

NJB
NEW JERSEY
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DEC 30 1991
Trenton, NJ

\$4.25

Winter 1992



Ozone: How It Will Affect You • Exploring the Wonders of Caves
Where the Birds Are: A Guide for Pheasant Hunters
Get Ready to Go Cross-Country Skiing • Understanding Artificial Lures

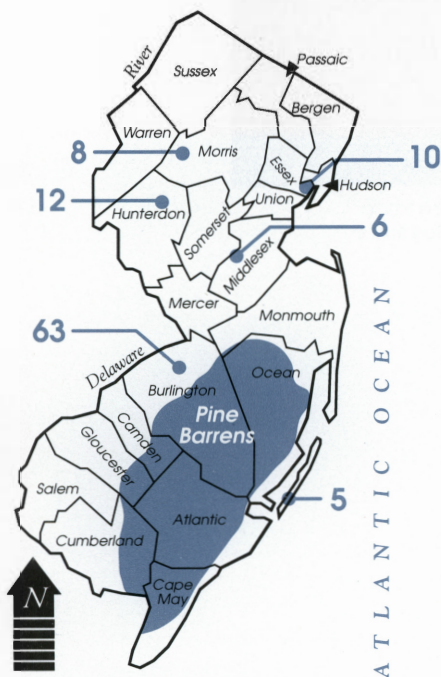


The red-orange peeling bark of a paper bark maple adds a touch of color to the Rutgers Display Gardens in New Brunswick. For a winter tour of the gardens, see page 6.

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NANCY WOLFF

Governor's Message

It's said that the journey of a thousand miles begins with one step. Looking back at 1991, we can see it was an important year for the environment because people from every sector of the state stepped up and acted on the belief that without clean water and fresh air, prosperity in the Garden State has little meaning.

Leaders from business and industry, government, communities and volunteer groups all worked together for a common purpose — a cleaner and greener New Jersey. That spirit of cooperation laid to rest the old myth that we had to make a choice between a clean environment and a strong economy. We now know that without one, we can't have the other. But we are working to have both, and that is an important step forward to a better future for everyone.

Our list of accomplishments is impressive — a ban on ocean dumping, the Clean Water Enforcement Act, the Pollution Prevention Act, our Oil Spill Prevention package, and our gains in farmland preservation. Combined, they form a solid foundation upon which we can build for tomorrow. In addition, they add to the quality of our lives in New Jersey.

People who go down to the Jersey Shore can now expect to find a clean ocean and safe beaches. The water that goes into people's homes will be purer. The air we all breathe is going to be cleaner and fresher. And the products we use won't come at such a terrible price to the environment.

Perhaps our most important step has been education. Everywhere I've traveled in New Jersey, I've seen communities committing themselves to recycling and making their corner of the state cleaner and greener. In schools, our children are learning about the mistakes of the past and how to avoid them in the future — ensuring that the next generation, and all the ones that follow, will be willing partners in preserving the environment.

Our work is only beginning. We've made good progress, but there is more to do. New Jersey has a unique set of challenges to face because we're the most densely populated state in the nation. But we're not just the Garden State; we're also the Invention State. That means the solutions to solid waste and sewage disposal, water treatment and air pollution are not beyond our abilities. Coordination, careful planning and cooperation are key elements in facing the challenges, but I'm confident it can be done.

Our greatest responsibility is to the future — ensuring that our children and grandchildren inherit a New Jersey that is filled with opportunities. They are the ones who will build on what we've begun, and at some future date, they will look back at 1991 and mark it as a turning point in changing the way this state looked at itself and how it could best preserve the bounty that nature has always provided.

The fight for the environment is not new — only the awareness and willingness of so many to act. After so many years, we understand what President Theodore Roosevelt meant in 1910 when he said, "Conservation and progress are really two sides of the same policy; and this policy rests on the fundamental law that none can prosper unless — in dealing with the present — thought is steadily taken for the future."

On the eve of 1992, New Jersey's people have a steady eye on the future, and their vision will be viewed with pride by those who inherit our legacy of a cleaner and greener New Jersey.



Jim Florio
Governor

Sincerely,

A handwritten signature in dark ink that reads "Jim Florio". The signature is stylized, with a large, flowing "J" and "F".

Jim Florio, Governor
State of New Jersey

Editorial

From the Commissioner



Scott A. Weiner
Commissioner

New Jerseyans and all Americans deserve clean air and a healthful environment in which to live, work and raise families. That's why preventing air pollution and further improving air quality throughout the state will remain key mission goals of the Department of Environmental Protection and Energy (NJDEPE).

In November 1990, President Bush signed the Clean Air Act Amendments. The new law goes above and beyond air pollution standards in New Jersey. It has to. The health of New Jerseyans, our northeastern neighbors and the nation is at stake.

Under the new requirements, we have to meet tough standards governing smog, carbon monoxide and other pollutants. And we will, but it is not going to be easy. Dramatically improving New

Jersey's air quality will require commitment by everyone: offices, state departments, utilities, small businesses and large chemical manufacturers, private citizens, motorists, transportation agencies, construction operations, car manufacturers, gardeners, fuel distributors and the entire northeast region of the country.

It is going to require each of us to rethink things like how we live, whether we can drive our cars less or whether we should choose a home or a job because it is close to mass transit.

New Jersey cannot delay in developing and implementing a plan for reducing the sources of air pollution — primarily ozone and carbon monoxide. The entire state has a severe problem with levels of ozone — also known as smog — and many areas of the state have elevated levels of carbon monoxide. These two forms of pollution present the state with its greatest air quality challenges.

According to the latest data we have, the most significant source of ozone and carbon monoxide is emissions from motor vehicles — by far.

We no longer can point to industrial smokestacks as the major source of air pollution in the state. The Clean Air Act reflects this change in emphasis by focusing pollution control measures on cars, fuels and other transportation issues.

Under the Clean Air Act, New Jersey must reduce smog-causing hydrocarbon emissions 15 percent by 1996 and three percent each year afterward through 2007. The state must meet new carbon monoxide standards in 1995. To accomplish these goals, New Jersey has already identified the California low-emission vehicle program as necessary to achieve long-term pollution reductions. Other control strategies are detailed in the article on page 23.

New Jersey also is studying the feasibility of converting fleet vehicles to use alternate fuels such as compressed natural gas, methanol or electricity. NJDEPE, along with the Departments of Transportation and Treasury and Public Service Electric and Gas Co., is coordinating a \$2 million demonstration project that will determine how this strategy works in the state's vehicle fleet.

The essential point to remember, though, is that the Clean Air Act has set New Jersey's goals, and we have great discretion in deciding how to get there. But we must plan now and start working to reach these air quality goals. Many state agencies are working together to meet Clean Air Act requirements. New Jerseyans must also work together as citizens, business people, civic leaders and educators. And New Jersey must work with its neighboring states in the northeastern United States because we all are trying to achieve similar goals.

State of New Jersey
Jim Florio
Governor



Department of Environmental Protection
and Energy

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New Jersey Outdoors
Winter 1992, Vol. 18, No. 4

This publication is dedicated to promoting and encouraging the wise management and conservation of our natural, cultural and recreational resources by fostering a greater appreciation of those resources, and providing our residents with the information necessary to help the Department protect, preserve and enhance them.

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New Jersey Outdoors (USPS 380-520) is a subscriber-supported magazine published quarterly by the New Jersey Department of Environmental Protection and Energy. Second-class postage is paid at Trenton, N.J., and additional mailing offices. Subscriptions are \$10.00 for one year, \$18.00 for two years, and \$25.00 for three years payable by check or money order to: **New Jersey Outdoors**, NJDEPE, Bureau of Revenue, CN 417, Trenton, N.J. 08625-0417. Single or back issues, if available, cost \$4.25. **New Jersey Outdoors** welcomes photographs and articles but will not be responsible for loss or damage. No part of the contents of this magazine may be reproduced by any means without the consent of **New Jersey Outdoors**. Telephone: Circulation (609) 777-1025; Editorial: (609) 292-2477; Subscriptions: 1-800-345-8112.

POSTMASTER: Send address changes to Editorial Office, **New Jersey Outdoors**, NJDEPE, CN 402, Trenton, N.J. 08625-0402. 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 eight weeks for new subscriptions and change of address to take effect.

The views and opinions of authors do not necessarily represent the opinion or policies of the Department of Environmental Protection and Energy or the State of New Jersey.

Volunteers

For Retired Couple, Life's a Cleaner Beach

It was a case of good news and bad news for the Jersey Shore in 1987.

The bad news: Wash-ups of trash caused the closing of many beaches that summer.

The good news: The bad news instilled in many people a heightened awareness of the ocean pollution problem.

Two of these people are Earl and Ginnie Gottshall of Beach Haven, who remember going down to the beach that summer and encountering a line of garbage about a yard wide as far north and south as they could see.

"It seemed like every garbage can in the neighborhood had been thrown into the surf," Ginnie Gottshall recalls.

With that in mind, on Memorial Day weekend the next year, the Gottshalls signed up to volunteer with a newly formed organization, the Alliance for a Living Ocean. The group now is best known for its year-round Adopt-A-Beach program in which volunteers choose a section of beach and then visit it on a regular basis to pick up trash and keep records of what they find.

Ginnie Gottshall is now coordinator of the program, while her husband is on Alliance for a Living Ocean's Board of Directors. And the group's efforts to keep New Jersey's beaches clean earned the couple the Governor's Volunteer Award earlier this year.

Both retired, they each spend about 40 hours a week doing volunteer work for the organization.

"We do it because of the need," says Ginnie Gottshall. She describes her husband and herself as "idea people" who like to think up new ways to get across to people "how desperately the environment needs us all."

The primary purpose of Alliance for a Living Ocean is to educate.

"For example, fishermen need to be educated not to throw their old lines and nets into the ocean," says Earl Gottshall, whose wife goes on to explain that whether animals become entangled in or ingest them, "it is a slow and painful death."

The Gottshalls remember the time a loon, trapped in a monofilament fishing net, was brought ashore by a fisherman.

"It seemed as if every feather was snarled into the net," recalls Ginnie Gottshall. Two staffers from a wildlife rehabilitation center spent more than an hour comforting the bird and snipping the net until it was free.

Now the net is in a display window at Alliance for a Living Ocean's office, wrapped around a cloth replica of a loon to make people aware of what can happen when a fishing net is carelessly thrown overboard. Also on display are broken glass, rusty fishhooks and other beach debris.

The Gottshalls and other volunteers at Alliance for a Living Ocean help students with projects by offering them the use of the organization's books, magazines and clippings.

"The children are the hope. We've pretty much figured that out," says Earl Gottshall.

The Gottshalls have been active as volunteers in civic organizations and youth and church groups for nearly 40 years. Work with an environmental

organization is new to them, although they say they always incorporated environmental principles into their daily lives by promoting recycling, repair and reuse, avoiding hazardous chemicals and planting trees.

But acute awareness of environmental issues is a more recent development, says Ginnie Gottshall. "A few years back, people had this philosophy that the earth was so big that pollution would just get absorbed."

Alliance for a Living Ocean needs more volunteers, especially in the winter months since at that time fewer people live on Long Beach Island.

"I see a lot of young, healthy retirees, and I wish they could in some way be inspired to help us with phone calls and letter writing," says Ginnie Gottshall.

Alliance for a Living Ocean is located at 204 Centre Street in Beach Haven. For more information or to volunteer, call (609) 492-0222, or write to the organization at P.O. Box 95, Ship Bottom, N.J. 08008.

By Michelle Anthony, a Trenton State College journalism intern for the Department of Environmental Protection and Energy

Earl and Ginnie Gottshall examine a discarded fishing net that almost killed a loon.



BILL CAMMANN

Winter Visitors Find Bursts of Color at Rutgers Display Gardens

It is in the dead of January, when winter spreads its long gray coat over the landscape, that garden lovers admire nature's simpler works — the rich and varied shades of evergreen trees and shrubs, the unexpectedly bright color of winter berries and even the hue and texture of bark.

In New Jersey, these signs can be found in the most unlikely of places. The Rutgers Display Gardens on the Cook College campus in New Brunswick are a blur to motorists speeding along the Route 1 corridor. Less than two minutes away from thick highway traffic, the gardens offer colorful signs of life to brighten the darkest of January days.

Visitors are greeted by a collection of American holly trees surrounding the entrance road. The collection includes more than 125 varieties of American holly, according to Dr. Elwin Orton, who has conducted research at the gardens for more than 30 years. The various shapes and sizes provide holiday colors in November and December when red holly berries reach full color.

Orton's work on deciduous hollies has attracted international attention to the Display Gardens. Unlike American hollies, which are evergreen trees, deciduous hollies drop all their leaves every fall.

Traditionally, deciduous hollies were a poor cousin to the American holly. While halls were decked with American holly around winter holidays, the deciduous holly was shunned because of its dull yellow leaves and coarse, sprawling appearance.

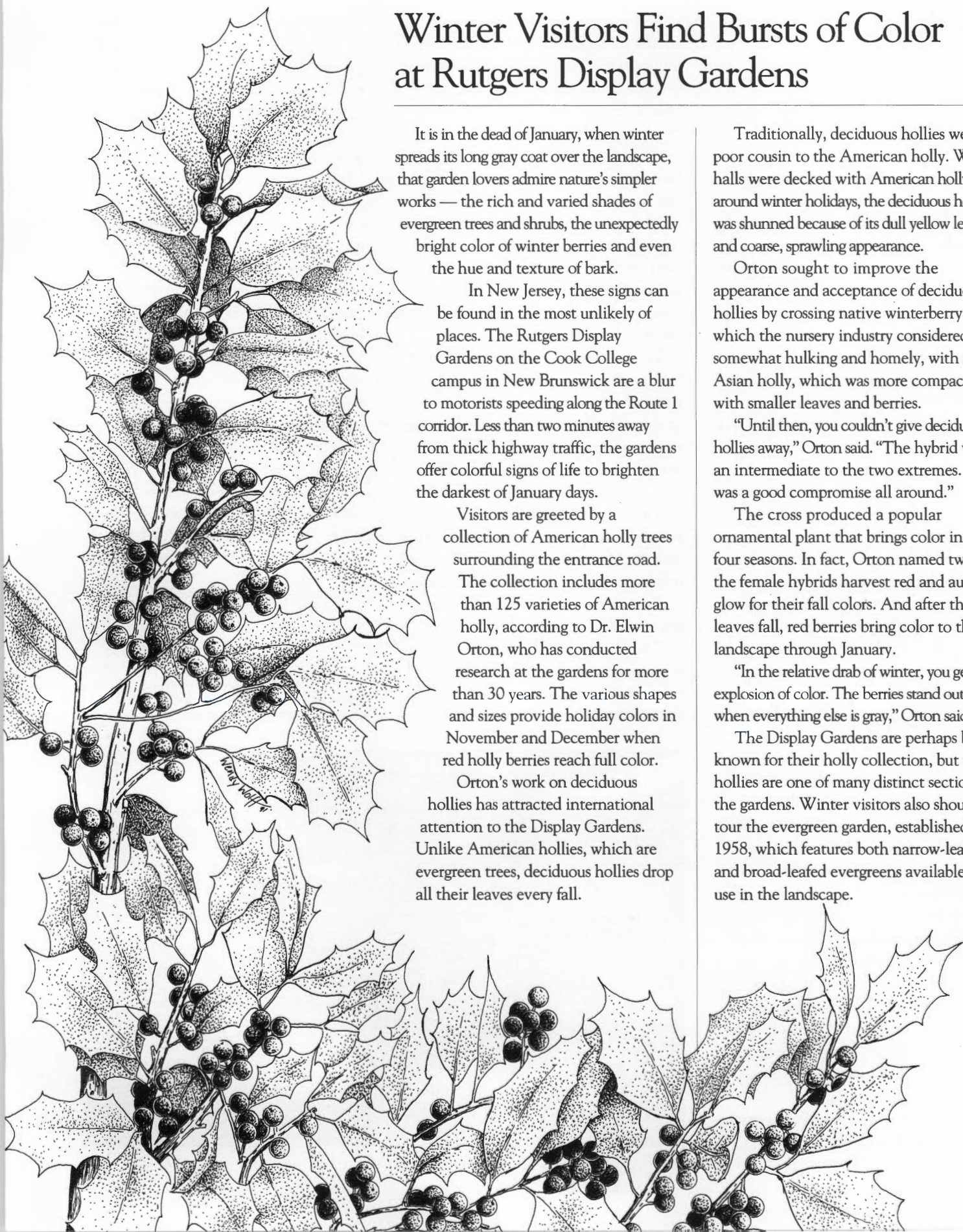
Orton sought to improve the appearance and acceptance of deciduous hollies by crossing native winterberry, which the nursery industry considered somewhat hulking and homely, with an Asian holly, which was more compact with smaller leaves and berries.

"Until then, you couldn't give deciduous hollies away," Orton said. "The hybrid was an intermediate to the two extremes. It was a good compromise all around."

The cross produced a popular ornamental plant that brings color in all four seasons. In fact, Orton named two of the female hybrids harvest red and autumn glow for their fall colors. And after the leaves fall, red berries bring color to the landscape through January.

"In the relative drab of winter, you get this explosion of color. The berries stand out when everything else is gray," Orton said.

The Display Gardens are perhaps best known for their holly collection, but the hollies are one of many distinct sections of the gardens. Winter visitors also should tour the evergreen garden, established in 1958, which features both narrow-leaved and broad-leaved evergreens available for use in the landscape.



Dr. Bruce Hamilton, an associate professor of landscape architecture at Cook College, uses the Display Gardens to teach plant identification, pruning and propagation and to demonstrate the role of the plant in the landscape. Hamilton encourages winter visitors to examine features that otherwise might be overshadowed by fall and spring colors. In particular, he points to the varied textures and colors of bark found throughout the Display Gardens, including the red-orange peeling curls of bark on a paper bark maple, which is native to China.

Hamilton is leading a volunteer effort to preserve and enhance the gardens. Two

The Display Gardens are perhaps best known for their holly collection.

years ago, he organized the Friends of the Rutgers Display Gardens to secure donations of money, labor and plant material. At times during the past two years, the funding problem has become all too visible. At one point, money was not even available for routine mowing, and grass at the garden grew to more than two feet.

With donations of \$25 and more, the group is building an endowment fund with a goal of earning enough interest income to cover annual maintenance expenses.

"Our goal is to make the gardens self-sustaining," Hamilton said. "We want to do more than just maintain the grounds. We want to take it beyond its present crisis state."

The plan also calls for a special projects fund to develop new garden areas, including a shade garden, terrace garden, water garden and theme gardens.

By Jim Morris, assistant director of the Office of Continuing Education at Cook College

Winter Peaks Across New Jersey

Lewis W. Barton Arboretum at Medford Leas Located on the edge of the Pine Barrens, the arboretum features areas of maintained plantings and wild woodland. Winter attractions include holly and pine sections.

Hours: During daylight **Admission:** Free **Phone:** (609) 654-3000 **Location:** Visitors should first go to the Medford Leas office, Route 70, one-half mile east of the Medford Circle, Medford (Burlington County)

Cora Hartshorn Arboretum and Bird Sanctuary Features include a deciduous forest of native trees, a museum with live animals and exhibits, maple-sugaring the first Saturday in February and family programs throughout winter, depending on the weather. **Hours:** Arboretum open from dawn to dusk, seven days a week; museum open Saturdays, 10 to 11:30 a.m.; maple-sugaring 1 to 3 p.m.

Admission: Arboretum free, maple-sugaring \$5 per family **Phone:** (201) 376-3587 **Location:** 324 Forest Drive South, Short Hills (Essex County)

Arboretum of Hunterdon County The Cirius cactus, which normally blooms once a year, has been known to bloom a second time in the winter here. Blooming geraniums also are possible. **Hours:** 8 a.m. to 4:30 p.m. Monday through Friday **Admission:** Free **Phone:** (908) 782-1158 **Location:** Route 31, five miles north of Flemington (Hunterdon County)

Holmdel Arboretum Attractions include a dwarf conifer garden featuring evergreens, and a synoptic garden of plants from A to Z. **Hours:** 9 a.m. to dusk **Admission:** Free **Phone:** (908) 431-7903 **Location:** Long Street, Holmdel, one mile off Route 34 (Monmouth County)

Shakespeare Garden Features flowers grouped according to the

Shakespeare play or poem in which they are mentioned. A wide variety of winter plants can be found, including bananas in the tropical room. **Hours:** Dawn to dusk; greenhouse open by appointment **Admission:** Free **Phone:** (201) 539-1600 **Location:** College of Saint Elizabeth, adjoining the Conservatory, at Seton Drive and the Midway, Convent Station (Morris County)

Edith Duff Gwinn Garden Started 30 years ago, this garden demonstrates what will grow at the seashore, including lilies, chrysanthemums, holly and cedar. Maintained by the Barnegat Light Historic Society and the Long Beach Island Ladies Garden Club. **Hours:** Dawn to dusk **Admission:** Free **Phone:** (609) 494-9196 **Location:** Grounds of the Barnegat Light Museum, southwest corner of Fifth and Central avenues (Ocean County)

Skylands Botanical Garden The Winter Garden features an evergreen collection of subtly varying shades and textures surrounding a century-old weeping beech. Jasmine blooms in January, and witch hazel, Daphne and buffalo berry can be found in February. **Hours:** Dawn to dusk **Admission:** Free **Phone:** (201) 962-7527 **Location:** Ringwood State Park, off Route 511, Ringwood (Passaic County)

Duke Gardens Hour-long guided walking tours are offered through 11 gardens, including the Japanese, English, Italian, French, colonial, Edwardian, desert and tropical sections. All are blooming with out-of-season plants because the gardens are completely under glass. Call for reservations. **Hours:** Noon to 4 p.m. **Admission:** \$5 for adults, \$3.50 for children, \$2.50 for senior citizens **Phone:** (908) 722-3700 **Location:** Route 206, Somerville (Somerset County)

Preserver of 'Beautiful Wrecks'



Nordstrom outside her 18th-century home

When Margaret Nordstrom moved to Washington Township in Morris County six years ago, she couldn't help but get involved. The community center, only 20 yards away, was practically in her front yard.

Attending meetings at the old chapel-turned-community center led to Nordstrom's joining the township's historic preservation commission. In the past four years, Nordstrom has played key roles in securing historic district status for the Middle Valley and Schooley's Mountain sections of the township, which contain more than 100 original structures. She also is one of the founders of a land trust that raises funds to purchase other endangered areas and buildings in the rural municipality. Lately, she has turned her attention to preserving as many of the township's more than 120 stone houses as possible. And that's just a sampling of her efforts.

"I keep putting my hand in the air," Nordstrom says with a smile. Getting

involved, it seems, is something that just comes naturally.

Nordstrom is a 43-year-old dancer and dance teacher by trade who since her earliest recollection as a child in Philadelphia has loved the mystery and the details of old houses. "I can remember being two or three and being very aware of the homes along the Main Line," says Nordstrom, who today lives in an 18th-century historic stone house. "I remember thinking no mortals could live there in these gorgeous mansions. Fairy princesses had to live there."

Before Nordstrom became involved, Washington Township had one historic district — German Valley. Known today as Long Valley, it was settled around 1740 by some of the region's earliest farmers. But, Nordstrom learned early on, it is not the only area of the township rich in history and unique buildings.

One night, as she and a friend walked around their Middle Valley neighborhood, they talked worriedly about county plans to one day widen a road cutting through the center of the valley. The plan would threaten several historic homes near the road. "My friend had an idea," Nordstrom recalls. "She said, 'What if we were to make it an historic district?'"

Nordstrom did much of the research; her husband, Bill Leavens, took the photos. "We didn't know you were supposed to do it with professionals. We did it all in-house," she says.

The research and application writing took two years, and Middle Valley was named an historic district about a year ago. "We felt like we'd done something for the community," says Nordstrom. "Now there won't be a widened road going through there. It's as safe as anything can be safe. Eternal vigilance is really the byword."

Schooley's Mountain, with its winding, steep roads and its renowned past as a resort and health-giving spa because of its mineral springs, was next. It, too, is now on the state and federal registers as an historic district.

Nordstrom's success stems from her

enormous well of energy, her persistence and a genuine sense of caring about the world and people around her, colleagues say.

"She's very focused," says Kathleen Smith, a project director at the Association of New Jersey Environmental Commissions (ANJEC). "Her activities are certainly diverse, but they all have one

"Her activities all have
one central theme:
extreme concern
with better government
and managed,
intelligent growth."

— Kathleen Smith,
ANJEC project director

central theme: extreme concern with better government and managed, intelligent growth. Mostly everything she does is directed toward those two goals."

Nordstrom's activism led her straight into politics. It would have been impossible to avoid it, she says.

"When you see stuff that has to be done, you can't help but get into it (politics)," says Nordstrom. "Sooner or later, you have to approach it at a governmental level."

Nordstrom first came to New Jersey in 1970 to attend Rutgers University for a master's degree in political science. As a graduate student, she never thought she would run for political office. "I was real shy. It was hard for me to talk in front of a group," she says.

That changed the more she got involved in her hometown. Aside from working with state government on preservation efforts, she also was vocal on the county level. Nordstrom fought freeholder plans to site a landfill in

Washington Township to hold the ash from a planned incinerator. That plan is now dead. She made her first run for a township committee seat in 1989 and lost in the primary by only 16 votes. The next year she won easily by a nearly 2-1 margin.

