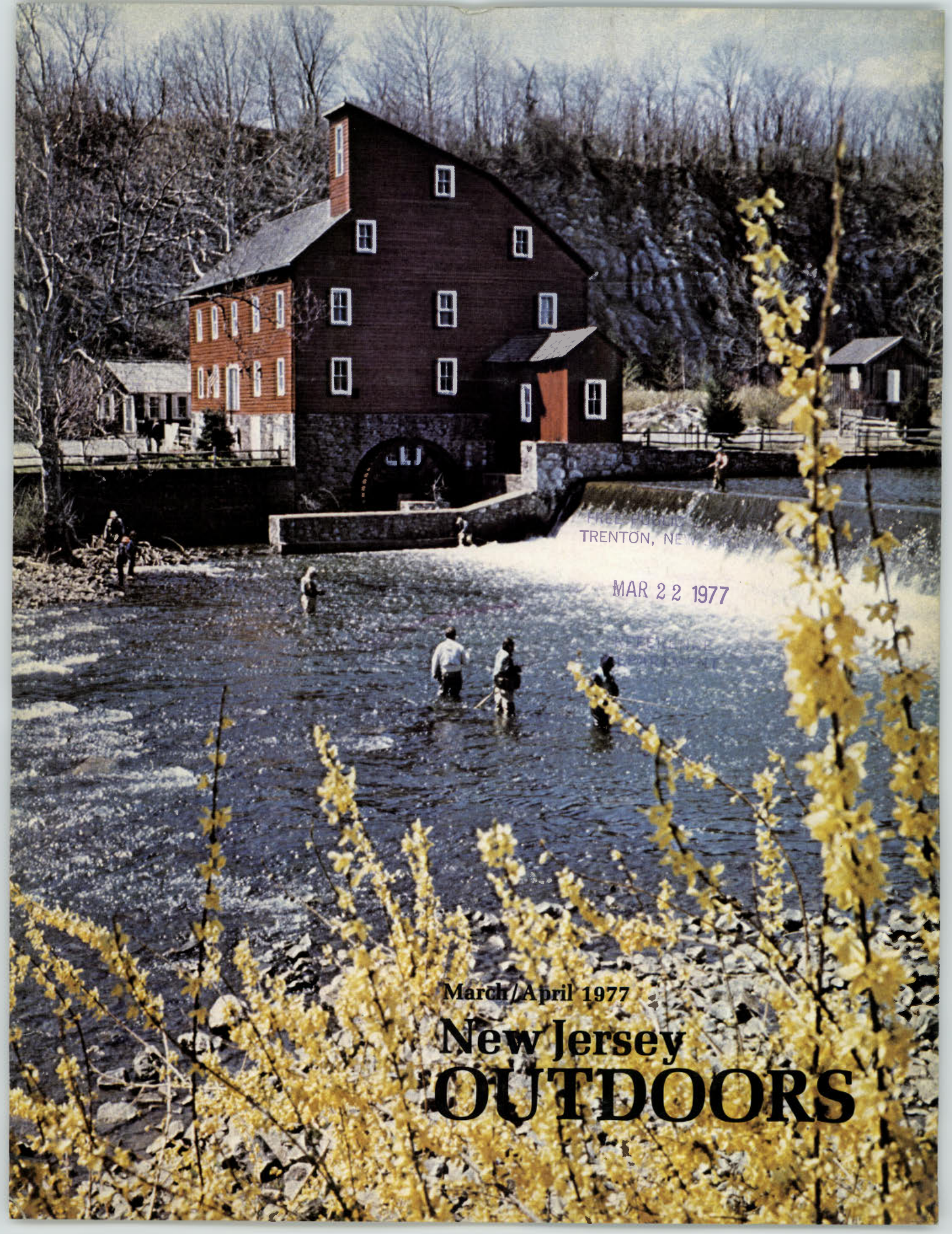


March/April 1977

New Jersey OUTDOORS

NEW JERSEY OUTDOORS is the bi-monthly magazine of the Department of Environmental Protection of New Jersey. This publication is dedicated to the wise management and conservation of our natural resources and to foster a greater appreciation of the outdoors.

(Note: Costs of publishing the magazine not covered by subscriptions are met primarily from the Fish and Game License Fund, administered in the Department of Environmental Protection by the Division of Fish, Game, and Shellfisheries, and from general revenues available to the Department of Environmental Protection.)

Second-class postage is paid at Trenton, N.J. and additional mailing offices. Subscriptions are $3.00 per year and three years for $8.00 payable by check or money order to New Jersey Outdoors Mailing Office, P.O. Box 1809, Trenton, N.J. 08625. Change of address should be reported to the above address. Send old and new addresses and the zip code numbers. The Post Office will not forward copies unless forwarding postage is provided by the subscriber. Allow six to eight weeks for new subscriptions and change of address to take effect. Unsolicited material is sent to the magazine at the risk of the sender. Permission granted to reprint with credit to New Jersey Outdoors. Publication office at 3885 Quaker Bridge Road, Mercerville, New Jersey, 08619.

March/April 1977
VOL. 4 NO. 2

New Jersey OUTDOORS

from the editor

Signs of Spring

Spring is here. Or that's what the song says. Well it's almost here—on the 20th day of this month it becomes official. (Because I'm writing this editorial in mid-January and the outside temperatures have refused to rise above the low teens for days on end, it is very difficult for me to believe that spring will ever return.)

But it will. It always does. Keep looking for the signs. Or just imagine them! See those yellow forsythia blossoms starting to pop! Was that a crocus I spied underfoot among last Fall's crumbling brown oak leaves? Those emerging points protruding from that swampy hollow are skunk cabbage—that earliest harbinger of Spring.

And I swear I saw a red-winged blackbird—and several robins too. Was that the drumming of the regal grouse I heard as I hiked that still wintry woodland glen? That pulsating chorus that lulled me to sleep last night sounded suspiciously like spring peepers. And I know I saw a woodchuck this morning. No mistaking that fat fellow. What does it all mean? It must be Spring!

And we all know that in the Spring a young man's fancy turns to . . . tying flies, checking his waders for leaks, looking for his lucky trout hat—because April 9th is Opening Day Trout. So get ready, get set, and GO. But first buy a fishing license, and a trout stamp. . .Good Fishin'.

in this issue

It's Spring again—and Principal Fisheries Biologist Walt Murawski gives us some inside information on the trout program just in time for Opening Day. More on fish—Biologist Hil Zich discusses our anadromous fish which are fish that migrate to, and spawn in fresh water, but spend much of their time in salt water. Included in this category are the American shad, alewife, and blueback herring.

Joan Galli, nongame biologist with DEP's Division of Fish, Game, and Shelfisheries and Joseph L. Lomax, Environmental Consultant from Cape May County, write about a very special place, Higbee Beach-Pond Creek Meadow, an almost wild, natural area in Lower Township, Cape May County. This unique area contains a diversity of wildlife and a variety of ecosystems, and the authors have some suggestions as to how it can be made available to all New Jerseyans.

Harry W. Young, Jr. a teacher in the Gloucester Township Public Schools, reveals what one school system is doing about environmental education. Read about CEEEP and get ideas for your own local school systems.

If you would like to live with wildlife, read the article by Raymond P. Korbobo, Extension Specialist in Landscape Design, Cook College, Rutgers University.

According to author Jack Kligerman, the first sign of Spring, 1977, came to Closter, New Jersey, on October 15, 1976. Now he'll get some argument on that—especially because of the below freezing winter we've experienced this year. Professor Kligerman teaches English at Lehman College and his most recent publication is *The Birds of John Burroughs,* published by Hawthorne Books, New York. He is presently working on a book called *In Praise of Pigeons* for the same publisher.

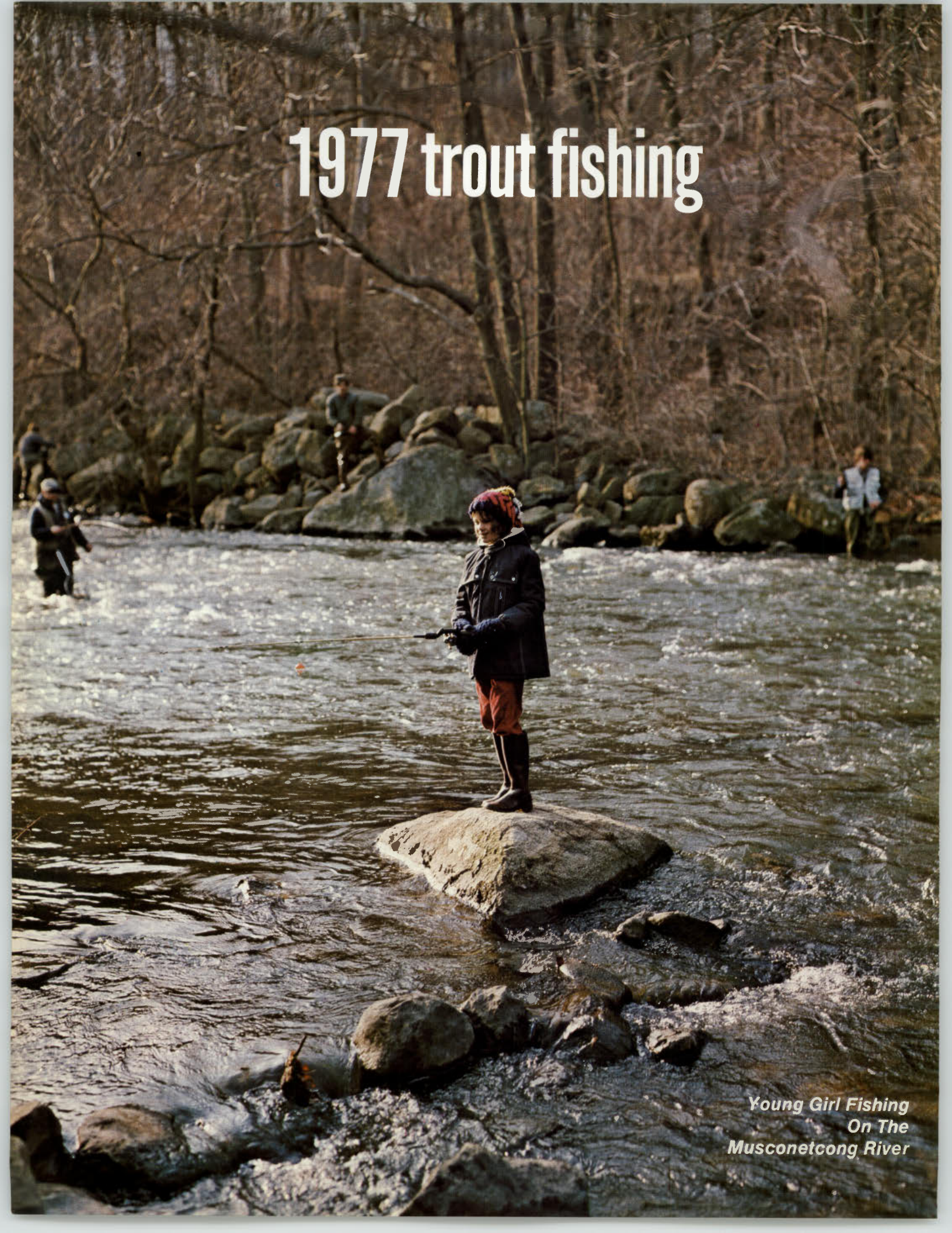
Recycling the Delaware and Raritan Canal by Barbara Levin covers some of the history of the canal and then explains the "major transformation" of this waterway. Built in the early 1800's to transport boats and cargo between New York and Philadelphia, the canal is now being rediscovered as a major recreation area.

In the article *It Happens Every Spring* by Biologist Joe Penkala, the author cautions the well-meaning animal lover about picking up injured or orphaned wildlife young.

Because man has developed and filled in many flooded timber areas and swamps, the beautiful wood duck has been deprived of much nesting habitat. Author Maurice Mills, Jr. writes about the wood duck nest boxes installed on the Great Swamp National Wildlife Refuge in Basking Ridge, New Jersey, and how this program has increased the local wood duck population.

Steve Perrone

1977 trout fishing



Young Girl Fishing On The Musconetcong River

BY WALTER S. MURAWSKI *Principal Fisheries Biologist*

New Jersey anglers, like General George Washington two hundred years ago, will sure be glad the long hard winter of '77 is over. However, instead of looking forward to pursuing a war for independence like the father of our country, the New Jersey anglers are looking forward to exercising their independence and freedom by getting out of the house and enjoying the out-of-doors by going trout fishing.

This year, by the re-opening of trout season April 9th, over 169,000 trout will be stocked in New Jersey waters by DEP's Division of Fish, Game and Shellfisheries. These and approximately 374,000 more, which will be stocked after the season begins, will comprise a total of 543,000 trout for this year's fishing season. This is essentially the same number that was released in 1976, which means that the individual waters will not receive any less fish this year unless they are affected by pollution or by closure of private property.

Because of the difficulties of trying to raise a consistently large number of catchable size trout at our outmoded Hackettstown facility we have once again had to rely on the federal government for a portion of our needs. Thus we will be receiving approximately 180,000 trout from them in order to meet our baseline commitment of 543,000 fish. Not all of these 180,000 will be stocked this year as approximately 80,000 are considered too small for stocking. These will be added to about 220,000 of our own fish to be held over until 1978 and then stocked as large two-year old fish.

Of the trout to be stocked in our waters this year, approximately 65% will be yearlings, 34% will be two-year olds and the remainder will be older. These older fish are those that had been kept for breeders in the late summer and fall of 1976 and now will be replaced by younger fish to supply next year's crop of fertilized eggs.

On a species basis the division plans to stock about 62% rainbow trout, 32% brown trout and 6% brook trout. None of the rainbows stocked this year will be of the golden variety as this type has been phased out of production because of its inferiority in terms of catchability and holdover potential.

As per our past practice, in those waters where there is a possibility of trout holdover through the summer and the following winter, we will stock both rainbow and brown trout whereas in those waters where year round survival is virtually impossible we will stock strictly rainbows. This practice is based on the fact that brown trout far exceed the rainbow in its ability to survive and grow in this state's waters. Therefore, if a stream or lake has any chance of holding over trout we will make the most of it by stocking brown trout to provide for a delayed fishery. Since brown trout are not readily caught in early spring, the stocking of rainbow trout is necessary to provide a fishery during that time.

The brook trout is the only one of these three species that can withstand the acid conditions found in the majority of waters from Middlesex-Mercer Counties and south. Disease problems with this species caused the division to discontinue attempting large scale production of it a number of years ago.

So, after the long hard winter of '77 we will be in good shape in terms of the number, species and size of trout ready to be stocked this year, and anglers can look forward to another rewarding season. Hopefully, when the new Pequest Hatchery is built, the Division of Fish, Game and Shellfisheries will win its independence by ceasing to be dependent upon the federal government to meet our trout needs. □

PHOTOS BY PATRICK BOFFO

Opening Day — Trout at Stokes Falls

Shad Fishing on the Upper Delaware

Photos by Harry Grosch

anadromous fish inventory

by hil zich

Anadromous fish are those which migrate to, and spawn in, fresh water, but spend part of their life in ocean waters.

Together with such fishes as the sturgeon and striped bass, the shad and river herring have an anadromous life cycle. Born in fresh water each spring, the young shad and herring remain there and in low-salinity waters until summer or early fall when they migrate to the ocean. They remain in the sea for at least three years, during which they attain sexual maturity; thereafter, each spring they migrate from the ocean back to fresh water to spawn. The adults that survive these spring spawning runs migrate back to the ocean immediately after spawning.

Originally most of New Jersey's freshwater streams had open and unobstructed access to tidal water and the ocean. Many of these streams were prime spawning grounds for anadromous fish. New Jersey was especially enriched each spring by its association with the marine and tidal water environment and the accompanying anadromous spawning runs of American shad, alewife, and blueback herring.

Shad and herring were a sustaining food for the Indians and colonists. Readily caught in great numbers while migrating up streams, these fish were eaten fresh or preserved for future use.

During the late 1800's and early 1900's, New Jersey maintained the most extensive commercial shad fishery on the Atlantic Coast. Three to four million shad were harvested annually by the state's fishermen.

