (789) is managed under a 60 year lease. About 80 percent of this land is hardwood forest on gently rolling terrain which culminates in steep (up to 50 feet) bluffs along the Potomac.

No active habitat management took place during 1984.

2. Wetlands

The 285 acre freshwater tidal Great Marsh is the largest marsh in Fairfax County, accounting for nearly one-third of the County's remaining wetlands.

There are no man-made impoundments on the refuge, so the only areas not subject to tidal fluctuation of the Potomac River are three beaver ponds covering about 75 acres.

5. Grasslands

The refuge contains approximately 15 acres of grassland. The grassland is usually mowed to inhibit invasion by woody species, however, equipment failure prohibited mowing this year.

9. Fire Management

The Fire Management Plan for Mason Neck was prepared and received Regional Office approval during 1984. No prescribed burns will be conducted on the area and fire related activities will center around presuppression and suppression work.

G. WILDLIFE



#8 Canada geese resting in the marsh.

EH

1. Wildlife Diversity

Despite its location within a large metropolitan area, the refuge has retained much of the wildlife diversity present during Colonial times. Numerous animals including 211 species of birds, white-tailed deer, river otter, beaver, etc., routinely utilize refuge resources.

2. Endangered and/or Threatened Species

The Mason Neck bald eagle population continues to do well. Total use days for 1984 was 2,610. Peak number observed was 12 and occurred in January. Eagle use was observed during each month and use appeared rather evenly distributed.



#9 Immature bald eagle.

EH

We can report good news this year with respect to our only breeding pair of eagles; two (2) eaglets were produced (#10). The adult pair used the same nest which produced a single eaglet last year. The nest is located 60 feet up a red oak tree. This marks the first time since the 1950's that more than one eaglet has hatched in a nest on Mason Neck.

Major concentration areas of bald eagles on the Mason Neck peninsula continue to be the communal roost on the state park, Pohick and Occoquan Bays, and the refuge's Great Marsh.

Refuge personnel participated in the Mid-Winter Bald Eagle Survey on January 2, covering an area from Mason Neck south to Powells Creek. Fifteen sightings of bald eagles were made, 11 on Mason Neck. There were 5 adults and 10 immatures.

3. Waterfowl

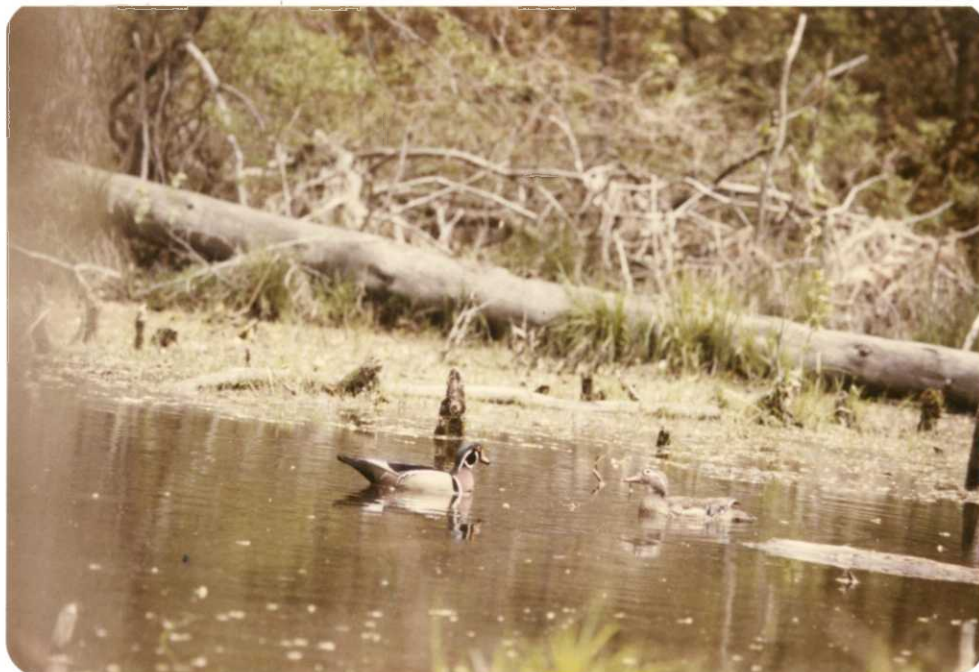
Mallard, black ducks, wood ducks, and common mergansers are the most commonly observed waterfowl on the refuge. Water conditions were good in 1984 and the Great Marsh attracted good numbers of waterfowl. Waterfowl use in 1984 was approximately 176,000 use days.

Canada geese are often observed passing over the refuge during migration, but use of our wetlands during 1984 was under 1,000 use days.



#10 One of two immatures in the nest, this one needed encouragement to pose for his picture. 6/84 YMS

Production was estimated at 40 wood ducks and 5 mallards. Our eight wood duck nest boxes were not checked. Natural cavities are plentiful in our beaver flooded timber.



#11 Wood duck pair on Raccoon Creek.

EH

4. Marsh and Water Birds

Great blue herons, great egrets, and green-backed herons make up the majority of this category.

The population of great blue herons peaked at near 1,000 individuals this summer. An estimated 461 young were produced in 288 nests in the High Point rookery.



#12 Great blue heron along edge of marsh.

EH

5. Shorebirds, Gulls, Terns and Allied Species

Gulls make up the bulk of use by this group. Predominant shorebirds frequenting the Great Marsh and Potomac shoreline are greater yellowlegs and spotted sandpiper.

6. Raptors

Several species of raptors including osprey, red-tailed, and red-shouldered hawks utilized the refuge this year.

The pair of osprey which had successfully nested on a channel marker last year were unsuccessful this year.

7. Other Migratory Birds

The annual Christmas Bird Count was conducted on Mason Neck on December 23. Outdoor Recreation Planner Schultz participated in the census. Eighty-nine species including several thousand greater and lesser scaup were observed this year.

8. Game Mammals

River otter were again sighted on Mason Neck. Sightings have been made annually since 1982 following a hiatus of 11 years.

Beaver are abundant on the refuge and surrounding lands. Beaver ponds provide our only impounded water. We do not have an accurate estimate of our white-tailed deer population. The animals are regularly observed along refuge roads, but no obvious signs of overpopulation are present.

16. Marking and Banding

This station has an assigned banding quota of 100 black ducks. Our banding operation is post-season and commences in February. This year, continual freezing of open water and repeated snowstorms hampered our banding efforts.



#13 Dom Ciccone and John Weller banding a mallard.

2/84 BMM

A total of 83 black ducks and mallards were banded this year and the banding effort continued into March.



#14 Schultz and Ciccone pose a black duck and mallard to illustrate the different wing markings. 3/84 EH

17. Disease Prevention and Control

There was no observed incidence of disease mortality among refuge wildlife during 1984.

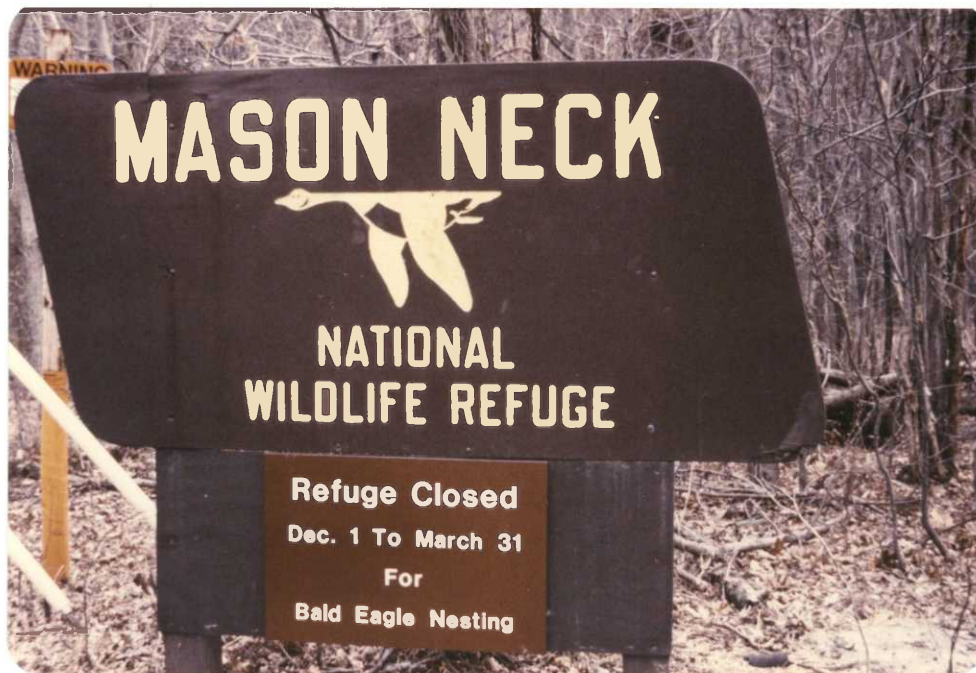
The rabies outbreak in Virginia seems to have leveled off even though indications are that the disease is spreading into additional counties. Around 95 percent of the current outbreaks are reported in the Northern Virginia area.