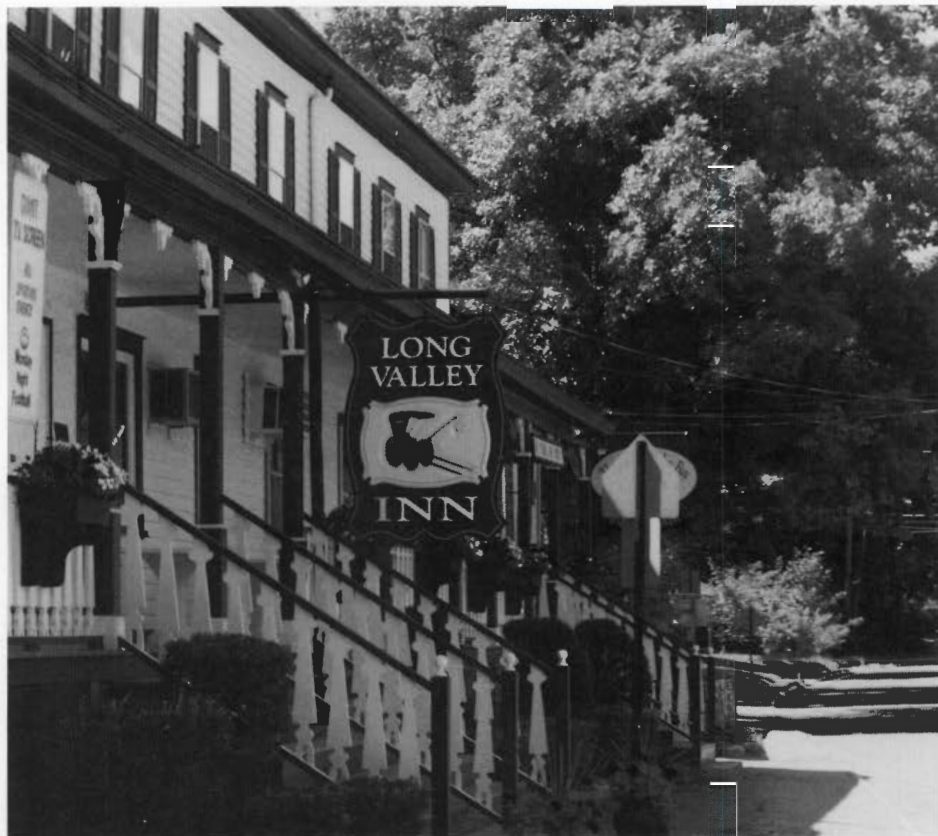
Nordstrom's willingness to add public office to her long list of activities "shows she's got incredible commitment," says Kitty Shuler, executive director of Preservation New Jersey. Nordstrom also is on the board of trustees of Preservation New Jersey, a nonprofit, statewide clearinghouse for historic preservation issues that assists local preservation efforts.

One of Nordstrom's strongest points, Shuler says, is she sees historic preservation as an integral part of protecting her whole environment. She doesn't have a single-minded architectural approach; she wants as much of her world to remain intact as long as possible. She also believes the structures saved should have a purpose.

"If they don't have a viable, economic use, they're not going to survive," says Nordstrom. "If it doesn't function, who's going to put the dough into it?"

Driving one Sunday afternoon through the center of Long Valley, Nordstrom points out one vacant storefront after another. "We need a bypass," she says. Traffic is heavy at the juncture of Route 24, East Mill and West Mill roads. And there is no parking, so people just pass through. Use of the buildings is limited, too, because there are no sewers. Even with the current picture dim, Nordstrom envisions a vital downtown, with the historic buildings in vibrant use. "There's no reason these buildings can't be stores," she says. "I want what we have to stay there and be valued."

The first project undertaken by the land trust is one of those downtown buildings, a roadside mill that overlooks the Raritan River. Called the LaTourette Gristmill, the 1750 structure was the first mill built in German Valley. The outside needs work, but the millworks inside are



PHOTOS BY AUTHOR

The Long Valley Inn in the center of Long Valley. Nordstrom supports a bypass to revive the traffic-choked area.

intact. "It's a beautiful wreck," says Nordstrom. One day it may be a museum, or even a cultural arts center, if Nordstrom has her way.

Outside Washington Township, Nordstrom is active as president of the Morris County Trust for Historic Preservation. This year, the organization is highlighting the rich mining history of the Boonton area and the mills of Washington Township.

Last year, she also worked closely with the Morris County Park Commission, lobbying countywide for a \$10 million open space bond issue. The success of the referendum already has benefited Washington Township. Through condemnation, the county has purchased for \$5.6 million the Claremont properties — a total of 236 acres on Route 24. Once slated for single-family homes, the open acreage serves as a gateway to Washington Township. Future plans call for making the expanse an equestrian center.

Behind the bond issue and the Washington Township land trust is the same philosophy that drives Nordstrom in her preservation work: the empowerment of people to shape the environmental future of their neighborhood, county and state.

"The land trust is a wonderful way of getting people involved in the goal of property management," says ANJEC's Smith. "We've come to depend on government to do it for us. I think there's a growing awareness that we can't do that anymore. Government doesn't have the time or the money to do this."

Nordstrom says it even more succinctly: "If you don't protect it yourself, it's not going to happen."

By Dory Devlin of Bernardsville, a reporter for the Star-Ledger of Newark

Recycling in the Big City: Newark Up to Challenge

It's a challenge to establish a successful recycling program in a city of 300,000 people, but through education and innovation, that's exactly what Newark has been able to accomplish.

The city has established one of the largest citywide curbside recycling

“Newark is fortunate in having a great deal of commercial and industrial recycling.”

— Jean Clark,
President of the
Recycling Forum of New Jersey

programs on the East Coast for paper, bottles and cans, as well as programs for office paper, composting, corrugated cardboard, tires, white goods (light iron), concrete/asphalt demolition debris and abandoned vehicles, according to Frank Sudol, manager of the city's Division of Engineering.

In 1990, residents recycled 3,380 tons of newspapers, magazines and office paper, which amounted to a savings of 57,460 trees, 13 million kilowatt hours of electricity and 23 million gallons of water, Sudol says.

“Newark is unique in that it is the state's largest city, and establishing recycling programs in heavily populated urban areas with a lot of apartment houses is not easy,” says Jean Clark, president of the Recycling Forum of New Jersey, a nonprofit organization



Puppets help teach Newark children the importance of recycling.

that focuses on recycling issues.

“Newark is fortunate in having a great deal of commercial and industrial recycling,” she says, adding that half of all the recycled material is heavy metal. The business community recycled 70,000 tons of paper that amounted to a savings of 1,190,000 trees, 280,000,000 kilowatt hours of electricity and 490,000,000 gallons of water. The waste paper and scrap metal obtained by these programs are Newark's biggest exports.

Thanks to these recycling programs, Newark avoided \$4.78 million in disposal costs and realized \$33,000 in revenues for 1990, Sudol says.

Local legislation forces mandatory separation of recyclables, bans the use and sale of polystyrene (Styrofoam) and polyvinyl chloride (a type of plastic) in food packaging

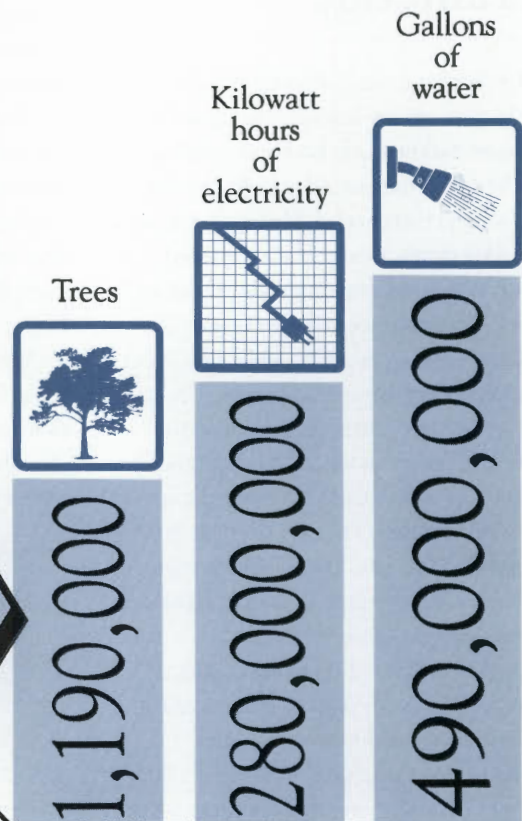
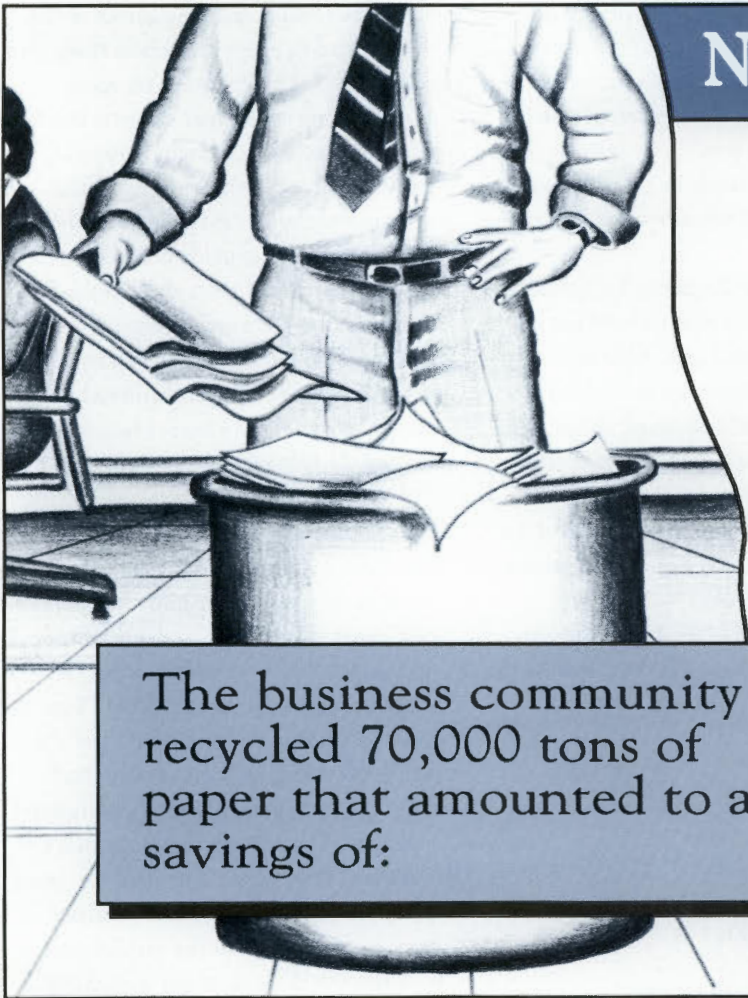
materials, and requires the purchase of recycled products by city agencies whenever possible.

“You're not really recycling unless you're completing the loop, and one of the ways you can do that is by buying back products that contain recycled materials,” Sudol says.

“Newark is the only city in New Jersey where there is a formalized adopted procurement process to buy recycled products,” he says. “There are some other cities that informally do it, but we have an ordinance that requires the procurement of recycled products when they're available.”

Newark also pioneered the use of crumb rubber from recycled tires mixed with asphalt to resurface streets. Thirty-two thousand tires were used to

Newark Recycling Results



pave more than a dozen streets.

A major part of Newark's educational effort targets children, with the hope that recycling will become second nature to them and that they will help educate their parents. This includes:

- ❑ the hiring of a full-time education coordinator to teach students the importance of recycling;
- ❑ an annual poster contest sponsored by the Newark Office of Recycling and the Board of Education;
- ❑ competitions among schools to determine which can recycle the most goods;
- ❑ a "Recycling Rangers" program in which children are deputized by city officials, given badges and sworn to recycle whenever possible and to persuade friends and family members to do the same;

❑ a puppet show called "Woes of Waste" performed in elementary schools and a walk-around puppet show for street festivals, both of which teach recycling.

However, children are not the only ones learning how to recycle in Newark. Residents are mailed a brightly colored, easy-to-use calendar every December that specifies curbside collection areas and dates. In the summer, they receive information on topics such as the disposal of household hazardous waste. These items are simply worded and printed in three languages — English, Spanish and Portuguese.

To make recycling more convenient, a "recycling depot" that accepts a wide range of recyclable materials is open Monday through Friday. The city also has set up an automated phone system

so residents can call and receive information on collection of both garbage and recyclables.

Although Newark's recycling program has proven successful, Sudol believes more work needs to be done. In particular, the city is aiming to reach the state's targeted 60 percent recycling rate by the end of this year, and plans to work for legislation on a statewide level to encourage reuse.

For more information on Newark's recycling programs, write to Frank Sudol, Newark Department of Engineering, Room 410, 920 Broad Street, Newark, N.J. 07102.

By James Grubic, a Rutgers University journalism intern for the Department of Environmental Protection and Energy

Spelunking: An Underground Challenge

Except for a small amount of light from the lantern on my helmet, I slouched in absolute darkness, my body contorted and perched on a narrow ledge to fit the crack into which I had crawled. My hands, encased in muddy gloves, grew colder as I grasped about an inch of protruding rock. About an hour had passed since I entered Leigh Cave.

My visit was part of an adult education course on cave exploring, or spelunking. A two-hour classroom lecture prior to this had filled me in on what I could expect during my visit to this state-owned cave. Located off Route 31 near Allerton in Hunterdon County, Leigh Cave is reputed to be New Jersey's largest cave in terms of underground volume.

A cave is divided into three zones, according to Kathy Jordan, curator of the Clinton Historical Museum and an instructor for the course.

In the twilight zone, where there is air movement, one can still see light, fungus, ferns, slugs, crickets and ticks. Often, raccoons, bears and skunks use this part of the cave for shelter, but seek food from outside.

The middle zone, where the temperature remains a constant 55 degrees, is completely dark. Here, the vegetation is pure white, and the rats, salamanders, crickets and millipedes feed upon the droppings of those that venture farther into the cave from the twilight zone.

Those born in the dark zone, which is void of all vegetation, are pure white and include crickets and spiders that feed on droppings deposited mainly by bats. Bats, common visitors within caves, are capable of eating 5,000 insects nightly before seeking shelter inside.

Jordan suggested that we test ourselves to see if we had what it takes for this unusual sport by locking ourselves in a dark closet for several minutes.

"If you scream or panic trying to get out, don't come on the trip," she warned. "A cave is a dark, confined space; it's wet, cold and dark. If you're claustrophobic, this sport isn't for you."

Since I could work in a darkroom for hours at a time, I felt caving would be manageable.

Finally, the big day arrived. Outside the cave, each of us was given a hard hat and an attached carbide lamp. Although battery-operated lights are available for the helmet, the old-fashioned miner's carbide lamp is cheaper to run and gives a bright, diffused glow.

We walked over to the entrance of the cave. I thought Jordan was kidding as she pointed it out, for all I could see was shrubbery, a bunch of rocks and a sewer pipe sticking out. I got a sinking feeling in

In this totally
unfamiliar element,
time no longer
mattered.

my stomach when I realized she was serious. One of the spelunking guides volunteered to go through the "entrance" first. He slid through the pipe, which was cemented in place to prevent further vandalism to the cave. After a lot of hesitation from others, it finally was my turn. I was told to extend my arms outward and slide into the narrow pipe. Oh, how I wished I were thinner at that moment, or somewhere else. However, I decided I had come to learn caving, and in I went, head first. A second later, I cowardly pushed my way backwards trying to get out of that sewer pipe as fast as I could. I had become panic-stricken as soon as I realized the inside of the pipe was absolutely black — but I hadn't figured out that the reason I couldn't see was that

my helmet had pushed my glasses down.

I wanted to forget the whole thing, but was persuaded by Jordan to try again — after securing my helmet atop my head and this time using a bright Mini-Mag flashlight I had brought along. Things went better the second time around. Once through the pipe, a guide reached out and took my hand. But then another crisis presented itself as I saw a deep pit below my feet. I bravely crossed over a sturdy log in place over the drop and entered the cave. Only later did I learn I had crawled above a 23-foot pit!

Here, in total darkness except for the light on my helmet and my hand-held flashlight, I squirmed like a snake, wiggling and pulling with my limbs, clawing at anything I could hold on to, making my way over narrow ledges and rough outcrops. No longer could I hear the sound of birds or feel the warmth of the sun. I was doing something alien, and although I was part of a group, each step I took was an important one for which I alone was responsible. I realized too late I should have worn lug-soled boots, not worn-out sneakers, for the mud-coated rock made it difficult to get a good grip.

It didn't help matters to keep banging my head and arms on the narrow passages, but now I did understand why we had been forced to wear the helmets. With a sense of accomplishment, I slowly figured out novel ways to cross over cracks and slide through mud, and successfully made progress through various formations — despite eerie shadows cast by my lighted helmet. Words from the experienced guides helped a lot, too. In this totally unfamiliar element, time no longer mattered. I knew I could rely on my partners for help, but although I could hear voices in front of and in back of me, in reality I felt alone — alone, but proud I was trying and succeeding at something new.

At one point, my guide asked me to wait a couple of moments so he could help someone in front of him get to a small chamber where a few of the others were waiting. At that precise moment, I was



A spelunker slides through the pipe entrance to Leigh Cave.

atop another small ledge and began to worry. I realized I was depending on my slippery sneaker soles to grip the rock as much as I was relying on my ability to contort my body to fit the unbelievably narrow spaces. By the time my guide had returned, I decided I had experienced enough excitement for one day. More than anything, I wanted to see daylight and hear the birds once again. A couple in back of me decided to exit also.

Vince Kappler, a guide who also teaches school in Washington Township, said that one-third of the people he takes into the cave decide to come right out. "No matter how we explain the dangers, the closeness, the deep pits, it doesn't register until you actually do it. Leigh Cave

is tough because of all the pitches and inclines, but it's a real challenge and I enjoy it. I do it because I love the camaraderie."

The caveman used caves for shelter. Today, it's an exciting sport for those who want adventure and to experience underground views few of us ever see. Before you try caving, remember it's a sport requiring dexterity, good coordination and complete trust in those you're with. Sometimes you'll walk through large passages; other times you'll be crawling through cold, wet, narrow openings. It does take stamina.

One day I hope to try this noncompetitive sport again. For now, though, I think I'll stick to nice, dry, lighted commercial caves.

For More Info

For the names and addresses of spelunking clubs in your area, write to the National Speleological Society, Cave Avenue, Huntsville, Ala. 35810, or call (205) 852-1300. This nationwide organization has 8,000 members from all walks of life, and many of the clubs offer clinics to help the novice spelunker.

By Arline Zatz, author of "25 Bicycle Tours in New Jersey" and "Special Places in New Jersey"

State Plan Sets Sights on . . .

By Richard V. Sinding

Imagine New Jersey in the 21st century. That, in effect, is the visionary charge that was given five years ago to a unique public body known as the State Planning Commission. It is a task that is as daunting as it is unprecedented — and, not surprisingly, the process of carrying it out has been neither tidy nor tranquil.

The mission of the 17-member commission, simply stated, is to integrate and coordinate state, regional and local planning to:

- ❑ Conserve New Jersey's natural resources.
- ❑ Revitalize its urban centers.
- ❑ Protect the quality of its environment.
- ❑ Provide needed housing and adequate services at a reasonable cost.
- ❑ Promote beneficial economic growth, development and renewal.

Integrating and coordinating the planning functions of state, county and municipal governments in New Jersey is itself a tall order. Pursuing the even loftier, almost Utopian goals of the State Planning Act — to conserve natural resources, revitalize cities, protect environmental quality, provide housing, and promote economic growth and development, all at the same time — would appear to be a noble, but futile exercise in the face of New Jersey's strong and unrelenting tradition of home rule.

The State Planning Commission, in concert with the Office of State Planning, continues to press ahead with its vision of what New Jersey should look like in the 21st century. With the adoption of the 182-page Interim State Development and Redevelopment Plan in July, the commission has taken a major step toward the establishment of an integrated, coordinated planning process, and the promulgation of clear guidelines for future statewide growth and development, which could very well shape the landscape of the Garden State for generations to come.

Typical suburban fringe development: Lots developed along wide, new suburban roads in pattern that destroys rural character and environment of area.

New Communities of Place

What the Interim Plan envisions is a New Jersey where compact, mixed-use development has replaced suburban sprawl; where central "communities of place" grow and prosper while surrounding open space is preserved and protected; where roads are less congested, housing is more affordable, and clean air and water can be taken for granted. To achieve these objectives, the Interim Plan proposes a series of public-sector investment strategies designed to direct private-sector development by supporting and encouraging the maintenance and efficient use of existing infrastructure systems, rather than supporting new facilities and services where they might otherwise be unnecessary — and in some cases, undesirable.

This would represent a sea change in New Jersey, where

decisions regarding growth and development have almost always been made at the local level of government — and almost always in response to, rather than in advance of, proposals put forward by private development interests. Over the years, the timing, location, pattern and pace of growth throughout New Jersey have been directed not by government planning, but by site-specific private development proposals, with predictable and often costly results. As the Interim Plan puts it, "Private sector development decisions . . . usually lead public investments in infrastructure that will be required to support it. In other words, growth usually occurs first, and many of the public facilities required to maintain service standards lag behind."

"We just can't continue developing the way we've been doing it for the past quarter-century," says Janet Lussenhop, director of the Regional Plan Association of New Jersey, a private, nonprofit research and planning organization. "The results of the most recent development pattern include traffic congestion, air pollution, high housing prices, difficulty producing enough affordable housing, an increased lack of attention paid to urban areas and increasing economic stagnation."



ILLUSTRATIONS: REGIONAL PLAN ASSOCIATION/DODSON ASSOCIATES 1991

... New Vision of New Jersey

It is this pattern of growth and development that the state planning process is designed to remedy. It is hardly a new pattern. The flight of housing, jobs and people from central cities to sprawling suburbs has been the trend in New Jersey for decades. But in the mid-1980s, the combination of a landmark New Jersey Supreme Court ruling and an overheated national economy forced state lawmakers to acknowledge a couple of painful realities: Not only were citizens of low and moderate incomes being systematically deprived of places to live in New Jersey, but New Jersey itself was very rapidly running out of room to grow.

In the 1980s, more square footage of office space was built along 13 square miles of the "Route 1 corridor" in central New Jersey than existed in downtown Indianapolis, America's 13th largest city. Mammoth shopping malls replaced fertile farmland in the suburbs of Atlantic City, Somerville and Asbury Park. Interstate highways — 287, 295, 78 — that were built to move motorists quickly and efficiently around points of traffic congestion became rush-hour nightmares themselves.

The unprecedented level of growth throughout New Jersey in the 1980s — and the extension of this growth to areas that

previously had escaped it — prompted policy-makers in Trenton to begin talking about a state planning process. But the principal event that inspired the Legislature to adopt the State Planning Act was the New Jersey Supreme Court's ruling in the case of Southern Burlington County NAACP v. Township of Mount Laurel.

In the Mount Laurel case, the court ruled that exclusionary zoning practices were denying low- and moderate-income citizens equal housing opportunity in many New Jersey communities. To correct this unconstitutional practice, the court ordered municipalities located in the state's "growth areas" to provide housing for people of limited means. It was left to the Legislature to define the state's "growth areas" — and the only guidance available came from a document known as the "State Development Guide Plan," which had been prepared several years earlier by an office in the Department of Community Affairs that had since ceased to exist.

This controversial ruling sparked several years of raucous debate before the court was obliged to issue two additional rulings. One, dubbed Mount Laurel II, included a much-maligned "builder's remedy" that forced municipalities to accept prescribed allotments of low- and moderate-income housing as a condition of permitting the construction of market-priced units.

So the state planning process had its origins in two occurrences: a sudden surge in unbridled development and the controversial Mount Laurel mandate. Together, these forces have driven not only the preparation and passage of the State Planning Act, signed into law on January 2, 1986, but the crafting of both the Preliminary State Development and Redevelopment Plan, released in January 1989, and the Interim Plan, adopted 30 months later.

The Preliminary Plan addressed the issues raised in the Mount Laurel ruling by establishing a "tier system," which divided the state into seven regions, or tiers, of prospective development. These regions ranged from the most densely populated and developed urban centers (Tier 1) to undeveloped areas of particular environmental sensitivity (Tier 7). The Preliminary Plan projected that future growth, for the purposes of satisfying

the Mount Laurel mandate, would generally take place in the lowest-numbered tiers.

Likewise, the Preliminary Plan sought to address the problem of unplanned and poorly managed growth by introducing a "regional design

system," which promoted the concept of "communities of place" where future growth and development would be encouraged. A "community of place" could perhaps best be described as a Supreme Court justice once described pornography: "I can't define it, but I know it when I see it!" In fact, we all know what a "community of place" looks like. It is a compact place with a central core of services in an identifiable "downtown"; a well-defined boundary separating it from its environs; and a diversity of population, housing,



Recommended suburban fringe development: Provides for longer, narrower lots that create expansive back yards and preserve farmlands and forests.

recreational activities and shopping conveniences — in short, the very opposite of the prototypical sprawling New Jersey suburb.

Getting Everyone to Agree

With the release of the Preliminary Plan, a most remarkable consensus-building process began — a process that is unique to New Jersey. While several states — including Maine, Vermont, Rhode Island, Maryland, Georgia, Florida and Oregon — recently have engaged in some sort of statewide planning exercise, only New Jersey's has been accompanied by a "cross-acceptance process" designed to solicit the comments, concerns, arguments, complaints and suggestions of virtually every stakeholder in the state's future.

At public hearing after public hearing, representatives of municipal and county governments, regional sewer authorities, farmers, engineers,

developers, environmentalists, planners, consultants, lawyers, politicians, housing advocates and dozens of other groups and professions entered into a dialogue with the State Planning Commission and the Office of State Planning over the Preliminary Plan.

Martin Bierbaum, former assistant director of the Office of State Planning and currently the director of the Department of Environmental Protection and Energy's Office of Regulatory Policy, calls the process "a great experiment in democratic, strategic planning."