REASONS FOR DECLINE

Since colonial times man's physical and biological domination of land and water resources has contributed significantly to the decline of the state's original shad and herring populations.

- The construction of some dams has denied anadromous fish access to their spawning grounds.
- Channelization, diversion, and displacement of some streams has contributed to the destruction or exclusion of spawning grounds.
- Streams used by anadromous species have often been degraded by pollution caused by sewage, chemicals, and siltation, often resulting in a loss or reduction of spawning habitat.
- Overfishing in particular situations has also probably influenced the decline of these anadromous fishes.

The decline or elimination of anadromous fish populations in many New Jersey waters over the years has emphasized the need for more affirmative action to protect the remaining spawning runs and to restore as many as possible of those that have been lost.

PROGRAMS

The Congress of the United States enacted the Anadromous Fish Act of 1965 (Public Law 89—304), appropriating funds to assist in the evaluation and improvement of conditions for anadromous fish. In 1972, with funding assistance from this Act, and as a first step toward developing a comprehensive anadromous fish program, the Department of Environmental Protection's Division of Fish, Game, and Shellfisheries initiated an anadromous fish inventory project.

DEP's water pollution control

programs in New Jersey are expected to improve water quality of our streams to the extent that these waters will be suitable for passage of anadromous fish.

Another device designed to allow fish passage on dammed streams is the fish ladder. The first installed in New Jersey is located on the South Branch of the Metedeconk River at Shenandoah Lake. DEP's Division of Fish, Game, and Shellfisheries has notified dam owners (property owners of dams located on anadromous fish waterways) that a fish ladder is a requirement when requesting permission for repair action on an existing dam.

SPECIES SURVEYED

For the purposes of this survey, the anadromous fish of primary concern in the intrastate waters of New Jersey are the American shad (*Alosa sapidissima*), the alewife (*Alosa pseudoharengus*), the blueback herring (*Alosa aestivalis*), and the hickory shad (*Alosa mediocris*). These four species belong to the family Clupeidae and are commonly referred to as clupeids.

The American shad is an important seasonal food fish in New Jersey; the roe of the female shad is especially in great demand. Commercial fisheries for shad continue in the Hudson and Delaware Rivers. Also, during the past 30 years the adult American shad has become a highly popular game fish in the upper Delaware River and many sport fishermen look forward to the spring spawning run.

The alewife and blueback herring enjoy local popularity and value throughout New Jersey as food and sport fish but are not nearly as well known as the American shad. Their roe is particularly sought after.

Hickory shad are reportedly caught by sport fishermen in some of New Jersey's major estuaries during the fall, but little else is known about direct human use of the species in the state.

All the clupeids, particularly the herrings, are important prey species for predatory fish such as bluefish, striped bass, and largemouth and smallmouth bass.

OBJECTIVES

The primary objectives of New Jersey's anadromous fish inventory are to (1) identify streams supporting existing spawning runs, (2) identify blockages or limitations in streams where anadromous fish are confirmed or reported to be spawning, and (3) identify streams where anadromous spawning runs have been eliminated.

Since 1972, the anadromous fish inventory has confirmed 92 anadromous clupeid spawning runs within the intrastate waters of New Jersey. These confirmations have resulted from reviews of existing literature and data, conversations with knowledgeable people, and on-site investigation of streams.

The following is a list of major intrastate drainages and streams where anadromous clupeid spawning has been confirmed to date in this continuing effort:

Alewife (*Alosa pseudoharengus*) Spawning Runs

Atlantic County

1. Negro Creek @ Green Bank
   Mullica River Drainage
2. Nacote Creek @ Mill Pond Dam
   Mullica River Drainage
3. Lenape Lake Dam
   Great Egg Harbor River Drainage
4. Watering Race
   Great Egg Harbor River Drainage
5. Gravelly Run @ Rt. 559
   Great Egg Harbor River Drainage
6. Miry Run @ Rt. 559
   Great Egg Harbor River Drainage
7. South River @ 11th St.
   Great Egg Harbor River Drainage
8. Stephans Creek @ Rt. 50
   Great Egg Harbor River Drainage
9. Patcong Creek @ Bargaintown Lake Dam
   Great Egg Harbor Bay Drainage
10. McNeals Branch @ Aetna Road
    Tuckahoe River Drainage
11. Mullica River @ Constable Bridge
    Mullica River Drainage
12. Nescochague Creek
    Mullica River Drainage
13. Hammonton Creek @ Nescochague Lake Dam
    Mullica River Drainage
14. East Pool Dam Brigantine Refuge on Grassy Bay
    Atlantic Ocean Drainage
15. West Pool Dam Brigantine Refuge on Reeds Bay
    Atlantic Ocean Drainage
16. Gibson Creek
    Great Egg Harbor River Drainage
17. Atlantic County Impoundment #1
    Great Egg Harbor River Drainage
18. Hawkins Creek @ Atlantic County Impoundment #2
    Great Egg Harbor River Drainage
19. Warners Mill Stream
    Tuckahoe River Drainage

Bergen County

1. Hackensack River at Oradell
   Hackensack River Drainage

Burlington County

1. N. B. Rancocas Creek @ Mill Dam Park
   Rancocas Creek Drainage
2. S. B. Rancocas Creek @ Rancocas Heights
   Rancocas Creek Drainage
3. Batsto River @ Batsto Lake Dam
   Mullica River Drainage
4. Blacks Creek
   Blacks Creek Drainage
5. Wading River @ Rt. 542
   Mullica River Drainage
6. Bass River
   Mullica River Drainage
7. Jobs Creek
   Mullica River Drainage
8. Ballanger Creek
   Mullica River Drainage

Cape May County

1. Tuckahoe River @ Rt. 49
2. Back Run @ Leamings Pond
   Tuckahoe River Drainage
3. Flat Creek @ C.M. Imp. #3
   Tuckahoe River Drainage
4. Cedar Swamp Creek @ Rt. 50
   Tuckahoe River Drainage
5. Bog Branch @ C.M. Imp. #2
   Cedar Swamp Creek
   Tuckahoe River Drainage
6. Mill Creek @ Magnolia Lake Dam @ Rt. 9
   Townsend Sound
   Atlantic Ocean Drainage

Cumberland County

1. Stow Creek @ Buckhorn Road
   Stow Creek Drainage
2. Raccoon Ditch @Davis Mill Dam
   Stow Creek Drainage
3. Cohansey River @ Sunset Lake Dams (2)
4. Mill Creek @ Clarks Pond Dam
   Cohansey River Drainage
5. Cedar Creek @ Cedarville Lake Dam
   Delaware River Drainage
6. Maurice River @ Union Lake Dam
7. Raceway @ Sharp St.
   Maurice River Drainage
8. White Marsh Run @ Silver Lake Dam
   Maurice River Drainage
9. Greenies Sandwash
   Maurice River Drainage
10. Hankins Brook @ Rt. 47
    Maurice River Drainage
11. Menantico Creek @ R.R. Bridge
    Maurice River Drainage
12. Manumuskin River @ R.R. Bridge
    Maurice River Drainage
13. Muskee Creek @ Rt. 47
    Maurice River Drainage
14. Buckshutem Creek @ Laurel Lake Dam
    Maurice River Drainage
15. West Creek @ Rt. 47
    Delaware River Drainage

Gloucester County

1. Raccoon Creek @ Rt. 322
   Raccoon Creek Drainage
2. Oldmans Creek @ Rt. 74
   Oldmans Creek Drainage
3. Oldmans Creek @ Porches Mill Dam
   Oldmans Creek Drainage
4. Mantua Creek @ N.J. Turnpike Bridge
   Mantua Creek Drainage

Hunterdon County

1. Delaware River @ Lambertville Wing Dam
2. Lockatong Creek
   Delaware River Drainage

Mercer County

1. Fiddlers Creek @ Rt. 29
   Delaware River Drainage
2. Washington Crossing State Park Creek
   Delaware River
3. Jacobs Creek @ Rt. 29
   Delaware River Drainage
4. Assunpink Creek @ Warren St.
   Delaware River Drainage
5. Delaware River @ Trenton Falls
6. Crosswicks Creek @ N. Crosswicks Dam
7. Doctors Creek @ Yardville-Groveville Road
   Crosswicks Creek Drainage
8. Back Brook @ Gropps Lake Dam
   Crosswicks Creek Drainage

Continued on page 24

Science students from the Middle Township middle school take a unique field trip to study the ecology of Higbee Beach.

HIGBEE BEACH—POND CREEK MEADOW

a very special place

BY JOAN GALLI and JOSEPH L. LOMAX

One of our country's most important assets has been its seemingly limitless natural resources, clean air, unpolluted water, wide expanses of forests, fields, beaches and bays harboring a richness of wildlife that will never again be known on this continent. How many times have we paused to wonder what it must have been like in years gone by when the country was inhabited only by birds and other wild creatures!

Scattered about the countryside are areas which serve as windows to the past. One such site is Higbee Beach-Pond Creek Meadow in Lower Township, Cape May County. Walk the beach on a clear day. The cool aromatic forest of holly and scrub oak at the base of the dunes stands in sharp contrasts to the blazing white sand at the top. Climb to the top of Signal Hill and sit quietly. All sounds of civilization will fade away, and you will experience the peace and solitude of our coastal dunes of years gone by.

The view from the top will do much to refresh your soul and restore your spirit. Delaware Bay shimmers to the west and to the east, an unbroken carpet of trees flows down to a lush meadow of reedgrass and cattail. To the south, we are reminded of 20th century America by the Harbison-Walker Magnesite Plant. The plant's contrasting character serves to heighten our appreciation of the beach and meadow.

The uniqueness of the area lies not only in its timeless nature but also in its diversity of wildlife, strategic geographic location and variety of ecosystems. (As you recall, an ecosystem is a descernible assemblage of plants, animals and their physical environment.)

We invite you to explore with us the many fascinating aspects of the area. The first stop on our tour is:

Fields surrounding the meadow serve as an important stopover for woodcock migrating south.

Birds such as this killdeer, driven from the beaches by human disturbance, successfully nest on the man-made fill area.

PHOTOS BY JOE LOMAX

THE DELAWARE BAY ECOSYSTEM—The nutrients in the shallow estuarine water adjacent to Higbee Beach encourage a rich fish fauna. The presence of fish is well known to anglers whose prizes from the area include weakfish, bluefish, drum, and flounder. It is the small bait fish, however, which attract large numbers of gulls, cormorants, mergansers, loons and terns.

THE BEACH—The wind, waves, tides and currents of the bay profoundly affect the adjacent beach and dune communities. Wind-driven winter waters eat away the beach and they are counteracted by gentler summer currents which redeposit lost sands. The bay's real gift to the beach, however, is a wealth of "Cape May diamonds," rough polished by the surf and tossed upon the sands for a beachcomber's pleasure. Early summer brings tens of thousands of horseshoe crabs from deep water to the beach to deposit eggs. The eggs are eaten by a variety of shorebirds which patrol the beaches. And gulls are ever ready to feast on adult crabs left stranded by falling tides. Birdwatching concurrent with the crabs spawning promises more than a score of shore-bird and gull species. Also be alert for the ghost crabs and tiger beetles that inhabit the beach.

THE DUNES—The salt spray and shifting dune sands create an inhospitable environment for all but the most highly adapted species. Only the hardy beach grass, sea rocket, and seaside goldenrod occur on the primary dunes which face the beach.

The dune forest, situated behind the primary dunes, has four distinct aspects. The western edge is comprised of a dense, low thicket of beach plum and poison ivy sculptured by wind and salt spray. Moving

Continued on page 30

Class about to start

PHOTOS PROVIDED BY AUTHOR

environmental education:

Gloucester Township Public Schools

BY HARRY YOUNG

Since 1968, the public has become increasingly aware of man's responsibility to and dependence on his environment. Our larger cities are cloaked in a brownish haze. Our homes and clothing are damaged by acidic droplets and soot from smoke. Poisonous gases such as carbon monoxide, carbon dioxide, and nitrogen oxides, endanger our health. These factors, coupled with overpopulation, water pollution, and abuse of our natural resources, prompted the development of an educational program to instruct our children in ways to deal with these problems.

In 1970, the Gloucester Township Public Schools, in Camden County, instituted the CEEEP program (Conservation Ecological Environmental Education Project). Starting with a class of 40 sixth-grade students, the program has grown to include instruction in environmental education for students from kindergarten through eighth grade. The CEEEP program utilizes an inter-disciplinary and multi-disciplinary approach. Through the use of on-school-site and in-township activities, environmental education occurs on an on-going basis. Students in the primary grades are taken on field trips to deserted farms, local cemeteries, historical sites, and other sites of ecological interest. The curriculum includes the study of air pollution, common organisms, animals, birds, fish, trees, plants, soil, and man and their relation to and effect on the environment.

The middle-school students (grades 6-8) are taken on a three-day camping trip to Bass River State Forest from September thru November, and April thru June. In this unique environmental setting, the students are afforded the opportunity to apply classroom theory practically. During this three-day resident experience, the students have outdoor classes in science, field math, social sciences, language arts, physical education, community living, and art, using natural materials. This experience offers the students the opportunity to observe and learn about their environment. At the end of the camping trip season, a test is administered to assess the effectiveness of the resident experience. The testing shows an 82 percent recall factor of materials covered.

Outdoor education is not merely the categorizing of environmental phenomena, the development of specific outdoor education curricula or the encouragement of a positive attitude about the environment. It must be an integral part of the community. Community involvement in the CEEEP program is most evident in the resident experience. Parents, teachers, and students from Glassboro State College volunteer as chaperones for the three-day trip. The number of chaperones who return again and again testifies to the success of the camping experience.

The environmental education program in the Gloucester Township Public Schools offers the potential to rekindle the student's desire to learn directly, and, hopefully, will instill in him a life-long respect for the environment. □

Transect Study — 50 Yards

Black Raspberry Bush — Edible Wild Foods CARL GROSS

Founding a New Community — Survival Lesson

house sparrows nesting in bird feeder

living with wildlife

BY
RAYMOND P. KORBOBO
Extension Specialist in Landscape Design
Cook College, Rutgers University

One of the best ways to learn the lessons of Life, I have found, is to look backwards. As I sit in my home office I look out upon my rear property from an upstairs "perch," you might say. It's a bird's-eye view.

In 1955 the 100' x 150' addition to my original very small property of 60 x 90 feet contained of one red oak and one pin oak. All the rest was a spanking new lawn. Today, on the 11th of March, 1976, the ground is covered with a beautiful snow, and the trees and shrubs planted between 1955 and 1957 are so large that it is almost impossible to see any part of my neighbor's houses! In the summer, with foliage, we enjoy complete visual privacy.

Looking back over those years of watching the landscape grow, I see that I accidentally designed a yard attractive to wildlife. At the time that I did the landscaping I knew perhaps 10 different species of birds. Today, I can identify 70 different species, 35 of which I have observed on my property. It occurred to me one day to analyze the landscape to determine why so many birds use it. I do not profess to be a bird specialist; I am by profession a landscape designer.

It seems that certain desirable features attract particular types of wildlife. The first plus is an open lawn area completely enclosed by plantings. Animals such as robins and rabbits use this open space as a secure feeding area, close to cover and safety. Often birds seem to "play" by darting from one plant cover across the open stretch and into plant cover again on the other side.

The plantings include many tall, narrow "steeples" such as upright junipers, hemlocks, and cryptomerias. Mockingbirds especially seem to be happiest when they are at the topmost branch of such trees. The hemlock is the most-used "winter home" of all trees on the property. It sheds snow like a tent and we often see at least six or seven birds waiting out a storm inside its sheltering branches.

Who can say they have seen and heard anything so sweet as a flock of chickadees during a deep snow hanging upside down on tiny hemlock cones picking out the ever-so-small seeds and giving off their almost inaudible little "chip, chip, chip" while they work away?

In the shrub border, I had planted five cultivated blueberries. These were for the "local kids" to snitch. By pure luck I noticed that until we were visited by mockingbirds we never had one ripe blueberry to eat unless we covered a plant with cheesecloth. However, every year that a mockingbird nests in our backyard we have an oversupply of delicious blue-

a bird's eye view

berries; these fellows simply will not allow other birds to eat the berries. We have never observed a mockingbird eating them either, although we have seen them feeding the fruit to their young.