The primary vector appears to be the raccoon and in this area probably resulting from transported animals, because the primary foci of raccoon rabies is in south-central Georgia.

H. PUBLIC USE

1. General

The refuge is open during daylight hours from April through November for visitors who wish to wander a 3 mile foot trail through hardwood forests to the Great Marsh, the largest freshwater marsh in Fairfax County. This is the only area open to the general public and is closed December through March to prevent disturbance of wintering eagles who have migrated into the area and to a pair which nests on the refuge.



#15 Some visitors seem to have problems reading this sign.
3/84 YMS

An area adjacent to the trail is reserved for environmental education or special tours. This gives the groups the feeling of visiting someplace special and prevents conflicts along the trail between hikers seeking solitude and groups trying to concentrate on their studies. It also permits use of more of the refuge but under controlled conditions. Use of this area normally declines during the winter because of bad weather and is further restricted by staff to minimize disturbances.

The remainder of the refuge consisting of the southwestern two-thirds is closed to all visitors throughout the year. This zone centers around the eagle nest and exists to protect the eagles.

The state park, which is adjacent to the refuge, completed a new access road which serves the trail area and the environmental education area. The road passes through the refuge to the park's visitor facilities. Park personnel were very cooperative during 1984 in the management of the road since they were not yet open and shared our desire to control access. During winter they provided a locked chain across the beginning of the access road and moved the chain and signs to a point just beyond the refuge's trail during the open season. Except for minor trespass problems, the system worked well. Access to the refuge was greatly improved over the old, poorly developed dirt road and relatively easy to monitor.

3. Outdoor Classrooms - Teachers



#16 Teachers and family members demonstrate their understanding of animal adaptation by creating a woods critter. 9/84 YMS

Staff enthusiasm over Project WILD was very high because of its simplicity and flexibility (works indoors and outdoors for almost any age). Any educator or group leader dealing with the refuge received a short talk about Project WILD. ORP Schultz received training as a facilitator in March and participated in two on site workshops featuring Project WILD, assisted in a third off site, and conducted an "Open House for Educators" to encourage use of the refuge and Project WILD.

To quote from its own introduction "Project WILD is an interdisciplinary, supplementary, environmental, and conservation education program emphasizing wildlife." In simpler terms, this is a series of over 200 activities split into elementary and secondary guides designed to let a teacher without biological training present simple to complex ecological principles. These activities are easily incorporated into coursework ranging from music and physical education to history and sociology.

In Virginia, Project WILD is cosponsored by the Virginia Game Commission through a tax deductible check off program and by the Izaak Walton League. Guides and supplementary materials about wildlife are provided at no charge but recipients must participate in a minimum of 6 hours of workshops. By requiring a workshop, participants experience several of the activities, see how easily they can be modified, and tend to use them more often. It also gives the facilitator the opportunity to emphasize

that Project WILD encourages people to make informed decisions regarding wildlife rather than emotional ones. Comments by animal rights groups have been received in some areas saying Project WILD supports hunting, but this has mainly occurred when people take activities out of context.

Workshops at Mason Neck have heavily stressed that Project WILD is not pro or anti-hunting but wants people to learn to examine as many facts as possible before drawing conclusions. All participants at workshops at Mason Neck have been enthusiastic and supportive about the program.

4. Interpretive Foot Trails

Mason Neck has one 3 mile long self-guided trail, the Woodmarsh Trail, through forest and marsh habitats. A brochure available at the beginning of the trail explains 18 numbered sites along the way and helps orient visitors as they traverse the trail.

Efforts to maintain the trail in as natural a state as possible leaves it narrow, twisting, climbing, and descending in many points but all the more enjoyable for its natural variety. Improvements include spreading gravel or woodchips in areas subject to erosion, installing five foot-bridges over low spots, lining the trail with logs to guide visitors at confusing points, and providing a few wooden benches as resting points. The trail is not accessible to even service vehicles and all materials must be carried in by hand or wheelbarrow. Alternate trails are being planned to provide handicapped accessibility.

This year, 4,240 visitors toured the trail guided by the brochure with 24 percent or 1,010 using it just during the month of April. Use rapidly tapered off as the heat and humidity brought out the insect population and visitors were kept moving by enthusiastic mosquitoes.

6. Interpretive Exhibits/Demonstrations

The refuge maintains two displays along the Woodmarsh Trail consisting of a truncated pyramid shape showing marsh residents on each of its four sides and a six-paneled display shed showing a map of the trail and explaining about eagles and other species using the refuge.

For off site use the refuge maintains a System 70 with panels that can be varied depending on the occasion, two small dioramas showing pond life purchased from a science supply house, and a new homemade 2 foot by 4 foot panel about endangered species which is used in conjunction with the station's small collection of endangered species byproducts.

These exhibits were displayed 11 times at schools, libraries, the Prince William County Fair, the Fairfax County Festival, and at the Eastern Prince William Stamp Club's annual show. The stamp club celebrated the Duck Stamp Anniversary and featured the System 70, a sales table, and continuous showings of the Duck Stamp film.



#17 Display at Chesapeake Bay Festival cosponsored by ES
and all the refuges near the Chesapeake Bay. YMS

The refuge also maintains a selection of 30 slide shows and 6 films for loan to local schools and groups.

7. Other Interpretive Programs

Fifteen groups were given tours of the refuge, mostly along the marsh portions of the Woodmarsh Trail. These were mostly scouts whose leaders were trying to stimulate interest in nature badges or the environment.

Because most schools in the area are extremely limited in field trip funding and we are trying to stimulate interest about the refuge, we provide some programs at the schools. This also occurs when a trip is rained out since the refuge has no facilities for inclement weather. Nine programs were given at 8 schools and reached 659 students.

Eleven programs were given off site when the groups could not be accommodated on the refuge or the refuge was closed for the winter. One group which has a good excuse for not coming is the Prince William Juvenile Detention Center who would have to cordon off a zone of the refuge if their inmates came. Six programs were given at the center and in several cases the participants were better behaved than some scout groups.

The refuge continues to provide programs periodically to nursing homes and senior citizens facilities. This year 13 programs were given at 7 locations with a total attendance of 287 people.

Career days at schools also are on the increase. Mason Neck staff participated in five contacting 234 students ranging from third grade through twelfth grade.

11. Wildlife Observation

Twenty-seven percent of refuge visitation or 1,978 individuals were involved in general wildlife observation along the Woodmarsh Trail. Most have previously toured the trail using the brochure and are returning to view the marsh or beaver activity.

12. Other Wildlife Oriented Recreation

Seventeen percent of this year's visitation was in some way involved in photography, mainly at points along the trail bordering the marsh. The refuge maintains a photoblind available by a free reservation system but it received little use due to lack of publicity. Plans are to mention it on a display panel at the Woodmarsh Trail parking lot and in two brochures scheduled for revision in 1985. This plus news releases and improving the trail to the blind should increase its use.

17. Law Enforcement

Four violation notices and two warning letters were filed in 1984, all involving trespass at some point along High Point Road, the new access road built by the state. This road cuts back and forth across state and Federal land resulting in five jurisdictional zones in less than 3 miles. Between 20 and 30 additional contacts regarding trespass were made but were either on state land just off refuge land or the offending vehicle had followed a contractor's or permittee's vehicle into a closed area.

The first two violations occurred on June 6 when two cars of teenagers bypassed five sets of area closed and boundary signs to get to the river. Both drivers paid off without contesting the charge.

The second pair of violations involved two hikers on October 23 driving past two sets of area closed signs, parked near a third set, and then walked past a fourth set to wander the area set aside for the eagles. As of the writing of this narrative, the agents had not yet mailed out the violation notices.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

When the Service assumed management responsibility for the southwestern portion of the Mason Neck peninsula under lease from the Northern Virginia Regional Park Authority, part of the agreement included utilization or removal of two groups of buildings located on the property (Sites 2 and 3 on Map 1, page 34). Only one building, a cinder block structure at Site 3 was deemed usable and converted into a maintenance/YCC building in 1983. Site 2 consisting of a mansion with nine and a half bathrooms, a bombshelter, small house, tennis court, and assorted garages were located too close to the eagle nest and too accessible to vandals by water to be of value. Site 3 included two older houses, two garages, a boat house of which only the garage mentioned earlier was worth salvaging. All were deemed surplus for refuge purposes and scheduled under ARMM's funding for removal. Two buildings in poor condition at Site 1 were also declared surplus and were included in the demolition plans.