"Cross-acceptance presumes that people sitting in their offices in Trenton simply don't know enough to write a state plan," he says. "They need to get out and interact with counties, municipalities and the public at large."

New Jersey's Five Planning Areas

The product of this cross-acceptance process, more than two years later, was the Interim Plan.

Like the Preliminary Plan, the Interim Plan divides the state into regions — but it calls them "planning areas" instead of tiers, and there are only five of them as opposed to the original seven. The five planning areas included in the Interim Plan are:

- ❑ **Planning Area 1: The Metropolitan Planning Area** covers most of the state's large urban centers and post-war suburbs, which are fully or almost fully developed and have little vacant land remaining.
- ❑ **Planning Area 2: The Suburban Planning Area** is generally located adjacent to the more densely populated Metropolitan Planning Area, but can be distinguished from it by a lack of high-intensity central cities and by the availability of vacant, developable land.
- ❑ **Planning Area 3: The Fringe Planning Area** generally abuts the Suburban Planning Area and contains a predominantly

rural landscape with scattered, small communities served by a two-lane road network and on-site well water and wastewater systems.

- ❑ **Planning Area 4: The Rural Planning Area** contains most of the state's farmland, and includes those actively

Urban area after typical abandonment: Structures abandoned, torn down, creating more rubble-strewn blocks and parking lots.

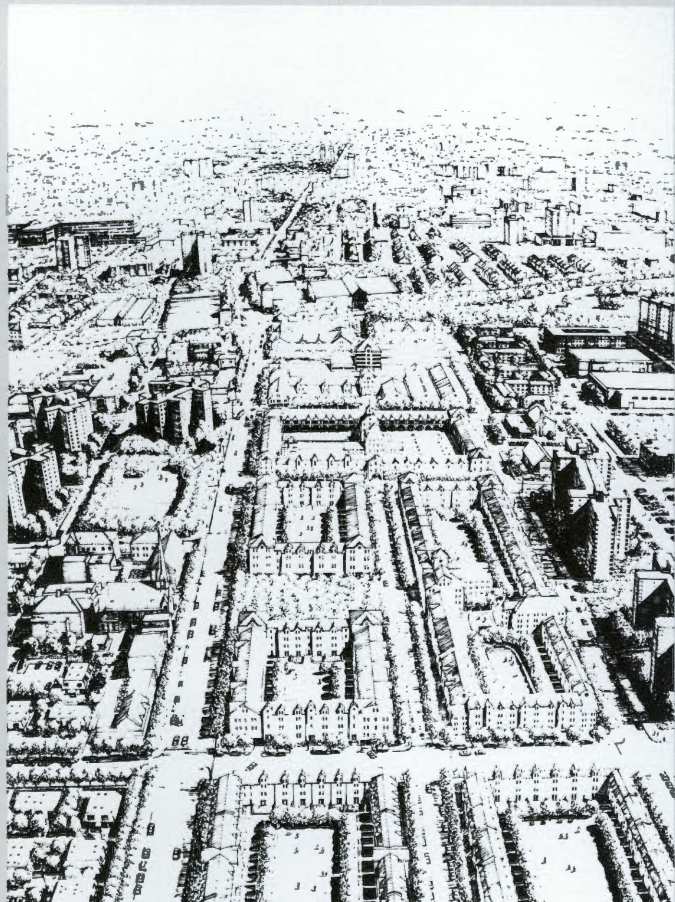


cultivated lands where healthy soils and adequate water supplies provide the greatest potential for long-term agricultural viability.

- ❑ **Planning Area 5: The Environmentally Sensitive Planning Area** has large, contiguous land areas of low population densities with valuable ecosystems and wildlife habitats, including lands characterized by watersheds of pristine waters, trout streams, and drinking water supply reservoirs, recharge areas for potable water aquifers, habitats of endangered or threatened plant or animal species, coastal and freshwater wetlands, prime forested areas, scenic natural landscapes, and other significant topographical, geological or ecological features.

Like the Preliminary Plan, the Interim Plan seeks to direct growth and development to the lower-numbered regions. Unlike the Preliminary Plan, however, the Interim Plan offers some very

precise tools for doing so. In particular, the Interim Plan establishes a hierarchy of public investment strategies, placing the highest priority on investment in distressed urban centers and the lowest priority on the extension of publicly funded facilities and services to environmentally sensitive areas. In other words, a



private investor who proposes to redevelop a section of Newark, Camden or Jersey City can expect significant support from the public sector in the form of infrastructure investment in these areas. An investor who wishes to subdivide and develop a piece of property on a steep slope next to a reservoir or a freshwater wetland in the most rural reaches of Sussex or Cumberland County cannot expect any public investment in the infrastructure needed to support such development.

The Interim Plan also expands on the "communities of place" concept by delineating five specific types of "centers" into which future growth and development should be directed:

- ☐ Urban Centers
- ☐ Regional Centers
- ☐ Hamlets
- ☐ Towns
- ☐ Villages

Eight cities — Atlantic City, Camden, Elizabeth, Jersey City, Newark, New Brunswick, Paterson and Trenton — are specifically

designated as urban centers in the Interim Plan, and are targeted for redevelopment. The Interim Plan establishes criteria for identifying towns, regional centers, villages and hamlets, but leaves it to municipalities and counties, working with the State Planning Commission and the Office of State Planning, to designate such "centers" during negotiations on mapping, which constitute the next phase of the cross-acceptance process.

All of this is designed to lead to the adoption of a "Final" State Development and Redevelopment Plan in early 1992.

But the word "final" may be somewhat misleading as applied to any stage of the state planning process. Just as cross-acceptance picks up where it left off now that the plan has moved from the preliminary to the interim phase, so does the plan itself continue to evolve. Even the "final" version to be adopted next year will have only a three-year period of applicability; thereafter, it is to be reviewed, amended, updated, subjected to cross-acceptance and readopted for another three-year cycle.

And the mapping that needs to take place during each of these cycles is an

extraordinarily complex procedure. Even after all the centers are identified, the boundaries of the planning areas delineated, environmentally sensitive lands pinpointed, towns and villages distinguished from regional centers and hamlets, and each of these designated areas and regions shoehorned into a jigsaw-puzzle map of

Urban area after recommended development: In partnership with community and government, a major corporation establishes itself in the most distant group of empty blocks and helps sponsor revitalization of the neighborhood, including new market-rate housing and recreational facilities.

New Jersey, it still will be necessary to reconcile the incalculable number of differences of opinion and interpretation that will arise among the various levels and branches of government, not to mention the myriad private interests affected by these deliberations. Once the map is drawn, and all 21 counties and 567 municipalities have a chance to examine the graphic implications of the latest version of the plan, all the battles of cross-acceptance begin all over again.

So the process is unwieldy, time-consuming and frequently contentious. It is, at the same time, New Jersey's best hope for planned and orderly growth and development as we head toward the 21st century. And, because it is a continual process, it will evolve over time in ways that reflect public sentiment and best serve the public interest.

It will be the public's desire to fulfill that lofty set of goals articulated in the State Planning Act that will drive the state planning process to its ultimate destination — a New Jersey where we think before we act, plan before we grow, and protect our quality of life while it is still of a quality worth protecting.

Richard V. Sinding, DEPE's director of Policy and Planning, serves as Commissioner Scott A. Weiner's designee on the State Planning Commission.



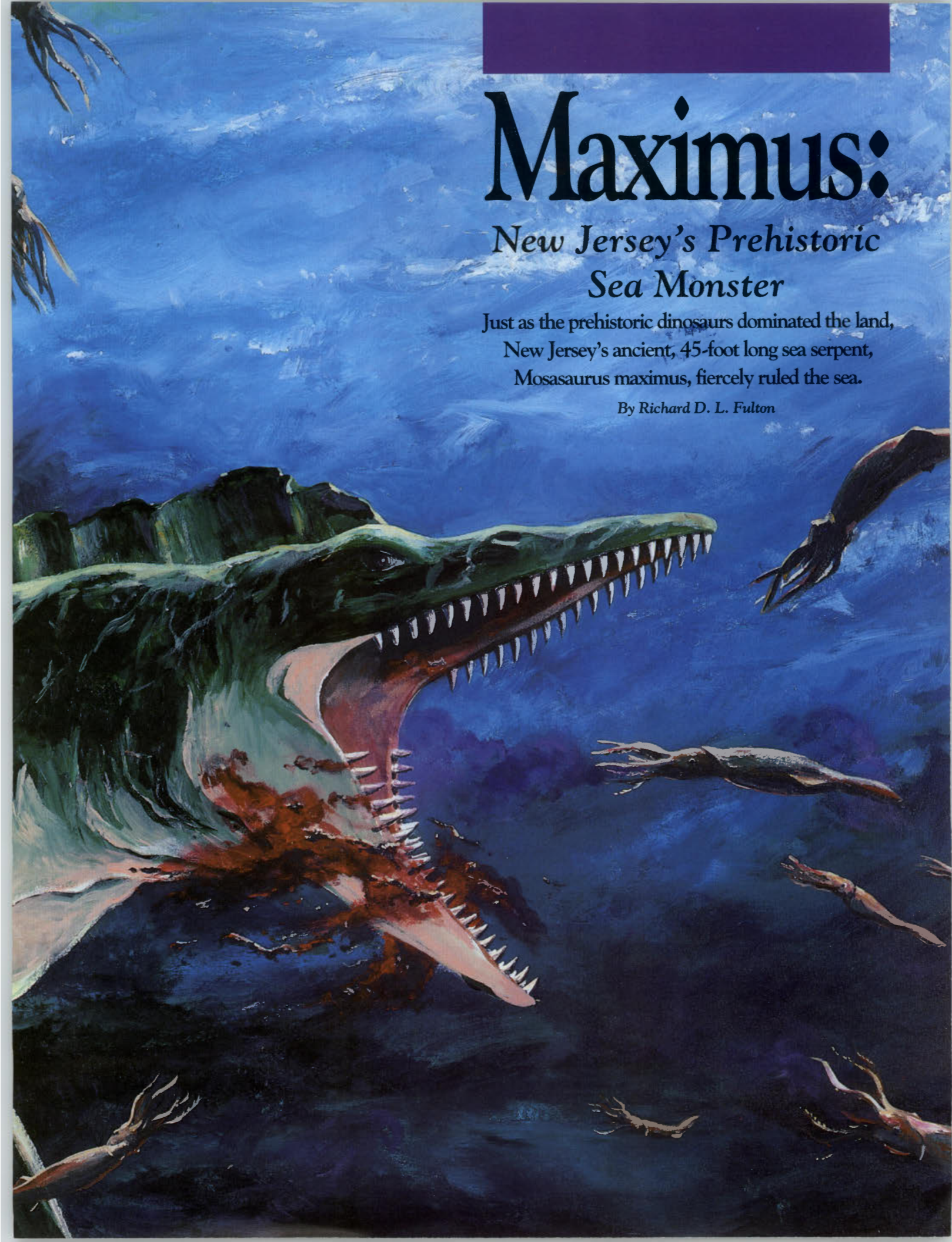
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GROMOLL
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Maximus:

New Jersey's Prehistoric Sea Monster

Just as the prehistoric dinosaurs dominated the land,
New Jersey's ancient, 45-foot long sea serpent,
Mosasaurus maximus, fiercely ruled the sea.

By Richard D. L. Fulton



Beneath the gently rolling hills of Monmouth County and extending to the far southwest of the state lies the buried sea floor of a lost world. Those who seek it out may catch only glimpses of it through “windows” that have been created in the form of creeks or quarries that have reached the ancient seabed through erosion or excavation.

These “windows” in time reveal that a warm, tropical sea once covered much of New Jersey about 70 million years ago during a prehistoric time that geologists refer to as the Cretaceous Period.

In this sea lurked the giant 45-foot *Mosasaurus maximus*, a sleek, killing machine of a reptile with three- to four-foot long jaws and two- to five-inch long teeth designed to grasp, crush and kill anything within its domain.

A View of Prehistoric New Jersey

The former shoreline of the ancient Cretaceous sea in New Jersey extended roughly west of a line from Raritan Bay through Trenton to Salem, where it exited the state and entered what is now Delaware, according to Richard Dalton, chief of the New Jersey Department of Environmental Protection and Energy’s Bureau of Geology and Topography.

“To the northwest of the shoreline sat gently rolling hills populated by various types of dinosaurs who spent their time feeding on the lush, tropical vegetation of the lowlands and the conifers of the highlands, or on each other,” says Dalton.

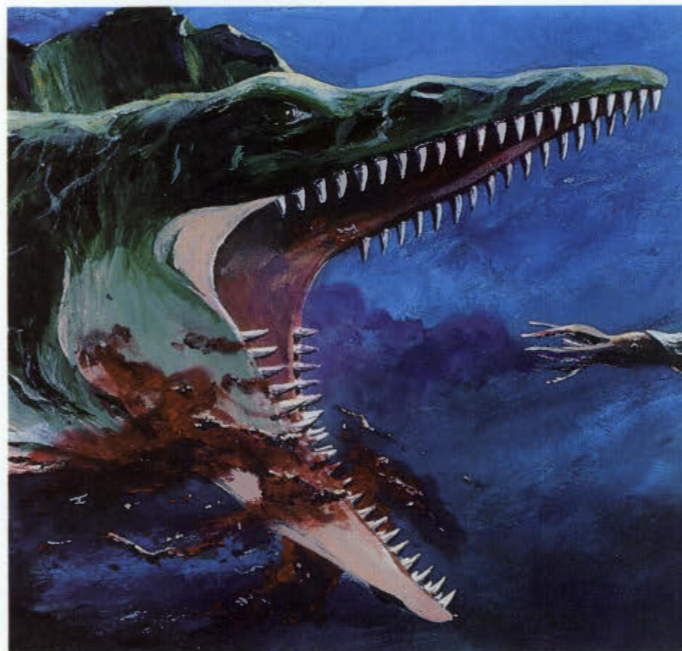
Beyond the foothills sat the primordial Appalachian Mountains, then considerably higher than they are today, possibly exceeding the height of the Alps. The effects of millions of years of erosion would eventually reduce the mountain chain to its present elevations.

Most of the sediments that made up the ancient seabeds were derived from rock particles produced through the erosion of the Appalachians and from minerals formed on the sea floor itself. The sediments of the ancient sea floor have been preserved as a thick bed of greensand known as the Navesink Formation. The formation derives its name from outcrops along the Navesink River in New Jersey, where it was first studied by geologists. In New Jersey, these greensand beds are composed of a mixture of glauconite, sand, clay and other minerals in varying amounts.

The Navesink Formation was deposited on the floor of an inland sea bordering the “newborn” Atlantic Ocean. The Atlantic Ocean itself had begun to form several million years prior to Navesink times when the African Plate split away from the North American Plate, creating an ever-widening gap that quickly filled with sea water. Prior to the breach, New Jersey had been attached to the pre-African continent approximately where Spanish Morocco is today.

The sea life that existed beneath the surface of this ancient ocean in New Jersey consisted of many forms we would recognize today, if only because they looked similar to modern forms. Many of the actual species, however, became extinct with the giant dinosaurs at the end of the Cretaceous Period due to still inexplicable causes.

Oysters, sponges, sea urchins, scallops, snails, clams, crabs, lobsters, squid by the hundred thousands, ammonites and a myriad of other animal forms made up much of the fauna. Even



KIM GROWOLL

Mosasaurus maximus resembled a giant, powerful alligator.

sea turtles, sharks and fish cruised about in the luxurious habitat. But the most fearsome of all creatures was the *Mosasaurus maximus*. Even the many sharks that flourished then offered little competition to this beast that patrolled the coastline with a deadly ferocity.

Rare Traces of the Sea Monster

The first fossils of the *Mosasaurus maximus* were discovered in 1780 in Holland, according to Dave Parris, curator of natural history for the New Jersey State Museum in Trenton. The unnamed animal eventually came to be called the "Great Lizard of the Maas (River)." In Latin, this descriptive title loosely translates into *Mosasaurus*, the formal, scientific name eventually given to the genus of the beast. The trivial name, *maximus*, meaning "great," was assigned to the giant of New Jersey by Edward Drinker Cope in 1869. Thus, the giant mosasaur of New Jersey came to be called *Mosasaurus maximus*. New Jersey's *maximus* represents one of the largest known examples of the mosasaur family.

"In New Jersey, no complete skeletons of *Mosasaurus maximus* have ever been found," says Dalton. "However, several partial skeletons were collected in the state by early fossil collectors during the 19th century. This was when there was more activity in mining the Navesink greensands, creating greater access to the fossils they contain."

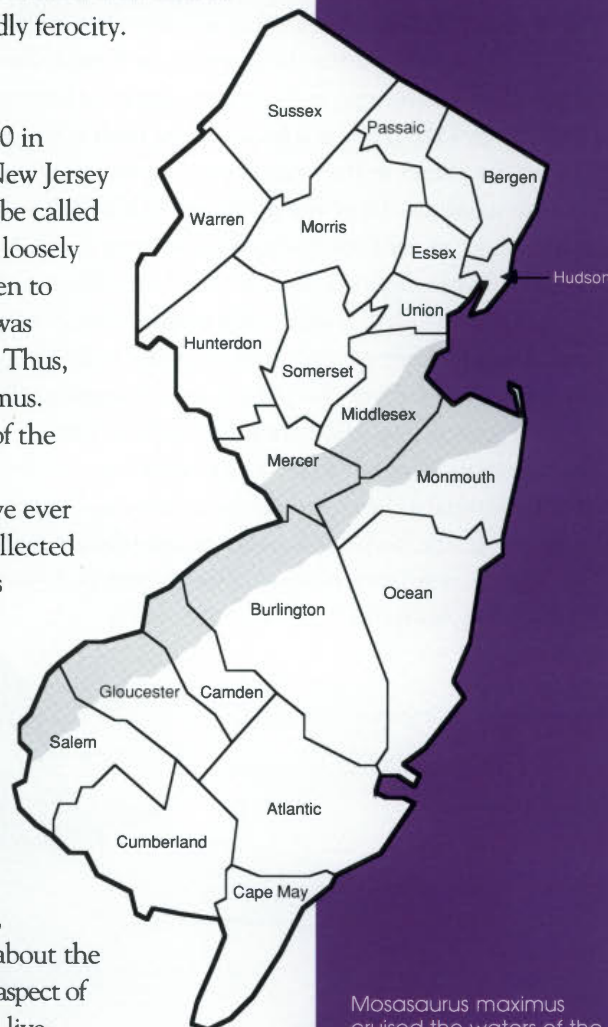
Two essentially complete skulls of *maximus* were discovered in 1961 at the Inversand Marl Company site in Sewell, New Jersey. But any find other than isolated teeth and bones has been rare, Dalton says.

To the untrained eye, *maximus* generally would have looked like a giant, powerful alligator, from the long jaws lined with conical teeth down to the tapering, flexible tail. Instead of feet, however, the mosasaur possessed paddles. It rarely, if ever, left the sea, although it may have come onto beaches to lay eggs. Little is known about the reproduction of the giant mosasaur since little can be deduced about this aspect of the creature's life from its skeletal remains. Dalton says it could have been a live-bearer, giving birth to its young at sea.

The creature's ominous skeletal remains reveal something of its apparent "infamy." Built like a steam engine designed to hunt and kill, the onslaught of a hungry *Mosasaurus maximus* must have assured immediate death to any potential prey caught in its path. It would eat virtually anything — sea turtles, ammonites, possibly even other mosasaurs, but the creature's favorite food tended to be large fish. In hungrier times, *maximus* probably was not above playing the role of scavenger, poking its muzzle around in piles of shells or feeding on a dinosaur corpse that had washed into the sea. Also prevalent in the area at the time were vast schools of squid. Almost certainly, the mosasaurs plunged headlong into these at every opportunity in merciless food-gathering frenzies, just as large sharks do today.

According to studies of the ancient sediments that made up the sea floor, as well as the fossilized remains of other marine inhabitants found in the Navesink Formation, *maximus* apparently cruised in waters near the coastline in depths averaging 100 to 300 feet. Of course, the creature no doubt ventured closer to shore as well as farther out, but it is in sediments laid down at this depth range that mosasaur remains most frequently are encountered.

The range of *maximus* included all of the East and Gulf coasts. *Maximus* probably was a solitary hunter. Fossil remains of this great creature are too rare to suggest it was a pack



Mosasaurus maximus cruised the waters of the ancient Navesink Sea, which covered the area indicated above.

animal. Individual mosasaurs the size of maximus no doubt required a considerable marine territory, which also may explain the scarcity of skeletal finds per square mile of ancient sea floor.

Mosasaurus maximus was not the only member of the mosasaur family cruising the waters of the “Navesink Sea” during the Cretaceous Period. Other related, but smaller types included mosasaurs bearing such generic names as Liodon, Plioplatecarpus, Prognathodon and Halisaurus. Like the genus Mosasaurus, most could also be found in almost every ocean and sea on the planet at the time. However, few could match the inherent ferocity of Mosasaurus maximus. Only the mosasaur Tylosaurus — whose remains are found in the sediments of an ancient sea that existed in areas of what is now known as the Central Plains — could even approach the giant killer sea serpent of New Jersey in size and potential ferocity.

Unlike the giant land animals that roamed the shoreline and foothills of ancient New Jersey and nearby Pennsylvania, the mosasaur was a true lizard, not a dinosaur. Yet these real sea serpents would share the same fate as the giant, distantly related dinosaurs at the end of the Cretaceous Period — complete extinction.

The dinosaurs have left their legacy behind in the form of birds, with so many characteristics shared between them that they no longer can be biologically separated. As one authority put it, the birds are merely feathered dinosaurs carrying on their reign in a more colorful manner. But the only living relatives of the monstrous mosasaur are the monitor lizards of Africa, South Asia and Australia.

Richard D.L. Fulton works in DEPE's Office of Public Participation.

A tooth from a Mosasaurus maximus

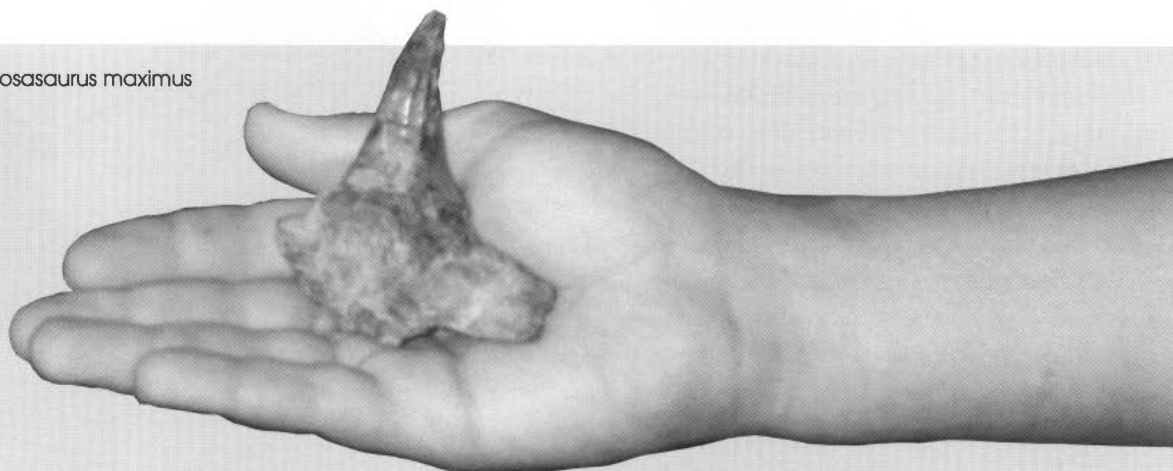


PHOTO BY AUTHOR

In Search of the Great Sea Serpent

For those who would like to try their luck at finding a bone or tooth from the great Mosasaurus maximus, the New Jersey State Museum conducts occasional trips to a Gloucester County site for a reasonable fee. The site involved has produced mosasaur fossils. However, aside from rare mosasaur bones, one can at least expect to find shells and other parts of some of the marine life that lived when maximus cruised in search of prey. For further information on the State Museum field trip, call (609) 292-6330.

For those who would like to explore the greensands of New Jersey on their own for traces of maximus:

❑ Always seek permission from property owners to look for fossils on their land.

❑ Always be prepared to encounter snakes, and check yourself for ticks.

❑ Watch for broken glass from bottles thrown from nearby roads or paths. Always wear shoes or boots when walking in streams to avoid getting cut. For the same reason, always use a tool or stick, rather than bare hands, to investigate an object or fossil partially hidden under debris.

❑ Always consult a specialist, such as the staff of the New Jersey State Museum in Trenton, after finding fossil remains of any vertebrate (such as a mosasaur) that appear to consist of something more than just an isolated tooth or bone. Do not attempt to remove the remains without expert help.

Traffic jams Interstate 80 in Rockaway Township, Morris County. Ground-level ozone may force New Jerseyans to change their driving habits.



Ozone:

It Could Change the Way You Live

By Richard D.L. Fulton

Ground-level ozone may prove to be such a health threat that we are forced to significantly alter the way we live to reduce its formation.

The federal government, recognizing the dangers posed by ground-level ozone, recently passed amendments to the 1990 Clean Air Act, which include requirements for New Jersey and other states to implement stringent measures to reduce ozone to safe levels by 2007.