Another thing I learned about bird feeding habits —accidentally, of course—was how they really go for the berries on Japanese hollies (*Ilex crenata* and varieties). If you can manage to work a couple of these into your landscape so as to allow them free growth (no shearing or pruning) they will produce thousands of black berries. Robins, mockingbirds, titmice, and cedar waxwings eat at this counter all through the winter and into the early spring.

Linden viburnum (Viburnum dilitatum) is an attractive deciduous shrub which bears deep Chinese-red berries from late summer into early winter. It is an absolute magnet for cedar waxwings and titmice, which usually hit ours in late February and early March. Cedar waxwings will also finish off the catbriar and blackhaw berries.

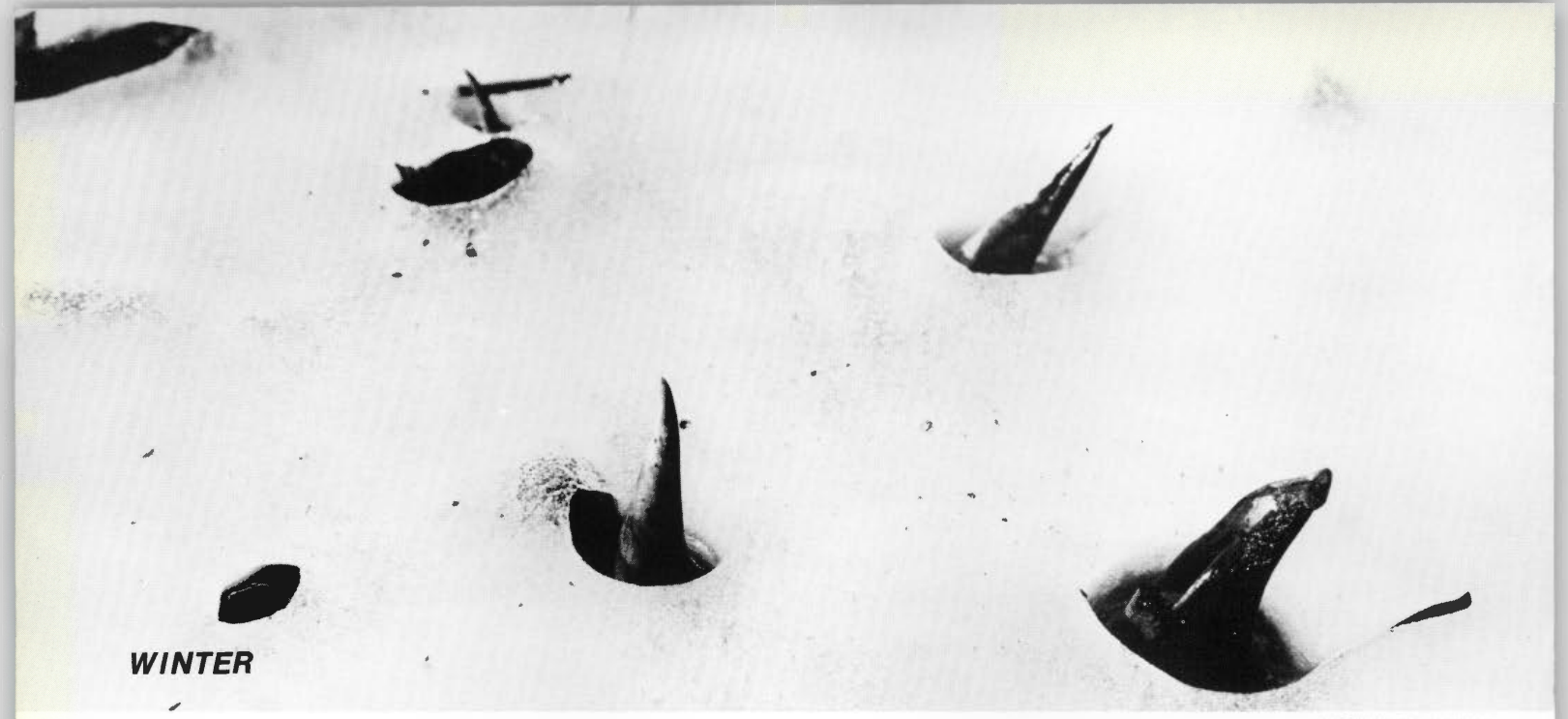
Acorns from the pin oaks are small enough for the blue jays and blackbirds to eat in the spring. Evidently (correct me if I'm wrong), the hard covering is softened by the weather enough for the birds to crack the outer shell and eat the nourishing cotyledons and embryos.

Even our formal brick terrace has proved a valuable part of our wildlife haven. When bird seed is placed on this flat exposed area, any attacking cats must show themselves from that all important split-second that allows ground-feeding birds to escape.

Around two sides of the rear property is a screen of false orange (*Poncirus trifoliata*). Covered with sharp stiff thorns one to four inches long, this plant is the greatest place for nesting you'll ever see. I recall seeing four active bird nests in one false orange growing not 200 feet from the main street in Woodbury. It would be a near impossibility for any predator to reach such nests through the thorns.

Just off our property on Borough-owned land is a small triangle of wild growth consisting mainly of wild cherries, young oaks, blackhaw and a few rhododendrons, all covered by Virginia creeper and catbriar. In that jungle-like triangle every year we have nests of catbirds, cardinals and brown thrashers. Nearby, on a white pine branch hangs a bird house for the busiest little singer and insect catcher of all—the house wren! In an unofficial and probably most unscientific experiment during a vacation many years ago I relaxed by keeping a count on the approximate number of insects that it took to feed one brood of "Jenny Wrens." I figured that one family of these

Continued on page 26



PHOTOS BY AUTHOR

signs of spring: skunk cabbage

BY JACK KLIGERMAN

Spring, 1977, came to Closter, N.J., on October 15, 1976. At least that is when I noticed the pointed purple and green spathes of the skunk cabbage (*Symplocarpus foetidus*) pushing their way up through the maple leaves that were just beginning to cover the floor of the swamp forest in Closter's nature center. Closter, where I make my home, is located in the northeast corner of Bergen County, a five-minute drive from the New York border. The swamp forest of my corner of the Piedmont plain drains into the Dwarskill, itself a tributary of the Hackensack River. The damp woods yearly provide the perfect habitat for a lush crop of skunk cabbage and other plants typical of the lowland areas of North Jersey, only 35 minutes from Lincoln Center. I had been looking for the first sign of spring in the midst of the first leaf fall ever since reading Thoreau's journal entry for October 31, 1857: "I say it is good for me to be here, slumping in the mud, a trap covered with withered leaves. See those green cabbage buds lifting the dry leaves in that watery and muddy place. There is no can't nor cant to them. They see over the brow of winter's hill. They see another summer ahead."

My discovery of the leathery spathes was particularly satisfying, because I had been photographing

Continued on page 32


APRIL


MAY

RECYCLING THE DELAWARE AND RARITAN CANAL:

from coal barges to canoes

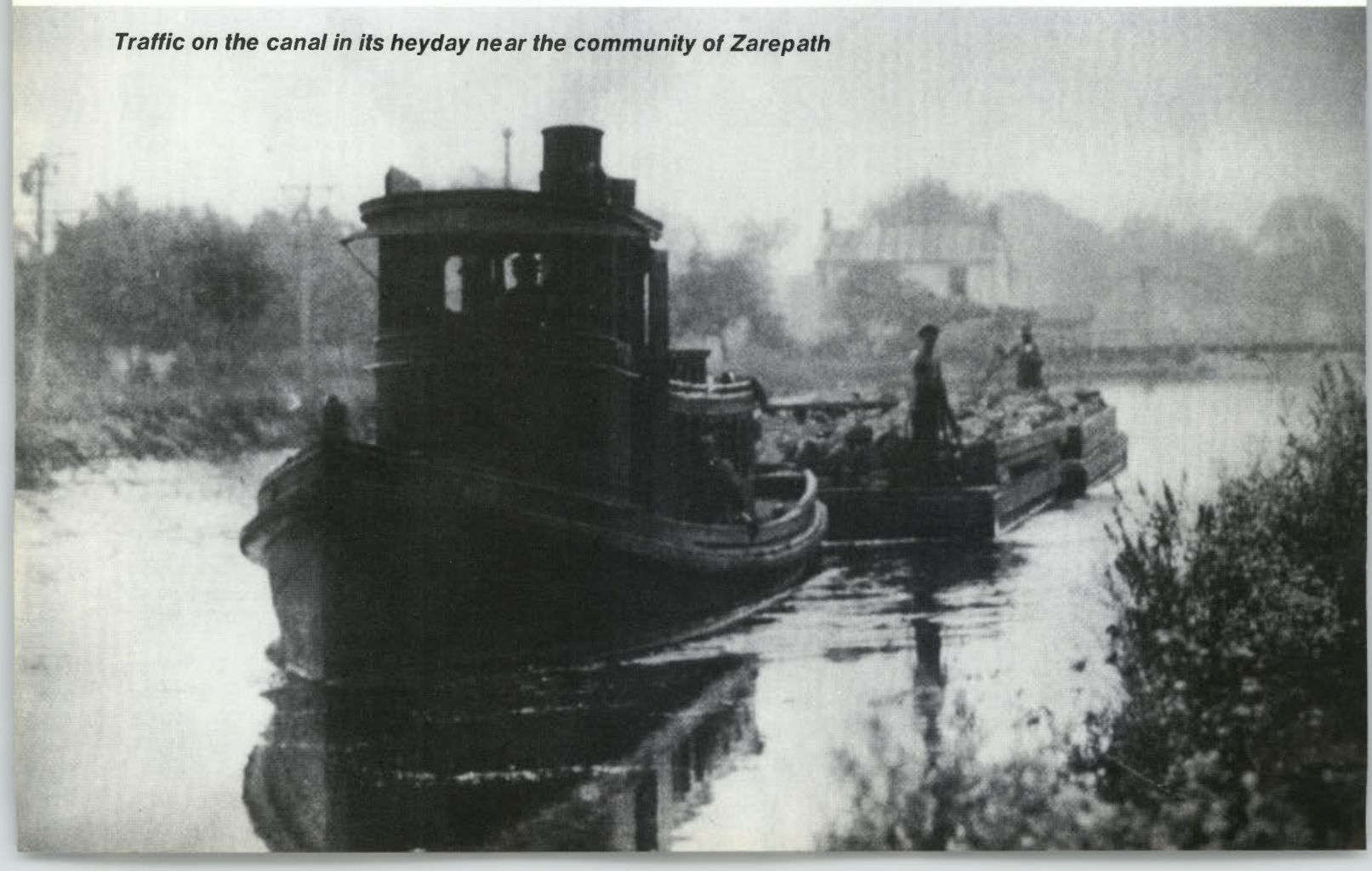
by Barbara Levin

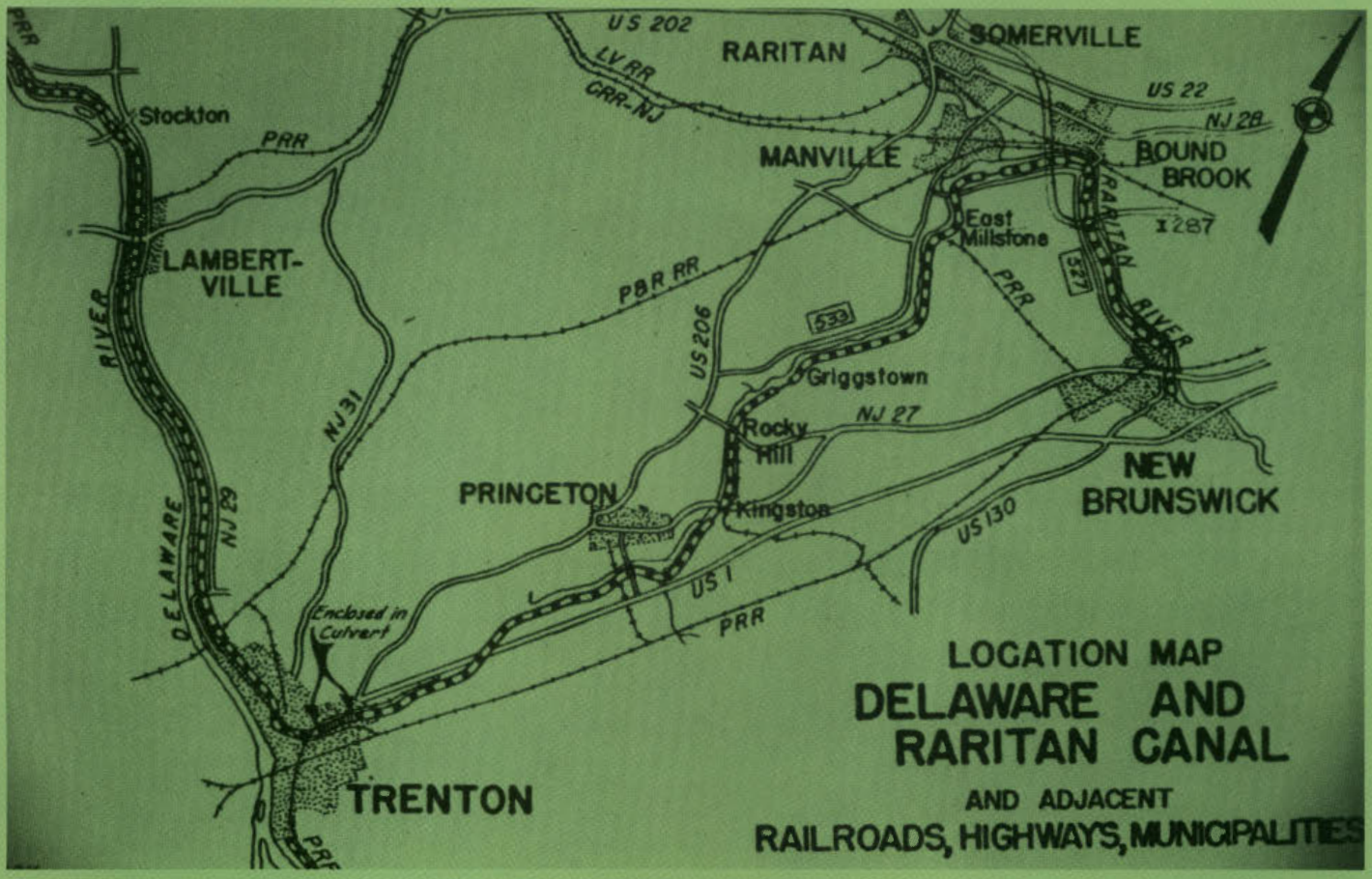
New Jersey's Delaware and Raritan Canal is undergoing a major transformation. Built to transport boats and cargo between New York and Philadelphia, the canal is now assuming a new identity as recreational "green space" used for fishing, canoeing, hiking, picnicking, bicycling, and historic restoration and interpretation. The waterway that once stimulated the economic development of central New Jersey and neighboring regions is beginning to make a much needed contribution to the environmental, aesthetic, and leisure time opportunities of the same area.

Although William Penn first proposed a New Jersey canal connecting Philadelphia and New York as early as 1676, the idea did not take hold until the early 1800's. At that time the initially skeptical attitude of New Jersey's legislators and businessmen was changed by the successful example of the newly constructed Erie Canal and by the threat of British attacks on American shipping, such as occurred during the War of 1812. When finally designed, the canal made effective use of the generally flat central New Jersey topography and of three major rivers: the Delaware, the Raritan, and the Millstone. Most importantly, this system had gravity working for it, permitting water from the Delaware River to enter the canal at Raven's Rock in Hunterdon County, then flow more than 60 miles, to the Raritan River, traversing 18 locks along its course. Thanks to its effective design and its strategic position as a connecting link between New York and Philadelphia and the canal enjoyed continued use for nearly 150 years.

Continued on page 22

Traffic on the canal in its heyday near the community of Zarepath





Canoeing on the canal

PHOTOS COURTESY D & R CANAL COALITION

it happens every spring

BY JOSEPH M. PENKALA

It's a predictable chain of events that happens every spring. Nature is busy producing a new crop of field and forest creatures. Because the young lack the caution and stealth of their elders, they are prone to injuries and often fall easy prey to some well-meaning protector.

