

A photograph of a farm in winter. In the background, a large white barn with a dark roof and a tall, cylindrical silo stand against a clear blue sky. The barn has several windows and a large 'X' mark on its side. In the middle ground, a group of horses of various colors (black, brown, white) are scattered across a field covered in snow. In the foreground, a wooden fence with wire mesh runs across the bottom of the frame. The scene is framed by bare tree branches in the upper corners.

January/February 1982
New Jersey
OUTDOORS



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From The Editor

Let's get on with it!

New Jersey Outdoors generally covers the green and sunny side of the Garden State: the recreational opportunities, the Jersey shore, the Kittatinny Mountains, the Pine Barrens, and so on. But on occasion we have spoken out on the littering of our public lands with soda and beer bottles and cans by our throwaway society; and on the polluting of our lakes, streams and bays by carelessness, or by design under the cover of darkness.

And yet I was somewhat saddened when I read an article with the heading: *DEP RANKS OLD DUMPS FOR PRIORITY CLEANUP* in the newsletter, *NEW JERSEY HAZARDOUS WASTE NEWS*, not too long ago. I knew about most of these atrocities but I had read or heard

about them piecemeal—not in one dose in bold black and white. According to the article, DEP'S Division of Hazard Management ranked the 22 top priority abandoned dump sites in our state for cleanup purposes.

Although these are not necessarily the "worst" sites, a reading of the list which includes sites in 10 counties (several counties have more than one dump site) will impress upon the reader that action must be taken to clean up these hazardous wastes. And it would seem that we have some tools to do the job. We now have a Hazardous Discharges Bond Act in New Jersey and, in addition, we have Federal Superfund and Clean Water Act Monies (coming?). So let's get on with it!

In this issue:

More than a 100 caves have been explored and mapped in New Jersey over the years. And where there are caves there are spelunkers or cavers such as author Thomas J. Pollock, who writes about cave exploring in *Caving In New Jersey*. Mr. Pollock is a member of The Central Jersey Grotto, a local caving group chartered by the National Speleological Society.

The Legacy of the New Jersey Dutch introduces us to the style of architecture called Dutch Colonial, found in the counties of Bergen, and southern Morris. Author Susanne Banta Harper also includes *A Tour of the Land of the Jersey Dutch*, which takes us to such places as Von Steuben House, Terhune Homestead, Old Paramus Church, and other Dutch Colonial buildings along the way.

We would not appreciate *Sixty-four Skunks in Our Backyard*. And neither would you. But authors Sydney Anderson and R. Justine Anderson had 64 different skunks in their backyard—but not all at the same time. Sydney Anderson is Curator of Mammals at the American Museum of Natural History in New York City.

In her second effort for our publication, Eleanor Gilman writes about *The Alternate Energy Center* at Ramapo College in Mahwah. The Center, which includes a greenhouse and gardens, a recycling center, a geodesic dome, a wind-electric generator, and a wind-mill, is a student project of the School of Environmental Studies.

Forest Fires in South Jersey: They're

Not All Bad, so says author Deborah A. Boerner. "As recently as 50 years ago, only a few foresters and firefighters realized that fire, like rain, can be both good and bad. Today, fire has become one of the forester's best tools in south Jersey." The author, a recent forestry graduate from Cook College at Rutgers, toiled in the NJO editorial office this past summer.

Habitat is the Key to Wildlife Survival introduces eight full-color posters produced by the American Wildlife Education Foundation. The posters were designed to aid in the teaching of conservation education in the classroom.

Wildlife in New Jersey/Raccoons is introduced by the Carol Decker painting on the inside back cover. The author, Dennis Slate, is an Instructor in Environmental Studies at Stockton College and a PhD Candidate at Cook College, Rutgers University. He participated in a four-year cooperative study (DEP's Division of Fish, Game and Wildlife—Cook College) to "Determine the Density, Dynamics and Structure of New Jersey Raccoons." The text illustration was provided by Robert J. Pierro.

Mount Hope Mine in Rockaway Township has "more than 500 million gallons of good water stored below the 1000 foot level—of good quality and in a mine that is recharging water at a rate of one million gallons every 24 hours." Author Cliff Ross writes that Mount Hope contributed nearly 100 million gallons to a rationed population in our state during the recent drought emer-

gency. Photographs for this article were provided by Harry Grosch, DEP Division of Fish, Game and Wildlife.