To protect the air we breathe, air quality specialists not only have enacted or proposed regulations to cut back on the amount of ozone-generating chemicals our vehicles and industries create, but are looking at other methods, including some that may require changes in our everyday lifestyle, such as:

- ☐ Reducing state government and the private sector to a four-day work week. This would reduce overall automobile traffic considerably.
- ☐ Encouraging or mandating that a percentage of the state and private sector work forces "work at home," cutting down on vehicular traffic going to and from work.
- ☐ Encouraging car-pooling. The 1990 Clean Air Act mandates that by 1995, companies with 100 or more employees must increase vehicle occupancy by 25 percent during the weekday commute.
- ☐ Encouraging or mandating the use of alternate clean-burning fuels, which may also include mandating new car designs.
- ☐ Changes in road development. Sometimes, it's not as easy as you might think to get around in New Jersey. Many of our roads follow former animal migration paths, Amerindian trails and stagecoach routes. A new network following modern needs may have to be developed.
- ☐ Establishment of high-occupancy vehicle lanes on our highways and special lanes for buses; congestion reduction methods (traffic control); and vehicle use restrictions in downtown areas.
- ☐ Expanded park-and-ride facilities, bicycle paths and security parking areas for bikes, and pedestrian path and access improvements.

Ozone Poses Health Threat

A study released in August by a Washington, D.C.-based environmental publication ranked New Jersey worst among all the states in terms of the most ground-level ozone and the highest number of automobiles per square mile. Motor vehicles generate more than half the emissions that cause ground-level ozone.

This is reason for concern since ozone, even at low levels of concentration in the air, can cause health problems.

"When inhaled, ozone reacts with and irritates the tissue lining the nose, throat and lungs," says Anthony J. McMahon, deputy

director of Air Programs for the state Department of Environmental Protection and Energy (DEPE). "Ozone also interferes with the actual functioning of the lungs.

People who are most affected by inhaling ozone are those who have asthma, chronic lung or heart disease, or allergies."

People who exercise

strenuously outdoors when ozone concentrations are high may also experience adverse health effects.

Recent studies have shown that exposure to high levels of ozone or frequent exposure to lesser amounts may cause adverse effects even in individuals with healthy respiratory systems, says McMahon.

Chest pains, coughing, wheezing, pulmonary and nasal congestion, labored breathing, a sore throat and nausea may occur as symptoms of ozone exposure. The duration of the exposure and degree of ozone concentration in the air are important factors in determining how long the adverse effects will be felt.

DEPE maintains more than two dozen stations around the state to monitor air quality. If ozone levels above the health standard are found in a given area, or statewide, the department issues an ozone forecast, recommending that residents — especially the elderly, those with existing respiratory problems and children — limit their outdoor activities.

However, alerting people to poor air quality is merely

addressing the after-effects of ozone pollution. More important is attempting to lessen the amount of ozone being formed.

Ozone is formed from a reaction between volatile organic substances and nitrogen oxides in the presence of strong sunlight or lightning. This is called a photochemical reaction, "photo" referring to light.

Not All Ozone Is Harmful

Upper-level ozone, in the form of the ozone layer, provides protection from harmful ultraviolet light emitted by the sun. In the upper atmosphere, the occurrence of ozone is a natural phenomenon, generated by the airborne presence of the necessary chemical ingredients and intense sunlight.

Ground-level ozone can be natural or man-made. Natural ground-level ozone may be produced by the interaction of sunlight or lightning with volatile organic substances generated by volcanic activity or emitted by oil seepage. Man-made ozone occurs as a result of the same principal, except that the sunlight or lightning is reacting with vehicle or industry-generated volatile organic substances and nitrogen oxide.

Automobiles are a major source of emissions that cause ground-level ozone in New Jersey. In its efforts to meet federal standards for ozone, New Jersey has begun to examine the motor vehicle emission program established by California. California for the past 30 years has been a leader in developing automobile emission standards. As the state with the most severe air pollution problem, California has become the only state allowed under the Clean Air Act to have emission standards more stringent than those required by the federal government.

California has enacted various revisions of its vehicle emission program over the past several years, with additional revisions ongoing. This program is designed to encourage technical development of low-emission, and eventually, zero-emission vehicles.

States have been given the option of adopting the stricter California standards or retaining the federal car standards as they strive to meet the standards of the federal 1990 Clean Air Act amendments. Gov. Jim Florio has instructed DEPE to pursue adoption of the California standards.

"New Jersey is presently planning to propose California standards for car model 1996," says Nancy Wittenberg, director of

Cars are a major
source of
emissions that
cause ozone.

EVOLUTION OF TRANSPORTATION



4000 B.C.



2100 B.C.



1750



1839

Early transportation moved one or a few people at a time.

DEPE's Office of Energy. "The standards will necessitate that auto manufacturers redesign their vehicles to enable them to meet California standards if they are to be sold in New Jersey."

Redesigning could involve a change in the design of the current catalytic converters as well as engine components, or creating a car that runs on alternate fuels, she says. If adopted, this could result in manufacturers having to produce one group of low-emission vehicles for the Northeast and California areas, and a second type for less strict auto emission states.

The federal Environmental Protection Agency has suggested a number of incentives states may offer to encourage sales of the strict emission standard vehicles. These could include exemptions to some transportation control measures, preferential parking provisions for low-emission vehicles or special registration fees to be applied to non-clean fuel vehicles still in use or being manufactured.

"Combining the California emission program standards with expanded use of alternate fuel vehicles, the development of cleaner-burning fuels, increased use of public transportation and office van pools will be a tremendous step toward providing for cleaner, fresher air over the Garden State," says DEPE Commissioner Scott Weiner.

Vehicle Inspections Control Ozone

The New Jersey Division of Motor Vehicles oversees a thorough vehicle inspection program that helps control ozone caused by emissions from poorly maintained vehicles. Anyone who sees a car that obviously has an emissions problem should call DEPE's Bureau of Transportation Control at (609) 530-4036 to report the vehicle. The state then will notify the owner that his or her vehicle is being called back for a "reinspection," and the owner will be required to address the problem.

Authorities often are amazed that citizens will report an industry emitting an odor, but are reluctant to report a vehicle that probably is emitting more dangerous contaminants than the reported industry.

Service stations are another source of volatile organic substances that contribute heavily to air pollution and the formation of ozone. In the past in New Jersey, volatile organic

To obtain daily air quality readings, call:

1 (800) 782-0160

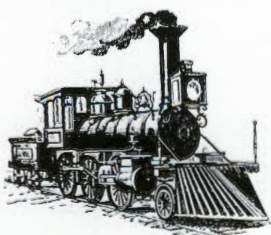
substances were allowed to escape freely into the air as gasoline (a major source of the substances) was being pumped into vehicles. The state now requires service station pumps to be equipped with complex vapor recovery systems. These systems prevent volatile organic substances from escaping into the air and pump the fumes to holding tanks for proper disposal later.

Industry also generates volatile organic substances and nitrogen oxide. These emissions are heavily regulated by both federal and state standards, and violators of state air permits face penalties of up to \$50,000 per day. Repeat offenders can even have their air permits revoked by the state if they generally have disregarded state warnings to address the problems. In addition, DEPE has initiated measures to help industry reduce its use of chemicals and products that can lead to the creation of pollution. This has been termed "source reduction."

Unlike natural calamities, ozone generation at ground level is something everyone can do something about. Whether an industry conducts an environmental audit of its facility to see how it can voluntarily reduce emissions, or two neighbors decide to do their grocery shopping together instead of using two vehicles, every step to reduce emissions of volatile organic substances and nitrogen oxide is a step toward being able to breathe good, clean air.

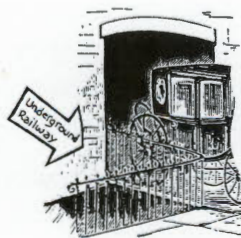
The state already has implemented a number of initiatives to help deal with this acute air pollution problem and eventually comply with the 1990 Clean Air Act. Other efforts, however, are likely to require some degree of lifestyle sacrifices by New Jersey residents themselves.

Richard D.L. Fulton works in DEPE's Office of Public Participation.

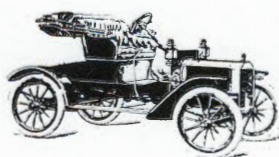


1840s

Mass transit provided for a more efficient way to move larger numbers of people.



1863



1870s

Cars that transport one or a few people at a time represent a move backward in the evolutionary timetable.



1904

The future: Mass transit

New Jerseyans Worried, But Often Misinformed

Three-quarters of New Jersey residents believe that poor air quality poses a direct threat to their health or the health of a family member, yet most are unwilling to make the changes in travel habits that could help clean the air.

These are among the findings of a recent Eagleton poll commissioned by the Regional Plan Association of New Jersey for Project: CLEAN AIR, a consensus-building effort to find solutions to air pollution

and congestion in New Jersey.

The telephone survey of 800 New Jerseyans found that though most are concerned about the health risks of poor air quality, they're misinformed about the sources. Most surveyed said they believed industry was the number-one culprit in generating pollution responsible for creating ground-level ozone. Industry is responsible for only about one-fifth of the emissions that cause ground-level ozone in the state. Motor vehicles, the single biggest cause, generate more than half.

Among the other findings:

☐ New Jerseyans underestimate the severity of the ozone problem. More than half of those surveyed rated air quality in their own areas as

good or excellent, yet every area of the state fails to comply with federal health standards for ground-level ozone. More than 80 percent of the respondents ranked the quality of air in the entire state as either excellent, good or fair. New Jersey, however, shares the Environmental Protection Agency's "severe ozone" designation with only seven other metropolitan areas in the country.

☐ More than 70 percent of employed New Jerseyans drive to work alone. Of those, only 19 percent said they definitely would consider participating in a car pool to travel to work.

☐ Asked to rank a number of policies aimed at reducing air pollution or traffic congestion, respondents gave

the lowest approval rates to those that would discourage automobile use. Nearly half said that increasing fuel taxes and vehicle registration fees would be unacceptable. More than 70 percent supported the use of cleaner-burning fuels, making this the most popular policy choice. Coming in second was the improvement of the road system to reduce traffic congestion.

☐ More than 80 percent said they favor stronger efforts to control air pollution. Three out of five said they would support these efforts even if they would cause an increase in taxes. Two-thirds said they favor controlling air pollution even if it would force companies to raise prices on their products.

What You Can Do to Help

The New Jersey Department of Environmental Protection and Energy has compiled a list of ways vehicle owners can help reduce ozone:

☐ Keep your vehicle well-maintained. A small number of poorly maintained vehicles also contributes a disproportionate amount of ozone-generating chemicals and compounds into the air.

☐ Live near amenities. When purchasing or renting a new home, or relocating a business, consider the distance that will be driven to reach the nearest stores, workplaces, service area and other places that will be visited frequently.

☐ Drive less. Many short trips from place to place add a great deal of pollutants into the atmosphere. By walking, biking or riding with others, some of these

trips can be eliminated. Reducing the number of car trips can benefit the environment and relieve traffic congestion.

☐ Drive at 55 mph. The car emits the least amounts of pollutants at that speed.

☐ Ride with others. Although homes and work locations often are scattered throughout the state, there are opportunities for people to share rides to work and elsewhere. Car-pooling, van-pooling and ride-sharing also lead to savings in gasoline purchases, vehicle maintenance and insurance costs.

☐ Take a bus or train. If you are fortunate enough to live near a bus route or train line, use those services when possible. By using mass transit, highway congestion is relieved and air quality can be improved.

Artificial Lures: Ready When You Are

By Joe Daly

With all of the many changes that have taken place in the world of fishing over the years, there probably is none more confusing and complex than the proliferation of artificial lures. Even longtime anglers find that they are a little confused about just how, when and where to fish each different type.

With that in mind, perhaps it's time to take a little closer look at them. The primary purpose of artificial lures is to replace natural live bait. The advantage of such stand-ins is that artificial lures are always available, regardless of seasonal changes or time of day, and they last longer than live bait.

No matter how many racks and aisles of lures you are able to find in your local sporting goods store, there are only five basic types: jigs, spoons, spinners, soft bodies and plugs.

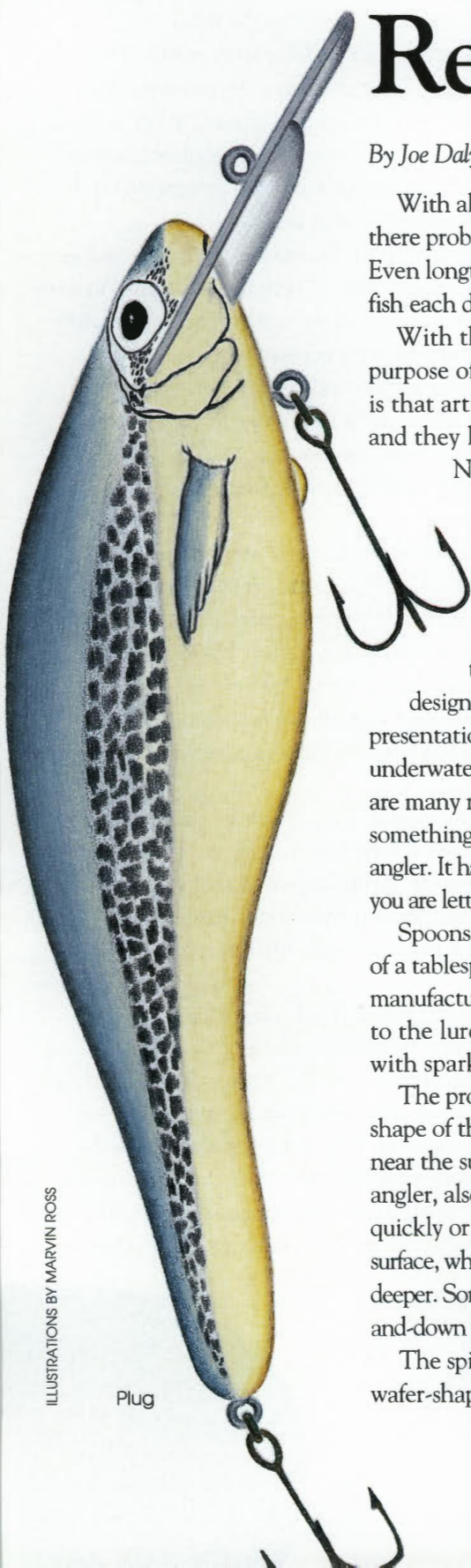
The jig is nothing more than a hook with a lead weight placed along the shank. This basic type of lure can and has been dressed with such materials as yarn, colored hair, bucktail and rubber skirts to help make it look more enticing to the fish. However, regardless of how anglers dress it, it is still a jig or weighted hook

designed to be fished on or very near the bottom of the lake. The most often used presentation with the jig is to bounce it up and down on the bottom to resemble a small underwater creature making its way from one spot to the next. Available on the market today are many rubber bodies and other dressings that can be used to make the lure look more like something to eat, but the choice of such dressing, as well as the color, is strictly up to the angler. It has been said that the very best way to fish a jig is to never allow the line to go slack when you are letting it drop down to the bottom, since many fish will strike the lure on the way down.

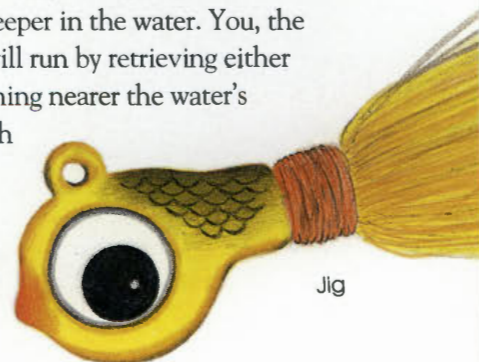
Spoons are easily identified by the fact that most look like the large, bowl-shaped portion of a tablespoon. The spoon lure has changed very little over the years, although lure manufacturers have made many attempts to make their particular spoons the most attractive to the lure-buying public. The metal spoons have been painted, plated and even coated with sparkling contact paper.

The proper way to fish a spoon is through use of a steady retrieval that will allow the spoon shape of the lure to cause it to wobble through the water. Small, lightweight spoons will run near the surface, while the larger, heavier spoons will travel deeper in the water. You, the angler, also can have a lot to do with just how deep the lure will run by retrieving either quickly or slowly. A fast retrieval speed will keep the lure running nearer the water's surface, while a very slow retrieval will allow the spoon to run much deeper. Some success has been had by jiggling the spoon in an up-and-down motion when fishing over structures in deep water.

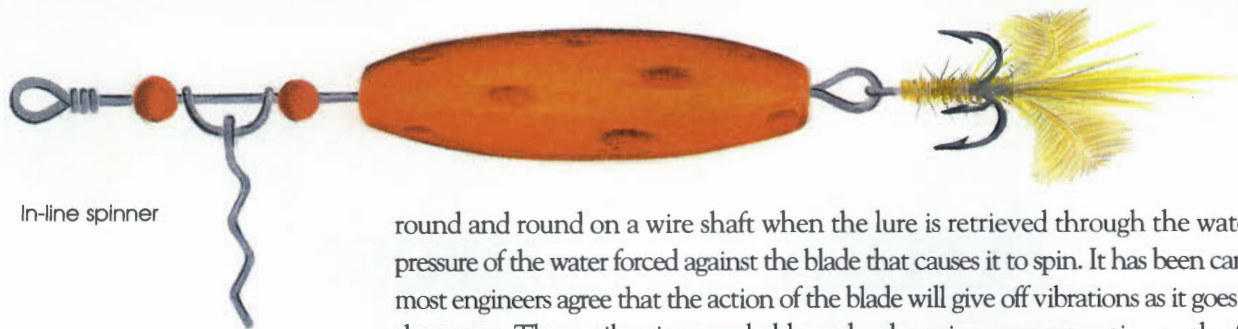
The spinner gets its name from the addition of a blade or wafer-shaped, beveled piece of metal or plastic that will spin



ILLUSTRATIONS BY MARVIN ROSS



In-line spinner



round and round on a wire shaft when the lure is retrieved through the water. It is the pressure of the water forced against the blade that causes it to spin. It has been carefully studied, and most engineers agree that the action of the blade will give off vibrations as it goes spinning through the water. These vibrations probably make the spinner so attractive to the fish.

There are two basic styles of spinners, and both of them will catch plenty of fish. The first style is commonly called an in-line spinner. This is a spinner that has a straight wire onto which all of the other lure components are attached. As with jigs and spoons, spinners often are dressed by either the lure manufacturer or the individual angler. Many anglers consider the in-line spinner to be ideal for catching plenty of panfish such as perch or sunfish, but I have found these lures very effective on trout, bass and pickerel as well.

The second type of spinner is called the spinnerbait. This is sometimes referred to as the safety pin-style spinner because the wire body of the spinnerbait is bent in such a fashion as to resemble the bend of an open safety pin. The greatest feature of the spinnerbait is that while the weighted lower arm of the lure holds the hook, the upper section of wire holds the spinner blade and prevents the hook from getting snagged on underwater logs, stumps and weeds. This does not make the lure completely weedless, but it does allow the angler the opportunity to fish in and around heavy structures with only an occasional snag. Most spinnerbaits have the hook dressed with a rubber skirt, although some are available with bucktail or some other form of dressing.

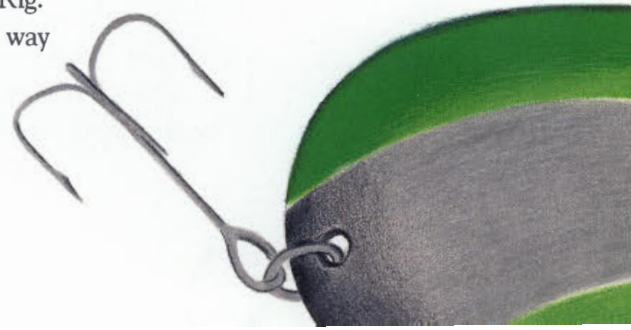
All spinners are available in many different sizes, shapes, colors and weights, and as is usually the rule, you will find plenty to choose from. The color is strictly up to the individual angler, but the most often used colors are white, chartreuse, black or purple. The color of the blade used depends on the color of the water. If the water is clear, a silver blade works best, and if the water is murky, a gold or brass-colored blade is believed to be best. One reason to be concerned about the color of the blade is that the light from above is reflected off the spinning blade into the water. This reflection is said to be every bit as important as the vibration given off by the spinner.

The next family of lures that you are sure to find productive is commonly called the soft-bodied lures. They obviously get their name from their soft bodies, made from soft rubber or plastic. For the most part, the soft-bodied lures are made in the shape of actual living creatures that fish find tempting. The oldest and best-known style of soft-bodied lure is the plastic worm. The secret to its success is that it not only looks lifelike, it also feels lifelike to the fish trying to eat it.

There is a wide variety of soft-bodied lures available on the market. The plastic worm may be the most popular, but the family includes lizards, salamanders, snakes, frogs, mice, leeches and insects. The right color is strictly a personal choice. The most commonly used colors are black, purple, motor oil green and red. While many of the soft-bodied lures come equipped with hooks, the plastic worms, lizards and salamanders are sold with no hook at all. This leaves the rigging up to the angler. There are several methods of rigging the plastic worm that will work, but without a doubt, the most popular method is what has come to be called the Texas Rig.

The Texas Rig is a great way to fish the plastic worm because it allows the angler to keep the point of the hook

Jig



Soft body



embedded in the body of the worm until the angler sets the hook on the fish. With the hook point well-hidden, the worm can be fished right in the thickest structures, such as weeds, lily pads, stumps and logs, with little worry it will get snagged. The plastic worm can be fished either with or without any added weight. With no weight, the plastic worm works great for fishing over lily pads and weed beds. With a weight added, the plastic worm can become a bottom lure, allowing the angler to use any number of various retrievals to entice a fish into striking.

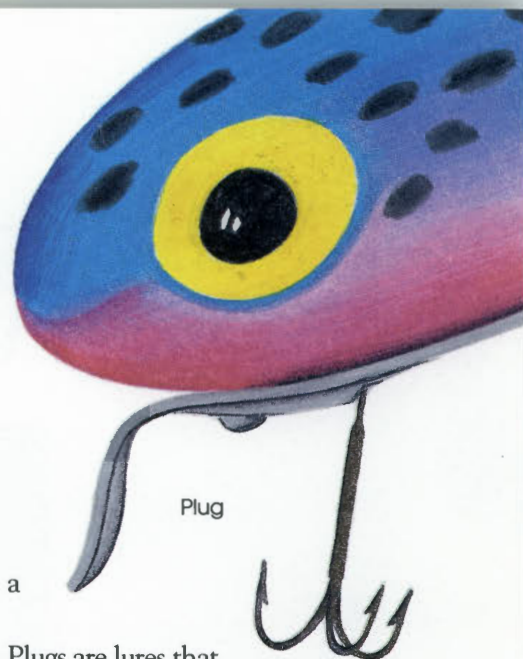
The fifth and final lure family is referred to as the plugs. Plugs are lures that have been carving their way into the tackle boxes of anglers for a long time. I use the word carving because that is exactly how they got their start. It is believed that the name plug came from the fact that the earliest models literally were carved from plugs of wood. While there still are a few wooden versions on the market, most of the plugs we now buy are made of injection-molded plastic. These lures have many different shapes, sizes and colors, but all of the members of the plug family are somewhat cigar-shaped, or some variation. Many plugs are designed to look like small fish, while others resemble frogs, birds and crayfish.

There are several basic styles of plugs, and each has its proper place. The different styles include the sinking plug, the shallow diver, the medium diver, the deep diver and the floater. As the names suggest, the floater is a plug designed to float on top of the water at all times. The shallow diver is a plug that has a short bill on the front of the plug body that causes the lure to dive under the water, usually not more than one or two feet. The medium diver is a plug that has a slightly longer bill on the front of the plug body, and this bill will make the lure dive a little deeper, usually from two to five feet down. The deep diver has a long bill on the front, and it will dive down from six to 15 feet under the water, depending on the model you purchase. The entire series of diver lures will float on the water's surface until they are retrieved through the water. The pressure of the water while the lure is in motion acts against the bill on the front of the lure, causing it to dive. The sinking plug is sometimes referred to as the countdown lure, and it will begin to sink down toward the bottom at the rate of about one foot every second. This allows the angler to begin counting just as soon as the plug hits the water, and then begin reeling in the lure when it gets down to the desired depth.

The floater version of the plug is often said to be the most exciting of all for the angler. The excitement comes from the fact that you not only get to watch the lure being worked on the water's surface, you also experience a bit of a start when a fish breaks the surface of the water to grab the lure and head for the bottom. It is sort of like playing with a jack-in-the-box toy. You know it's going to pop at some point, but you're never really ready for it.

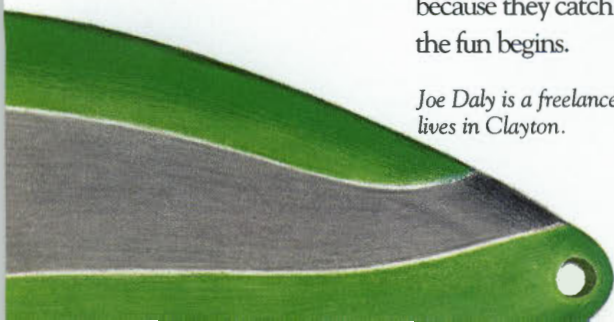
That's all there is to that wide selection of artificial lures. It's important to get acquainted with them since they will allow you to go fishing at any time of the year. Most of all, you'll want to use artificial lures because they catch plenty of fish — and that's when the fun begins.

Joe Daly is a freelance writer who lives in Clayton.