One of three fates usually befalls these animals; they die from improper or inadequate care, become caged "pets," or die soon after release back to the wild because they have not developed the proper survival instincts. Division of Fish and Game biologists and conservation officers are all too familiar with this situation. We are usually called when the animal is on the verge of death or has become large enough to become a nuisance. Needless to say, in most cases this leaves us with the unpleasant responsibility of disposing of the animal in a humane manner.

DEP's Division of Fish, Game, and Shellfisheries issues permits allowing people to care for wild animals that are injured or orphaned. Possessing such an animal without one is illegal.

Each year hundreds of thousands of small game animals and thousands of deer are harvested by New Jersey's sportsmen. It might seem contradictory that in May and June we may issue a permit to save one injured rabbit while in November we allow the harvesting of some 400,000 rabbits. *Continued on page 17*

10 week old red fox kit in den LEONARD LEE RUE III

white tailed fawn — 4 days old LEONARD LEE RUE III

Environmental News

PHOTOS SUPPLIED BY DEP

UNIQUE PINE BARRENS, PRECIOUS RESOURCE. The Pine Barrens is a unique and sensitive ecosystem which has a vast underground water reservoir for future water needs. The area offers fine recreational opportunities, and supports New Jersey's cranberry and blueberry crops. Water pollution could ruin the valuable crops, as well as the groundwaters. Governor Byrne called for new water quality standards as part of his overall program to protect the Pine Barrens from exploitation and overdevelopment. On January 20, DEP proposed nondegradation water quality standards for 750 square miles (or 486,400 acres) of the Pine Barrens in Ocean, Burlington, Camden and Atlantic counties. The proposal, scheduled for public hearings in March, will set New Jersey's first standards for ground (underground) water protection and will upgrade existing water quality standards by adding a special Pine Barrens classification. Environmental Protection Commissioner Bardin said the new standards should help prevent degradation and preserve the present high quality of the waters in the Mullica River and Cedar Creek and portions of the Rancocas Creek and Toms River watersheds. Copies of the rules may be obtained from Robert Tassan, DEP, Division of Water Resources, P.O. Box 2809, Trenton 08625. Written comments will be accepted until March 30.

Governor Byrne Spurs State/Federal Units To Tighten Controls Of Spray-On Asbestos

DEP, per Governor Byrne's direction, in mid January proposed a new statewide regulation under the air pollution control code to ban spray-on asbestos in any form. At the same time, Governor Byrne petitioned EPA to close a loophole in their regulations that allows the use of some spray-on asbestos products. The federal agency responded favorably within two weeks indicating they were in the process of modifying their rules.

The tightening of spray-on asbestos controls on both the state and federal levels was spurred by Governor Byrne to prevent any further incidents of potential health hazards as had occurred in Howell Township Monmouth County elementary schools in December. (A layer of spray-on asbestos material applied to ceilings in the halls, gymnasium and other areas in the schools had aged and was flaking off releasing asbestos fibers into the air. Six schools were closed for three weeks while the ceilings were removed.) □

Under new law

DEP INTRODUCES RULES FOR NEW OIL SPILL LAW

Environmental Protection Commissioner Bardin on January 27 proposed regulations to implement the Spill Compensation and Control Act (A-1903) signed into law by Governor Byrne on January 6. The department is required to adopt regulations and define "hazardous substances" before the law becomes effective. It is intended to have the rules in operation by the beginning of April.

A public meeting on the definition of hazardous substances was held on February 15. and a public hearing on the proposed regulations was held on March 9.

Under the law, DEP is responsible for the cleanup of oil spills and hazardous substances and may require major facilities, such as oil refineries and chemical plants to submit discharge prevention and cleanup plans to DEP for approval.

Bardin noted that the spill problem has increased dramatically in recent years. DEP data show a total of 7.3 million gallons released in 826 spills last year as compared with 2.4 million gallons released in 676 spills in 1975. Most of the spilled material involved gasoline. kerosene. home heating fuel and other petroleum products, Bardin said.

The hazardous substances defined by DEP will be subject to the one cent per barrel transfer tax between major facilities. This tax will be used to build a state fund to clean up spills and allow compensation to owners of property suffering spill damage.

The preliminary hazardous substance list included crude oil, petroleum products, substances listed as hazardous by the federal Environmental Protection Agency (EPA), certain additional pesticides, radioactive materials and liquified natural gas.

Other key provisions of the proposed regulation include:

—Procedures which require all persons, vessels and refineries to notify DEP of any spills of hazardous substances.

—Standards for spill prevention, cleanup and removal plans by major facilities. including construction and operating requirements.

—Standards for rating spill cleanup companies including equipment and personnel requirements. □

McLAIN NAMED FG&S DEPUTY DIRECTOR

Paul D. McLain, 51, of Toms River, has been named deputy director of the Division of Fish, Game and Shellfisheries. McLain, who has been with the division for 26 years, will be responsible for supervision and direction of DEP's Endangered and Nongame Species, Wildlife Education, Planning, and Federal Aid sections. He will serve as acting director in the absence of Director Cookingham. McLain, a graduate of Cornell University with a degree in wildlife management, started with the division as a summer assistant becoming a full-time employee in 1950. He rose through the ranks and for the five years just prior to his appointment as deputy director McLain was federal aid coordinator for the division. □

Companion to battle map

BATTLES AND SKIRMISHES PAPERBACK PUBLISHED

The Revolutionary war era began in New Jersey with the "tea party" at Greenwich on December 22, 1774, and ended with a naval encounter on March 3, 1783—more than eight years later. In 1974 DEP published a map showing where the more than 850 confrontations between the British and Colonials occurred in New Jersey. In response to requests for a companion book giving the information on the map plus available background information, sources, alphabetical and chronological listings. the department has published a 141-page, 6" x 9" paperback book which contains that data. The book, "Battles and Skirmishes in New Jersey of the American Revolution," was written by David C. Munn. The book alone is a worthwhile addition to collectors of material on the state's history, but will be especially helpful for use along with the map. The paperback is available at $4 each copy from DEP's Bureau of Geology and Topography, Publication Sales, P.O. Box 2809, Trenton 08625. The map (which carries the same name) is available at $3 each copy from the same office. Please make check or money order payable to General Treasury, State of New Jersey (G.T. of N.J.). □

HARRY GROSCH

Bob McDowell, Division of Fish, Game and Shellfisheries, demonstrates tip-up rig to ice fishing pupils.

LAKE HOPATCONG ICE CLASS

Roy Elicker

It's been a harsh winter. Heavy snowfall and low temperatures have put a chill in the bones of most of us. However, for the frustrated ice fishermen who endured the last five years of mild winters, this winter couldn't be better. Solid ice has been in since December with good fishing in many areas. Good ice fishing weather has brought many inquiries to DEP's Division of Fish, Game, and Shellfisheries offices asking simply, "How do I ice fish?"

With this demand for ice fishing know-how in mind, the division, in cooperation with the Knee Deep Hunting and Fishing Club of Lake Hopatcong, sponsored its first annual Ice Fishing Seminar. Held at Lake Hopatcong State Park, with help from the DEP's Division of Parks and Forestry, the clinic lasted from 10 a.m. to 2 p.m. Although this particular Sunday, January 16, dawned on a grey, snowy day, the cold weather was forgotten as over one hundred and thirty interested ice fishing pupils braved the elements.

Knee Deep instructors demonstrated current techniques and procedures by setting up four demonstration stations. Students gathered around each station as a particular topic was discussed, then moved on. Jigging, tip-up construction, baits, locating fish, and cutting ice were some of the subjects. Demonstrating safe ice was left up to one imaginative state employee who drove his car onto the lake. Lucky for him the ice was 17 inches thick.

Although many of the neophyte ice fishermen (and fisherwomen) seemed ill-dressed to stand up to the fierce winds and extremely low temperatures, enthusiasm was high throughout the duration of the clinic. DEP's Division of Fish, Game, and Shellfisheries has literature available explaining many of the techniques demonstrated at the seminar. Please send a self-addressed stamped envelope to: Ice Fishing, c/o Art Lupine, Lebanon State Fish Lab, Box 394. Lebanon, New Jersey 08833. □

AIR POLLUTION CONTROL: MOTOR VEHICLES

Broadening exhaust test program

The department has announced rules to expand the state's exhaust testing program to include heavy duty gasoline powered trucks and buses (currently exempt from emission inspection), and new cars prior to their delivery from the showroom (presently tested at the manufacturers' discretion). Other related regulations would upgrade the testing program to achieve more effective pollution control, energy conservation, consumer protection and overall fairness to the motoring public. These include rules to 1) set a separate standard for light weight fuel-economy cars and more restrictive standards for heavier models, 2) prohibit tampering with emission control systems, 3) provide for training and certification of emission control mechanics, 4) set an upper limit for repair costs for 10-year or older cars, and 5) entitle vehicle owners, in specific cases, to reimbursement by the manufacturer for necessary repairs (subject to EPA adoption of regulations to enforce emission warranty provisions of the Clean Air Act). Public hearings will be held on March 29 at the Gateway Downtowner Inn on Raymond Boulevard in Newark and on March 30 at the State Museum on West State Street in Trenton. For further information contact John Elston either by phone at 609-292-6714 or by mail at DEP, Bureau of Air Pollution Control, P.O. Box 2807, Trenton 08625.

Our cars are cleaner

New Jersey cars emit less carbon monoxide than California autos equipped with advance emission control systems. This is true despite the fact that cars in New Jersey need have no other pollution equipment beyond that required by the federal government. Why? A technical report issued by DEP concludes that engine maintenance plays an important role in emission levels, and the emis-

Continued on page 16D

WHAT NEW JERSEY'S SEWER GRANT PROGRAM IS ALL ABOUT

The $12.2 million Long Branch (Monmouth County) Secondary Sewage Treatment Plant (below), which went into operation this past fall, is another important step in cleaning up the state's shoreline. DEP Commissioner Bardin, who participated in the dedication ceremony, said, "This modern plant with its improved effluent discharge is what New Jersey's sewer grant program is all about . . . As more of these plants go on line, the rivers, bays and ocean will become cleaner, the shellfish beds will be restored and swimming and recreation values will be enchanced." The project, certified by DEP in June 1973, was funded by a federal grant of $7.9 million and a state grant of $1.6 million, with the Long Branch Sewerage Authority assuming the balance of the cost. Plant operation began in November 1976. □

AIR ATTACK ON FOREST FIRE. In New Jersey the spring forest fire season extends from mid March through mid May, peaking in April. During this time air attack bases for both fixed wing aircraft and helicopters will be maintained and fully staffed. These aircraft, loaded with liquid fire retardant, will be on standby alert during the danger period. Under actual fire conditions, the helicopters and fixed-wing aircraft (above) drop retardant on a blaze and keep it under control until the arrival of Forest Fire Service crews and equipment. Aircraft are extremely effective in containing blazes because of their ability to provide rapid initial attack. Helicopters are also used for observation. James Cumming, State Forester, reported that in 1976 there were 2,510 fires which burned 13,819 of the 2.7 million acres under the surveillance of DEP's Forest Fire Service unit. Cumming stressed that public cooperation, including good individual conservation practices of sportsmen, picnickers and residents, along with the use of modern firefighting equipment and intensive training of forest fire personnel is vital in forest fire prevention and control.

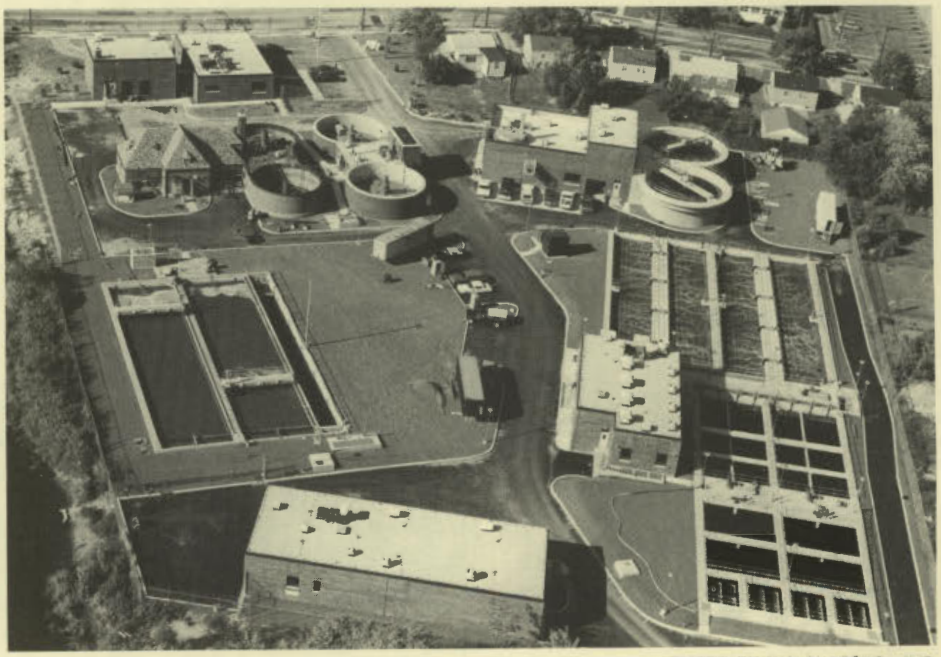


PHOTO BY T & M ASSOC., INC.

LONG BRANCH SECONDARY SEWAGE TREATMENT PLANT. The new plant (above) will clean up to 5.4 million gallons of sewage daily—removing 85 percent of the pollutants before discharge into the ocean. The previous primary treatment plant removed only 30 percent. The new ocean outfall has been extended beyond the surf zone in order to meet state water quality regulations. The upgrading was achieved by additions and alterations to the existing plant and the introduction of biological waste treatment facilities and new sludge treatment units. The modern plant serves a population of 32,500. It was designed for future expansion to handle 8.1 million gallons of wastewater daily and serve a population of 66,500.

News Capsules

MORE THAN 1.5 MILLION VOTERS APPROVED CLEAN WATERS BOND

It's official—the clean waters bond issue proposal won by more than half a million votes in the recent general elections. The State Board of Canvassers certified the final and official voting results as 1,543,237 votes cast for the bond issue and 884,948 against. □

VAST WATER AREA OK'D FOR CLAMMING

Good news for sea clammers—8,850 acres of shellfish waters off the Ocean County shoreline have been reopened following reclassification as "approved" as the result of water quality inspection surveys. The clamming area extends from Island Beach State Park south to Harvey Cedars. It had been closed since 1972 to meet federal Food and Drug Administration (FDA) requirements that the waters be surveyed before being classified as approved for sea clam harvesting.