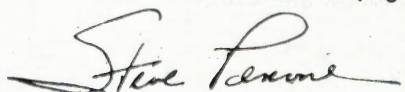
Photographer Walter J. Choroszewski, a New York resident and a native Pennsylvanian, came to our state on assignment to photograph *New Jersey: A Scenic Discover* for Foremost Publishers. In the process he discovered a "truly beautiful state" which he shares with us in *New Jersey/A Photographer's Delight*.

Back in July/August 1975 we published an article on acid rain in New Jersey which prompted some reader comments. Recently two major national magazines featured comprehensive articles on the effects of acid rain on our environment. So we're back with *Acid Rain* by Ron Harkov and Kathy Brody. Mr. Harkov is Acid Rain Task Force Coordinator for the DEP Office of Cancer and Toxic Substances Research and Kathy Brody is assistant to Assistant Commissioner Tyler.

Read *How to Reduce Your Heating Costs this Winter* on page 29—it may save you some money.

In his farewell appearance as governor in our magazine, Governor Brendan Byrne takes a look back at the programs, progress and accomplishments of his two terms in office: *An Environmental Retrospective*, page 16D of the *Environmental News*.

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CAVING IN NEW JERSEY

BY
THOMAS J. POLLOCK

"From which tree do you want to tie off the rappel line?"

"How about that one over there?"

"O.K. Then we can use the one opposite to secure the cable ladder and safety line."

The lines were rigged quickly and doublechecked by each one of us. That nylon cordage was not only our highway down, but it would also be the only road back to the surface. Yes, the surface. This group, like many others across the country, was made up of ardent cave explorers. The cave they were about to enter was accessible only from this vertical entrance.

The silent gloom of the world awaited the cavers. The cool damp air coming from the entrance hole lent an atmosphere that promised great adventures. In the space of a few minutes the cavers were gone, their headlamps and voices fading as they dropped into the inky caverns below. Only the twitching rope gave any indication of activity in the depths, and soon even that was still.

It was Homework Time

New Jersey does not offer such fascinating speleo opportunities as described above, but it does have cracks and crevices that offer a challenge or two. The Central Jersey Grotto does a lot of caving, but very little of it in New Jersey. When the editor of this magazine contacted our organization and asked for an article about caving in New Jersey, we suddenly realized that it was

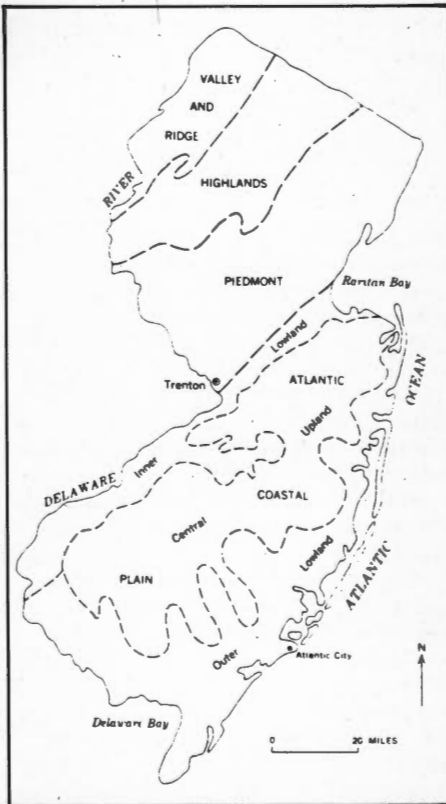
Cave exploring can be dangerous and should never be attempted alone or without experienced people along.

The Central Jersey Grotto is a local caving organization chartered by the National Speleological Society. With a current membership of 25, the Grotto has been actively caving in four states consistently. The Grotto has been carrying out a speleo program for the students of the Marie Katzenbach School for the Deaf, Trenton, N.J., as well as providing guided speleo experiences to other organized youth groups upon request. The Grotto has also provided speakers for such as the Lions Club of Cranbury, N.J., several senior citizens functions, school programs and nature clubs. The Central Jersey Grotto has also presented a session on caving as an element of the Sunday Science Lecture Series held at the New Jersey State Museum.