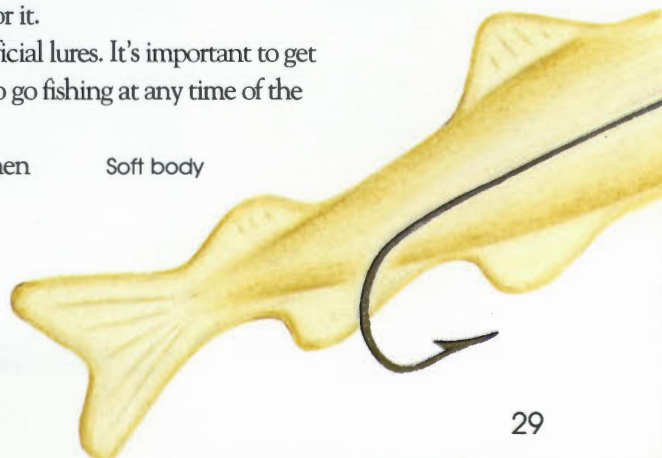


Plug

Spoon



Soft body



Window on Winter



Snow and rocks give a globe-like appearance to the side of a mountain in Stokes State Forest, Sussex County.

WALTER CHOROSZEWSKI




HERB SEGARS



WALTER CHOROSZEWSKI

Waves crash against the jetty at Point Pleasant Beach, Ocean County.

The Volendam Windmill stands out against a winter backdrop in Holland Township, Hunterdon County.



Water freezes into icy white sculptures at Great Falls in Paterson, Passaic County.

Frost crystals (below) form a variety of patterns on a window pane.



CORNELIUS HOGENBIRK





WALTER CHOROSZEWSKI



WALTER CHOROSZEWSKI



CORNELIUS HOGENBIRK

Water swirling over rocks (opposite page) gives a glassy appearance to the Raritan River in Lockwood Gorge, Hunterdon County.

Mallards make their way across the frozen surface of a cove off Barnegat Bay in Waretown, Ocean County.

A dark sky looms over a farm in Sussex County.



WALTER CHOROSZEWSKI



Flights of Fancy in Store For N.J. Pheasant Hunters

By Russ Wilson

There was a time when New Jersey had abundant numbers of wild ringneck pheasants. Farms were common throughout the rural countryside and pheasants were everywhere. During the mid-1940s to mid-1970s, it was possible to enjoy good pheasant hunting in almost all of the state's 21 counties.

Those "good old days" are but a memory. A continuing loss of undeveloped land to residential housing, strip malls and light industry, and the advent of modern farming practices designed to maximize crop yield from every workable foot of land, all but eliminated the type of habitat that's preferred by wild pheasants.

Wild pheasant populations hit new lows during the 1980s. Fortunately, ample hunting opportunities still exist because of a stocking program initiated by the New Jersey Division of Fish, Game and Wildlife.

The division has set up a zone system utilizing selected wildlife management areas in the northern, central and southern regions

A successful day of hunting
(above) at the Flatbrook-Roy
Wildlife Management Area

for its pheasant stocking program. During the 1991 small game season, ringnecks will be stocked onto six northern region management areas, plus the Delaware Water Gap National Recreation Area. A total of seven management areas in the central region, plus Fort Dix, will be stocked on a regular basis. In the southern zone, a total of nine wildlife management areas will receive pheasants during November and December.

These management areas offer a varied terrain, with the kind of ground cover and hunting opportunity to satisfy everyone from the young buck who doesn't mind walking many miles over hill and dale, to the not-so-young hunter who prefers a much slower and easier pace.

Rolling hills and mountains dominate the northern scene. Sportsmen planning to hunt northern county management areas had better be in good shape. My first hunt in an out-of-the-way section of the Walpack Wildlife Management Area was a real eye-opener in that it showed the importance of preseason physical conditioning.

The late Newark Star-Ledger saltwater editor Bob Duffy, outdoor writer Lester Hodax, myself, a pair of frisky German shorthairs and three members of the division hiked up a washed-out dirt road leading to a stand of pines nestled near the mountaintop.

The trip up the mountain couldn't have taken more than 15 or 20 minutes, but it was a bit much for us clam diggers. As we approached the road's end and an opening leading to a large, overgrown field, one of the shorthairs went on point. I was elected to take the first bird and confidently waded into the brush to take what I felt would be an easy shot.

Walking past the dog, I pushed into the thick cover, and out popped a very startled ringneck. I missed with the first shot, recovered in time to pop off a second, and then realized that I was huffing and puffing so hard from the uphill climb that I couldn't hold the gun steady enough to get on target.

It was a lesson I've not forgotten in the 20 or so years that have passed since that mid-November morning display of how not to shoot pheasants. Today, I no longer rush to be the first; that's for the young and strong of heart. Being a tad older and a lot wiser, I may not shoot as many birds as the young bucks, but then I don't embarrass myself either.

Although it was one of the first management areas, having been purchased in 1932, Walpack isn't very large. The entire tract covers just 387 acres spread along both sides of Route 615 in Sussex County, starting approximately five miles west of Walpack Center.

The Big Flatbrook runs through the center of the tract, and birds that are released in the fields often head for the thick cover flanking the stream. There's a small spot where the brook parallels the road before making a sharp U-turn that always holds a couple of birds, but never any hunters.

Berkshire Valley in Morris County is a sleeper. The original

purchase of 1,320 acres in 1940 was funded through fishing and hunting license sales. An additional 480 acres later added through Green Acres funding brought the total to 1,800 acres of what many sportsmen feel is the finest upland game habitat in the northern portion of the state.

Berkshire Valley does get a lot of hunting pressure on days when the division is stocking birds. However, at other times there are few hunters and it is possible to find plenty of room to work a dog on birds that escape to the swamps and wetlands flanking the Rockaway River and Stephen's Brook.

Obviously, there is good pheasant hunting to be had in the northern part of the state. However, most of the northern area

management tracts are within an easy drive of many major population centers and are heavily pressured compared to those in the central and southern areas.

A favorite of central-zone pheasant hunters is Stafford Forge Wildlife Management Area. Located west of the Garden State Parkway in Ocean County, Stafford Forge is sandwiched between the towns of West Creek in Eagleswood Township,

Tuckerton and Warren Grove. The tract, purchased in 1965 with funding from the Green Acres program, covers some 2,788 acres, most of it forests, ponds, small creeks and wetlands, which provide exceptional habitat for whitetail deer and waterfowl, but do not provide much in the way of cover for pheasants.

Determined to provide increased hunting opportunity for central state bird hunters, the division constructed fields, hedgerows and edge cover. These are stocked with pheasants on a regular basis during November and December.

The principal pheasant hunting areas are located on the west side of Route 539 and are accessible from Tuckerton to the east or, for those driving in from the western part of the state, Warren Grove.

I've had some memorable days on the Manahawkin Wildlife Management Area. Although the entire tract covers only 965 acres, it is located in a rather sparsely developed section of Ocean County, one that doesn't get a lot of attention from local or out-of-county hunters.

Access to this area is via the Garden State Parkway to Route 9, off Stafford Avenue, Bay Avenue (Route 72), which leads to Manahawkin from the west, and a network of dirt roads leading to a series of fields. These fields are designed to provide optimum upland game habitat. As you might have guessed, the fields are stocked at regular intervals and usually attract a crowd.

Rolling hills and mountains dominate the northern scene.

If the fields are crowded, as they often are during the peak of the small game season, local bird hunters don't waste a lot of time following the crowds. They head for swamps and wetlands bordering nearby lakes and ponds, for that's where most of the fresh-stocked pheasants will be found soon after the first shots are fired.

The major difference between northern, central and southern state wildlife management lands, other than terrain, is size. It costs a ton of money to purchase large tracts of undeveloped land in northern and central New Jersey, but until recently, property was very inexpensive in the southern part of the state.

The division began buying up huge tracts of undeveloped land in the southern half of the state during the Depression when property owners were begging for buyers. Many of these early purchases are today's 12,000- to 15,000-acre management areas.

The Lester G. MacNamara (formerly Tuckahoe-Corbin City) Wildlife Management Area in Atlantic and Cape May counties, with 12,377 acres purchased in 1933, is one of them. It is one of the best upland game hunting areas in the southern portion of the state, harboring a healthy native population of cottontail rabbit, gray squirrel and woodcock, and a surprisingly large number of pen-reared pheasants that hold over following the fall and winter stocking program.

The most difficult aspect of hunting the MacNamara tract is its size. With more than 12,000 acres, much of it salt marsh and low-lying wetlands, finding birds can be a problem. Anyone unfamiliar with the layout of this area is advised to obtain a Wildlife Management Area Guide and topographic maps, which detail the area. For guides, call (609) 292-2965. For maps, call (609) 777-1038.

I usually allow time each fall to hunt the Winslow Wildlife Management Area at least a couple of times. Although it is a bit of a drive for me from the central part of the state, the exceptional cottontail rabbit hunting more than justifies the additional time and effort involved in getting there.

Located south of County Road 720 in Gloucester and Camden counties, the Winslow tract is bisected by the Egg Harbor River and the Atlantic City Expressway. Access is via Piney Hollow Road, Malaga Road, Winslow Road and Blue Anchor Road. Piney Hollow and Malaga roads intersect Route 322 (the Black Horse Pike), a major east-west artery.

Winslow is large by northern area standards, having a total of 6,566 acres, most of it woodlands and wetlands flanking the Egg Harbor River. The principal pheasant hunting areas are four man-made fields. These are planted annually with the types of foods

Thousands of ringneck pheasants will be stocked onto state wildlife management areas.



BRECK P. KENT

preferred by rabbits, ruffed grouse and ringneck pheasants. The fields and adjacent woodlands also are visited by whitetail deer, gray squirrels and waterfowl.

It is possible to hunt pheasants without a good pointing or flushing dog, but I do not advise it when planning a day at any of the state-owned wildlife management areas.

When crews from the Bureau of Land Management are stocking pheasants, they stop at each field, drop off a few birds and move on to the next location. The birds are well-dispersed and nearly impossible to locate without having a well-trained pointing or flushing dog to sniff them out of hiding.

The 1991 statewide pheasant season opened on November 9 and runs through December 7, and from December 16 through January 4. The daily bag limit is two males. In addition, hunting from December 16 to February 17 is permitted within designated areas only and in all wildlife management areas. The bag limit is two birds of either sex. Other than the requirement that bird hunters purchase a pheasant and quail stamp (\$20), and the bag limit, rules and regulations regarding hunting on state-owned wildlife management areas are the same as those that apply elsewhere in the state.

In addition to the pheasant and quail stamp, sportsmen

utilizing New Jersey wildlife management areas must have a current, valid hunting license (\$20 resident, \$100 nonresident), and wear at least 200 square inches of fluorescent orange clothing.

If there is a key to being a success at hunting wildlife management area ringnecks, it is knowing when the state will release the birds and getting there ahead of the crowds. The dates birds will be stocked are provided below. The rest is up to you.

Russ Wilson is an outdoor writer who lives in Neptune.

Here's Where You Can Find Them

The Division of Fish, Game and Wildlife will stock approximately 50,000 pheasants in 1991, with 26,360 going to wildlife management areas in the northern region, 12,080 to the central region and 11,780 to the southern region. The following schedule was tentative at press time, but is not likely to change, according to Dave Chanda, chief information officer for the Division of Fish, Game and Wildlife.

❑ **Northern-region management areas** included in the pheasant stocking program are Flatbrook-Roy, Whittingham, Walpack, Black River, Berkshire Valley, Clinton and the Delaware Water Gap National Recreation Area.

Each of these areas were scheduled to have pheasants released on November 9*, 12, 14, 16, 19, 21, 23, 26, 28 and 30, and December 14, 17 and 19. In addition, on December 21 and 28, birds will be available for hunting at Flatbrook-Roy, Black River, Clinton and the Delaware Water Gap Recreation Area.

❑ **Central-region management areas** included in the stocking program are Assunpink, Colliers Mills, Howardsville, Manahawkin, Manasquan River, Medford and Stafford Forge. Also included in the pheasant allotment is Fort Dix.

Assunpink and Colliers Mills were scheduled to have birds released on November 9, 12, 14, 16, 19, 21, 23, 26, 28 and 30, and December 14, 17, 19, 21 and 28.

Howardsville, Manahawkin, Medford and Stafford Forge were scheduled to have birds released on November 9, 16, 21, 23 and 30, and December 14. Fort Dix was scheduled to be stocked November 9, 12, 14, 16, 19, 21, 23, 26, 28 and 30, and December 14, 17 and 20.

Manasquan River Wildlife Management Area was scheduled to be stocked on five Saturdays, November 9, 16, 23, 30 and December 14, and Thanksgiving Day.

❑ **Southern-region management areas** that were slated to receive pheasants include Glassboro, Dix, Mad Horse, Bevans, Nantuxent, Port Republic, MacNamara, Winslow and Heislerville.

Glassboro, Bevans and MacNamara were scheduled to be stocked on November 9, 12, 14, 16, 19, 21, 23, 26, 28 and 30, and December 14, 17, 19, 21 and 28. Mad Horse, Winslow and Heislerville were scheduled to have birds available for hunting on November 9, 12, 14, 16, 19, 21, 23, 26, 28 and 30, and December 14, 17 and 19.

**We realize that, because of the magazine's printing schedule, it may be too late to take advantage of the earliest stocking dates. We've provided the complete schedule, however, for informational purposes.*

Getting Ready To Go Cross-Country Skiing

By Nancy Wolff

A skier casts a shadow on the Tempe Wick House in Jockey Hollow, Morris County.



PHOTOS BY AUTHOR

Most skiers probably would be very happy if the laws of nature required that snow fall regularly each winter, eight to 10 puffy inches at a time, on mountains, parklands, ski trails and hill and dale.

It's tough to be a skier who has no snow.

But when there is snow, New Jersey lights up with convenient, comfortable, charming, challenging ski trails. Some are on public land, while others are privately owned and maintained.

Cross-country skiing is one of the fastest-growing winter sports in the nation. These factors contribute to its growth:

- ❑ It's relatively easy to learn. Like racquetball, one can achieve "instant mediocrity" on "skinny skis," shuffling along on fairly level ground.

- ❑ It's a sport the whole family can enjoy.

- ❑ It's good for you aerobically; your entire body is involved.

- ❑ You can ski in your back yard or local park. You don't need to travel to Vermont, Canada or Austria to practice.

In your first hour on skis, you can move along on snow and have a good time on level terrain such as a field, a canal towpath or an unplowed road. Lessons are available for those who want formal instruction.

Should you have downhill skiing experience before trying cross-country skis? Well, yes and no, say the two schools of thought. Yes, it helps build confidence in your ability to move on snow and to use your poles. No, it's better to face a new sport innocently, with no bad habits to unlearn.

How much snow do you need? On a flat, grassy field, you can ski on a couple of inches. Most people suggest at least 4 inches of snow to cover stones, sticks and uneven terrain. On hilly ground, 6 to 8 inches or more are needed. Skis pack snow quickly just by gliding over it. Falling, turning and snowplowing to check speed all erase snow very rapidly and add to ski hazards. If you do fall, fill in your "sitzmark" (that hole you made in the snow) so the next skier doesn't catch an edge in it.

You want to ski, but there's no snow? Follow the downhill crowd: Go to an area where they make snow.

Wherever the snow is, you want to be ready. What to wear?

Clothing: Whenever you are out in the cold weather, layering is the key. Cross-country skiing makes you sweat. When you are wet, you can lose body heat. You want to avoid becoming chilled, so you need to wear layers of clothing.

The layering principle is similar for any sport. It's often described in catalogs and brochures from outdoor outfitters or product manufacturers. The first layer, long underwear, does two things. It traps a layer of warm air next to your skin and draws away the perspiration your body produces while skiing.

Over your first layer you might wear a turtleneck or light wool shirt or sweater. For cross-country skiing, don't wear a heavy outer parka. It'll just make you overheat, get in your way and cause problems. Instead, a wool sweater and light windbreaker or shell will help protect you from the wet and the cold. Each body is different;

Four to 6 inches of snow usually are needed to safely cover a fairly level trail.



every garment is different. Experiment to get a good combination.

Don't wear jeans or other cotton pants. Cotton gets wet and causes you to lose body heat. Hypothermia can be a serious problem. Wear light wool pants or knickers and wool socks. Even if you don't fall (you don't fall?) and get wet, snow will brush up against your legs. Wool keeps dry snow on the outside, and you can shake it off. If you do get wet, wool will keep you warmer.

If you ski in a snowstorm, you might consider water-resistant garments. Waterproofs that don't breathe will make you very wet from perspiration inside the garment. Breathable waterproof fabrics, on the other hand, make very expensive clothes, but they are great in a snowstorm.

A hot beverage is very helpful when it's cold. Gloves or mitts keep your hands warm.

Equipment: We used to call cross-country skiing "the simple sport." We wore old hiking clothes and rented skis, boots and poles for a while before buying our own. We skied on wood; we waxed the skis; we had snow. Simple. In 1975, 80 percent of the skis sold were waxable skis. Ten years later, the figures were reversed. Non-wax skis have made it possible for everyone to ski

"The ski tourer is,
indeed,
the ecologist's dream."

without worrying about what color wax to apply and whether to use a blowtorch to do so; how to get old wax off; and how many hours on any ski weekend to spend fondly removing and applying wax, not to mention elbow grease. No more.

Just pick up your rentals and go.

If I wanted to rent cross-country equipment, where would I go? I'd try to find a place where the employees are knowledgeable about cross-country skiing. Most ski shops are geared toward downhill skiing. You can check your Yellow Pages and call some shops that mention cross-country in their ads. You can ask other skiers.

Do rent before you buy. Cross-country skiing might be less expensive than downhill, but it is no longer a non-technical sport. Twice, I've had experience with skis that had too stiff a camber. I spent days with my skis slipping and sliding up, down and sideways with absolutely no control because the skis were so stiff my foot never touched the ground, so the ski couldn't grip the snow.

"Camber is the slight bow in the middle of the ski that enables you to glide over snow," explains Louise Decker, proprietor of Cross-Country Ski Outfitters in Lambertville. "If it's too stiff, your ski never contacts the ground, and you lose control. If it's too flat, you drag over the snow. No glide, no fun."

According to Decker, the industry is changing. Experts like Bill Koch, the Olympic silver medalist, and Mike Gallagher, former Olympic coach, are moving toward slightly shorter skis (for better control on turns) and less stiff camber. "I put people on skis based on their weight/height ratio," Decker says. "And I consider where and how they will use their skis. People who ski in New Jersey exclusively, on fairly level terrain, might remain beginners for three years before they consider upgrading to a stiffer ski. On the other hand, if you want to burn off 900 calories an hour, get a stiffer ski and jog uphill on it."

A downhill skier wears a stiff boot that is attached, heel and toe, firmly to the ski. A cross-country ski boot is attached to the ski at the toe only; the heel lifts up to enable the skier to push and glide. They're alike, but different: a motorcycle vs. a racing bicycle.

Hazards: Yes, they do exist. You could fall. You could bump into a tree. (It's generally considered less painful, given a choice, to fall deliberately on soft snow to avoid crashing into a tree, a building or another skier.) The biggest hazard in New Jersey skiing comes from sparse snow that leaves rocks and roots exposed. If your ski hits a rock, it'll probably stop dead. If you're skiing fast, and your ski stops, you'll fall hard. Don't ask me how I know.

Another hazard: footprints. When a person, a dog, a deer, a snowmobiler or anything travels over ski tracks, the indentations on the tracks can catch a tip and stop your ski. Be careful. Try to ski on ski-tracked or untracked snow, especially at first. Do not walk or stand in the ski tracks. Be considerate of other skiers. Respect the tracks. Get out of the way of others; the downhill skier has the right of way. Isn't there a law of physics that says a body in motion will crash into you if you don't get out of the way?

A final reminder: Be gentle with the environment. It doesn't recover as fast as we used to think it did. "Take nothing but pictures; leave nothing but ski tracks."

Or, as Rudolf Mattesich, president in 1973 of the Ski Touring Council, wrote: "Gliding through the winter, the tourer makes no noise, neither damages nor pollutes the natural setting. The ski tourer is, indeed, the ecologist's dream."

Nancy Wolff is a freelance writer who lives in Montclair.

Where to Ski in New Jersey

Listed below are a few of the places to go cross-country skiing in New Jersey. Because of varying conditions, be sure to call ahead for up-to-date information.

❑ Allaire State Park

Ski from campground to trails; features include winter camping and historic village. **Trail Miles:** 17+ **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (908) 938-2371 **Location:** Route 524, near Lakewood

❑ Delaware & Raritan Canal (a)

Scenic trail along canal not far from Route 1 corridor. Facilities accessible in towns along the way. **Trail Miles:** 24 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Phone:** (908) 873-3050 **Location:** Main canal from Millstone Aqueduct, Plainsboro, to New Brunswick

❑ Delaware & Raritan Canal (b)

Scenic route between canal and Delaware River. Facilities accessible in towns along the way. **Trail Miles:** 33 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Phone:** (908) 873-3050 **Location:** Feeder canal from Trenton to Milford

❑ Delaware Water Gap

Blue Mountain Lake trails maintained by N.J. Nordic Ski Club; variety of difficulty. **Trail Miles:** 15+ **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (908) 496-4458 **Location:** I-80, Sussex County

❑ Fairview Lake XC Center

Special ski packages, overnight cabins available; call for brochure. **Trail Miles:** 20 **Groomed:** Yes **Fee:** \$5 **Rent:** \$10 **Lessons:** \$8 **Food:** Yes **Toilets:** Yes **Phone:** (201) 383-9282 **Location:** YMCA Camp, Stillwater

❑ Great Gorge/Vernon Valley

Skiing usually on spa course. Complete information unavailable at press time. **Groomed:** No **Rent:** No **Lessons:** Yes **Food:** Yes **Toilets:** Yes **Phone:** (201) 827-2222 **Location:** Route 94, Vernon, Sussex County

❑ High Point State Park

Hiking trails, except Appalachian Trail and Monument Trail, can be used. **Trail Miles:** 50+ **Groomed:** No **Fee:** None **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 875-4800 **Location:** Route 23, 7 miles north of Sussex, Sussex County

❑ Lewis Morris State Park

Connects with Jockey Hollow (below) for additional miles. **Trail Miles:** 4 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** No **Phone:** (201) 326-7600 **Location:** Route 24, Mendham

❑ Morristown National Historic Park

Ski trails follow hiking trails. Visitors Center open most weekends. **Trail Miles:** 19 **Groomed:** No **Fee:** None **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 539-2016 **Location:** Jockey Hollow area, Tempe Wick Road, Morristown

❑ Newark Watershed

Call ahead to arrange payment of fees. Special-use permits for groups by prior arrangement. **Trail Miles:** 10+ **Groomed:** No **Fee:** \$6/year. **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 697-2850 **Location:** Clinton Road, West Milford

❑ Palisades Interstate Park

Five trails, variety of difficulty; four-inch snow cover recommended. **Trail Miles:** 10 **Groomed:** No **Fee:** None **Rent:** Yes **Lessons:** No **Food:** Yes **Toilets:** Yes **Phone:** (201) 768-1360 **Location:** State Line Lookout, Palisades Parkway, Alpine

❑ Ringwood State Park

Same trails for skiing, snowmobiling and hiking. **Trail Miles:** 10 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 962-7031 **Location:** Sloatsburg Road, Ringwood

❑ Stokes State Forest

Winter camping; no pets. **Trail Miles:** 10+ **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 948-3820 **Location:** Route 206, north of Branchville

❑ Washington Crossing State Park

Connects with Delaware-Raritan Canal Towpath. **Trail Miles:** 3 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (609) 737-0623 **Location:** Titusville

❑ Wawayanda State Park

Trails and unpaved roads. **Trail Miles:** 10 **Groomed:** No **Fee:** None **Rent:** No **Lessons:** No **Food:** No **Toilets:** Yes **Phone:** (201) 853-4462 **Location:** Near Upper Greenwood Lake

❑ Weis Ecology Center

Cross-country clinics available; call for dates. Connects with Norvin Green State Forest (undeveloped). **Trail Miles:** 5+ **Groomed:** No **Phone:** (201) 835-2160 **Location:** Snake Den Road, Ringwood

From Cow Tongue Point to Timbuctoo:

The Stories Behind These and Other Strange Names

By Richard D.L. Fulton
Illustrations by Fran Hughes

Those who seek out unusual place names will not be disappointed in New Jersey. From Cow Tongue Point to Timbuctoo, thousands of strange names have found their way onto the map. The origins of quite a few are obvious, but others require a little more digging.

Nancy Zerbe, administrator for the Department of Environmental Protection and Energy's Office of New Jersey Heritage, says novice researchers should be prepared for a lot of guesswork when it comes to tracking down origins of place names.

"Over the years, some writers have taken liberties at deducing the meaning of a name by a relationship the name seems to suggest. For example, it is not clear if Hog Island was named for the shape of the island, or for hogs that were kept there. One writer may go along with the shape theory, another with the kept hogs theory," Zerbe says.

Perhaps the most intriguing aspect of tracking down place names is the amount of New Jersey history that can be learned in the process.

Most of the place names in New Jersey can be somewhat categorized by the origins of their names. There are places named after the primary occupation of the area, physical characteristics and Lenni Lenape descriptions, as well as a dozen other groupings.

Some names no longer can be found on current maps since the names have changed over time or the places have been absorbed by larger communities. Out of the thousands of names, it is practical here to discuss only some of the typical or more unusual

Determining the origins of
place names requires both
detective work and
guesswork.



place names and their origins.

New Jersey and the Atlantic Ocean are inseparable, and many of the state's place names come from marine and naval terms and phrases. Belmar, Monmouth County, is from Latin for "beautiful sea." Neptune, Monmouth County, was of course named for the Roman god of the sea. Cabbage Thorofare, Atlantic County, would seem to have derived its name from the vegetable cabbage. After all, this is the "Garden State." However, a good guess along these lines would be far from the truth. Cabbage Thorofare derived its name from sea cabbage, a member of the algae family of marine plants. The shallows in this area often are heavily populated with the aquatic plant.