Only the mansion's removal was put out on bid and no one wanted to or proved capable of removing it. Attempts to have the Army or Marines destroy these buildings as an explosives training exercise failed. The local fire department agreed to remove three buildings at Site 3 by burning them during training drills. This left roughly nine buildings needing removal.



#18 After practicing with small fires inside, the Fire Department let the whole building go. The hoses were used to protect surrounding vegetation. 9/84 YMS



#19 The second building at Site 3 went with a hotter fire because it was still in good condition and almost air tight. 9/84 YMS



#20 Once the second building started burning, firemen had a challenge protecting vegetation and a nearby shed. 9/84 YMS



#21 And then there was the boat house. With a fire like
this it sure didn't last long. 9/84 RW

Great Dismal Swamp National Wildlife Refuge came to the rescue when Sherman Stairs, assistant manager at Great Dismal and acting manager of Mason Neck, brought in Bailey White and Mike Bryant with dozers. They were turned loose on Monday, September 10 and by Friday had leveled Sites 1 and 2, plus dug pits at Site 3. Site 3 was then finished by maintenanceman Westerman after utilities were rerouted to the YCC building and the firemen had burned their buildings. Only final grading and seeding with native mix remains.



#22 One of two buildings at Site 1 on refuge land. The walls and interior were too unstable for rehabilitation and would have cost more than a new building.
2/84 DRC



#23 The Dismal Swamp crew couldn't wait to start.
Bailey White started poking around ... 9/84 YMS



#24 ... and down it came.



#25 Less than one hour after starting, Bailey White was grinding the remains into the ground.



#26 At Site 2, the Dismal Swamp crew found a slightly
greater challenge ... 9/84 YMS



#27 ... but they seemed to have a system. Pull off anything
that sticks out ... 9/84 YMS



#28 ... poke holes everywhere you can ...

9/84 YMS



#29 ... and even the biggest shall fall.

9/84 YMS

FAIRFAX COUNTY, VIRGINIA

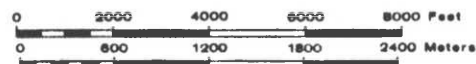
UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



BOSTON, MASSACHUSETTS

JULY 1974



MEAN
DECLINATION
1971

5R VA. 803

A - FWS Property

B— " " " " acquired CY84

C—Leased from NVRPA

D-State Park

⊗—Demolition Site

The YCC building was painted inside and out, had a sagging shed roof repaired, and was enclosed in a compound with chain link fencing removed from an old compound on Gunston Road.

Sycamore Road received approximately 400 tons of gravel in several soft or low spots.

A new approach was cut to the boat ramp. The old path encircled one of the houses that was burned and was subject to erosion.

4. Equipment Utilization and Replacement

The refuge received a new John Deere tractor in March. Unfortunately, it arrived still crated and unassembled with the truck driver expecting the refuge staff of three to remove crates weighing up to 4300 pounds. A nearby dealership which had bid lower on the tractor promising to deliver it fully assembled, ready to operate, and with orientation lessons, but who had lost out to CGS's more expensive contract company, was nice enough to unload and assemble the tractor for the refuge. Even then, they had to supply many of the small bolts and other items that the contract company had not included.



#30 Our new tractor after the local dealership took delivery from the CGS contract dealership and assembled it for us. It saw a lot of use throughout the spring and fall. 2/85 YMS

The station's deficiencies in maintenance equipment have come to light with a maintenanceman now on staff and several moderate sized pieces of equipment such as a generator, a larger chain saw as well as many hand tools were acquired.

J. OTHER ITEMS

3. Items of Interest

Some time on or before April 22, the refuge office (GSA off site lease) was broken into. The burglars dismantled the safe and ransacked the office. Guns, cameras, binoculars, Government credit cards and other valuable items were bypassed with only \$29.44 in imprest being stolen.

The Fairfax County's SWAT team trained for most of the summer in surplus refuge buildings. Unfortunately, the vandals frequenting these sites never encountered these black-jacketed, wired-for-sound, machine gun toting commandos. Staff observed their training exercises on July 31 and were impressed by their skill.

The Fairfax County Fire Department conducted a disaster drill in September using abandoned buildings on the refuge. Units from all over the county were involved. Officials said the main value of the exercise was testing communications in regards to finding an unknown site and avoiding bottlenecks. Even though most of the firemen had no idea the refuge existed and had to enter and exit along 2 miles of a one lane road once they were directed to and located the refuge, Mason Neck turned out to be an excellent choice.

During June and July, Capital Edition, a local television affiliate, taped some scenic marsh shots which they used on July 29.

ORP Schultz was gone or tied up most of the spring with A-76 studies at Great Dismal Swamp National Wildlife Refuge.

Government training received by the refuge staff:

2/21	A-76, Boston - Schultz
2/27	Virginia Division of Forestry Basic Course, on site - Ciccone, Schultz, Mitchell, Weller
3/19	LE Refresher, Richmond - Ciccone
3/29	PAY/PERS, Boston - Mitchell
4/16	LE Refresher, Erie - Schultz

The refuge was visited by:

Several visits	Andy Moser, ES - dredging near refuge
Several visits	Martin Lutsky, Realty - land acquisition
6/27	Ed Moses, Refuge Supervisor
7/20	Bob Jourdan, Office of Maintenance Management, D.C.
7/30	Norma Higgins, Youth Programs - YCC, D.C.
10/11	Dom Ciccone, Noreen Clough, Sam Spiller - Refuges, D.C.

4. Credits

The narrative was written by Manager Stewart and Outdoor Recreation Planner Schultz. Typing and assembling the report was done by Secretary Mitchell.

K. FEEDBACK

I have two comments for this section, one on a positive note and the other on a not-so-positive note.

The new cost coding system has substantially reduced the paperwork associated with tracking station budgets. The system permits flexibility in spending and still provides a reasonable system of following station expenditures. I thank the powers-that-be for making, at least this aspect of the job, somewhat less tedious and time consuming.

My second comment deals with the new policy on hiring temporaries in place of permanent employees. I don't believe anyone would argue that the new policy will save the Government dollars, but at the same time, employee morale continues to deteriorate. The system, although not eliminating the position effectively, eliminates the employee. We as an agency end up with throw-away employees. It is unlikely we can manage to keep, for example, a good maintenance person for the entire 4 years, considering the lack of health and retirement benefits. In a few years we may find ourselves with employees who no longer care as fervently for the resource and are unwilling to put forth that extra effort so evident today at most FWS field stations. In the end we all loose, managers, employees, and the resource.