For further information about caves or caving, contact the following:

The National Speleological Society
Cave Avenue
Huntsville, Alabama 35810

or
The Central Jersey Grotto
Care of Mr. Charles Wagg
CN 330 John Fitch Plaza
Trenton, N.J. 08625



The physiographic provinces of New Jersey. The Valley and Ridge Province and the Highlands province comprise the State's "Cave Country."

homework time.

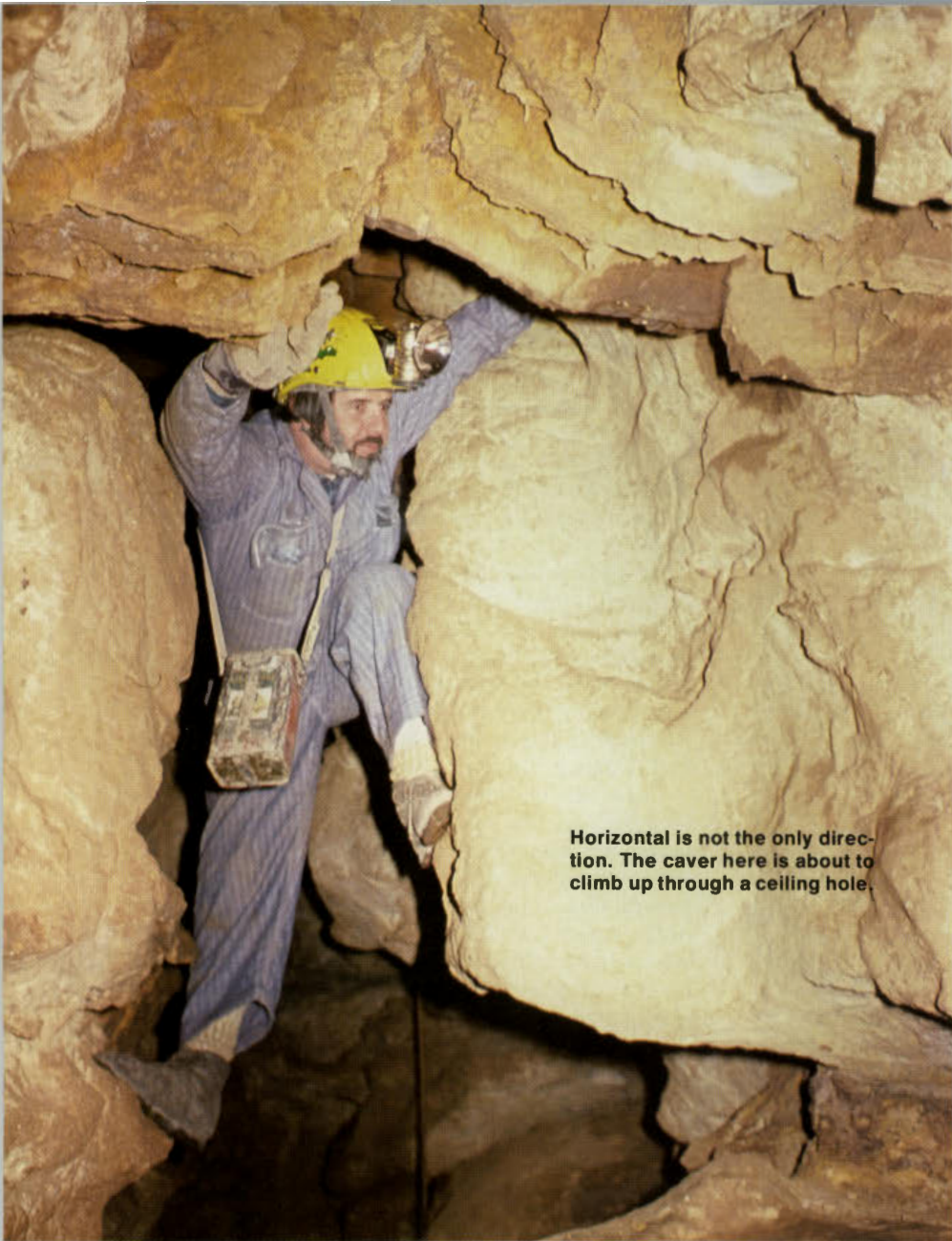
The research began with the obvious sources first. Very little about New Jersey caves has been published by the National Speleological Society, and not much more by the New Jersey Department of Geology. We also tapped our counterparts in other local caving organizations for such data as they might be able to contribute. Little by little the information began to trickle in, much of it lacking in description and detail. We

learned very quickly that we would have to take to the field and develop much of our own data.