Brigantine, Atlantic County, was named for a brig (ship) wrecked in the vicinity around 1710. Ship Bottom, Ocean County, also derives its name from a ship that wrecked and went "belly up." Yawp Shore, Cumberland County, is said to have taken its name from a maritime phrase for "land sighted," while Fair Haven, Monmouth County, is also said to have its origins in a ship captain's remarks while looking for a natural shelter for his ship.

The whaling industry in the state also left its mark on place names such as Whale Pond, Monmouth County; Spermaceti (whale products) Cove, Monmouth County; and New England, Cape May County, which was named by a colony of New England whalers.

Other locations have taken their names from physical resemblances to common objects. Chicken Bone Hill, Ocean County; Alligator Hill, Salem County; and probably Cow Tongue

Some locations, such as Cow Tongue Point, were named because of physical resemblances to common objects.

Point, Sussex County, all derive their names from the shape of the land form being named.

Another common practice was to take the name of a local tavern and apply it to the community. These include such examples as Old Halfway, Burlington County; Three Tuns, Burlington County; and obviously Bear Tavern, Mercer County. Ong's Hat, Burlington County, which has baffled historians in search of name origins, also was probably a local tavern.

Quite a few New Jersey towns and villages reflect both our state and national history, especially American Revolutionary War heroes and Civil War personalities and events.

Petticoat, Burlington County, derived its name from the fact that, during the American Revolution, a woman tore her petticoat while trying to remove planks from a bridge (Petticoat Bridge) in the face of advancing enemy soldiers. Pension records have established that General George Washington had, during certain periods of the war, more women enlisted in local militia units than men, so it is not that unusual to run across records of female escapades in resisting the British war effort.

Kearny, Hudson County, was named for Union General Philip Kearny, killed August 1, 1863, during the Battle of Chantilly, Virginia, in the Civil War. Apparently irate that 800 Confederates were holding off 1,300 Union soldiers, the general dashed into a cornfield to round up reinforcements. Riding up to an infantry line concealed in corn, a driving rain and gun smoke, he shouted, "What troops are these?" The unfortunate response



was "49th Georgia." Kearny had found the Confederate line, rather than his own. Bending low over his horse, Kearny spurred the animal around to escape. A Georgia bullet entered his body, traversing it from the base of his spine to his heart, killing him instantly. Respected by soldiers of both sides, Kearny's body was conveyed back to Union lines by Confederate officers under a flag of truce.

Although New Jersey generally was opposed to black emancipation, having had a resolution proposed in the Legislature condemning Union President Abraham Lincoln and the Emancipation Proclamation, at least Sussex County possesses one town named in honor of the proclamation. This is the town of Fredon, originally Freedom.

Some place names reflect major industries that once flourished in the area of settlement.

Both Marlboro, Monmouth County, and Marlton (Marl Town), Burlington County, derived their names from the extensive pits worked in the dinosaur-age marl beds that underlie those areas. The marl was used primarily, at first, for natural fertilizers due to the high phosphate content. Later, other uses were found, including as a water softener.

Bivalve, Cumberland County, took its name from an oyster industry established there.

Bivalve, Cumberland County, took its name from an early oyster industry that had become established there. Oysters are comprised of two shells or valves. In Latin, "bi" means "two." The village of Commercial, Cumberland County, also was a center of shellfisheries. However, those who named the town chose a more ambiguous name, Commercial, referring to the fact that the shellfisheries were a commercial operation.

Many place names in New Jersey derived their names from mills, or from the products that local mills produced. Hominy, Monmouth County, is said to have taken its name from one of the main products of a local mill. Others are less specific, such as Milltown, Middlesex County, and Millville, Cumberland County.

The lumber industry also produced its share of place names, including the obvious Lumberton (Lumber Town), Burlington County. However, Cedarville, Cumberland County, and Great Cedar Swamp, Cape May County, took their names from the post-Ice Age cedar trees found buried in the swamps. These trees were the source of recovery and lumbering activities as early as 1740. Shingles from the "fossil" logs were used on Independence Hall in Philadelphia. The practice was referred to as "cedar mining," according to Henry Charlton Beck, author of *More*

Forgotten Towns of Southern New Jersey.

The native inhabitants of New Jersey also are responsible for many of our place names in New Jersey.

Bear in mind, however, that the Lenni Lenape language existed only in the spoken form.

Settlers wrote down what they thought was the correct English spelling of a native pronunciation of a given place. Given the evolution of the English language over the past couple of hundred years, combined with spelling errors, most of the Lenape place names probably have been at least moderately corrupted over time.

Certain creeks and streams had specific purposes for the Lenape, and these often are reflected in the names. Batsto, Burlington County, takes its name from Batsto Creek. Batsto translates into "bath place," obviously a former gathering area for the natives to bathe.



Capoolong (Kakepoulin) Creek is Lenape for "watering place for the wild geese," or some variation on the theme. This no doubt indicated a good hunting ground for waterfowl. Crosswicks Creek took its name from "crossweeksung," meaning "house of separation," where girls were placed at puberty. Paramus, Bergen County, simply means "pleasant stream."

Animals also played an important part in Lenape lore, as well as in efforts to acquire food. A number of towns took their names from places the Lenape associated with certain animals. Conaskonk Point, Monmouth County, means "place of the bears." The community of Espanong, Morris County, was known to the Lenape as the "place of the raccoons." Weehawken, Hudson County, was known as the "place of the gulls."

Indian chiefs and kings also lent their names to new villages of settlers. Nummytown (King Na-mahomie), Cape May County; Cohansey (Chief Conahockink), Cumberland County; and Rumson (Chief Alumson), Monmouth County, are all names of leading Lenapes, and all have been considerably corrupted from the original English spellings.

Atlantic City, Atlantic County, originally was called Absecon Beach, which traces its origins to "absogami," Lenape for "little stream."

Adding to the difficulties in tracking down place name origins is the habit in some areas of changing a name over time to something completely different.

Atlantic City, Atlantic County, originally was called Absecon Beach, which traces its origins to "absogami," Lenape for "little stream." Naturally, since Atlantic City was Absecon Beach, there could not also have been an Absecon. Absecon originally was Absecum. This must have given early postmen a headache.

Hopatcong, Sussex County, took its name from "hokunk-peek-atn-saconk," Lenape for "hill near the outlet of a body of water." But even though the town bears a Lenape name, it originally was called Brooklyn.

Tuckerton (Tucker's Town), Ocean County, was named for Ebenezer Tucker, one of the residents. But it originally was called Clamtown, presumably due to a clamming industry that thrived there or nearby.

Woodville, Monmouth County, could have acquired its name from the Woods family (early settlers in nearby counties), or from its wooded location. But its original name was Little Africa. From this, we can deduce it was another of the black colonies

established in this and other area counties. Another early black colony was Timbuctoo, Burlington County, named after a city in Africa.

Manasquan, Monmouth County, came from "menach'hen-esquand," Lenape for "island door." Originally, it simply was called Squan, which means "door." Fairton (Fair Town — probably the site of county fairs), Cumberland County, originally bore the cumbersome name of New England Town Cross Roads.

Solving place names, if they can always be solved, is a bit like solving mazes. Some are obvious, such as Shiloh, Cumberland County, and Shiloh, Warren County, which derived their names from the Battle of Shiloh, Tennessee, fought during the Civil War. Others seem obvious, such as Surf City, Ocean County, until you find that its original name was Mansion of Health.

Mannington, Salem County, would appear to have been named for the Manning family, but actually was derived from the Lenape word "manito," meaning "spirits of the dead."

At least some historians have approached the subject matter with a sense of humor. In truth, we may never know the origins of some of the names, either because the logic behind the name was never recorded, or because a name was the product of a local joke or unrecorded incident. However, with a determined search and a lot of patience, one will learn a great deal about New Ceaserea (New Jersey's earlier name) during the quest for place name origins.

Those who would like to begin this quest should sit down with a bottle of aspirin, plenty of paper and pencils and copies of *The Story of New Jersey's Civil Boundaries, 1606-1968*, compiled by John P. Snyder in 1969 and published by the state Bureau of Geology and Topography, now with the Department of Environmental Protection and Energy; *The Origin of New Jersey Place Names*, compiled by the New Jersey Writers' Project in 1938 and reissued in 1945 by the New Jersey Public Library Commission, Trenton; and any number of books by the noted historical-cultural writer Henry Charlton Beck, including *Forgotten Towns of Southern New Jersey*, *More Forgotten Towns of Southern New Jersey*, *The Roads of Home*, and *Tales and Towns of Northern New Jersey*, all published by Rutgers University Press, New Brunswick.

Richard D.L. Fulton works in DEPE's Office of Public Participation.

Marketplace

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Inside DEPE

Radon: Exposing the Invisible Threat

Exposure to elevated levels of radon in the home is the most serious environmental health threat facing New Jersey residents today.

Radon is a radioactive gas produced through the decay of other naturally occurring radioactive materials and is found everywhere in the environment. In elevated concentrations, which might occur in a home, radon is a known environmental health hazard, considered to be the second leading cause of lung cancer, after smoking. Radon is believed to be responsible for an estimated 500 cases of lung cancer per year in the state.

Exposure to elevated levels of radon may occur in as many as 350,000 homes in New Jersey. But because radon is odorless, tasteless and invisible, it can be detected only by a test. If elevated levels are found, many effective reduction techniques are available.

Many health hazards associated with environmental contaminants initially were identified as the result of laboratory tests using animals. "But in the case of radon, we have data from studies that were done on real people, not laboratory animals, and they show that radon can cause lung cancer," says Jill Lipoti, assistant director for Radiation Protection Programs for New Jersey's Department of Environmental Protection and Energy. "And what those studies show about exposure to radon versus exposure to other environmental contaminants is staggering."

"Radon is not going to go away by itself," she says. "People must test their homes to see if they have a problem, and then they must make decisions about fixing any problems."

The heating season is a good time to conduct a radon screening test because windows and doors are more likely to be

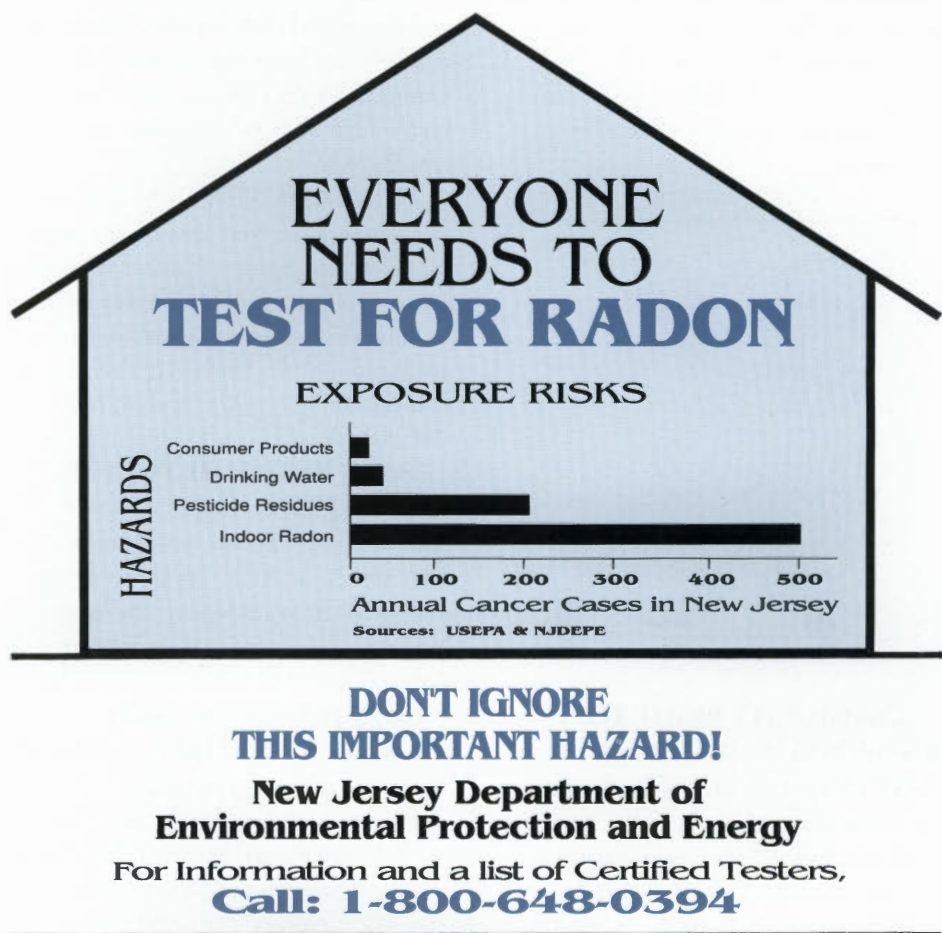
closed. Radon gas enters homes from the surrounding soils, coming through cracks in the foundation, sump pumps, drain openings and porous cinder block. Consequently, the test should be done in the lowest livable area of the house because that is where the concentrations will be highest. Homeowners can perform their own screening tests or have them conducted by a certified radon service company. An initial screening test usually takes only two to five days. If the indoor levels are elevated, a certified mitigation company can work with a homeowner to select the best techniques for reducing radon entry or buildup. Costs range from \$200 to \$1,500. All radon testing and mitigation companies doing business in New Jersey must be certified by the state. Residents should always request proof of New Jersey certification from any radon service business.

Since 1985, the Radon Program has

worked to define the extent of the radon problem in New Jersey, to consult with other state and federal agencies in determining and implementing the best standards for protecting the public health, to guarantee the availability of reliable testing and mitigation services for residents, and to actively engage in outreach activities to promote public awareness and understanding of radon hazards and control.

For more information about radon hazards, testing and control, or a list of certified testing and mitigation companies, call the Radon Information line at 1 (800) 648-0394, Monday through Friday, from 8 a.m. to 5 p.m.

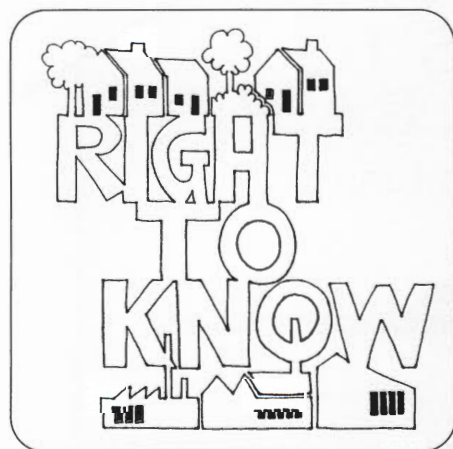
By Barbara Sergeant, principal area coordinator for the Radon Program



Bookshelf

AMERICAN LITTORAL SOCIETY HANDBOOK FOR THE MARINE NATURALIST, by New Jersey author David K. Bulloch, is a beginner's guide to many basic techniques of a marine naturalist. Learn how to identify and study marine life from whales to plankton, how to take underwater photographs and much more. Available at local bookstores for \$11.95 in paperback, \$19.95 in hardcover, or call Walker and Company's customer service department at 1-800-AT WALKER. Add \$3 for shipping and handling for one book, 75 cents for each additional book.

HIGH POINT OF THE BLUE MOUNTAINS, by Kevin W. Wright and Ronald J. Dupont, traces the history of High Point State Park from the prehistoric period to the present. Copies are available for sale at High Point State Park Headquarters and other bookstores in Sussex County, or by sending a check or money order payable to the Sussex County Historical Society, Box 913, Newton, N.J. 07860. Cost: one copy, \$12.95; two to five copies, \$9.95 each; six copies or more, \$7.95 each. Add 10 percent for postage and handling to mail orders.



COMMUNITY RIGHT TO KNOW FOR HEALTH AND SAFETY is a free outreach handbook for local emergency planning committees, published by the New Jersey Department of Environmental Protection and Energy (DEPE) and the Association of New

Jersey Environmental Commissions. Available by writing to the Bureau of Hazardous Substance Information, Division of Environmental Quality, DEPE, CN 027, Trenton, N.J. 08625-0027.

HAWK WATCH, A GUIDE FOR BEGINNERS, by Peter Dunne, is an illustrated book on how to identify hawks in New Jersey. Cost: \$10 (includes shipping and handling). Send check to New Jersey Audubon, 790 Ewing Avenue, Franklin Lakes, N.J. 07417.

A FIELD GUIDE FOR HAWKS SEEN IN THE NORTHEAST is a six-page illustrated guide that aids in identifying hawks, falcons and accipiters found in the Northeast, and provides a map of some hawk-watching sites in the area. Available for a \$1 donation by writing to the New Jersey Raptor Association, 1390 White Bridge Road, Millington, N.J. 07946.

ENDANGERED AND THREATENED WILDLIFE OF NEW JERSEY is a free list of the endangered and threatened birds, reptiles, amphibians and fish of New Jersey. Available by writing to DEPE's Division of Fish, Game and Wildlife, CN 400, Trenton, N.J. 08625-0400.

NONGAME NEWS, a free quarterly newsletter of the New Jersey Endangered and Nongame Species Program, features articles on endangered and nongame wildlife of New Jersey. Available by writing to DEPE's Division of Fish, Game and Wildlife, CN 400, Trenton, N.J. 08625-0400.

BACK YARD HABITAT FOR BIRDS, by Patricia Sutton, tells how and what to plant to attract wildlife to your back yard. Cost: \$1.50 (includes shipping and handling). Send check to New Jersey Audubon, 790 Ewing Avenue, Franklin Lakes, N.J. 07417.

NEW JERSEY ENVIRONMENTAL DIRECTORY is a listing of more than 200 environmental organizations in New Jersey. Cost: \$10 (includes shipping and handling). Send check to Youth Environmental Society (YES), P.O. Box 441, Cranbury, N.J. 08512.

HIKING GUIDE TO THE DELAWARE WATER GAP NATIONAL RECREATION AREA, by Michael Steele, describes 65 hiking trails on the 70,000 acres of both the New Jersey and Pennsylvania sections of the Water Gap National Recreation Area and New Jersey's adjacent Worthington State Forest. Cost: \$6.95. Available in local outdoor shops and bookstores, or by mail from the New York-New Jersey Trail Conference, 232 Madison Avenue, New York, N.Y. 10016. Mail orders should include \$1.25 for postage and handling. New York state residents must add local sales tax.

CLEAN OCEAN ACTION'S ANNUAL GUIDE 1990 - 1991 is a 60-page guide of ocean pollution issues. Cost: \$4. Send check to Clean Ocean Action, P.O. Box 505, Highlands, N.J. 07732.



NEW JERSEY'S SPECIAL PLACES — (SCENIC, HISTORIC, AND CULTURAL TREASURES IN THE GARDEN STATE), by Arline Zatz, gives detailed information about 52 places to visit in New Jersey, including directions, special events and places to stay and eat. Available for \$12.95 in bookstores or for \$15.45 postpaid from the publisher, The Countryman Press, Inc., P.O. Box 175, Woodstock, Vt. 05091.



A FIELD GUIDE TO THE PINE BARRENS OF NEW JERSEY, by Howard P. Boyd, contains listings and illustrations of the plant and animal species that live within the Pine Barrens. Also included in the 420-page book is the history of this unique area, from iron mining and glass manufacturing to ghost towns and the Jersey Devil. Cost: \$32.50 for hardcover, \$22.95 for soft cover, plus \$2.50 per copy for shipping and handling. Send check to Plexus Publishing, Inc., 143 Old Marlton Pike, Medford, N.J. 08055.

The following publications are available by sending a check to the Association of New Jersey Environmental Commissions (ANJEC), 300 Mendham Road, Route 24, Box 157, Mendham, N.J. 07945.

THE NATURE TRAIL is a directory of 97 nature centers, environmental education facilities and programs in New Jersey. Cost: \$5, plus \$2.50 shipping and handling.

DIRECTORY OF ENVIRONMENTAL CONSULTANTS is a listing and description of 130 New Jersey environmental consultants. Cost: \$7, plus \$2.50 shipping and handling.



KEEPING OUR GARDEN STATE GREEN: A LOCAL GOVERNMENT GUIDE FOR GREENWAY AND OPEN SPACE PLANNING, by Linda Howe, explains the benefits of greenways and how they can be preserved by

communities. It describes design criteria, planning and zoning techniques and conservation easements. It also contains actual case studies, information resources and worksheets. Cost: \$8, plus \$2.50 shipping and handling.



WALKING THE WETLANDS: A HIKER'S GUIDE TO COMMON PLANTS AND ANIMALS OF MARSHES, BOGS AND SWAMPS, by Janet Lyons and Sandra Jordan, is a field guide with illustrations of 100 plants and animals of the wetlands. Cost: \$12.95, plus \$2.50 shipping and handling.

SPREADING THE WORD: A PUBLICITY HANDBOOK FOR RECYCLING, by Sandy Batty, is a "how-to" manual for promoting recycling programs. It offers illustrations, clip art and reproduction sheets. Cost: \$8, plus \$2.50 shipping and handling.



ENVIRONMENTAL HOTLINE has emergency and informational telephone numbers for environmental problems. Cost: free for single copies; \$5 for 100 copies, plus \$2.50 shipping and handling.

Orders for the New Jersey Geological Survey maps listed below should be mailed to DEPE, Map and Publications Sales, Bureau of Revenue, CN 417, Trenton, N.J. 08625-

0417. Please make checks payable to "Treasurer, State of New Jersey."

Geologic Survey Map 91-3
SURFICIAL GEOLOGY OF THE NEWFOUNDLAND QUADRANGLE, PASSAIC AND MORRIS COUNTIES. Cost: \$4.

Geological Survey Map 91-4
BEDROCK TOPOGRAPHY OF THE MILLBURN GAP AREA, ESSEX AND MORRIS COUNTIES. Cost: \$4.

Geological Survey Report 25
INVENTORY OF ACTIVE AND ABANDONED SAND AND GRAVEL MINING OPERATIONS IN NEW JERSEY. Cost: \$8.

Geological Survey Bulletin 61
CRETACEOUS FOSSILS OF NEW JERSEY, VOLUMES 1 AND 2. Cost: \$10 per volume.

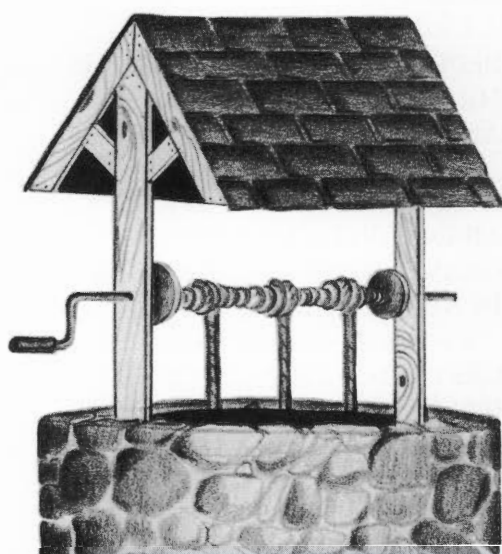
Geological Survey Open-File Report 91-3
PRELIMINARY ANALYSES OF VIBRACORE SAMPLES FROM OFFSHORE OF ATLANTIC COUNTY. Cost: \$3.

Geological Survey Report 26 A
MARINE SEISMIC SURVEY, ATLANTIC COUNTY. Cost: \$5.

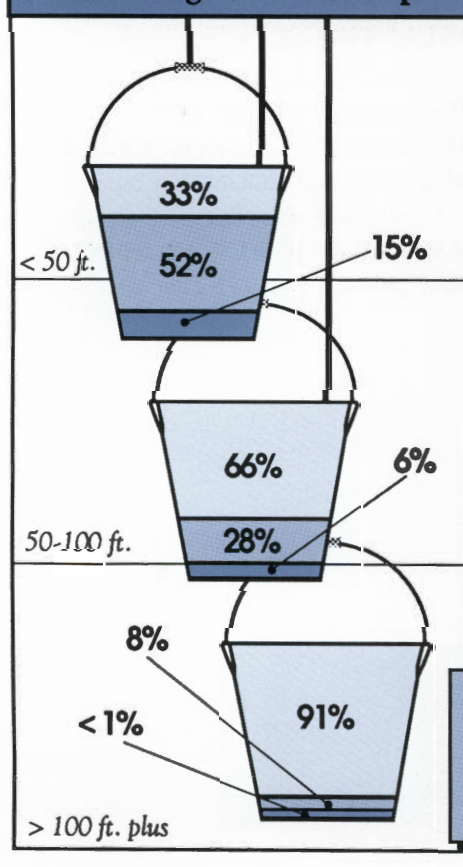
Geological Survey Open-File Report 91-1
DETECTION OF THE ABANDONED LAWRENCE IRON MINE, MORRIS COUNTY. Cost: \$5.

Geological Survey Open-File Report 91-2
GEOLOGIC RESEARCH IN NEW JERSEY — 1991. Cost: \$1.

Well Water: Just How Pure Is It?



Nitrate Distributions According to Well Depth



There's nothing like the taste of cold, pure well water. How often have you heard that comment? Most people contend that there's no chemical taste or smell in well water like there seems to be in publicly supplied water. But is well water really so pure?

New Jersey has more than 250,000 domestic wells supplying approximately 13 percent of its residents with potable water. There currently is no mandated periodic testing program for private water supplies, as there is for public wells. One reason for this is that well owners and government agencies are reluctant to pay the high costs associated with periodic sampling. Ironically, private well systems are more susceptible to contamination since they often are shallower and less carefully sited and constructed than wells used for public supplies. They also often are located near nonpoint sources of pollution such as agricultural fields or septic tank discharges.

To help regulators get an idea of the average quality of groundwater in the state, the Department of Environmental Protection and Energy's Division of Science and Research last year began an extensive monitoring program for nitrates in drinking water wells in Burlington and Mercer counties. The study continued last spring in Gloucester, Ocean and Salem counties, and will be completed after the monitoring of two additional counties in northwestern New Jersey.