LIBERTY STATE PARK GROWS TO 700 ACRES

Lands opposite Ellis Island were recently acquired by DEP and added to Liberty State Park. This acreage, purchased with federal and state funds, brings the state's Liberty Park holdings to about 700 acres. Plans call for the state's first urban state park to eventually embrace 800 acres. The first section to be developed, a 35-acre park overlooking the Statue of Liberty and Ellis Island, opened to the public in June 1976 and was visited by more than a quarter of a million people by the end of November. Liberty State Park, located off Exit 14B of the New Jersey Turnpike Extension near Jersey City, is open year-round including holidays. □

NEW 200-MILE FISHING LIMIT

The federal 200-mile fishing limit law became effective on March 1. The importance of this law, which gives fishing priority to American vessels within the limit and requires all foreign vessels in those waters to obtain permits, can be appreciated when the following facts are considered: The number of foreign fishing and fisheries support vessels sighted off the coasts of the United States between January 1, 1976 and November 30, 1976 totaled 6,477, according to the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. During November, a seasonal low of 258 vessels were sighted (as compared with 970 in June). Yet all of the 258 foreign fishing ships were within 200 miles of the U.S. coasts. In the Mid-Atlantic region, which includes New Jersey, 29 such vessels were sighted—11 from Spain, 10 from Italy, 5 from Japan and 3 from South Korea. □

NEW OFFICES FOR SOLID WASTE MANAGEMENT UNIT

All sections of DEP's Solid Waste Management Administration have been brought together under roof. The new offices are located on the second and third floors of 32 East Hanover Street in downtown Trenton (zip code 08625). The phone number remains 609-292-9120. □

500 ADDITIONAL ACRES UNDER WETLANDS ORDER

The Wetlands Order covering Monmouth and Middlesex counties has been extended to include an additional 500 acres of small parcels and fringe wetlands. (The original order for the two counties brought approximately 11,000 acres under regulation in January 1973.) The order requires permits for any activity, other than farming or recreation, on designated wetlands (Wetlands Act of 1970). Property owners who wish to excavate, fill or build on wetlands should contact Thomas Hampton, supervisor of DEP's Office of Wetlands Management, to arrange a conference before applying for a permit. The purpose of such meeting is to outline review procedures and to eliminate problems which could result in possible denial or time-consuming delays. Hampton can be reached by phone at 609-292-2302, or by letter at DEP, Office of Wetlands Management, P.O. Box 1390, Trenton 08625 □

Continued from page 16C

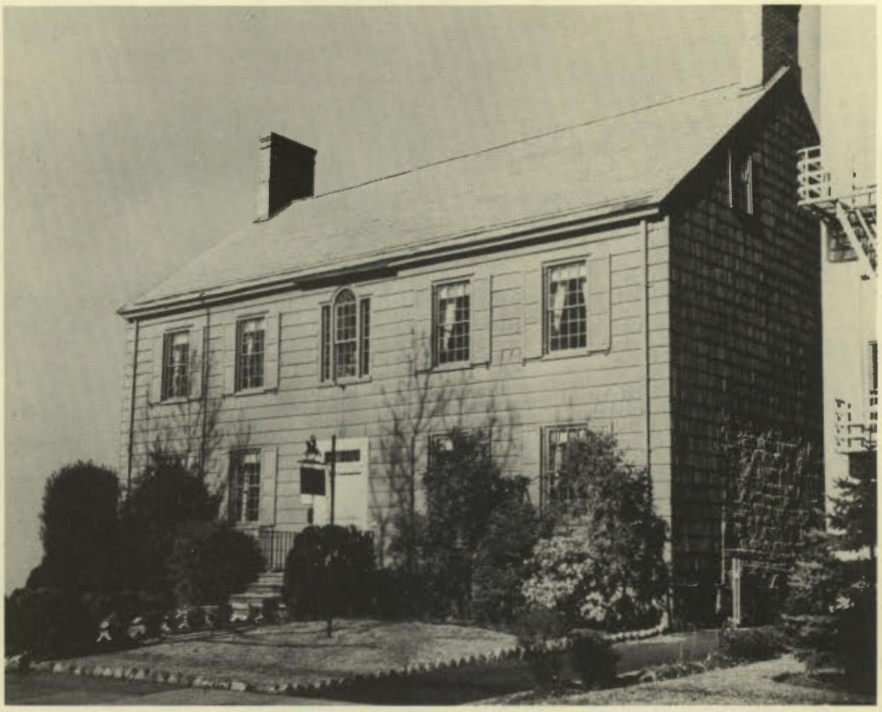
AIR POLLUTION CONTROL

sion inspection/maintenance program, as carried out in New Jersey, is helping to achieve cleaner cars. Copies of the report, *"A Comparison of National Inspection Program Idle Emission Data,"* may be obtained from John Elston at the address given in the lead article above. □

Tell DEP by March 31

GOT A FAVORITE SPOT ON THE JERSEY COAST?

Is there a fishing spot, barrier beach or scenic area you'd like to see protected under the state's coastal zone management plan? If so, send your nominations to David Kinsey, chief of DEP's Office of Coastal Zone Management, P.O. Box 1389, Trenton 08625, by March 31. Designation of geographic areas of particular concern is a basic part in the development of New Jersey's overall plan for managing coastal areas. (Nominations can include areas having scenic importance, historical significance, vulnerable natural habitat, high potential for development, or other unusual 'actors. Suggestions can include places such as coastal waters and bays, rivers, streams, lakes, wetlands, prime forest areas or other locations deserving special consideration.) □



BOXWOOD HALL. Built about 1750 by Samuel Woodruff, Mayor of Elizabeth, Boxwood Hall later became the home of Elias Boudinot, first president of the Continental Congress and a signer of the "Peace with Great Britain." George Washington met with the Committee of Congress here on April 23, 1789 on the way to New York for his inauguration as first President of the United States of America. The French general and statesman, Marquis de Lafayette, was entertained in Boxwood Hall on his triumphal tour of the U.S. in 1824. Located at 1076 East Jersey Street, Elizabeth (Union County), Boxwood Hall contains period furnishings. Admission charge.

Continued from page 16

it happens every spring

One must take a closer look at the facts to understand the situation. As biologists our most important concern is wildlife populations, not individual animals.

Small animals have high reproductive rates—one pair of rabbits can produce 36 young in one year. They also have high death rates, that's why we are not overrun with rabbits. The handful of wild rabbits that are hand-raised and released by people therefore makes no difference to the total population.

If this is the case then why does the Division of Fish, Game, and Shellfisheries issue permits that allow people to care for wild animals? Well there are people who don't understand the facts or feel some need to care for wild animals and their activity must be regulated through permits. Other facts that are commonly ignored are that young wild animals are very difficult to care for properly. Experts in zoos often have a great deal of trouble finding the proper diet and right conditions to keep wild animals alive. Secondly small animals grow up. They can become destructive and vicious during the breeding season. Once they are grown they can't be released because they don't know how to survive in the wild. When tempted to pick up a wild animal, remember that if a person can approach and catch the animal there is a fair chance that it is sick. Healthy animals can easily escape man. If the animal is sick, it may have one of a number of animal diseases that can be transmitted to man. Therefore, the practice of picking up wild animals can be downright dangerous.

If you want to do something for wildlife, let nature function. This is also a way of caring. The rewards are less direct than a lick on the hand from a pet. The reward is merely knowing that the animal has been allowed to be truly wild. Caring can be keeping dogs and cats locked up when young animals are not yet quick enough to escape them. Caring can be seeing to it that habitat for wildlife is allowed to remain so that wild animals will have a place to live. Clean air and water are also important, as is supporting programs of habitat enhancement and wildlife management on state and local levels. □

So this spring if you are tempted to adopt a wild creature—try and resist. Let Nature do her thing.

what? **Wildlife Art Exhibit**

where? Johnston Scouting Museum, corner Routes 1 and 130, North Brunswick.

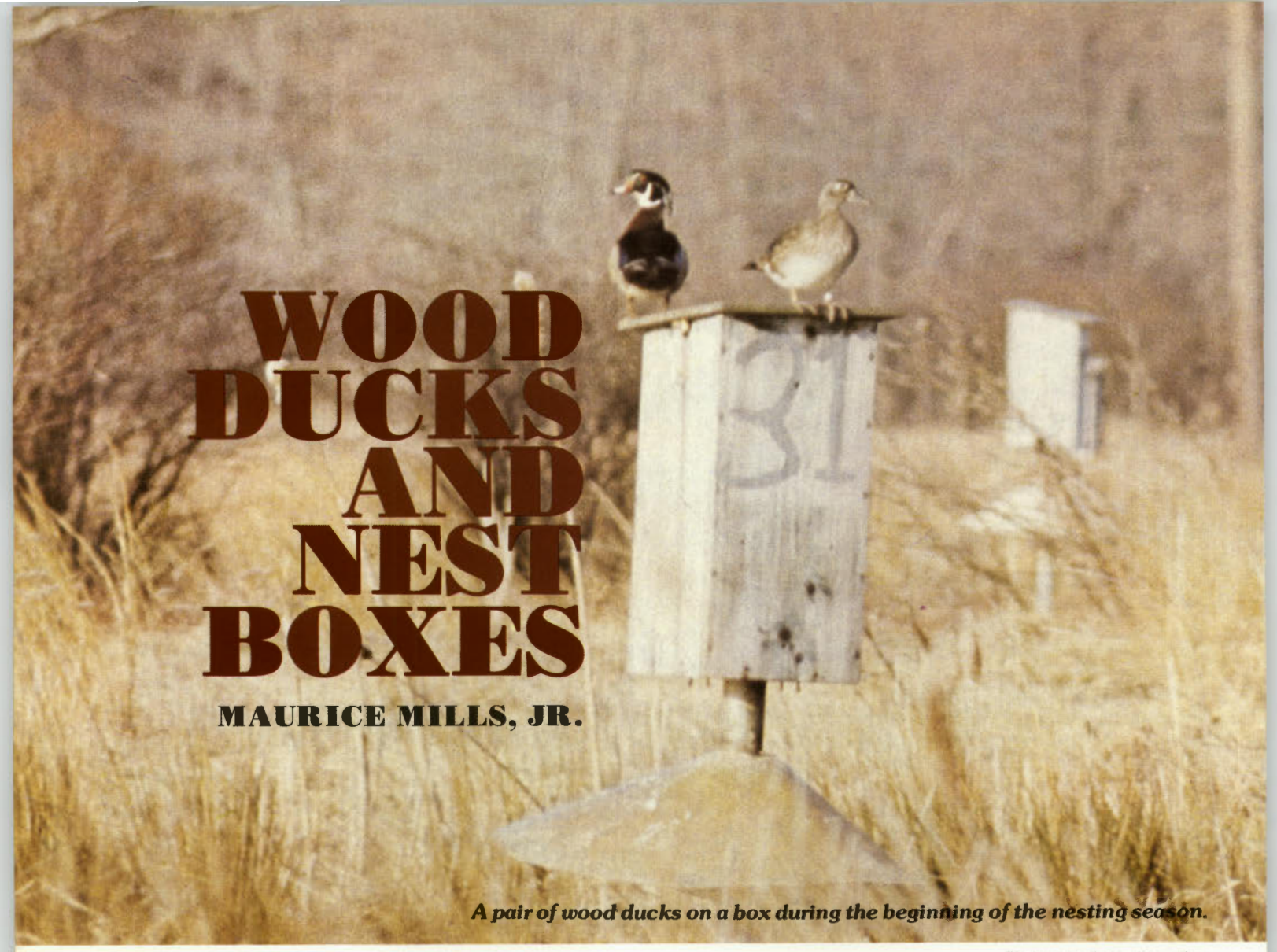
when? Starting April 23, for one month,

an exhibit of 50 wildlife paintings by Daniel Carter Beard, early 20th Century artist and illustrator. The paintings, a gift to the Boy Scouts of America from John Ripley Forbes, president of the Natural Science for Youth Foundation, were done in 1904 to illustrate The American Natural History, by William T. Hornaday, a pioneer American conservationist. Subjects include fish, mammals, birds, reptiles and amphibians of the North American continent. Formal presentation and acceptance on April 23 at 2:30 p.m.

Admission is free.

WOOD DUCKS AND NEST BOXES

MAURICE MILLS, JR.



A pair of wood ducks on a box during the beginning of the nesting season.

Photos supplied by the author

The wood duck *Aix sponsa* is one of the most beautiful and highly respected species of waterfowl in North America. It is cherished by hunters, birders, and photographers, all of whom derive countless hours of appreciation and pleasure from it annually. Although it is presently common throughout much of its range, the wood duck was once faced with extinction. The U.S. Biological Survey (forerunner of today's U.S. Fish and Wildlife Service) reported a sharp decline in the population from 1880 to 1901. This decline was attributed to a variety of factors including overharvesting, loss of habitat through the drainage of marshes and swamps, and the removal (by logging companies and developers) of hollow trees that had provided nesting sites.

Laws which gave the federal government the power to regulate the taking of migratory birds were finally passed in 1918. Wood ducks then enjoyed complete protection in the United States and Canada until 1941. During this time the population slowly built up to its previous levels. Limited harvesting was first permitted in 15 states in 1941. During the 1974-75 season, hunters in the Atlantic, Central, and Mississippi flyways were permitted to take a maximum of two wood ducks daily, with a possession limit of four. In the states of the Atlantic Flyway where the point system is in use, "woodies" are a 70-point bird.

Current nationwide population estimates based on surveys conducted by the Fish and Wildlife Service vary from two and a half to three and a half million wood ducks. Although it is far from the point of extinction, this species is still in trouble. Man is rapidly destroying the few remaining swamps and expanses of flooded timber which are the woodies' favorite haunts; drainage, clearing, flood control, and environmental pollution are cited as the primary human activities which destroy wood duck habitat and consequently limit the size of the population in the Southeast. No assessment of the magnitude of the problem in the Northeast has been made; however, the generally accelerating rates of development and the large-scale destruction of forests, marshes, and swamps cannot be considered beneficial to the woody.

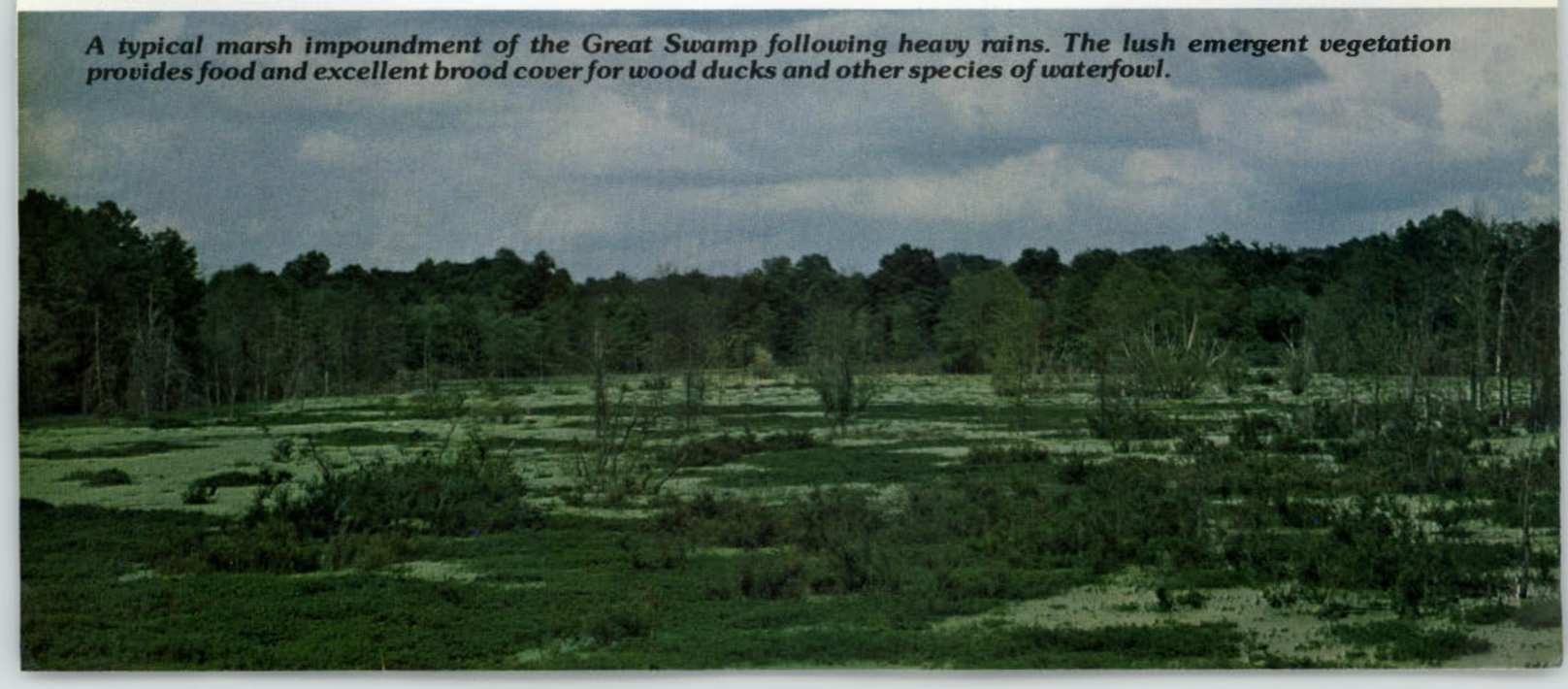
continued on page 28

Wood ducks in a pond on the Great Swamp National Wildlife Refuge.

A successful wood duck nest in the process of hatching. Ducklings usually leave the nest box within 24 hours of the time they hatch, and never return.