L. INFORMATION PACKET

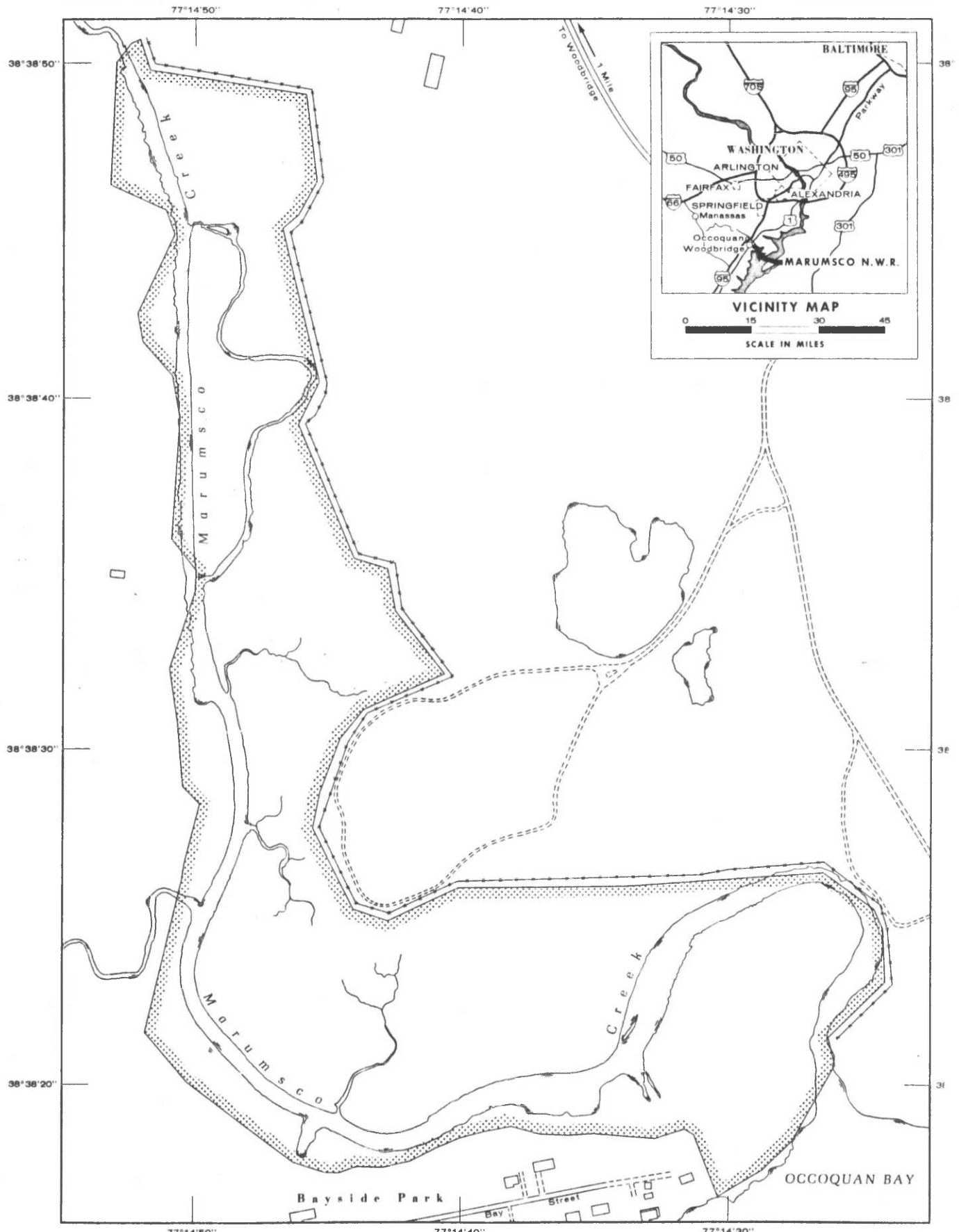
See inside back cover.

MARUMSCO NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

PRINCE WILLIAM COUNTY, VIRGINIA

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF ENGINEERING
FROM SURVEYS BY G.S. AND B.S.F. & W.

BOSTON, MASSACHUSETTS FEBRUARY 1974



MEAN
DECLINATION
1971

MARUMSCO NATIONAL WILDLIFE REFUGE

Woodbridge, Virginia

Marumsko Refuge consists of 63 acres of freshwater tidal marsh located along Marumsko Creek near its conjunction with Occoquan Bay. It was established in 1973 from lands declared excess by the U.S. Army and is administered by the Mason Neck staff.

No management activity takes place on Marumsko and, in fact, the Refuge is visited rather infrequently. However, Secretary Mitchell's residence abuts this area and she is therefore able to maintain a watchful eye over it.

The refuge is used by small numbers of feeding and resting waterfowl and marsh birds. Mallards, black ducks, mergansers, and great blue herons predominate.

Red-tailed hawks and osprey were also seen resting in the area with bald eagles believed to occasionally visit from Mason Neck National Wildlife Refuge which is less than 3 miles away.

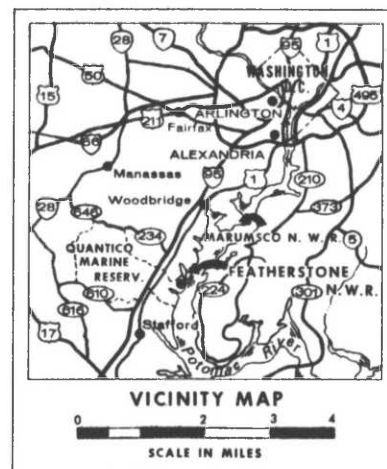
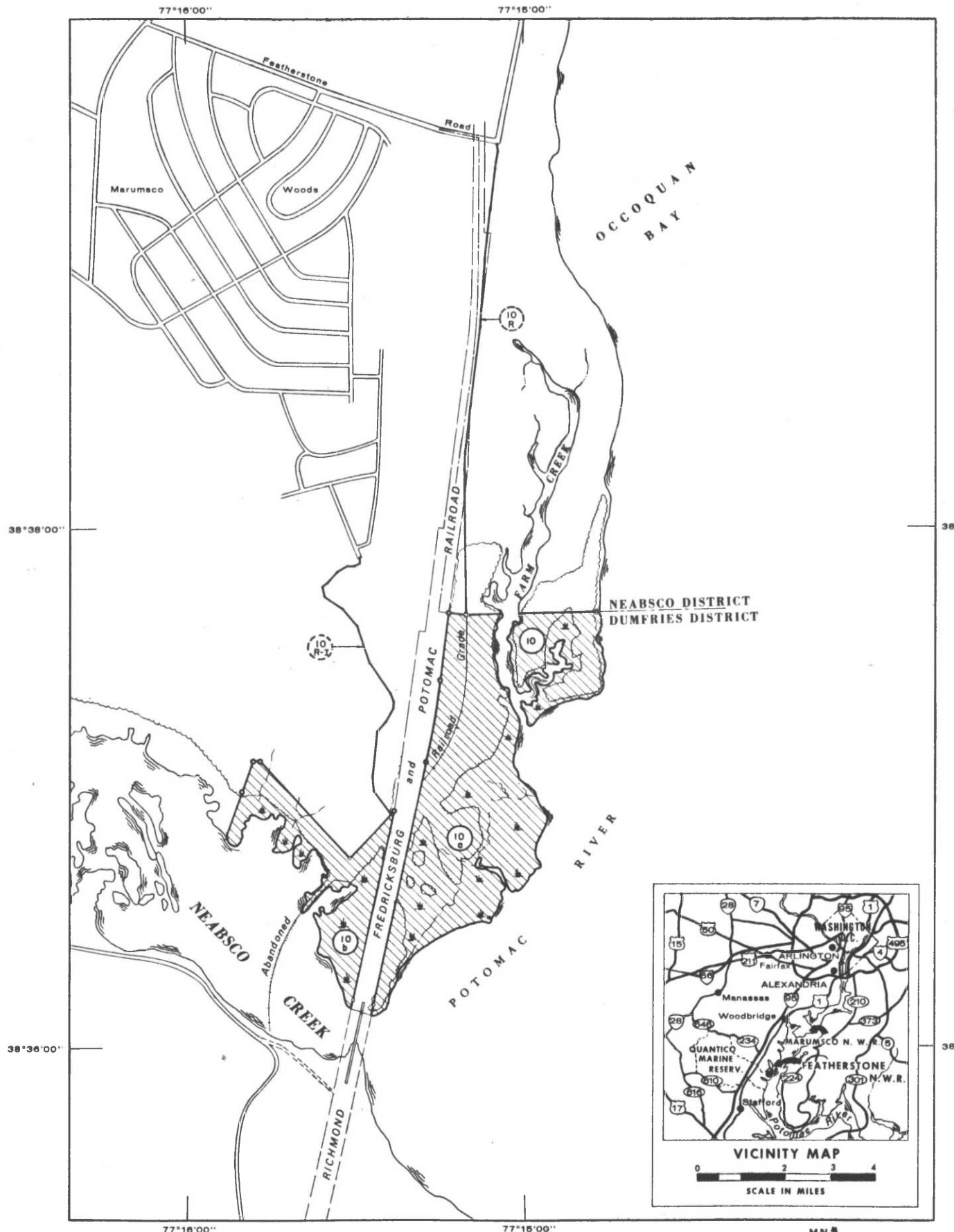
Efforts to increase use of the refuge for environmental education were partially successful with four classes of Signet students visiting Marumsko before going to Mason Neck NWR. The only other public use consisted of visitors viewing the refuge from a trail on the adjacent Prince William County Park.

FEATHERSTONE NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

PRINCE WILLIAM COUNTY, VIRGINIA

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S. AND U.S.F. & W.S.

0 800 1600 2400 3200 FEET

0 .5 1 KILOMETER

M.N. 8
7 1/2° S.N.
1° 26'

MEAN
DECLINATION
1971

BOSTON, MASSACHUSETTS AUGUST 1976
POSTED:

FEATHERSTONE NATIONAL WILDLIFE REFUGE

Woodbridge, Virginia

Featherstone Refuge is located in Prince William County, Virginia, approximately 2 miles south of Mason Neck headquarters, out of which it is administered. The 164 acres of woodland and freshwater tidal marsh along Occoquan Bay and Neabsco Creek were acquired in 1979 from the District of Columbia.

Difficult access to this refuge, along with manpower deficiencies, unfortunately result in fewer staff visits than could be desired. No management activities took place on Featherstone during 1984.