Nitrates are inorganic chemicals formed by the natural decomposition of organic material, such as plants or manures. They also can be formed when excess commercial fertilizer is applied. Nitrates in drinking water are not considered a health threat to adults, although high levels can be harmful to infants, according to the federal Environmental Protection Agency.

- Low level; indicates natural source of nitrates
- Moderate level; indicates man-made source
- Above acceptable drinking water standard; man-made source

The reason that nitrates were selected for monitoring is their potential for use as an indicator of pollution. Studies in the Midwest have shown that well water contaminated with high levels of nitrates may also contain detectable levels of pesticides. Likewise, researchers have found that nitrates, when emanating from a septic tank or similar source, may be a useful indicator of bacterial or viral contamination of a well.

The results of the study in Burlington and Mercer counties where 340 wells were sampled indicated that shallow wells (wells less than 100 feet deep) are more vulnerable to nitrate contamination than deeper wells, regardless of the source of the nitrates. High nitrate levels were associated with the application of fertilizer in either agricultural or residential areas. High levels also were associated with the presence of a septic tank within 50 feet of the well. These two factors, fertilizer use and the presence of a septic tank, therefore seem to be useful indicators of the vulnerability of a well to nitrate contamination. The data analysis for well water from Gloucester, Ocean and Salem counties has not been completed.

The results of this study indicate that nitrate contamination may result from a number of sources, including the application of fertilizer on agricultural land or on individual lawns and gardens, and leakage from septic tanks.

While many people are aware of the increased risk of well water pollution in agricultural areas, few realize that their own practices or those of their neighbors may be important factors in the quality of water in their wells. Paying strict attention to instructions on fertilizer and pesticide labels and maintaining septic tanks are two ways to minimize harmful effects on groundwater quality.

By Eileen Murphy, a research scientist in DEPE's Division of Science and Research

'91 Duck Stamps and Prints Available

The New Jersey Waterfowl Stamp for 1991 is now available for purchase by hunters and collectors.

The stamp, based on a design by artist Tom Hirata, formerly of Rutherford, features the Atlantic Brant flying by Barnegat Lighthouse (see back cover).

This is the eighth such stamp to be issued by the state and is required by law for all waterfowl hunters over 16 years of age. Stamps are valid now through June 30, 1992, and come in two denominations, \$2.50 for New Jersey resident hunters and \$5 for nonresident hunters.

Only individuals who possess a valid New Jersey resident firearm hunting or bow-and-arrow license may purchase the 1991 resident waterfowl stamps before June 30, 1992. A copy of your current license must be enclosed with your order.

Collectors may purchase resident

waterfowl stamps from June 30, 1992, until December 31, 1992.

Nonresident stamps may be purchased by anyone from now through December 31, 1992.

Stamps are sold by hunting license agents and the New Jersey Division of Fish, Game and Wildlife, CN 400, Trenton, N.J. 08625. For more information, call (609) 292-9567.

A signed and numbered limited edition print retails for \$142.50, which includes a resident and nonresident stamp. To locate a dealer who sells prints in your area, call 1 (800) 382-5723.

Revenues from stamp and print sales help fund the acquisition, protection, maintenance, improvement and enhancement of waterfowl habitat and associated wetlands.



The 1991 Waterfowl Stamp by artist Tom Hirata

In the seven years since the state's Waterfowl Stamp Program began, more than 7,500 acres of waterfowl habitat have been purchased or donated. A total of \$2.1 million has been collected from the sale of prints and stamps and earmarked for land purchases.

New Delaware River Maps Available

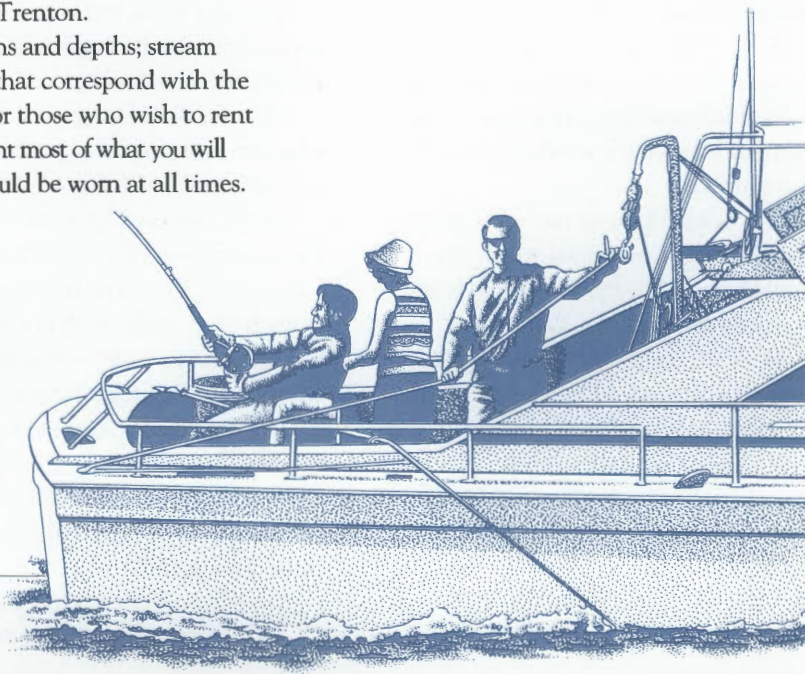
A canoe ride on the Delaware River may not seem particularly appealing this time of year, but it's not too early to plan those river trips, whether they're by canoe, motorboat or inner tube.

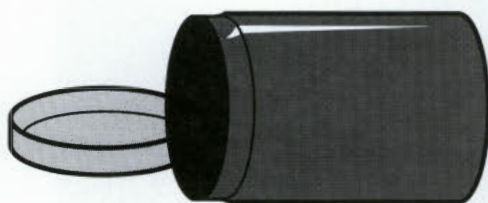
To help you along the way, the Delaware River Basin Commission has updated and revised its Delaware River Recreation Map series. The 10 maps cover the 200-mile, non-tidal stretch of the river from Hancock, N.Y., to Trenton.

The detailed information includes river channel locations and depths; stream miles and reference points; and stream flow characteristics that correspond with the International Canoe Federation's scale of river difficulty. For those who wish to rent equipment, the package contains a list of private liveries that rent most of what you will need to enjoy the river, including life preservers, which should be worn at all times.

The Delaware River's many recreational opportunities are described. A comprehensive list of river access areas in New Jersey, New York and Pennsylvania is included.

Copies may be purchased for \$10 per set from the commission's headquarters at 25 State Police Drive, West Trenton, N.J., or by sending a check or money order to the Delaware River Basin Commission, P.O. Box 7360, West Trenton, N.J. 08628.





Creative Recycling: One Family's Effort

New Jersey has set a goal of recycling 60 percent of its waste by 1995. But recycling on an individual basis doesn't have to be limited to setting out your cans, bottles and newspapers at the curb. It also can involve finding a new life for used products thought to be worthless and disposable.

Take the Wolf family of Pennington, Mercer County, for instance. Virginia Wolf collects empty film canisters and sends them to her daughter, Catherine, a doctor in Haiti. Catherine works in a hospital where the canisters are used to dispense medicine and collect specimens.

The government of Haiti, the poorest country in the Western Hemisphere, regards the film canisters as medical supplies and allows them to enter the country duty-free.

Since 1982, Wolf has collected thousands of canisters, from groups and individuals, and has sent them to the hospital in a recycling effort that serves two purposes.

"It's helpful from an ecological point of view, but also to the missionaries who would have to buy brand-new pill bottles at maximum cost," says Wolf.

Wolf has no trouble meeting the hospital's demand, and therefore asks that no additional canisters be sent to her. But with a little imagination, others are likely to find many more markets out there for film canisters and other perceived throwaway items.

Are You Part of the Pollution Problem?

Most New Jersey residents blame industry as the worst culprit in water pollution, yet there is another source that accounts for an estimated 65 percent of the state's water pollution and 90 percent of all beach closings.

That nonpoint source is our everyday lifestyle — habits that jeopardize the quality of our drinking water and endanger wildlife habitats.

These habits include fertilizing the lawn and changing motor oil. Americans apply more than a million tons of chemicals to their lawns. Car owners drain as much as 400 million gallons of waste oil annually, with only 12 percent properly disposed of at a service station or recycling facility.

Stormwater washes fertilizer and used oil, along with pet waste, litter, pesticides and the hazardous products that are flushed down drains or toilets, into ponds, lakes, streams, rivers, bays and the ocean. The impact is enormous. One gallon of oil can pollute one million gallons of water.

A recent poll commissioned by New Jersey Pollution RESPONSE (Research and Education to Stop Pollution Originating from Nonpoint Sources in the Environment) found that many New Jersey residents were unaware that these and other activities were sources of pollution.

Following are some harmful activities and the percentage of residents who were unaware they could cause environmental damage:

- ☐ Washing a car with soap or detergent (35 percent)
- ☐ Leaving pet waste on the ground (34 percent)
- ☐ Overusing fertilizers (24 percent)
- ☐ Pouring cleaning agents down the drain (17 percent)
- ☐ Pouring used motor oil on the ground (11 percent)
- ☐ Pouring paint or turpentine down the drain (4 percent)
- ☐ Pouring used motor oil down the sewer (4 percent)

Pollution-Prevention Nominees Sought

The New Jersey Department of Environmental Protection and Energy is accepting applications for the third annual Governor's Awards for outstanding achievement in pollution prevention.

The awards are designed to recognize small and large businesses, public interest groups, educational institutions, public entities and individuals. Any business, organization or individual in New Jersey is eligible to apply.

Eligible pollution-prevention initiatives include any technique or activity that reduces the use and/or generation of hazardous substances at the source.

Last year, Governor Jim Florio recognized AT&T Bell Laboratories and Hoffmann-LaRoche, Inc., with awards in the large-business category. The New Jersey Environmental Federation, a nonprofit organization committed to educating the public about the use of environmentally safe products, received an award for its Environmental Shoppers Campaign.

The deadline for applying for the awards is February 1. Governor Florio will present the awards in April during Environmental Education Week.

For application materials, contact the Department of Environmental Protection and Energy, Office of Pollution Prevention, CN 402, Trenton, N.J. 08625-0402, or call Debra Milecofsky at (609) 777-0518.

Follow-Up

A Park Grows in Lawrence

Patience paid off this year for Lawrence Township, Mercer County, which in 1970 purchased 62 acres of farmland with the help of a \$156,493 matching grant from the state Green Acres Program (NJO Summer 1991).

This past summer, Village Park — complete with ball fields, tennis courts, exercise trails and basketball courts — opened to the public.

The years between saw many changes, both in the design of the park and the township it would serve. Lawrenceville in 1970 still possessed much of the rural character that dated back to when the village was known as Maidenhead.

The township's proximity to Route 206 and Interstate 295 made it a magnet for development, and cornfields gave way to condominiums, nearly encircling the tract. A development plan for the park was designed to meet the growing recreational demands of the township. Construction was financed through a \$300,000 loan from the Green Acres Program.

The park includes three lighted soccer fields, two softball/baseball diamonds, two playground structures, two lighted tennis courts and two basketball courts, along with bocce, volleyball, quoits and horseshoe courts. Bicycle and exercise trails wind through the landscaped park, which retains its woodland and wetland areas.

In 1991, Green Acres awarded Lawrence Township a \$525,000 loan to acquire 15 acres as additional access into Village Park. One of the park's playgrounds was funded through a \$25,000 grant from Bristol-Myers Squibb, while the two tennis courts were constructed through a \$40,000 donation from Trafalgar House Residential.

Law Reduces Pollution at the Source

Imagine a law that would be welcomed by both industry and environmentalists, reduce pollution, shorten the permit process, and eliminate hazardous substances before they became a part of the manufacturing process.

That law is known as the Pollution Prevention Act of 1991. It requires a company to submit to the Department of Environmental Protection and Energy a list of the hazardous materials it uses, along with the byproducts created in the manufacturing process.

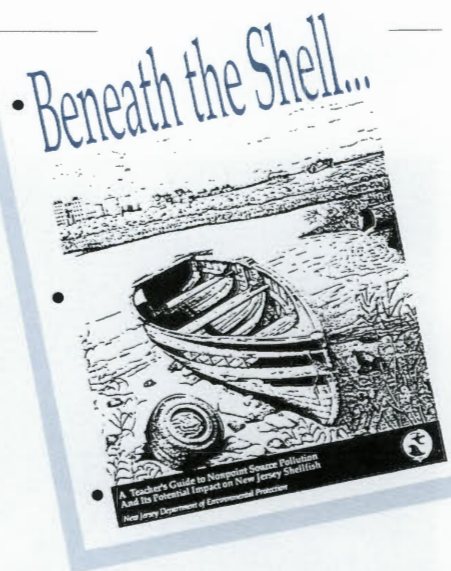
The company must describe how it will reduce pollution by 50 percent within five years. In turn, it will be allowed to apply for facility-wide permits, thereby dramatically reducing the number of

individual permits necessary for operation.

Industry, which for years has viewed the permit process as a thorn in its side, now has an incentive to use fewer toxic materials and to engage in pollution prevention at the start of the manufacturing process. The law is expected to cut the use of hazardous substances and the emission of hazardous waste by 50 percent over a five-year period.

In 1987, more than seven billion pounds of toxic material were either used or produced in New Jersey. The state's factories emitted 124 million pounds of toxins into the air, land and water. This is in addition to the millions of pounds of toxic materials that are released by other states and cross New Jersey's borders.

The first phase of the law will involve 400 companies by 1993. Another 400 will submit plans by 1995.



Pollution Guide Available

Beneath the Shell ... A Teacher's Guide to Nonpoint Source Pollution and its Potential Impact on New Jersey Shellfish, is filled with current information and suggested classroom activities, field excursions and community action projects.

Developed by the New Jersey Department of Environmental Protection and Energy (DEPE), the guide explores topics such as water flow, topography, soils and geology, New Jersey shellfish species and harvesting, land use, population and nonpoint source pollution.

To obtain a free copy, contact the New Jersey Department of Environmental Protection and Energy, Office of Environmental Education, CN 402, Trenton, N.J. 08625-0402; (609) 633-1317.



DEPE ACTION LINE

To Report Abuses of
the Environment,

Call:

609-292-7172

24 hours a day

DIVISION OF FISH, GAME AND WILDLIFE



Red-Shouldered Hawk, Bobcat Endangered

The New Jersey Division of Fish, Game and Wildlife recently added the red-shouldered hawk and the bobcat (above) to its revised list of endangered species.

The red-shouldered hawk moves from the threatened to endangered list after surveys revealed a lower population than previously thought. The bobcat, once found statewide, now roams only New Jersey's northern region.

The eastern woodrat, which inhabits caves, abandoned mines and boulder piles, also was added to the endangered list because it now is found at only one site in the state.

The little blue heron and the long-eared owl have continued to decline in numbers over the past 10 years, and therefore have been placed on the threatened list.

Also added to the endangered list are four invertebrate species: the Mitchell's Satyr (a butterfly); the American burying beetle; the dwarf wedge mussel; and the northeastern beach tiger beetle. All but the northeastern beach tiger beetle are also on the federal endangered list.

Given a declining status are the black-crowned night heron; the glossy ibis; the red knot; the sanderling; the ruby-throated hummingbird; and the brown thrasher.

The cliff swallow has been upgraded from endangered to threatened status after its numbers improved from 408 nesting pairs in 1983 to 658 pairs in 1987.

You can help protect endangered species by supporting the Endangered and Nongame Species of Wildlife Conservation Fund, which provides almost all of the operating funds for New Jersey's Endangered and Nongame Species Program. Simply check off on your state tax return the amount that you wish to contribute.

'Environary'

Confused about the meaning of some environmental terms? Following are definitions of a few common ones:

Aquifer — An underground geological formation containing water, which often serves as a source of water supply. Though below the surface, aquifers are susceptible to pollution. The preservation of wetlands enables aquifers to recharge themselves.

Biodegradable — The ability to decompose and be absorbed by the environment, such as by plant and animal organisms.

Compost — A mixture of decomposing items such as grass clippings, leaves, and fruit and vegetable scraps that form a natural fertilizer suitable for use on lawns and gardens and around the base of trees.



Northern blazing star

22 Plant Species Added to List

The New Jersey Office of Natural Lands Management recently added 22 plant species to the endangered list, bringing the total number of endangered plant species in the state to 308.

The common names of the recent additions are handsome sedge; Allegheny chinquapin; Hammond's yellow spring beauty; false pennyroyal; northern blazing star; smooth beard tongue; wild blue phlox; Hooker's orchid; algae-like pondweed; Robbin's pondweed; orange coneflower; northern blue violet; oceanorus; and nine species of sphagnum, or moss.

The Office of Natural Lands Management is charged with tracking the status of New Jersey's native plant species that officially are classified as endangered. Endangered is defined as any native plant species whose survival in the state or nation is in jeopardy. In general, this includes species that have five or fewer existing populations within the state.

About 11 percent of the state's native flora is currently on the endangered species list.

\$4.5M Awarded in Historic Trust Grants

The New Jersey Historic Trust has awarded 21 matching grants totaling more than \$4.5 million for historic preservation projects throughout the state.

These were the second round of grants awarded through the Historic Preservation Bond Program, established with the passage of the 1987 Green Acres, Cultural Centers and Historic Preservation Bond Act. Grants this time ranged from \$18,250 to \$1 million, and will fund projects in 13 counties.

A third round of grants is scheduled for 1992. To be considered for funding, properties must be listed or meet criteria for listing in the State and National Registers of Historic Places. For further information, call (609) 984-0473.

The projects most recently awarded grants include:

❑ Restoration of the Tenaflly Railroad station in Bergen County. The exterior of the station will be restored to its original 1872 appearance. The station is a prominent community landmark that recalls Tenaflly's origins as a fashionable commuter suburb.

❑ Restoration of the Clyde A. Phillips schooner in Cumberland County. The grant will restore the schooner, one of the few

remaining examples of a New Jersey spoon-bowed oyster schooner. The vessel will be used for educational programs, emphasizing the role of marine activity in the history, culture and environment of the Delaware Bay.

❑ Stabilization of Loew's Jersey Theatre in Hudson County. The structure is one of five "wonder theatres" built by Marcus Loew between 1927 and 1930 and is an important example of "movie palace" architecture.

❑ Restoration work at Long Pond Ironworks in Passaic County. The ironworks were established in 1766, though the existing structures date from the 1850s to 1870s. The grant will fund rehabilitation of the country store as a visitors orientation center and will stabilize other structures on the site. When work is completed, the site will be open for self-guided tours focusing on iron-ore refining and the lives of the iron workers.

❑ Preservation of the Deserted Village of Feltville. Built as a Utopian community in 1845, this village later became a summer resort, its Greek Revival cottages remodeled in the rustic Adirondack style. It represents one of the few surviving pockets of open space in Union County. Feltville will be preserved as a unique recreational and educational resource.

The Deserted Village of Feltville

Clues to Past Stored in State Archives

Have you ever seen an old foundation and wondered about the people who once lived in that building? Maybe you're curious about the age of the road you live on, or you want to trace your family history.

The clues to these mysteries and many more can be found in the New Jersey State Archives. The office, charged with the safekeeping of New Jersey's official records since 1760, is managed by the Department of State's Division of Archives and Records Management.

Its records reach back as far as the 17th century and contain documents such as wills, deeds, election returns, Revolutionary War and other military records, 18th- and 19th-century tax ratables, justice of the peace dockets and the Historic American Buildings Survey. Also stored there are thousands of microfilm reels of county records, microfilm copies of more than 100 New Jersey newspapers and other sources of information.

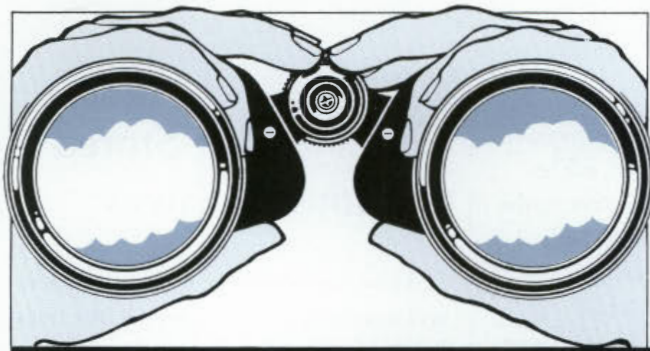
The State Archives office is at 185 West State Street, Trenton, in the State Library building. Hours are 8:30 a.m. to 4:30 p.m. Tuesday through Friday. For further information, call (609) 292-6260.



Did You Know ... ?

New Jersey contains 5,000 square miles, or three million acres, of first-class wildlife habitat. More than 25 percent of this is publicly owned. Despite the rapid development of open space during the 1980s, 40 percent of New Jersey is classified as commercial forest, and nearly 880,000 acres remain as farmland.

Roundup by Greg Johnson of DEPE's Office of Publications



Explorer

What Can We Do About Ozone?

Many of us have learned that a thin layer of ozone, 12 to 31 miles above our heads, protects us and other living things from the sun's harmful ultraviolet rays. But did you know that another type of ozone can harm us if too much of it accumulates in the air we breathe? It can cause chest pains, coughing, wheezing, congestion, sore throat and nausea.

Ozone is made up of three atoms of oxygen that come from a variety of ingredients and are "baked" by the sun. Here are the ingredients, which when put together, form harmful ground-level ozone:

Fumes called VOCs (that's short for volatile organic compounds), which come from things that evaporate quickly, like oil-based paint, gasoline, nail polish and some deodorants and air fresheners



Nitrogen oxide, which is formed by the high temperatures inside the engines of machines that burn fossil fuels, like engines found in cars, trucks and equipment used to generate electricity



Very hot, sunny days with no clouds

Or put very simply:

VOCs + Nitrogen Oxide + Heat and Sunlight = Ground-Level Ozone

Motor vehicles (cars, vans, trucks and buses) provide two of the three ingredients — VOCs and nitrogen oxide. What can we do to decrease the amount of VOCs and nitrogen oxide that make ozone?

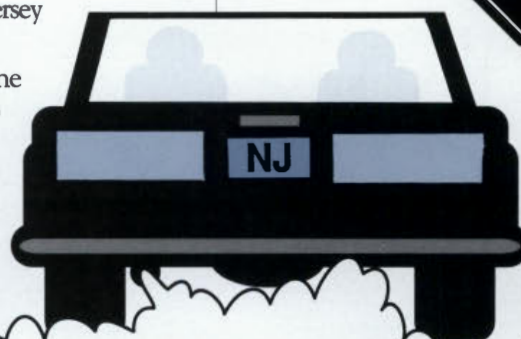
USE OUR MOTOR VEHICLES LESS!

We could encourage our family and friends to car pool. We could limit the amount of parking at places of business so employees would have to car pool. We could improve our railroad and bus systems so they would run more frequently to more places. We could raise tolls along the Garden State Parkway and New Jersey Turnpike and increase the tax on gasoline. We could also let motorists transporting more than one person use special lanes on busy highways. These special lanes are called High Occupancy Vehicle lanes, or HOV lanes for short.

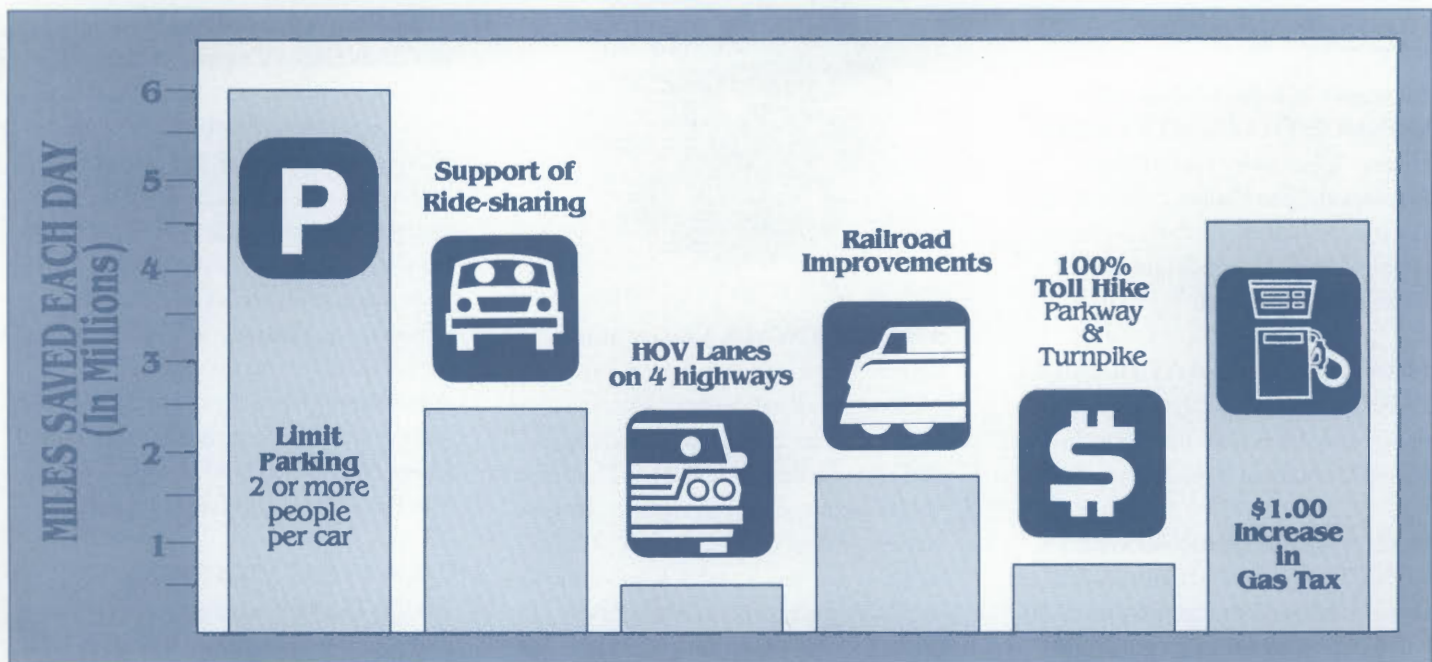
Recently, these ideas were fed into a computer. The computer figured out how many miles of driving each idea would save in a day. These savings are represented on the graph on the next page. The horizontal axis (the line with all the "skyscrapers," or bars along it) shows the different ways we could reduce the number of miles New Jersey residents drive in a day. The vertical axis (the line with the numbers on it) shows how many miles of driving would be saved by each idea. Use the graph to answer the questions that follow.