A red-phase screech owl nesting in a wood duck box. Artificial nesting boxes benefit many wildlife species throughout the year.

A typical marsh impoundment of the Great Swamp following heavy rains. The lush emergent vegetation provides food and excellent brood cover for wood ducks and other species of waterfowl.



welcome back ...turkey!

By Joseph Penkala

In the last issue of *New Jersey Outdoors* "The Coming of the Wild Turkey, January-February 1977" we discussed the history of the wild turkey in New Jersey, and the possibility of receiving wild turkeys from Vermont to begin the reestablishment of these birds in the Garden State. At the writing of the last article, we were long on optimism but short on birds. We had expected to receive birds some time in December.

The weather during December was relatively snow free, this situation combined with the abundant production of acorns, nuts, and berries throughout the northeast caused problems. With no snow to cutoff the *copious* food supply the turkeys refused to come to bait at the netting sites in Vermont. Snow fell at the start of the new year and so did the temperature. For three weeks the northeast was locked in a cold wave, the likes of which had not been seen for over a hundred years. Temperature never climbed much above zero and the snow got deeper and deeper. The snow and bad weather tipped the odds in our favor.

The turkey's natural food sources were blanketed with snow and the piles of bait near the *rocket* netting sites began to look very attractive to the birds. The first three weeks in January passed without any word from Vermont. It seems as if the weather was so cold that the birds just stayed put. During extreme weather turkeys will move very little in search of food and sometimes may not leave their roosting sites at all.

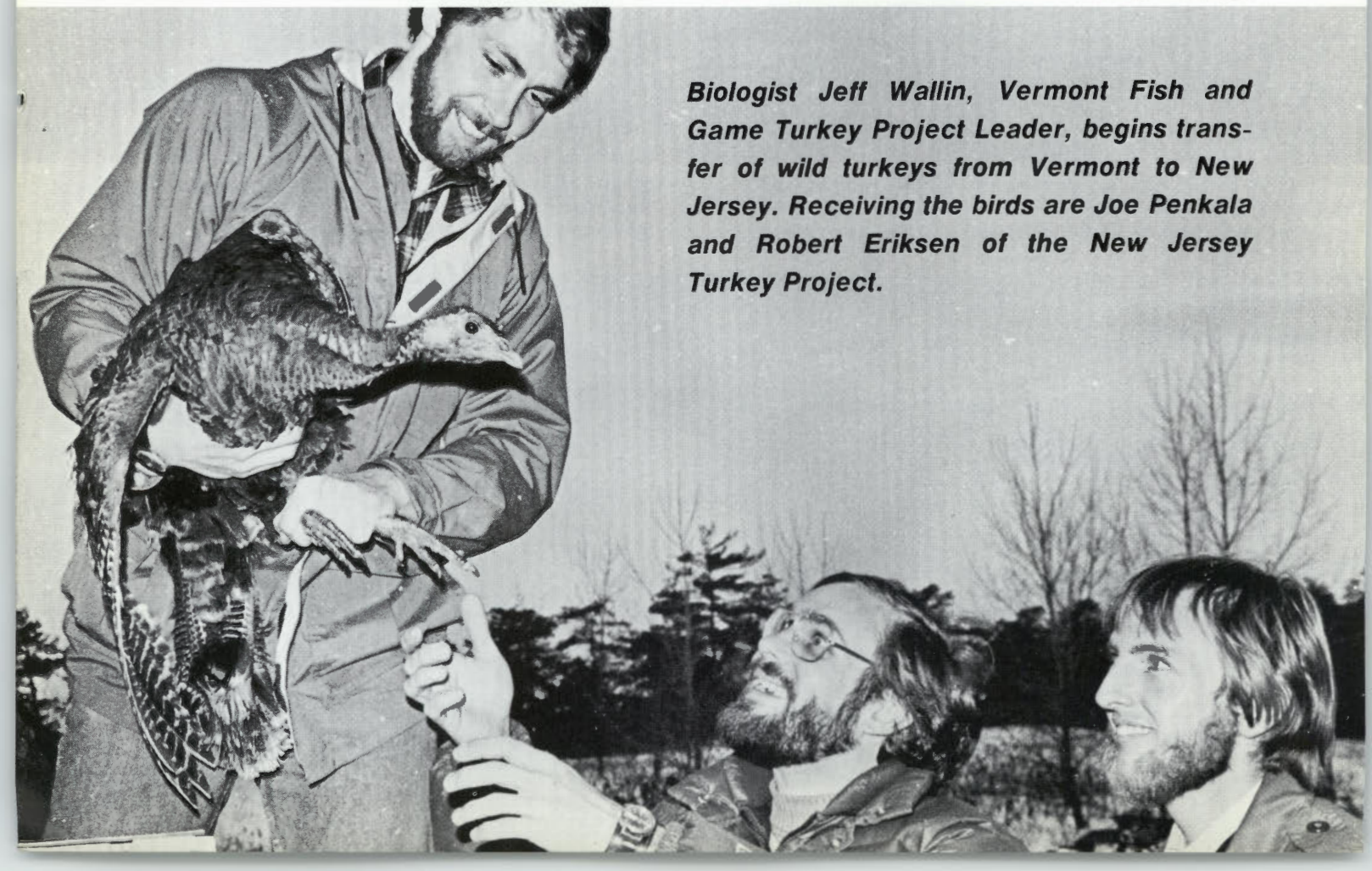
Our spirits dropped with each successive day and still no word from Vermont. It looked as if New Jersey would go another year without turkeys.

The record cold snap began to show a slight break about January 19. On Thursday, January 20, Jeff Wallin, the head of Vermont's turkey project called to say that the birds had been using one of the baited areas. He had set the rocket net after dark and would try for a capture the following morning. This was a good sign, but we tried not to get our hopes too high. Many things can go wrong when trying to capture turkeys. The birds may not return to the same feeding site for days at a time or not at all, or a malfunction of the rocket net can also leave you emptyhanded.

At 9 in the morning on Friday, January 21 we received a call from Vermont informing us that they had 11 wild turkeys waiting to be picked up. We loaded up our turkey transport box and headed up the New York State Thruway to meet the biologists from Vermont. The transfer of birds occurred at a toll booth just outside of Albany. We headed back for New Jersey with our precious cargo just as the sun was setting.

The Vermont biologists had been successful in capturing 11 hen turkeys: 3 adults and 8 juveniles. The weights of the adult hens ranged from 11 to 11.5 pounds and the juveniles ranged from 8.5 to 10 pounds.

Photos by Harry Grosch



Biologist Jeff Wallin, Vermont Fish and Game Turkey Project Leader, begins transfer of wild turkeys from Vermont to New Jersey. Receiving the birds are Joe Penkala and Robert Eriksen of the New Jersey Turkey Project.

Cannon netting going over feeding turkeys at bait site

The birds had been trapped in southeastern Vermont.

We arrived back in New Jersey about 10 that evening. All of the birds were then leg-banded and wing-tagged with colored streamers.

The adult hens received yellow streamers and the juvenile hens received red streamers. The release was scheduled for sunrise the following morning. We had the birds loaded and ready to go before first light. We arrived at the release site in Sussex County just as the sun topped over the mountain. Eight inches of snow lay on the ground and the temperature hovered around 6 degrees as we carefully carried the crate of turkeys out into an old field surrounded by large pines and hard woods. By this time representatives of the news media, as well as representatives of the National Park Service, New Jersey Division of Forests and Parks, Russ Cookingham, Director of the Division of Fish and Game, and the local conservation officers had arrived.

We expected the birds to be somewhat slow in leaving the transport crate. After all they had been in it for almost 24 hours and had just come through a trying experience. We raised the door on the crate not really knowing what to expect. The first four birds emerged from the crate and immediately flew across the open field. They were truly an impressive sight. The yellow and red wing tags streamed out behind the birds. The first four were soon followed by the remaining seven birds. One of the eleven turkeys did falter in flight and ran afoul of an old wire fence. This bird eventually died. This occurrence was not unexpected since accidents can occur when transplanting wild animals. The remaining ten birds appeared in excellent condition and we left with a great feeling; for the first time in 70 years wild turkeys were again roaming the hills of New Jersey. Not game farm turkeys who would disappear in a few years but wild birds, who knew nothing of incubators, turkey chow, or wire cages—birds who had emerged from an egg under some hen in the wilds of Vermont and who had used their own instincts to find food and avoid predation.

These birds will be the seed of what we hope will be a healthy, thriving, turkey population in New Jersey. Only one problem still existed, we released only hens because that's what had been caught. During the winter wild turkeys break up into sex specific groups so that when they are captured one will usually catch all hens or all toms. At the time of this writing, Vermont Fish and Game is actively trying to capture toms to go with our hens. Subsequent field checks indicate that our initial release is doing fine. The birds have been able to find food and cover to their liking. As soon as the toms arrive we can sit back and let nature do her thing □

Wild turkey release in western Sussex County. Left to right: unknown reporter, Joe Penkala, Robert Eriksen, Phil Campbell, U.S. Park Service, and Russ Cookingham, Director, Division of Fish, Game and Shellfisheries.

A scenic view of the canal near Griggstown

Come on in—the water's fine. Youngsters swinging into the swim.

Continued from page 14

RECYCLING THE DELAWARE AND RARITAN CANAL

Although much romance came to be associated with canal hauling, construction on the D & R was accomplished only through a great deal of hard work and suffering—not the least being a cholera epidemic that decimated the labor force in 1832. Since there was no railroad in the central New Jersey area, all materials for the D & R Canal had to be procured locally. A century before the invention of mechanical earth-moving equipment the ditch had to be dug entirely by men using shovels, picks, and other hand tools. Recent Irish immigrants, later supplemented by Blacks, provided the muscle which completed the canal in an incredibly short four years.

What Was The Canal's Impact?

For about 100 years, the canal provided a low-cost method of transporting coal, other heavy freight, and farm produce between New York and Philadelphia. Traffic along the canal stimulated industrial development in New Brunswick and Trenton and encouraged the establishment of inns and taverns along the route. Although the fame of the D & R Canal never matched that of the Erie, it was indeed a major carrier; for example, in its peak years, it carried more coal than any other American canal, including the Erie.

Private yachts as well as freight barges plied the D & R, traversing the chain of inland waters on route to their owner's wintering grounds in Florida. This semi-annual armada provided much excitement for local residents. The most impressive boats were those large enough to require smartly uniformed crews; of these, the most famous was the "Corsair", owned by J. P. Morgan.

A decision by the Pennsylvania Railroad to purchase the canal in the late 1800's and build a competing freight track along the towpath was the beginning of the end for canal traffic. In 1934, having operated at a loss for sometime, the D & R Canal was closed for business. It was turned over to the State of New Jersey, which established a commission to study possible alternative uses and to recommend the most appropriate disposition of the waterway. In 1942, the commission recommended that the canal be used mainly to transport water for municipal and industrial use and secondarily to provide recreation for local residents. By the mid-1970's the canal's water-supply function had developed into major importance—about 600,000 New Jersey residents (8 percent of the state's population) are dependent on canal water for potable and industrial uses.

What of the Canal's Future?

In the last decade, residents of communities near the canal rediscovered the D & R as a recreation resource for boating, hiking, and fishing. Planners have also begun to take note of the canal's value as a waterway and linear green space providing pleasant aesthetic relief in a heavily developed section of the state. The formation of a Canal Coalition and the activity of other groups speaking out on behalf of the

Fishing along the canal at Kingston

Bicycling the canal towpath

canal have succeeded in heightening public awareness of its value. This active and vocal constituency continues to monitor public and private actions affecting the canal.

One major accomplishment was the passage, in 1974, of a Canal Park Bill (N.J.S.A. 13:13A-1 et seq.) establishing the canal and adjacent state-owned lands as a state park. The Bill also created a Canal Commission of citizen members to oversee the park and prepare a master plan for recreation development. Of the many options open to the canal planners, some considerations must clearly receive priority attention:

(1) The canal's water-supply function is very important and must be maintained. Its significance was increased in 1975 by the decision not to build the Tocks Island Dam, which would have provided a substantial source of water. If the canal's potential of 100 million gallons per day is to be met to meet a growing state demand, the canal must be maintained in good condition.

(2) Some aspects of the canal that were assets in its heyday now detract from its recreational and aesthetic value. Specifically, some of the manufacturing enterprises in the communities bordering the canal are eyesores and polluters rather than attractions. Clearly, if the canal is to be used for open or green space, it is desirable for reasons of aesthetics, access, and pollution control to regulate such land uses in the future.

(3) A major problem—and also an asset—is the fact that the canal passes through 17 municipalities in four counties. Although the waterway is accessible to a large number of people, efforts to protect it from a variety of unfavorable local zoning ordinances and from encroachment by unsuitable land uses often meet with difficulties.

(4) Opportunities for historic restoration and interpretation are excellent. Although only 18 of the original canal houses remain, these few should be restored and at least one of the locks made to operate again. The events of the Revolutionary War associated with this area—the battles of Trenton and Princeton as well as Washington's crossing of the Delaware—should also be highlighted. Equally interesting would be exhibits illustrating the role of the canal in the growth of central New Jersey.

(5) A green space/linear park can be developed along the canal; this would require both acquisition of additional lands and careful design. The park might be landscaped to screen out visual intrusions and to provide a restful contrast from the urbanized and industrialized character of the region. Since the connecting link provided by the canal is more attractive in many ways than highways, this route should be reestablished and maintained so that people can canoe, cycle, or walk from one community to another.

(6) Recreation activity along the canal will probably expand greatly. Canoeing, fishing, and hiking already are actively pursued in a number of areas and provision should be made for the support of these and other appropriate activities. As the canal's future takes shape, new ideas will undoubtedly be suggested and reviewed as part of the master planning process.

What are the chances that any of these ideas will bear fruit? Clearly, the largest single obstacle is New Jersey's continuing shortage of money. In addition to the cost of preparing a master plan and developing a linear park, the recommended capital improvement program for water supply purposes alone is estimated to require more than $24 million. Since the state's financial crisis may continue for some time, a sum of this magnitude is not likely to be found. Although the canal regularly receives capital improvement funds, they are insufficient to accomplish the desired water-supply improvements within a reasonable period of time, much less to develop recreation facilities.