Very little accurate information is available on wildlife populations using this refuge. Waterfowl such as mallards, black ducks and wood ducks are known to frequent the marsh areas and some production is suspected. Bald eagles, osprey and other raptors are occasionally seen flying over the refuge. Great blue heron are seen in the marshes and along the bay shore throughout the year. Muskrat, beaver and deer are known to be present.

No public use is permitted on Featherstone, although a considerable amount of unauthorized activity does occur. The refuge has received reports of some illegal hunting but has been unable to confirm or deny these reports due to poor accessibility and limited staff time. State wardens and the closest special agent checked the area during waterfowl season. They found no active signs of violations.

Project WILD



Teaching & Learning
About Shared Concerns
... Earth As Home
For People & Wildlife

What is WILD?

Project WILD is an interdisciplinary, supplementary, environmental, and conservation education program emphasizing wildlife. Project WILD was designed for use by teachers in all major areas of study in kindergarten through twelfth grade. The instructional activities within the Project WILD materials are designed for easy integration into school subject and skill area. The program is an unbiased approach to presenting basic wildlife management practices and developing an appreciation for and understanding of wildlife, its relationship to man, and our shared home, Earth.



How WILD was Developed

WILD was developed through a joint effort of the Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council (WREEC). The materials were written by classroom teachers and other educators, resource agency personnel, representatives of private conservation groups and other community representatives. WREEC also developed Project Learning Tree (PLT), an environmental education program emphasizing the forest community.

During the 1982-83 school year, the Project WILD activities were field-tested in three states, Colorado, Virginia and Washington. One hundred and twenty teachers were selected from five Virginia school systems for the testing. Students in rural, urban, and suburban communities were tested in the fall of 1982 before exposure to WILD, and tested again in the spring of 1983 following their experience with the program. Project WILD adds a new dimension to subjects already being taught in Virginia's school systems.



Virginia and Project WILD

Virginia's sponsorship of WILD was financed by the Virginia Commission of Game and Inland Fisheries and the Virginia Division of the Izaak Walton League of America. Both have jointly sponsored environmental education in Virginia's schools since the late 1940's.

The Virginia Game Commission will be coordinating the introduction of the material into the schools through teacher workshops. Educators around the state will be trained as workshop leaders at one of several two-day leadership workshops. Upon returning to their school districts, the leaders will present six-to eight-hour workshops for teachers in those districts.

Only after attending a teacher workshop will participants receive a free Project WILD Activity Guide suitable for the grade level they teach.

The workshops are open to classroom teachers, environmental educators, park and nature center personnel and scout and 4-H leaders.



More About the Activity Guides

There are two Activity Guides: one is for elementary teachers, the other for secondary teachers. ~~And middle school teachers will receive both.~~ The guides include activities suitable for all grade levels and can be used indoors or outdoors.

For each activity, the guide lists objectives, suitable grade levels, reference to the school curriculum, related subjects and ideas for expanding the lesson. The Guide also includes a glossary, a resource list, a bibliography and topic index.

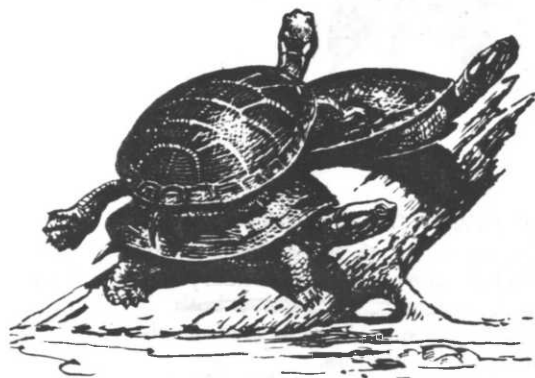
In addition to the Activity Guide, teachers will receive a packet of resource materials from the Virginia Game Commission with information about Virginia's wildlife species, bulletin board materials and other resources.



Workshops in Your Area

To find out about the next Project WILD workshop in your area, or for more information about Project WILD, send the attached form or write to:

Susan Gilley
Project WILD
Virginia Game Commission
P.O. Box 11104
Richmond, Virginia 23230-1104
804/257-1000



Project WILD Workshop Application

Name _____

Address _____

Phone _____

School Division (if teacher) _____

Position _____

_____ Please let me know when the next workshop will be available in my area.

_____ I am interested in becoming a Workshop leader. Please send more information.

Return to:

Susan Gilley
Project WILD
Virginia Game Commission
P.O. Box 11104
Richmond, Virginia 23230-1104

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Brenda Baker	Henrico County Schools
Marilyn Bartelt	Fairfax County Park Authority
Vicki Clark	Mathematics and Science Center
Brownie Cauley	Montgomery County Schools
Jeffrey Curtis	Virginia Game Commission
Harry Gillam	Virginia Game Commission
Susan Gilley	Virginia Game Commission
Pam Moran	Orange County Schools/ Piedmont Environmental Council
Bernie Parsons	VPI & SU/Virginia Resource Use Education Council
Francis Satterlee	Virginia Game Commission/ Izaak Walton League
Ted Scott	Piedmont Environmental Council
Betsy Waring	Mathematics and Science Center



A Wildlife Education Project



Introduction

What Is Project WILD?

Project WILD is a conservation and environmental education program which emphasizes wildlife and its habitat.

The goal of Project WILD is to assist learners of any age in developing awareness, knowledge, skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends.

What Is A Project WILD Workshop?

For our purposes, a workshop is defined as an instructional experience that is involving, inspiring, informational and leads to action. It is typically designed for adults, and is aimed at enabling participants to do something after the workshop is over. A Project WILD workshop enables participants to use the Project WILD materials and strategies in instructional settings, like classrooms, outdoor study areas, urban environments, or any place where people are interested in learning about wildlife and its habitat.

What Is The Purpose Of This Workshop?

This workshop handbook is designed for those of you who want to plan, offer and facilitate Project WILD workshops. Its purpose is to provide you with guidance and assistance—as you build on your own talents, preferences and expertise. It offers helpful hints for avoiding disaster, background about how people learn and suggestions for major factors to consider. As ever, use your own good judgment about what works best for you, and the people with whom you are working. Although this handbook was especially designed for use related to Project WILD, parts of it may be useful to anyone interested in providing workshops for others.

A Philosophy Of Wildlife

Ask any wildlife biologist to name the key to wildlife survival in New Jersey, New Mexico, Nepal, Nicaragua—or anywhere—and he or she will answer without hesitation: *habitat*. Without the land or marine environment in which an animal can find food, water, shelter, and space—in an arrangement suitable for survival—wildlife cannot exist. This may be the single most important concept to be conveyed by Project WILD.

Although the importance of habitat is the central theme of Project WILD, several other themes are presented as well. These are described in detail in the conceptual framework which appears at the back of each Project WILD activity guide.

For your convenience, these major themes are summarized here. Please look at them closely!

Awareness and Appreciation of Wildlife

Humans, domesticated animals, and wild animals share environments and have similar basic needs. Although humans and wildlife are subject to many of the same environmental conditions, humans have far greater ability to alter or adjust to these conditions than do wild animals. Thus, we humans have a great responsibility to consider the effects of our activities on other life forms.

Human Values and the Wildlife Resource

These are among the values of wildlife: aesthetic, spiritual, ecological, scientific, social, political, commercial, and economic, as well as consumptive and non-consumptive recreational values. Wildlife also has intrinsic value, although often we only recognize values based upon our human wants and needs.

Wildlife and Ecological Systems

Each ecological system has characteristic life forms that are interrelated. Variation, change, and adaptation occur in all ecological systems. Living things tend to reproduce in numbers greater than their habitat can support. Each area of land or water—and ultimately even our planet—has a “carrying capacity” of plants and animals.

Wildlife Conservation

With the application of scientific knowledge and technical skills, we can manage and conserve our wildlife. Good habitat is the key to wildlife survival. Wildlife is one of our basic natural resources and in the United States, it is owned by the public rather than by landowners.