1. According to the graph, how many miles of driving would be saved each day if companies allowed only cars with two or more passengers to park?
2. How many miles would be saved each day if the railroads were improved?
3. How many miles would be saved each day if tolls on the Garden State Parkway and New Jersey Turnpike were doubled?
4. How much would car travel be reduced if the gasoline tax were raised to \$1.00 per gallon?
5. How many miles per day would be saved if all of the ideas in the graph were used?

Answers:
1. 6 million miles
2. approximately 1-3/4 million miles
3. approximately 3/4 million miles
4. 4-1/2 million miles
5. 16 million miles



DON'T EXHAUST YOUR FUTURE!



What Would You Do If...

Here are some situations you may encounter in which you have to decide what is the right thing to do for you and for the environment. There are no right or wrong answers, but what you have learned in this issue of Explorer will help you to decide.

Your family is planning a summer vacation. Together, you have made the following list of vacations to choose from.

Which is the right one for you and your family?

- ☐ Drive to Florida to visit the Everglades, Kennedy Space Center and Disney World
- ☐ Drive to a state park and spend two weeks camping and hiking
- ☐ Drive to the New Jersey Shore and spend time powerboating, riding your all-terrain vehicle (ATV) and driving to shore attractions
- ☐ Other

You are a member of a soccer team that has a game to play on Saturday at 9 a.m. The game will be played at a field that is three miles from your house.

Which is the best way for you to get there?

- ☐ Ask your parents to drive you there
- ☐ Walk to the game
- ☐ Take a bus
- ☐ Ride your bicycle
- ☐ Find out how many of your friends need a ride, then ask your parents to drive your group to the game
- ☐ Other

Imagine you are 18 years old and your parents have given you permission to buy a car that costs \$9,000 or less. Any money that remains after you purchase your car will be put toward furthering your education after high school.

Which of the choices below is the right one for you?

- ☐ Buy a used car with low mileage, air conditioning and an AM/FM/cassette player, but with a very large engine and body, for \$3,000
- ☐ Buy a new compact car with no air conditioner or radio for \$8,000
- ☐ Buy a new compact car with air conditioning, but no radio, for \$9,000.
- ☐ Buy a used compact car that has no air conditioning or radio and needs four new tires, for \$2,500
- ☐ Other

By Marlena Gloff-Straw, supervisor of the Department of Environmental Protection and Energy's Education Program, and Edward Nartowitz, teacher coordinator for science and mathematics for Lawrence Township Public Schools

Events

December

All winter ICE SKATING AT MONMOUTH COUNTY PARKS

Hours: When green flag is flying
Admission: Free **Phone:** (908) 842-4000
Location: Shark River Park, Neptune; Holmdel Park, Holmdel; and Turkey Swamp Park, Freehold

All winter SLEDDING AT HOLMDEL PARK **Hours:** When there is snow on the ground **Admission:** Free **Phone:** (908) 842-4000 **Location:** Holmdel Park, Holmdel

Sundays in December NATURE IN WINTER Hiking trip. **Hours:** 10:30 a.m. to noon **Admission:** Free **Phone:** (908) 637-4125 **Location:** Pequest Natural Resource Education Center, Route 46, nine miles west of Hackettstown



Until December 15 N.J. MASTERS Show features work of New Jersey artists. **Hours:** 11 a.m. to 4 p.m. Wednesday through Sunday **Admission:** \$3 for adults, \$1.50 for seniors and 50 cents for full-time students and children **Phone:** (609) 652-8848 **Location:** The Noyes Museum, Lilly Lake Road, two miles south of the Historic Town of Smithville

4 CAMDEN COUNTY PARKS WALK AND PIZZA PARTY Walk will be five miles at a moderate pace, followed by a pizza party, Dutch treat. Sponsored by the Outdoor Club of South Jersey. **Hours:** 10 a.m. **Admission:** Free **Phone:** (609) 547-0377 **Location:** Meet at Haddon Heights VFW, East Atlantic Avenue, Haddon Heights



5-8 HOLLY WALK Visit six historic sites in the Morristown area. Acorn Hall, Historic Speedwell Village, Macculloch Hall, Schuyler-Hamilton House, the Willows at Fosterfields and Ford Mansion will be decorated for the holidays. **Hours:** Noon to 4 p.m. on Dec. 5 and 6, 10 a.m. to 4 p.m. on Dec. 7 and 8 **Admission:** \$8, or \$7 for seniors and students **Phone:** (201) 538-2404 **Location:** Start at any of the sites, Morristown area

6-8, 13-23, 25 & 26, 29-31 CHRISTMAS LIGHTS TOUR Take a trolley ride to see Christmas lights. Sponsored by the Mid Atlantic Center for the Arts **Hours:** 7:45 p.m. and 8:30 p.m. Friday and Saturday from Dec. 6-21; 7:45 p.m. Sunday from Dec. 8-22; 7:45 p.m. Monday through Thursday from Dec. 16-23; 7:45 p.m. and 8:30 p.m. Dec. 25, 26, 29, 30 and 31. **Admission:** \$3 for adults, \$1 for children **Phone:** (609) 884-5404 **Location:** Meet at Washington Street Mall information booth, Cape May

7 "M.O.O.N. NIGHTS" Members and others view space through a telescope. Sponsored by the New Jersey Astronomical Association. **Hours:** 8 p.m. **Admission:** Free **Phone:** (908) 638-6969 or (908) 638-8500 **Location:** Meet at observatory in Hill Acres Section of Voorhees State Park, Route 513, Lebanon Township

7 & 8 THE JOYS OF CHRISTMAS PAST See the ways Christmas has been celebrated in the past by different ethnic groups. **Hours:** 10 a.m. to 4 p.m. **Admission:** \$5 **Phone:** (908) 938-2253 **Location:** Allaire Village, Route 524, Farmingdale

7, 8 BIRD-WATCHING FOR BEGINNERS All aspects of bird identification, bird-watching (local hot spots), equipment (books, binoculars, telescopes and tripods), and attracting birds to your own back yard will be covered Saturday evening. A field trip Sunday will put skills to use. Sponsored by New Jersey Audubon's Cape May Bird Observatory. **Hours:** 7 to 10 p.m. Saturday, 10 a.m. to noon Sunday **Admission:** \$10 for members, \$15 for nonmembers — preregistration is required **Phone:** (609) 884-2736 **Location:** Cape May Point State Park's Education Building

7 & 8, 14 & 15 VICTORIAN CHRISTMAS Costumed guides will give tours of Ringwood Manor. There also will be a boutique with crafts people and music. **Hours:** Noon to 6 p.m. **Admission:** \$5 for adults, \$3 for seniors and \$2 for children **Phone:** (201) 697-5737 **Location:** Ringwood Manor, Sloatsburg Road, Ringwood State Park, Ringwood

7, 18, 29 THE HOLIDAYS WITH A SCOTTISH FLAIR Take a candlelight tours of the Hermitage, celebrating in the Highland tradition. There will be music and light refreshments. Sponsored by Friends of the Hermitage, Inc. **Hours:** 7 to 9 p.m. **Admission:** \$5 **Phone:** (201) 445-8311 **Location:** The Hermitage, Ho-Ho-Kus



8 MYSTERY BIRDING Van trip, with destination decided at last minute based on reports from birders. **Hours:** 8 a.m. to 5 p.m. **Admission:** \$18 for members, \$20 for nonmembers **Phone:** (908) 780-7007 **Location:** New Jersey Audubon's Owl Haven Nature Center, Englishtown-Freehold Road, Tennent

8 FILM: "THE STRANGE NEW SCIENCE OF CHAOS" Scientists are making surprising sense out of some very chaotic behavior in nature. New evidence indicates chaos and uncertainty are more often the rule than the exception. Courtesy of the University of Minnesota. **Hours:** 2 p.m. **Admission:** Free **Phone:** (201) 891-5571 **Location:** James A. McFaul Environmental Center, Crescent Avenue, Wyckoff

9 TOWN HIKE Hike six or seven miles at a slow and easy pace to see old homes and narrow streets where early settlers lived and worked, including the first Burlington County Hospital and other places of historical interest. Sponsored by the Outdoor Club of South Jersey. **Hours:** 10 a.m. **Admission:** Free **Phone:** (609) 267-9263 **Location:** Mount Holly Municipal Parking Lot, off Washington Street, Mount Holly

11 WASHINGTON CROSSING HIKE Hike six miles at an easy pace on the New Jersey side. There will be a lunch stop at the picnic area, so bring your lunch and beverage. Sponsored by the Outdoor Club of South Jersey **Hours:** 10 a.m. **Admission:** Free **Phone:** (609) 737-3598 **Location:** Meet at Washington Crossing Visitors Center off Route 546, two miles east of Route 29 and the Delaware River, Titusville

14 BIRDSEED SAVINGS SALE Sponsored by New Jersey Audubon's Sherman/Hoffman Sanctuary. Orders must be made in advance by Nov. 30. Call for details. **Hours:** Pickup must be made from 10 a.m. to 4 p.m. **Admission:** Free **Phone:** (908) 766-5787 **Location:** Sherman/Hoffman Sanctuary, Hardscrabble Road, Bernardsville

14 SNOWFLAKES AND KALEIDOSCOPIES Learn how snow crystals are formed and look at the variety of types and patterns nature has designed. Then build your own kaleidoscope.

Recommended for ages 10 and up. Registration is required and some materials are needed. **Hours:** 1 to 3 p.m. **Admission:** Free **Phone:** (908) 637-4125 **Location:** Pequest Natural Resource Education Center, Route 46, nine miles west of Hackettstown

14 BIRDS ON VACATION See birds that use New Jersey as a warm vacation spot in the winter. Dress for the weather. **Hours:** 8:30 a.m. **Admission:** Free **Phone:** (201) 460-8300 **Location:** Hackensack Meadowlands Environment Center, 2 DeKorte Park Plaza, east end of Valley Brook Road, Lyndhurst

15 MOMS, POPS AND TOTS ASK, "WHERE DO THEY ALL GO?" Examine how animals prepare for winter in this indoor/outdoor program. Children ages 3 to 5 are invited with a parent. Reservations are required and will be accepted beginning Dec. 2. **Hours:** 10 a.m. **Admission:** Free **Phone:** (201) 891-5571 **Location:** James A. McFaul Environmental Center, Crescent Avenue, Wyckoff

15 FILM: "TORNADO" Spectacular footage captures the awe-inspiring beauty and violence of one of nature's most powerful acts. NOVA follows a team of "storm-catchers" into the heart of a storm. Courtesy of the University of Minnesota. **Hours:** 2 p.m. **Admission:** Free **Phone:** (201) 891-5571 **Location:** James A. McFaul Environmental Center, Crescent Avenue, Wyckoff

17 FILM: "A WINTER SLEEP" Observations of the Canadian ground



squirrel examine the complex nature of hibernation and the advantages animals derive from the process. Courtesy of the University of Wisconsin. **Hours:** 2 p.m. **Admission:** Free **Phone:** (201) 891-5571 **Location:** James A. McFaul Environmental Center, Crescent Avenue, Wyckoff

20 WILDLIFE STORY HOUR For ages 3 to 5. Registration required. **Hours:** 10 to 11 a.m. and 1 to 2 p.m. **Admission:** Free **Phone:** (908) 637-4125 **Location:** Pequest Natural Resource Education Center, Route 46, nine miles west of Hackettstown



21 LUNAR LUNACY Take an evening walk in search of things that fly at night. Sponsored by New Jersey Audubon's Sherman/Hoffman Sanctuary. Call to register. **Hours:** 7 to 9 p.m. **Admission:** \$5 for members, \$7 for nonmembers. **Phone:** (908) 766-5787 **Location:** Sherman/Hoffman Sanctuary, Hardscrabble Road, Bernardsville

21 MOONLIGHT WALKS **Hours:** 7 to 9 p.m. **Admission:** \$3 **Phone:** (609) 893-4646 **Location:** Old General Store Building, Whitesbog Village, Route 530, one mile off Route 70

22 CREATURE DOUBLE FEATURE! An afternoon at the wildlife theater for the whole family. **Hours:** 1 to 3 p.m. **Admission:** Free **Phone:** (908) 637-4125 **Location:** Pequest Natural Resource Education Center, Route 46, nine miles west of Hackettstown

Events

27 & 28 CHRISTMAS

CANDLELIGHT VICTORIAN

HOUSE TOUR Self-guided tours of 10 national landmark Victorian homes each night. Sponsored by Mid Atlantic Center for the Arts **Hours:** 6 to 10 p.m.

Admission: One night — \$15 for adults, \$7.50 for children ages 3 through 12; both nights — \$25 for adults, \$12.50 for children ages 3 through 12 **Phone:** (609) 884-5404 **Location:** Start at any house on the tour. Call for information.

January

1 NEW YEAR'S DAY WALK AT THE DELAWARE AND RARITAN CANAL

Start the new year with a leisurely six-mile walk on the Delaware and Raritan Canal towpath. Bring lunch and a beverage. Sponsored by the New Jersey Sierra Club. **Hours:** 11 a.m.

Admission: Free **Phone:** Paul Foged at (908) 254-4949 weekdays or (908) 988-5273 evenings and weekends **Location:** Meet at the Delaware and Raritan Canal Recreational Parking Area on Route 27, Kingston

4 & 5, 11 & 12, 18 & 19, 25 & 26 (weekends) MAPLE-SUGARING DEMONSTRATION Sponsored by the Great Swamp Outdoor Education Center **Hours:** 2 p.m. **Admission:** Free **Phone:** (201) 635-6629 **Location:** Great Swamp Outdoor Education Center

9-12 THE 25th NEW JERSEY TRAILER AND CAMPING SHOW **Hours:** 3 to 10 p.m. Thursday, 10 a.m. to 10 p.m. Friday and Saturday, 10 a.m. to 6 p.m. Sunday. **Admission:** \$5 **Phone:** 1 (800) 332-EXPO **Location:** Raritan Center Exposition Hall, Edison

18 & 19 CROSS-COUNTRY SKI

CLINIC For beginning skiers. Call for reservations. **Hours:** 9:30 a.m. to noon and 1:30 to 4 p.m. **Admission:** \$18, or \$10 if you use your own skis **Phone:** (201) 835-2160 **Location:** Weis Ecology Center, Ringwood



18 & 19 SUPER SCIENCE

WEEKEND Workshops, planetarium programs, demonstrations and booths staffed by members of New Jersey's science community. **Hours:** 9 a.m. to 4:45 p.m. Saturday, noon to 5 p.m. Sunday **Admission:** free **Phone:** (609) 292-6330 **Location:** New Jersey State Museum, 205 West State Street, Trenton

February

1 MAPLE-SUGARING **Hours:** 1 to 3 p.m. **Admission:** \$5 per family **Phone:** (201) 376-3587 **Location:** Cora Hartshorn Arboretum and Bird Sanctuary, 324 Forest Drive South, Short Hills

1 & 2 CROSS-COUNTRY SKI CLINIC Same as January 18 and 19.

1 & 2, 8 & 9, 15 & 16, 22 & 23 (weekends) MAPLE-SUGARING DEMONSTRATION Sponsored by the Great Swamp Outdoor Education Center. **Hours:** 2 p.m. **Admission:** Free **Phone:** (201) 635-6629 **Location:** Great Swamp Outdoor Education Center, 247 Southern Boulevard, Chatham

5 & 6 NEW JERSEY SPECIAL OLYMPICS **Hours:** 9 a.m. to 3 p.m., with ice show Wednesday at 7 p.m. **Admission:** Free **Phone:** (201) 326-7600 **Location:** Mennen Sports Arena, 161 East Hanover Avenue, Morristown

7-9 THE NEW JERSEY BOAT

SHOW **Hours:** 1 to 10 p.m. Thursday and Friday; 11 a.m. to 10 p.m. Saturday; and 11 a.m. to 6 p.m. Sunday. **Admission:** \$5 **Phone:** 1 (800) 332-EXPO **Location:** Raritan Center Exposition Hall, Edison

8 BIRDSEED SAVINGS SALE

Sponsored by New Jersey Audubon's Sherman/Hoffman Sanctuary. Orders must be placed in advance by Jan. 26. **Hours:** Pickup from 10 a.m. to 4 p.m. **Admission:** Free **Phone:** (908) 766-5787 **Location:** Sherman/Hoffman Sanctuary, Hardscrabble Road, Bernardsville

15 & 16, 22 & 23, 29 MAPLE-

SUGARING **Hours:** 9 a.m. to 4 p.m. Saturday; noon to 4 p.m. Sunday **Admission:** Free **Phone:** (908) 766-2489 **Location:** Leonard J. Buck Garden, Layton Road, Far Hills

17 GEORGE WASHINGTON'S BIRTHDAY CELEBRATION

This event will offer demonstrations of 18th-century colonial living, gallery talks on the life and times of George Washington, children's activities and opportunities to build your own Washington Monument and get your picture taken with George Washington. **Hours:** 11 a.m. to 4 p.m. **Admission:** \$2 for adults, \$1 for seniors and students, and 50 cents for children under 13 **Phone:** (609) 396-1776 **Location:** Old Barracks Museum, Trenton



Outings

Don't Let Cold Come Between You and Nature

It may be cold outside, but you don't have to spend the winter months cooped up indoors. If you can handle the walk from your front door to the car, then you're hardy enough to spend a whole day enjoying the outdoors — at one of New Jersey's many environmental education centers.

Since the centers are located all across the state, they focus on different aspects of New Jersey, such as the Pine Barrens, the seashore and even the city.

Many Burlington County habitats are represented at the Rancocas Nature Center in Mount Holly, operated by the New Jersey Audubon Society. Self-guided nature trails take visitors through a field, thickets, a conifer plantation, upland woods, oak-pine and floodplain forests and freshwater marshes.

But visitors who skip the nature trails on the most miserable of winter days still can enjoy a fun and educational day trip here. Visit the museum to expand your



GREG JOHNSON

Karl Anderson (right), director of the Rancocas Nature Center, talks to a visitor in the gift shop.

knowledge of New Jersey wildlife and return to walk the trails when the weather is more favorable.

Inside, boards that light up when you pick the correct answers challenge your knowledge of plants, trees, birds, mammal tracks and reptiles found in Burlington County and elsewhere in New Jersey.

On display in glass cases are bird nests, animal skulls, fossils of marine life and other three-dimensional exhibits. At the "touchables table," children and adults alike will be fascinated by turtle shells,

starfish, antlers, fossils and a giant single vertebra from a finback whale. There also are other terrariums with live animals that you won't want to miss.

In the visitors center is a gift shop that sells books, shirts, bird feeders, binoculars and much more, as well as a natural history reference library that is open to the public.

The Rancocas Nature Center, open Tuesday through Sunday from 9 a.m. to 5 p.m., is located on Rancocas-Mount Holly Road in Mount Holly. Call (609) 261-2495 for more information.

Other Environmental Education Centers

Marine Mammal Stranding Center, Brigantine, Atlantic County; (609) 266-0538

Warren E. Fox Nature Center, Estell Manor, Atlantic County; (609) 625-1897

Hackensack Meadowlands Development Commission Environment Center, Lyndhurst, Bergen County; (201) 460-8300

James A. McFaul Environmental Center, Wyckoff, Bergen County; (201) 891-5571

Tenaflly Nature Center, Tenaflly, Bergen County; (201) 568-6093

P.A.W.S. Farm, Mount Laurel, Burlington County; (609) 778-8795

Camden County Park Commission Environmental Studies Center, Berlin, Camden County; (609) 767-7275

Wetlands Institute, Middle Township, Cape May County; (609) 368-1211

Essex County Center for Environmental Studies, Roseland, Essex County; (201) 228-2210

Liberty State Park Environmental Interpretive Center, Jersey City, Hudson County; (201) 915-3409

Washington Crossing State Park Nature Center, Titusville, Mercer County; (609) 737-0609

Kateri Environmental Education Center, Wickatunk, Monmouth County; (908) 946-9694

Owl Haven Nature Center, Monmouth Battlefield State Park, Tonnent, Monmouth County; (908) 780-7007

Spermaceti Cove Visitors Center, Gateway National Recreation Area, Highlands, Monmouth County; (908) 872-0115

Great Swamp Outdoor Education

Center, Chatham Township, Morris County; (201) 635-6629

Aeolium Nature Center, Island Beach State Park, Seaside Park, Ocean County; (908) 793-0506

Cooper Environmental Center, Toms River, Ocean County; (908) 270-6960

Weis Ecology Center, Ringwood, Passaic County; (201) 835-2160

Passaic County Nature Center, Rifle Camp Park, West Paterson, Passaic County; (201) 523-0024

Nature Center at Parvin State Park, Salem County; (609) 358-8616

Somerset County Environmental Education Center, Lord Stirling Park, Basking Ridge, Somerset County; (908) 766-2489

By Michelle Anthony, a Trenton State College journalism intern for the Department of Environmental Protection and Energy

Wildlife in New Jersey

The Barn Owl

Standing about 15 inches tall and weighing about a pound, the common barn owl, or *Tyto alba*, is one of New Jersey's larger owl species. Its white, heart-shaped face, dark eyes, round, tuftless head and long beak make it distinctive among all other owls found in the state. Its unusual facial characteristics have resulted in such locally common names as the monkey-faced owl and sweetheart owl.

The barn owl's underparts range from a buff color to pure white with small black spots. The plumage on its back is a dark, orangish-brown flecked with whitish and dark spots. Long, slender legs give it a somewhat knock-kneed appearance when perched. As with many species of raptors, female barn owls are slightly larger than the males. Although similar in appearance, males often can be distinguished from females by their lighter-colored breasts that bear fewer and smaller spots.

Unlike our "hooting" owls, barn owls have a repertoire of calls that includes hissing, beak-snapping, groans and unearthly screeches. None of these calls possesses any of the musical qualities associated with other species of owls.

Ideally suited as a night predator, the barn owl is equipped with specially adapted feathers for silent flight, hypersensitive eyes for excellent night vision and most importantly, an extraordinary sense of hearing. A barn owl's hearing is so highly developed that it has been said it can detect a mouse running on hard-packed soil at a distance of more than 30 yards.

Barn owls feed primarily on small rodents, although they are not opposed to taking an occasional amphibian, reptile or insect. It is estimated that a family of eight owls can consume more than 1,000 rodents during a single nesting season.

Barn owls typically can be found in open country, coastal marshes and farmlands. However, they often live in close proximity to people, taking up residence in and around towns. They find suitable sites for their nests in barns, abandoned buildings, tree cavities or even holes in the ground. Like most owls, they do not build nests, but instead lay their eggs on bare ledges in barns or buildings, on dirt in underground burrows, or on whatever litter is available in tree cavities. There even have been reports of barn owls laying eggs on flat surfaces of old, abandoned farm machinery.

The only materials found in the barn owl's nest are the regurgitated pellets of indigestible hair and bones from its prey. The pellets often accumulate to form crude nests around the eggs. A typical barn owl nest contains four to seven eggs. Once egg-laying begins, one egg is laid every two to three days until the clutch is completed. After an incubation period of about 33 days, the down-covered chicks begin hatching. They remain totally dependent on the adults for more than two months.

Barn owl nesting can occur at almost any time of the year. Eggs and young have been observed during every month except January. Most Garden State barn owls, however, prefer to nest in the springtime.

Barn owls have relatively short life spans, with few surviving beyond their third or fourth seasons. They succumb to a variety of hazards, including falls by chicks from their precarious nests, severe cold and wet weather, electrocution, predation by raccoons and great-horned owls and human disturbance.

A recent study of barn owls in southwest New Jersey found a lack of good nesting sites had a limiting effect on the population. During the 10-year period that barn owls were studied in that area, nearly 100 nest boxes were installed in barns and other structures. Researchers reported that by 1985, artificial structures accounted for 75 percent of the known nesting locations in the study area.

New Jersey is fortunate to have vast areas of coastal marshes, grasslands and pastures that provide excellent habitat for small mammals. Barn owl populations are thriving in these areas. As a result, the population here is considered stable.

The barn owl's future in New Jersey currently appears secure. By preserving suitable foraging habitat and providing nesting sites, we can ensure that the future holds a place for this magnificent nocturnal predator.

By Michael Valent, a senior zoologist for the Division of Fish, Game and Wildlife's Endangered and Nongame Species Program

If you live in barn owl country and would be interested in building and installing a barn owl nest box, write to the Division of Fish, Game and Wildlife, Endangered and Nongame Species Program, CN 400, Trenton 08625-0400. The staff will provide you with detailed instructions for building and placing your nest box.



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New Jersey's 1991 Waterfowl Stamp features the Atlantic Brant flying by Barnegat Lighthouse. For more information on the stamp, see page 53.

In Next Season's Issue:

Become an Environmentally Smart Shopper
Rabies: What Precautions Should You Take?
Get Ready to Go Camping
The Urban Forest