One suggestion has frequently been made to provide some of the much-needed funds: Allocate for canal maintenance and improvements all or part of the $1 million the state receives annually from the sale of canal water (and which presently goes into the General Treasury). Earmarking this sum for canal improvements would be the surest method of providing the funds necessary to protect and enhance one of New Jersey's unique attractions. □

Continued from page 5

anadromous fish inventory

Middlesex County

1. Lawrence Brook @ Westons Mill Dam
   Raritan River Drainage
2. South River @ Duhernal Lake Dam
   Raritan River Drainage

Monmouth County

1. Comptons Creek @ Broadway Ave.
   Raritan Bay Drainage
2. Swimming River @ Swimming River Reservoir Dam
   Navesink River Drainage
3. Pine Brook @ Riverdale Ave.
   Navesink River Drainage
4. Swamp Brook—Shadow Lake Dam
   Raritan Bay Drainage
5. Deal Lake @ Main St. Bridge
   Atlantic Ocean Drainage
6. Wreck Pond Creek @ Old Mill Dam
7. Lake Takanassee Dam
   Atlantic Ocean Drainage
8. Mill Run
   Manasquan River Drainage
9. Watson Creek @ Stockton Lake
   Manasquan River Drainage

Ocean County

1. S. B. Metedeconk River @ Shenandoah Lake
   Metedeconk River Drainage
2. N. B. Metedeconk @ Rt. 88
   Metedeconk River Drainage
3. Parkway Pond
   Metedeconk River Drainage
4. N. B. Beaverdam Creek @ Rt. 88
   Metedeconk River Drainage
5. S. B. Beaverdam Creek
   Metedeconk River Drainage
6. Kettle Creek @ Brick Blvd.
   Barnegat Bay Drainage
7. Tunes Branch @ Brick Blvd.
   Barnegat Bay Drainage
8. Polhemus Creek @ Hooper Ave.
   Barnegat Bay Drainage
9. Silver Bay Creek @ Hooper Ave.
   Barnegat Bay Drainage
10. Wrangle Brook @ Gem St.
    Toms River Drainage
11. Davenport Branch @ Silver Ridge Park
    Toms River Drainage
12. Toms River @ Rt. 9
13. Jakes Branch
    Toms River Drainage
14. Long Swamp Creek @ Washington Ave.
    Toms River Drainage
15. Mill Creek
    Toms River Drainage
16. Lily Pond @ Ocean Gate
    Toms River Drainage
17. Cedar Creek @ Rt. 9 @ Lanoka Harbor
18. S. B. Stouts Creek @ Bayview Parkway
    Barnegat Bay Drainage
19. Willis Creek @ Radio Road
    Little Egg Harbor Drainage
20. Little Silver Lake
    Manasquan River Drainage
21. Lake of the Lillies
    Manasquan River Drainage
22. Twilight Lake
    Metedeconk River Drainage
23. Potter Creek
    Barnegat Bay Drainage
24. Double Creek
    Barnegat Bay Drainage
25. S. B. Double Creek
    Barnegat Bay Drainage
26. Gunning River
    Barnegat Bay Drainage
27. Fresh Creek
    Barnegat Bay Drainage
28. Mill Creek
    Manahawkin Bay Drainage

Salem County

1. Beaver Creek
   Oldmans Creek Drainage
2. Mannington Creek @ Rt. 540
   Salem River Drainage
3. Alloway Creek @ Alloway Lake Dam
4. Deep Run @ Elkinton Mill Pond Dam
   Alloway Creek Drainage
5. Salem River @ Beaverdam
   Salem River Drainage
6. Fenwick Creek
   Salem River Drainage

Blueback Herring (*Alosa aestivalis*) Spawning Runs

Burlington County

1. S. B. Rancocas Creek @ Rancocas Woods
   Rancocas Creek Drainage

Bergen County

1. Hackensack River @ Oradell
   Hackensack River Drainage

Fish ladder at Lake Shenandoah, Ocean County

Gloucester County

1. Raccoon Creek @ Swedesboro
2. S. B. Raccoon Creek @ Hill St.
   Raccoon Creek Drainage
3. Mantua Creek @ N.J. Turnpike Bridge
   Mantua Creek Drainage

Cumberland County

1. Cohansey River @ Sunset Lake Dams (2)
2. Maurice River @ Union Lake Dam
3. Mill Creek @ Clarks Pond Dam
   Cohansey River Drainage
4. Cedar Creek @ Cedarville Lake Dam
   Delaware River Drainage

Mercer County

1. Delaware River @ Foot of Trenton Falls
2. Crosswicks Creek above Rt. 206

Middlesex County

1. Hooks Creek @ Hooks Creek Lake Dam
   Raritan Bay Drainage

Monmouth County

1. Swimming River @ Normandy Road
   Navesink River Drainage
2. Deal Lake
   Atlantic Ocean Drainage
3. Pine Brook @ Riverdale Ave.
   Navesink River Drainage
4. Swamp Brook @ Shadow Lake Dam
   Navesink River Drainage
5. Wreck Pond Creek @ Old Mill Dam

Ocean County

1. Shenandoah Lake
   Metedeconk River Drainage
2. Kettle Creek @ Brick Blvd.
   Barnegat Bay
3. Toms River @ Rt. 9
4. Jakes Branch
   Toms River Drainage
5. Tuckerton Creek @ Rt. 9
   Little Egg Harbor Drainage
6. S. B. Beaverdam Creek
   Metedeconk River Drainage

Somerset County

1. Millstone River @ Rt. 518
   Raritan River Drainage

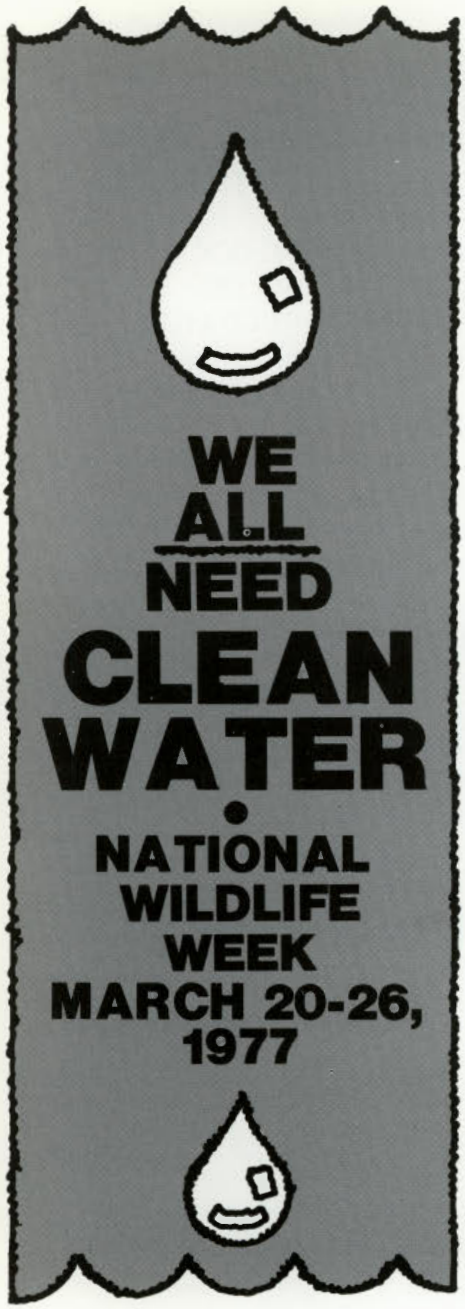
American Shad (*Alosa sapidissima*) Spawning Run

Warren County

1. Delaware River @ Phillipsburg

If you have any information concerning existing or former anadromous fish resources in New Jersey that are not listed here, you are invited to contact:

New Jersey Anadromous Fish Inventory
Bureau of Fisheries Laboratory
Lebanon, New Jersey 08833
(Telephone 201-236-2313)



NATIONAL WILDLIFE WEEK 1977 is sponsored by the National Wildlife Federation and state affiliates.

Clean Water — Key To Our Survival

Every living thing must have water to survive.

We drink it — about a quart and a half a day, plus another quart in our food. *We shower in it,* five to ten gallons a minute. *We grow food with it — swim in it* — use it to make steel, about 16,000 gallons per ton.

Ways We Use Water

- swimming
- canoeing
- skiing
- scuba diving
- fishing
- making soup
- making soap
- watering garden
- heating and cooling houses
- eating fish and shellfish that live in it
- making paper, steel, aluminum
- brushing teeth
- scrubbing floors
- washing car
- washing hands
- brewing tea and coffee
- growing grass, flowers, trees

Water — The Great Home For Wildlife

Over 8,000 species of fish live in the world's lakes, rivers, and streams.

About 12,000 more kinds of fish make their home in salt water. Eighty out of every 100 animals in the world live in the oceans.

Our wetlands are home for ducks, geese, songbirds, raccoons, muskrat, deer, shrimp, crayfish, snails, and many more.

Water Pollution

It costs money. In 1976, the Environmental Protection Agency estimated it cost Americans over 11 billion dollars in damages to human health, wildlife, and property.

The World's Fresh Water

All the world's fresh water comes from rain, snow, and other precipitation.

The earth gets enough rain, but it falls unevenly. 75% falls in oceans. Parts of India get over 400 inches a year, but other areas of the world go for years with almost none.

If all the world's rain fell evenly, every spot on the earth would get about 26 inches a year.

About 40% of all water used in America goes for irrigation, and over 50% for industry.

Cleaning Up Our Water

In 1972, America set two goals when Congress passed amendments to the Federal Water Pollution Control Act to:

1. Make America's waters clean enough for swimming, boating, and protection of wildlife by 1983.
2. Dump no more pollutants into waterways by 1985.

The Amazing World Of Water

Water is everywhere, almost.

Your body is about 70% water. A jellyfish is 95% water. The all-time champ may be the watermelon, all but 3% water. While a person drinks about 1½ quarts a day, a dairy cow drinks 18½ to 25 gallons but is no match for an elephant. It drinks about 50 gallons daily. The little kangaroo rat of our deserts drinks little or no water. Its body makes water from dry seeds.

Water covers over 70% of the earth. If all the valleys and mountains, on land and under the sea, were leveled, water would cover the earth everywhere to a depth of over 2 miles.

Little of the world's water is fresh. Divide it all into 100 big drops and over 97 of these would be salty. Over two would be fresh but frozen in the polar ice.

Less than 1% of the earth's water is useable.

Most Pollution Comes From:

1. Industrial wastes — Oils, metals, acids, and dangerous chemicals.
2. Sewage from cities and towns — Mostly waste from people's homes.
3. Runoff from the land — Pollutants like mine acid, fertilizers, pesticides, and silt from farm areas.

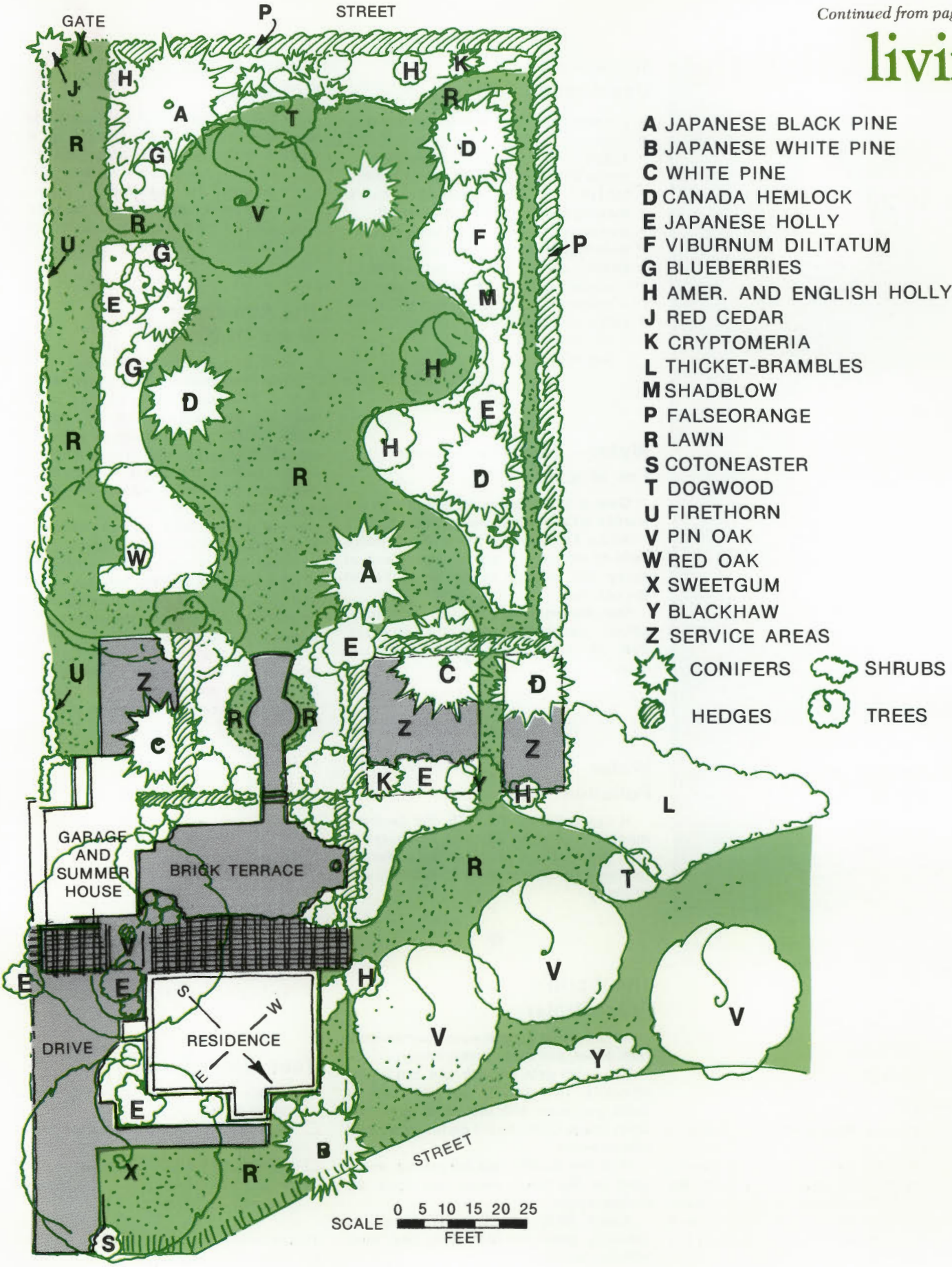
Your Water Quiz

- ☐ *Where does your drinking water come from?*
- ☐ *Who is in charge of your water supply?*
- ☐ *Where does your sewage go?*
- ☐ *What standards must the sewage treatment plant meet?*

To start working for clean water, find out the answers to these questions. ☐

Continued from page 11

living



with wildlife

hard-working and singing bundles of energy used from 8,000 to 10,000 insects (mostly canker worms and small moths) for each brood. Talk about helpers in the garden!

Mourning doves love to nest in our Japanese black pine trees with their wide-angled crotches and relatively flat exposed layers of heavily needled branches. It is a wonder how any of the nests ever last through the slightest windstorm! In our large red oak we have been fortunate to have three sets of northern orioles so far. These are truly slick camouflage artists. We never once suspected they were in our yard until the leaves fell to the ground in the fall exposing the nest. And I'd like to know how many little larvae *they* need for one brood. (Our orioles use silver maples more than most other trees).

One year we had a cardinal's nest in a Japanese andromeda (Pieris) right under our dining room window. Unfortunately, some predator cleaned out the eggs before they hatched. We suspect blue jays.

Another time we had two broods of house sparrows inside a squirrel-proof bird feeder. From our window less than two feet away we watched these two families grow up and "fly the coop."

In addition to birds, we have had squirrels nest in the yard this year, in the hemlock and in a Japanese white pine.

Another delight is to watch the mallards (from a small lake across the street from us) waddle onto our property and "look us over" in their search for a suitable spring home. Sure enough, we have had three mallard families over the years select the low-spreading rockspray cotoneaster right in our front yard about 18 inches from the busy gravel driveway. What camouflage! The oak leaves are just the color of their feathers. And to see the family of ducklings walk in single file down to the water is a moment of happiness that is difficult to match.

So you see, just by following the principles of good landscape design we suppled many needs for many different birds and wildlife (our neighbors had a dozen cats, and I must say they did take their toll). All these unexpected pleasures were ours accidentally. They can be yours purposefully.

For additional information on landscaping in New Jersey, write to the Publications Office, Cooperative Extension Service, Rutgers University, New Brunswick, New Jersey and request leaflets:

454—Home Landscape Design Do's and Don'ts
97A—How to Landscape Your Home
by Raymond Korbobo

Also for free copy of "Creating and Improving Wildlife Habitat in Your Own Backyard," write Backyard Wildlife, New Jersey Division of Fish, Game, and Shellfisheries, P.O. Box 1809, Trenton, New Jersey 08625. □

false orange hedgerow

Continued from page 18

WOOD DUCKS AND NEST BOXES

Much of the wood duck's problem is associated with its nesting habits. Unlike most other species of waterfowl, it nests in cavities in trees. Many of man's previously mentioned developmental practices destroy trees which contain suitable cavities and the areas conducive to their evolution. Ironically, though, the same odd nesting habit which encouraged the decline of the wood duck is now allowing wildlife managers to increase its numbers through the installation of artificial nesting cavities.

Since the late 1950's, numerous state and federal agencies have initiated nest-box programs and studies. A discussion workshop sponsored by the Bureau of Sport Fisheries and Wildlife in 1966 resulted in the publication of *A Guide to Wood Duck Production Habitat Requirements*. Along with the works of other researchers, this provided the wildlife manager with the directions to increase the wood duck population on his refuge or management area.

One attempt to increase an existing wood duck population is underway on the Great Swamp National Wildlife Refuge in Basking Ridge, New Jersey. The refuge is divided into a Management Unit of 2,200 acres and a Wilderness Area of 3,600 acres. All habitat manipulation practices are restricted to the Management Area, which will eventually include 600 acres of controlled water impoundments. The only extensive marsh-forest habitat in New Jersey, the refuge may be described as a series of wooded ridges and islands interspersed with large areas of timbered swamp and open marsh.