Cultural and Social Interaction with Wildlife

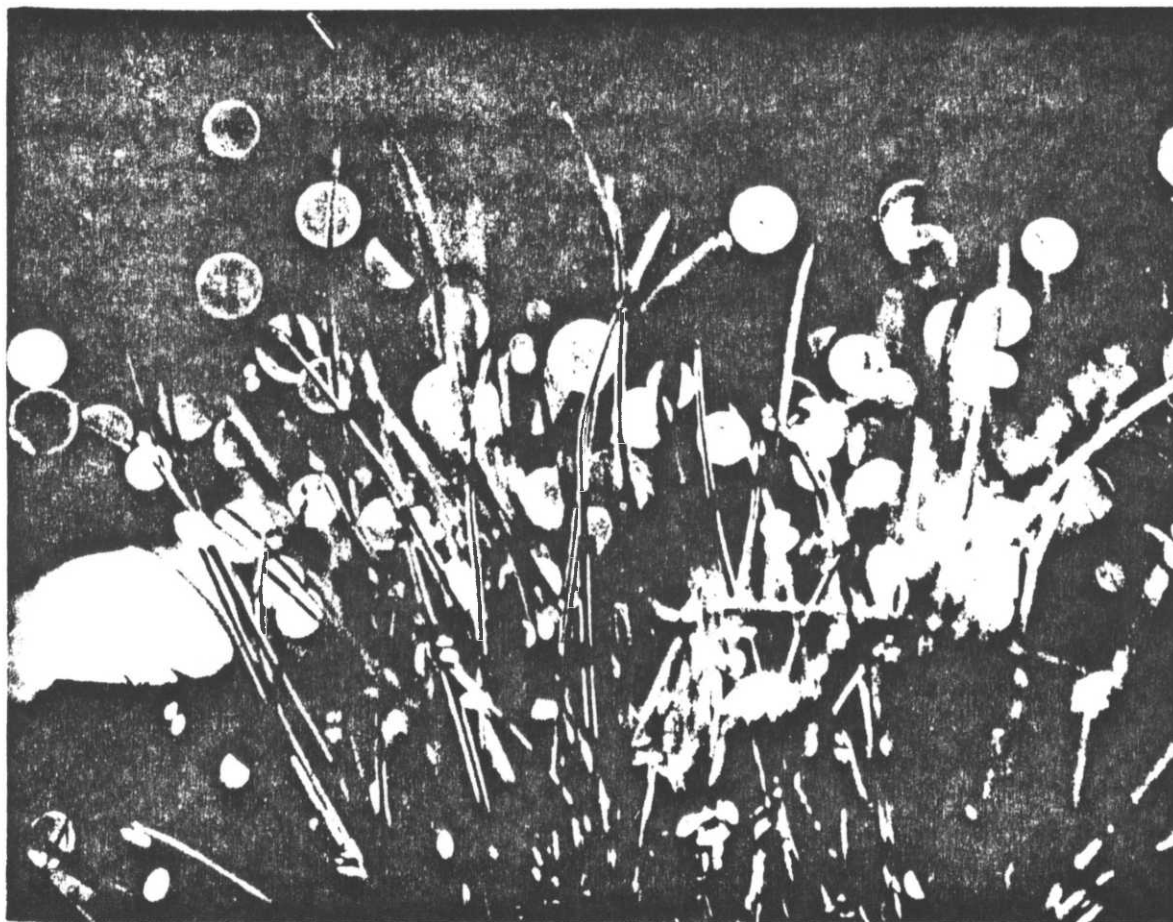
Our cultures and societies, past and present, affect and are affected by wildlife and its habitat. Societies develop programs and policies relating to wildlife and habitat through a variety of avenues.

Wildlife Issues and Trends: Alternatives and Consequences

Human use of wildlife and habitat is increasing worldwide. Issues involving wildlife and habitat—a product of social and cultural trends—are complex and involve alternatives and consequences. Issues involving wildlife in other parts of the world are similar to those in this country.

Wildlife, Ecological Systems, and Responsible Human Actions

Each of us—as individuals and as members of society—affect the environment. Responsible human actions are the obligation of all of us—starting with each one of us!



These then are the basic themes of Project WILD. Although the WILD activities are designed to teach skills in many different subject areas, they are also meant to convey these themes and to engender a sound philosophy of wildlife.

Remember the goal of Project WILD: to assist learners of any age in developing awareness, knowledge, skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends. Keep this goal—and the themes upon which it rests—clearly in mind as you plan your Project WILD workshops!

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John Stone, Education Director
Jack Greene, Class Project Coordinator
National Wildlife Federation
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(703) 790-4360

**INTERNATIONAL ASSOCIATION OF FISH AND
WILDLIFE AGENCIES**

Executive Vice president
International Association of Fish &
Wildlife Agencies
1412 16th Street N.W.
Washington, D.C. 20036
(202) 232-1652

WHAT'S THAT, HABITAT?

Objectives Students will be able to: 1) identify their own basic needs for food, water, shelter, and space in a suitable arrangement; and 2) generalize that wildlife and other animals have similar basic needs.

Method Students draw pictures of people's and animal's homes, comparing basic needs.

Background This activity is similar to "Habitacks." One option is to use "Habitacks" with 4th and 5th grade students, and "What's That, Habitat?" with 2nd and 3rd grade students. Use either activity after "The Beautiful Basics" and "Everybody Needs A Home," especially with 2nd grade students and older. The same drawing used in "Everybody Needs A Home" can be used to start "What's That, Habitat?"

See "The Beautiful Basics" and "Everybody Needs A Home" for more background. The major purpose of this activity is for students to understand that animals—including people, pets, and wildlife—have some of the same basic needs.

Materials drawing paper, crayons or chalk

Procedure

1. List the following words on a chalkboard: **food, water, shelter, space.**
2. Read each word aloud, asking the students to repeat the words after you. (They may say the letters of the words and use for spelling.)
3. Food and water will be easy concepts for the students to understand. They are familiar needs for themselves each day. Shelter and space will be more difficult. Ask the students to explain what shelter and space are. Make sure the meaning of all four words is clear before you proceed.

4. Give the students drawing paper and chalks or crayons. Ask the students to draw a picture of where they live, including pictures of where they find food, water, shelter, and space. (NOTE: If the students have made drawings in "Everybody Needs A Home," use those same drawings instead of making new ones!) Ask the students to label the parts of their drawings where they find their **food, water, shelter, and space.** For example:



NOTE: Food and water will not be difficult to identify. Shelter could be shown in a number of ways. Here, for example, it is shown by labeling the roof. Space can be shown as the area outside and inside the house or apartment. Shown here, it includes the house and yard. Space can also include the neighborhood. (Space actually includes all the areas used for survival.)

5. Once the drawings are complete, write two more words on the chalkboard: **arrangement, habitat.** Say the words aloud, asking the children to repeat them after you. (Again, these words may be used for spelling.)

Age: Grades 2—3

Subjects: Science, Language Arts, Art, Social Studies

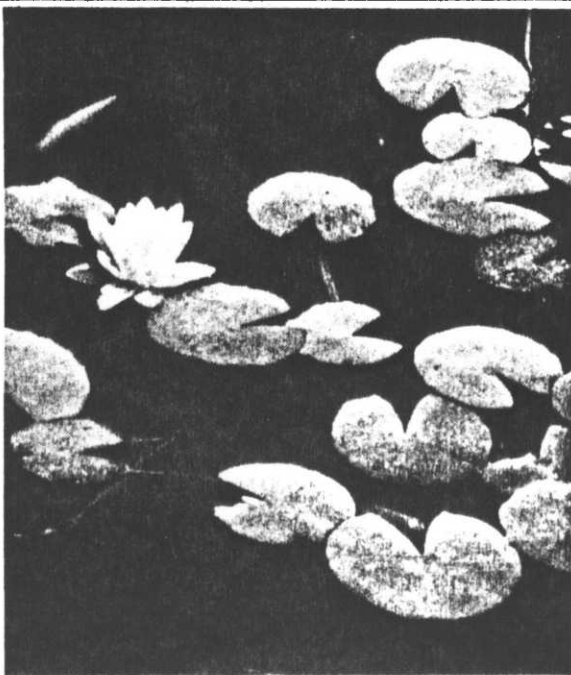
Skills: analysis, comparing similarities and differences, discussion, drawing, generalization, reading, writing
Duration: two 20-minute sessions, or one 40-minute session

Group Size: any

Setting: indoors

Curriculum Framework Reference: I.A., I.A.4., I.C.1., I.C.2

Key Vocabulary: habitat, survival needs, food, water, shelter, space, arrangement



6. Tell the students that when food, water, shelter, and space go together in a special way, so that animals—including people—can live, we call that place a **habitat**. The food, water, shelter, and space are in an **arrangement** that makes it possible for animals to live. (Optional: Ask the children if they could live in a home where the bathroom was four miles north, the kitchen was 12 miles west, and the bedroom was nine miles east. The answer, of course, is likely, "No," since the "arrangement" is not suitable for a person. Some animals, do travel great distances in their habitat, however.)



7. Ask the students to write the word "habitat" in big letters at the top of their drawings. Talk with them about the meaning of habitat.

8. Give the students another piece of drawing paper. Ask them to think of an animal—any animal. Ask a few students what animal they are thinking of. Identify whether the animals they named are "wild" or "domesticated." You will probably get both. If you don't get both, ask the students to think of the kinds of animals that are missing. It is important to make sure the students are thinking about both wild and domesticated animals.

9. Ask the students to draw a picture of their animal in a place where it lives. Ask the students to make sure they include: food, water, shelter, and space in an arrangement that they think would make it possible for the animal to survive.

10. Ask the students to talk about their drawings, pointing out the habitat components they have included.

11. Ask the students to write "habitat" in big letters on the top of their drawing. Talk with the students about how humans and other animals need food, water, shelter, and space. The arrangement is different for each, but all have similar basic needs. When food, water, shelter, and space are arranged in a way that is suitable for an animal to survive, we call that place where these things are available a habitat. When the students have an understanding of "habitat," write a few sentences on the chalkboard defining habitat. As much as possible, make use of the ideas the students suggest. For example: **Habitat is a place. It has food, water, shelter, and space. These are things that animals need to live.**

Possible sentences for older students: **Food, water, and shelter must be within a useable range for each animal. Different kinds of animals need different kinds of food, water, and shelter and different amounts of space.**

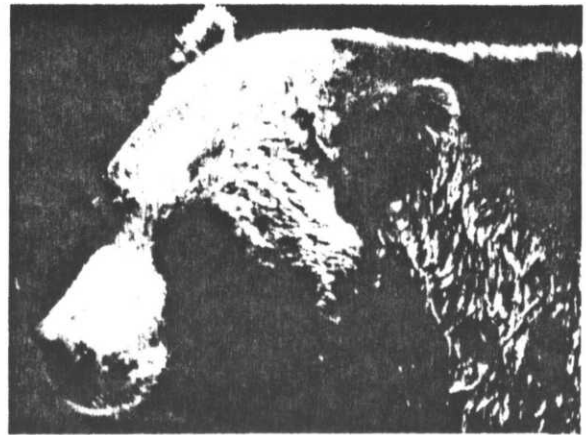
12. The students may now write these sentences on the back of one of their drawings or on a piece of writing paper. They may also read the words in the sentences you have put on the board, after you. They may also write their own sentences about what habitat is, drawing pictures to go along with their words.

Evaluation

Choose which things wildlife need to survive: food, water, shelter, space, arrangement.

Choose which things people need to survive: food, water, shelter, space, arrangement.

HOW MANY BEARS CAN LIVE IN THIS FOREST?



Objectives Students will be able to: 1) define "carrying capacity;" and 2) describe the importance of carrying capacity for wildlife and people.

Method Students become "bears" to look for "food" in a "habitat" during this physically-involving activity.

Background This activity is best after one on "adaptation" and "limiting factors." For additional information about black bears, see "Bearly Born."

Carrying capacity may be defined as the ability of a given unit of habitat to supply food, water, shelter, and necessary space to a wildlife species. It is the largest population the unit can support on a year-round basis, or during the most critical season. Carrying capacity varies throughout the year—and varies from year to year—dependent on conditions within the habitat such as rainfall, competition from domestic animals, etc.

An area of bear habitat can support only a specific number of bears, just as a one gallon bucket can hold only one gallon of water. All habitats, for whatever species, vary seasonally

and/or yearly in their carrying capacity. Habitats can therefore only support the numbers which can be carried at the lowest ebb of the season or year. Those surplus animals, born during richer seasons, must be lost to some "limiting factor" prior to or during the harsher season. In this activity, we will be talking about black bears. The major purpose of this activity is for students to gain an understanding of "carrying capacity."

Materials five colors of construction paper (two to three sheets of each color) or an equal amount of light poster board; one black felt pen; envelopes (one per student); pencils; one blindfold

Age: Grades 3-9 (and older)

Subjects: Mathematics, Science, Social Studies, Physical Education

Skills: analysis, computation, discussion, evaluation, generalization, kinesthetic concept development, listing, observation, psychomotor development

Duration: 20—45 minutes or longer

Group Size: any (adjust number of food squares per size group; less than 80 pounds of food per student)

Setting: outdoors and indoors

Curriculum Framework Reference: III.F., III.F.1., III.F.2., III.F.3., III.F.4., III.F.5.

Key Vocabulary: carrying capacity, limiting factors, habitat

Procedure

1. Cut the paper or poster board into 2" x 2" or 2" x 3" pieces. For a classroom of 30 students, make 30 cards of each color as follows:

orange—nuts (acorns, pecans, walnuts, hickory nuts); mark five pieces N-20; mark 25 pieces N-10.

blue—berries (blackberries, elderberries, raspberries); mark five pieces B-20; mark 25 pieces B-10.

yellow—insects (grub worms, larvae, ants, termites); mark five pieces I-12; mark 25 pieces I-6.

red—meat (mice, rodents, peccaries, beaver, muskrats, young deer); mark five pieces M-8; mark 25 pieces M-4.

green—plants (leaves, grasses, herbs); mark five pieces P-20; mark 25 pieces P-10.

The following estimates of total pounds of food for one bear in ten days are used for this activity:

nuts	— 20 pounds	= 25%
berries	— 20 pounds	= 25%
Insects	— 12 pounds	= 15%
meat	— 8 pounds	= 10%
plants	— 20 pounds	= 25%
	80 pounds	= 100% in ten days

NOTE: These figures are based on actual research data from a study in Arizona, indicating a mature black bear could typically eat about eight pounds of food per day in a ten-day period.

Keeping these figures in mind, make and distribute the appropriate number of food cards for your size group of students. There should be less than 80 pounds of food per student so that there is not actually enough food in the area for all the "bears" to survive.

2. In a fairly large open area (e.g., 50' x 50'), scatter the colored pieces of paper.

3. Have each student write his or her name on an envelope. This will represent the student's "den site" and should be left on the ground (perhaps anchored with a rock) at the starting line on the perimeter of the field area.

4. Have the students line up on the starting line, leaving their envelopes between their feet on the ground. Give them the following instructions: "You are now all black bears. All bears are not alike, just as you and I are not exactly alike. Among you is a young male bear who has not yet found his own territory. Last week he met up with a larger male bear in the big bear's territory, and before he could get away, he was hurt. He has a broken leg. (Assign one student as the crippled bear. He must hunt by hopping on one leg.) Another bear is a young female who investigated a porcupine too closely and was blinded by the quills. (Assign one student as the blind bear. She must hunt blindfolded.) The third special bear is a mother bear with two fairly small cubs. She must gather twice as much food as the other bears. (Assign one student as the mother bear.)"

5. Do not tell the students what the colors, initials, and numbers on the pieces of paper represent. Tell them only that the pieces of paper represent various kinds of bear food; since bears are omnivores, they like a wide assortment of foods, so they should gather different colored squares to represent a variety of food.

6. Students must walk into the "forest." Bears do not run down their food; they gather it. When students find a colored square, they should pick it up (one at a time) and return it to their "den" before picking up another colored square. (Bears would not actually return to their den to eat; they would eat food as they find it.) Pushing and shoving—any competitive activity—is acceptable as long as it is under control. Snatching food right out from under the blind bear or the crippled bear is natural—but stealing from each other's dens is not. Remember that if bears fight (which they seldom do) they can become injured and unable to gather sufficient food; then they starve.

7. When all the colored squares have been gathered, the food gathering and hunting is over. Have students pick up their den envelopes containing the food they gathered and return to class.

8. Explain what the colors and numbers represent. Ask each student to add up the total number of pounds of food he or she gathered—whether it is nuts, meat, insects, berries, or plant materials. Each should write the total weight on the outside of his or her envelope.

9. Using a chalkboard, list "blind," "crippled," and "mother." Ask the blind bear how much food she got. Write the amount after the word "blind." Ask the crippled bear and the mother bear how much they got and record the information. Ask each of the other students to tell how much food they found; record each response on the chalkboard. Add the poundage gathered by the entire class. This is the total amount of food available in this particular bear habitat. How many bears are there? Divide this number of bears into the total pounds available to find out how much is available for each bear. Tell the students each bear needs 80 pounds to survive. Which bears survived? Is there enough to feed all the bears? If not, how many bears can live in this area? What would happen to the extra bears? Would they all starve? How many pounds did the blind bear collect? Will she survive? What about the mother bear? Did she get twice the amount needed to survive? What will happen to her cubs? Will she feed cubs first, or herself? Why? What would happen to her if she fed the cubs? What if she ate first? If the cubs die, can she have more cubs in the future, and perhaps richer, years? (The mother bear will eat first and the cubs will get whatever, if any, is left. The mother must survive; she is the hope for a continued bear population. She can have more cubs in her life; only one needs to survive in order for the population to remain static.)