During the late 1950's, the Great Swamp basin was proposed by the Port Authority of New York as the site of a new jetport. Local residents opposed the development and formed several organizations to collect money to purchase enough land within the swamp to halt the proposed destruction of their homes and the surrounding area. They were highly successful, and in 1960 more than 3,000 acres were turned over to the federal government to create a National Wildlife Refuge.

Great Swamp Refuge was permanently staffed in August 1964. In that year's Narrative Report, Refuge Manager Richard Rigby stated that the swamp had a history of moderate waterfowl use. He also reported that wood ducks normally nested on the area and produced as many as 100 young in favorable years. Twenty-nine nest boxes were installed on the refuge during the winter of 1964 and 1965 by the refuge staff with the assistance of the Summit Nature Club. Little waterfowl use was reported on the refuge during 1965, and a survey of the existing nest boxes revealed no nesting attempts. Although use of the refuge by wood ducks increased in 1966, there was still no use made of nesting boxes. The first successful wood duck nest in an artificial cavity hatched in 1967.

Prior to the 1969 nesting season, the refuge staff decided to renovate and/or replace the existing boxes. With the assistance of a local Boy Scout troop, 45 nesting boxes were installed in various locations throughout the Management Area. That year at least nine boxes were used by wood ducks. Kestrels, bluebirds, starlings, common flickers, and screech owls also used the boxes but offered no direct competition to nesting wood ducks.

Before the 1970 nesting season, 64 units were added to those already available; 49 percent of the boxes were used by wood ducks. An additional 104 compartments were installed during the winter of 1971. Woodies nested in 99 percent of the available compartments, resulting in the production of 1,650 ducklings in 1971. Additional boxes were installed in 1972 and 1973 with the assistance of the Morris County Sportsmen's Federation. In general, the program has been successul in increasing the local population of wood ducks and is currently sustained at a maintenance level. An estimated 4,935 ducklings hatched in refuge nest boxes during 1975.

Additional research and data analysis is needed to determine both the optimum number of wood ducks the refuge can support and the proper placement and density of nest boxes. At Great Swamp, boxes are currently located in a variety of local environments. No one has determined which habitat type is most likely to support a box which will result in a successful nest. However, it appears that the ducks prefer nesting boxes located on wooded ponds, ditch junctions, and slow-moving brooks.

Another promising method of establishing breeding wood duck populations is by relocating wild broods which have been hatched in nest boxes. The success of this tactic is attributable to the strong homing instinct exhibited by female wood ducks and to the tendency of yearling females to return to nest in the area where they were reared. This technique opens many possibilities in the field of wood duck management. In areas where a successful program has been established, hens can be captured with ducklings before they leave the nest box and transported to another area.

Although it may have great potential, a program to increase a local population of wood ducks can be costly and sometimes disappointing. As with many other aspects of waterfowl management, more research is needed in order to utilize this management practice most effectively. There is no reason, however, why additional populations of wood ducks cannot be established in New Jersey. Individuals or sportsmen's groups interested in initiating a wood duck nest box program can obtain information on the construction and placement of boxes from Director, U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240. It is imperative that all boxes be protected from predators such as the raccoon. Plans for predator guards made from fiberglass, wood, or metal can also be obtained from the above address.

Unfortunately, a problem on many areas is the vandalism of nest boxes. Better public cooperation in management efforts would result in more wood ducks for all outdoorsmen to enjoy. □

What?

Environmental Country Fair

When?

April 23, 1977

10:00 AM to 4:00 PM

Where?

National Headquarters
Boy Scouts of America
Rts. 1 & 130, North Brunswick

Who?

The public is invited to this Environmental County Fair at no charge.

Objectives?

This large indoor/outdoor Environmental Country Fair combining exhibits, demonstrations and audience participation activities, is designed to:

1. Create an awareness of some basic principles of ecology and environmental problems.
2. Show graphically and dramatically how the problems can be or are being solved.
3. Create feelings of concern for the environment and the motivation for actively participating in its protection and improvement.

Activities

Federal and state agencies, industry and other groups and organizations concerned with environmental protection and improvement are being invited to provide exhibits, demonstrations, audience participation activities and films and filmstrips. The exhibits, demonstrations and other activities will be arranged in a circular country fair type midway.

Each member of the audience will be provided with a list of events and a map, and will be free to visit those activities of his choice. *Those who bring a bag of aluminum cans, will be eligible to take part in a drawing for door prizes.*

Exhibits and demonstrations will cover a wide variety of environmental subjects: solar energy for cooking, heating water and space heating; solar still; paper and aluminum recycling; air and water pollution control; solar cells; energy conservation; how to read gas and electric meters; endangered wildlife species in New Jersey and the country; tree and shrub identification; exhibits of live owls and snakes; outdoor cooking; Indian environmental dances; how to reduce waste in the home; backyard conservation and more.

Audience participation activities will include duck calling, fly tying, casting; fire starting using native materials, metric measurements; edible plant identification and more.

Films and filmstrips subjects will cover recycling, energy conservation, endangered species and others.

As of this date, the following have agreed to participate with exhibits, demonstrations and audience participation projects:

New Jersey Division of Fish, Game and Shell Fisheries; New Jersey Division of Forestry; Cook College; Monmouth College, Public Service Corporation; Trout Unlimited; Reynolds Metals, Inc.; Middlesex County; Boy Scouts of America; New Jersey Tree Farm Program; National Park Service; Environmental Protection Agency; Conservation and Environmental Studies Center; New Jersey Chapter, Wildlife Society; Eastern Bird Banding Association.

For More Information Contact:

Conservation Service
Boy Scouts of America
North Brunswick, N.J. 08902
201-249-6000

Continued from page 7

HIGBEE BEACH—POND CREEK MEADOW

away from the bay, the vegetational pattern changes to a mosaic of forested areas and open spaces of disturbed sand (dune buggies and foot traffic). Low growing pioneer species such as seaside golden rod, false heather, prickly pear cactus, and lichens occupy the open spaces. If left undisturbed, the spaces would fill with groundsel tree, poison ivy, dwarf sumac, Japanese honeysuckle, bayberry, Virginia creeper and beach plum.

The third zone of dune vegetation is dominated by red cedar, American holly, wild grape, pitch pine, and scrub oak. The great variety of fruit and berry producing trees and shrubs attract song birds during the day. Evening visitors to the banquet table include the opossum, racoon, fox, and rabbit. Other inhabitants of the dune forest include the eastern fence lizard, the black racer, and the box turtle which delights in nibbling the cactus.

The fourth component of the dunes is a man-made spoil area—a flat expense of white materials extracted from seawater by the Magnesite Plant operation. Surprisingly, the area is of particular value to wildlife. It serves as a nesting site for terms, piping plovers, and killdeer displaced from the beach by hoards of summer tourists.

Davey's Lake, nestled within the dune forest, was originally created by man in his need for sand and gravel. The lake's secluded location and abundant fish and invertebrate inhabitants attract grebes, kingfishers, long-legged waders and migratory waterfowl. Frequently, osprey will pause along the lake edge.

THE MEADOW—Pond Creek Meadow derives its name from the intermittent nature of its main stream. At times, Pond Creek was a free flowing creek. At other times, the creek outlet was dammed by shifting beach sands. The impounded waters then flooded over the marsh, creating a shallow pond. In 1917, mosquito control plans called for the freshening of Pond Creek. A sluice and tide gate were installed, permitting only unidirectional flow of water off the marsh. Thus began the evolution of the marsh to the essentially freshwater meadow we see today.

Pond Creek Meadow comprises more than 400 acres. The western half is dominated by reedgrass so tall and dense that wildlife utilization is limited. The reedgrass does, however, provide a food source for muskrats which are the most obvious mammals of the meadow.

The cattail marsh on the eastern portion of the meadow is more diverse. Sub-dominants include royal fern, jewelweed, marsh mallow, three-square and a haze of purple loosestrife. The streams and ponds lacing the meadow are home to spring peepers and chorus frogs whose calls accompany the greening of the area. In tune with the seasons, the cattail marsh plays host to a variety of wildlife.

As the days lengthen, cricket frogs, southern gray tree frogs and leopard frogs temporarily share their home with northbound geese and a variety of song birds. Bitterns, rails, ducks, and redwings will remain

The diversity of habitats is apparent in a single view.

Sun bleached cedar tree stands as a sentinel on the dunes. It serves as a perch for ospreys and peregrine falcons.

The Virginia opossum forages throughout the Higbee Beach-Pond Creek Meadow area.

in the meadow to raise their young. Mammalian inhabitants include star-nosed and eastern moles, skunks, rats, long-tailed weasels and occasionally, a family of river otters.

The water in the lower reaches of Pond Creek is still brackish due to a failing water control structure which leaks bay water. These conditions support fiddler crabs and salt marsh killifish which attract herons and egrets. Vestiges of the previously predominant salt marsh habitat are concentrated along the main creek channel. Year by year, the area is reduced by encroaching cattail and reedgrass. Marsh mallow, marsh elder, and short-billed marsh wrens can still be found in association with the few remaining acres of salt hay.

Upstream, the creek branches into small channels and ponds. These ponds and some man-made canals create a habitat for duckweed, carnivorous bladderworts and the fragrant water lilies. The mosquitoes produced in the scattered areas of standing water are a food source for predacious insects, mosquitofish, and an occasional bluegill.

Wildlife utilization of the meadow is most impressive in the fall. Northwest winds concentrate great numbers of raptors which "kettle up" over the meadow awaiting favorable conditions for continuing southward. Song birds and waterfowl in endless variety use the meadow as a staging area. The vast, undisturbed meadow provides the last opportunity for birds making this arduous journey to rest and refuel with food and fresh water before crossing Delaware Bay. Swarms of migrating monarch butterflies also wait out unfavorable winds by clinging like jeweled ornaments to any suitable shrub or branch.

THE FOREST—The ruby-throated hummingbird epitomizes the transition zone (ecotone) between the meadow and upland forest. "Hummers" dart among the sweetbay, bayberry, arrowwood and winterberry in search of nectar producing cardinal lobelia and other wildflowers.

Trees of the meadow edge such as black gum, red maple, sweet gum and black willow support a cascading curtain of catbrier and wild grape which shade the forest interior. The forest is dominated by a canopy of white oak and mockernut hickory. Within the shadow of these tall trees grows an understory of dogwood and American holly which serve as food for the wildlife.

A horseback ride is an excellent way to experience the sights, sounds, and smells of the forest. Follow the road from the woods across the meadow to Sassafras Island—a forested island sanctuary surrounded by a moat of meadow and mire. On dead trees reaching above the forest islands, ospreys, eagles and occasional goshawk seek out perches with a commanding view of the meadow.

OLD FIELDS—Surrounding Pond Creek Meadow are vast areas of agricultural lands. During the fall, these areas are frequented by killdeer, golden and upland plovers and woodcock.

Many abandoned fields have reverted to a natural state. Herbacious cover includes sedges, a variety of goldenrods, ragweed, camphorweed, clover, wild carrot and partridge pea. Groundsel tree and bayberry are the dominant shrubs.

The old field habitat is of particular value to wildlife. Grasshoppers, true bugs and caterpillers, the first step in the food chain, relish the herbs and ground cover. These insects are eaten in turn by Fowler's toads, five-lined skinks, shrews, moles and various birds including the kestrel.

Small mammals such as the white-footed mouse, meadow voles, meadow jumping mouse and cottontail rabbit are also dependent on old field vegetation for food, cover, and nesting material. Predators such as the fox, long-tailed weasel, black racer and raptors are the final links in the chain.

The dunes, meadow, forest and fields of the Higbee Beach area were once part of a vast and limitless wilderness. Now, they are the only "wilderness" remaining. They stand alone as a reminder of the past and they compel us to consider the future.

The Higbee Beach-Pond Creek Meadow complex warrants preservation. Over the past several years, our explorations have convinced us of the unique and special qualities of the area. With the cooperation of local conservation groups, land owners, county, state and federal agencies, we have developed a comprehensive plan for the preservation and management of this special place. We have rekindled the State's commitment to acquire the area for the enjoyment of all who value unique natural areas. Now, we ask you to join us in a commitment. Only if we all agree to the management of Higbee Beach-Pond Creek Meadow in its entirety, considering all the communities as one living system, will we be able to preserve this very special place. □

Continued from page 13

signs of spring

skunk cabbage for several years, often kneeling or lying belly-flat in mud to get the best angle for a picture. I had pushed back their appearance to mid-February, their points several inches above the ice covering the lower spots of the forest floor. This had in itself been gratifying, because Euell Gibbons in *Stalking the Healthful Herbs* had described the plant as only "pushing through the wet muck almost as soon as the ground has thawed." As far as concerned the signs of spring, of reawakening life, they now for me antedated the snow fleas that Annie Dillard found near Tinker Creek and that my son, Jonathan, and I had seen at Ward Pound Ridge in Westchester County, New York, while cross-country skiing in early February, 1976. They were up, then, well before the headbobbing mating rituals of the mallards which frequent the pond at the nature center as long as it is not frozen over, and before the return of the white-breasted nuthatches to our birdfeeders the same February, after about a six-week absence.

John Burroughs, who valued the skunk cabbage as the first spring flower, appearing even earlier than his beloved hepatica, had complained in his journal entry of March 22, 1884, that the plant always seemed to get ahead of him. But then when he found that "sturdy advanced guard of our floral array" thrusting its "spear-point up through the ooze," he confessed to a quickening of the pulse. Burroughs eventually did find it up in December, thereby pushing spring back at least that far. Other naturalists, of course, have other signs, reference points on what Annie Dillard has called the "continuous loop" of the seasons. Joseph Wood Krutch, in *Twelve Seasons,* was content to wait until April and the voice of *Hyla Crucifer,* the spring peeper, to be reassured that "warmth would return and that nature would reawaken. . . . The voice of the peeper from the marsh announces the tremendous fact that our faith has been justified. . . . 'It' has happened again, though there was nothing during the long months that passed to support our conviction that it could and would." Ordinarily, I would have waited too. In fact, if one had asked me before this year to point to the month when I felt Krutch's kind of relief at the confirmation of spring's return, I would automatically have said, February, thinking of the red-winged blackbird's appearance near the nature center, which I noticed this year, 1976, on February 18th. But not any more. And thanks, perhaps, to the skunk cabbage, my usual October melancholy did not reappear.

Skunk cabbages have other uses and appeals, however, though one of them is not their odor when the full-grown leaves are broken or bruised, from which it has gotten its popular name. The scientific name *Symplocarpus,* incidentally, comes from the Greek words referring to the connection between the ovaries which forms the plant's compound fruit. *Foetidus* needs no explanation. Euell Gibbons talks, again in *Stalking the Healthful Herbs,* of his attempts to find culinary uses for the skunk cabbage. The first time he finished cooking the leaves "the kitchen smelled as if it had been visited by an angry skunk." He was more successful with the flour he made from roots that had been drying for six months. Ground fine and mixed "half-and-half" with wheat flour, the root flour made pancakes which, when served with butter and maple syrup, were "unusually good." For me the appeal of skunk cabbages is primarily aesthetic. I find their sensuousness fascinating. From the first points of the spathes in the autumn leaves, to their bold appearance above ice and snow, to the patterns they form when they come out in force, to their partly hidden flowers, through their first, tightly rolled leaves, to their full unfolding on the swamp-forest floor: They challenge the photographer's eye and skill in black-and-white, especially since their subtle contrasts of color are not so readily apparent in this medium.

So the much-maligned skunk cabbage, like all of nature, deserves our praise. There are, after all, more uses than one to any plant. Put on your boots this February or next October and go out searching for the skunk cabbage. Check its growth frequently throughout the spring, note its disappearance by early summer, and be heartened by its return in early autumn. And don't let it get ahead of you. □

FRONT COVER

Opening Day Trout at Red Mill, Clinton on the South Branch of the Raritan — Photographed by Harry Grosch

INSIDE BACK COVER

"Still Life" near Mountainville, New Jersey — Photographed by David M. Campione

BACK COVER

"Barred Owl" in Hanover Township — Photographed by Wade Wander