10. Discuss with the class that this area of black bear habitat can only support a certain number of bears. We call that number the "carrying capacity." Discuss the idea of a one gallon bucket only being able to contain one gallon of water. Carrying capacity also holds true for humans—the earth can only support so many.

11. Wrap up with a discussion of the idea that any piece of land can support only so many plants and/or animals. That is the land's "carrying capacity."

Evaluation

Define carrying capacity.

Describe some of the factors which determine carrying capacity for a species of animal.

Explain why carrying capacity is important for wildlife. Explain why carrying capacity is important for people.

ETHI-REASONING

Objectives Students will be able to: 1) examine their own values and beliefs related to wildlife and other elements of the environment; and 2) evaluate possible actions they might take that have impact on wildlife and the environment.

Method Students read, discuss, make judgements, and write about hypothetical dilemmas concerning wildlife and/or natural resources.

Background This activity is designed to give students the opportunity to examine their own values and beliefs as they relate to wildlife and other elements of the environment. It is not the intent of this activity to prescribe "right" and "wrong" answers for the students, except in the areas where information about laws is conveyed. It is the major purpose of this activity to provide students with an opportunity to come to their own judgements about what they think would be the most responsible and appropriate actions to take in each situation that is described.

Materials copies of "dilemma cards"

Procedure

1. From the attached pages the teacher should copy and cut up the dilemma cards. Other dilemmas could be written that are more specific to problems in your area. Students could also be involved in the process of creating the dilemma cards, with each student responsible for one card.
2. Divide the class into groups of four, and give each group a stack of dilemma cards. Place them face down at the center of the group.
3. The first player draws a card from the top of the stack. The player has two minutes to study the situation, decide what he or she would do, and formulate his or her reasons.
4. When the allotted two minutes is up, the

player reads the situation and the options aloud to the rest of the group. The student gives the decision he or she has chosen, and briefly describes the reasoning involved.

5. Without consultation, the other players decide to what degree each agrees with the first player's answer. Rating is done on a scale ranging from zero through ten points with zero representing total disagreement with the decision and ten representing total agreement. A rating of five would be given when the rater is uncertain of his or her opinion, indifferent to the player's decision, or feels more information is needed. (Additional information needed should be specified.)

6. Each of the players, in turn, announces how he or she has rated the first player's decision and the reasons for their views. This part of the activity should be limited to five minutes. The person whose response is being discussed should have the opportunity to ask questions and offer clarification. The rating is not to represent any kind of judgement of the person; it does give the students experience in having ideas examined by peers, and is intended to remind the students of the need to take personal responsibility for decision-making. It is not necessary and may not be desirable for the students to reach consensus; there are legitimately ranging views of the most appropriate and responsible actions to take in many situations. The purpose is to provide students with an opportunity to examine, express, clarify, and take responsibility for their own reasoning.

7. The card is then returned to the bottom of the stack and the next player selects a card from the top of the deck. Continue this process until all students have had the opportunity to express their decision and rationale about a dilemma.

Age: Grades 5—12

Subjects: Social Studies, Science, Language Arts

Skills: analysis, application, discussion, evaluation, problem-solving, small group work, synthesis, writing

Duration: one 30—45-minute period

Group Size: any; small groups of two to four students recommended

Setting: indoors or outdoors

Curriculum Framework Reference: VII.A., VII.A.1., VII.A.2., VII.A.3., VII.A.4., VII.B., VII.B.1., VII.B.2., VII.B.3., VII.B.4., VII.B.7.

Key Vocabulary: dilemma, responsibility

Dilemma Card

You have been issued a once in a lifetime bighorn sheep permit and have spent two months scouting an area before the season. You have seen a ram that is record size. The season opens and you can't find the big sheep. You hunt the entire season, and on the last afternoon of the hunt you see a very good ram. Realizing this could be your last chance for a sheep, you shoot the ram. Suddenly, the large ram walks out of a ravine 50 yards away. Do you:

- ignore it and start cleaning the smaller ram
- shoot the big ram and leave the smaller ram for the coyotes
- shoot the big ram and bury the smaller ram
- take a picture of the big ram and keep the smaller ram
- shoot the big ram, cut its head off and hide it, to get the dried skull in the spring and say you found it
- other

Dilemma Card

You are president of a large corporation. You are very interested in pollution control and have had a task force in the company reviewing the pollution your plant is creating. The task force reports that you are barely within the legal requirements, but are adding more than your share of pollution to the community. To add the necessary equipment to reduce pollution would cost so much that you would have to fire 50 employees. Do you:

- add the equipment and fire the employees
- not add the equipment
- wait a few years to see if the cost of the equipment will drop
- other

Dilemma Card

You are a member of a country club that has recently voted to build a game farm to raise animals for members to hunt. You are not a hunter, you think that hunting is only okay to do in the wild, and you are opposed to the building of the game farm. Do you:

- stay in the club and do nothing
- stay in the club and speak out strongly against the project
- resign from the club
- other

Dilemma Card

You are fishing at a secluded lake and have caught seven fish during your first day at the lake. Now, on the second day, the fishing has been great and you have caught five fish in the first hour, all of which are bigger than yesterday's fish. The law allows you to possess 12 fish. Do you:

- continue to fish and keep all the fish
- continue to fish and keep only the biggest ones you catch today, to stay within your limit
- dispose of the smaller fish you caught yesterday and keep the big ones to stay within your limit
- have fish for lunch
- other

Dilemma Card

You are head of a task force created to select the best course of action to attempt to preserve the California condor. There are 22 condors left in a steadily declining population. Left to their own, it is probable they will all die. Some members of your task force would like you to authorize capturing some of the condors and sending them to zoos to try to propagate them in captivity. Do you:

- leave them in their natural environment
- capture some of them for zoos
- other

Dilemma Card

You are finally able to build the home your family has dreamed about. After reviewing the plans for your home, you realize that you cannot include all of the features you had planned for, due to rising construction costs. You must decide which one of the following you will include:

- solar heating
- recreation room with fireplace
- swimming pool
- hot tub and sauna
- other

Dilemma Card

You love children and would like to have a large family. You are aware, however, of the world's population projections for the future. Do you:

- plan to have a large family anyway
- decide not to have children
- limit yourself to one or two children
- other

Dilemma Card

You have found a young screech owl which you have managed to raise to maturity. You cannot keep the owl any longer in your apartment. Do you:

- offer it to your local zoo
- release it back into the wild
- keep it as a pet
- call the fish and game department and ask their advice
- other

Dilemma Card

You are walking in the woods and come upon a young fawn. There is no sign of the fawn's mother. Do you:

- leave it where it is
- move it to a sheltered area
- take it home
- other

Dilemma Card

You are deer hunting with a friend when you spot a hawk perched on a high limb. Before you realize what is happening, your friend shoots the hawk. An hour later, you are leaving the woods and are approached by a game warden, who tells you a hawk has been illegally shot and asks if you know anything about it. Do you:

- deny any knowledge of the incident
- admit your friend did it
- make up a story implicating someone else
- say nothing, but call up later with an anonymous phone tip
- other

Dilemma Card

You have purchased a beautiful ten acre property in the mountains to build a summer home. One hillside of the property has a beautiful view of valley and lake below and is your choice for your homesite. However, you discover there is an active bald eagle nest site on that hillside. The bald eagle is sensitive to disturbance around its nest tree and is a protected species. Bald eagles are highly selective in choosing nest sites and usually return to the same nest year after year. Do you:

- select a different site on the property to build your home
- sell the property
- chop down the tree and build your home
- other

Dilemma Card

You are on a field trip with your class to the zoo. Although you know that feeding of the animals by zoo visitors is prohibited, some of your friends are feeding marshmallows to the bears. Do you:

- tell them that feeding marshmallows to the bear may harm it and ask them to stop
- report their behavior to the nearest keeper
- ask the teacher to ask them to stop
- not do anything
- other

Dilemma Card

You are the judge in a case where a man has been charged with shooting a deer out of season. He has been unemployed and is using the meat to feed his family. Do you:

- give him the maximum punishment and put him in prison for nine months
- fine him \$500
- release him with a warning
- other

Dilemma Card

You are an influential member of the community. On your way home from work, you are stopped by a police officer, and cited for having excessive auto emissions. Do you:

- use your influence to have the ticket invalidated
- sell the car to some unsuspecting person
- work to change the law
- get your car fixed and pay the ticket
- other

Extensions and Variations

1. Adapt this to a debate format!
2. Write and discuss your own dilemmas!

Evaluation

Choose a dilemma. Write a short paragraph on the positive and negative effects of all the options listed for that dilemma. Indicate what additional information, if any, is needed in order to make a responsible and informed decision. Identify what seems, in your judgement, to be the most responsible decision—and explain your reasoning.