All the available data placed the caves in the hilly northwest portion of the state, the region that was to become our focal point. We acquired complete sets of the New Jersey State Atlas maps (1957) along with the United States Geological Survey topography maps (1954), and plotted the cave sites on these maps according to the coordinates given with their written descriptions. Not all the caves, however had either written descriptions or coordinates; these would have to be found in the field and plotted later.

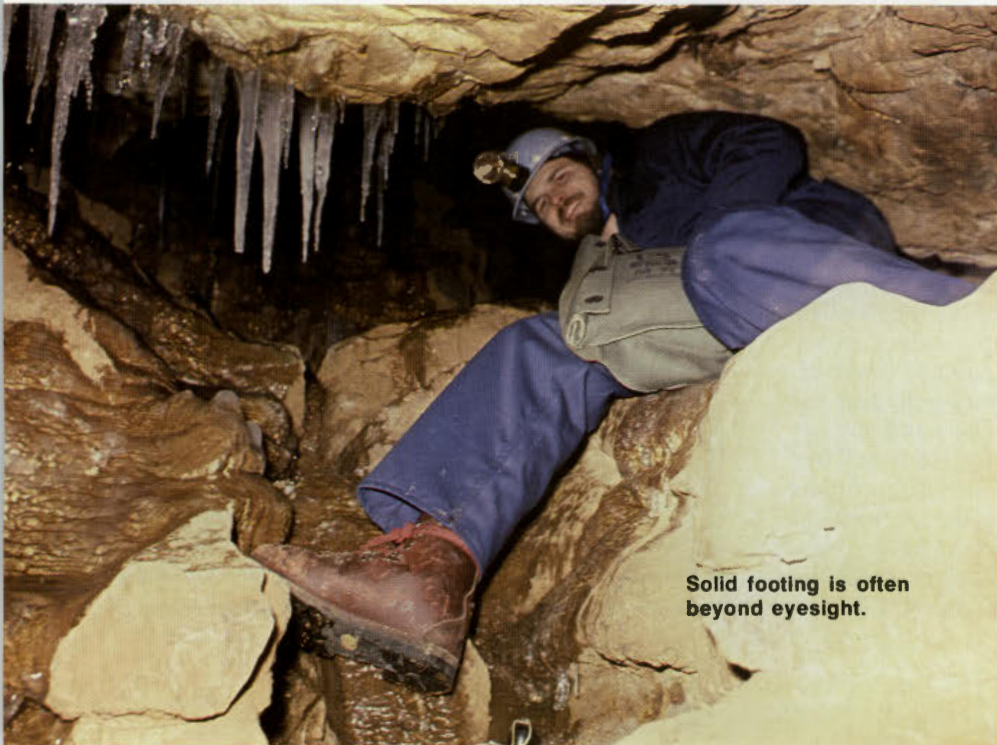
We obtained geology overlays, keyed to one of our map sets, and plotted the cave sites onto these. The picture was becoming clearer. Knowing what kind of rock formations a cave was sited among gave a fair idea as to the extent of passage development to be expected.

The host rock for a cave is usually limestone, but other types of rock, if sufficiently consolidated, may also allow for cave development. The basic deposition of bedrock underlying the "cave country" of New Jersey is fairly well documented. Much of the northern New Jersey area was subjected to the ravages of glaciation. As the ice crept south, the earthen layers below were crushed and compacted. In areas where the ice itself was not a factor, the accumulated debris pushed along before the ice gouged, scraped and tumbled the surface layers. This resulted in overturning the rocks, often



Horizontal is not the only direction. The caver here is about to climb up through a ceiling hole.

PHOTOS BY KEN LAW



Solid footing is often beyond eyesight.

leaving the older layers on top of the younger rocks. The tumbling served to intermix and consolidate the fragments, depositing them as a conglomerate.

This same region also demonstrates a history of extensive fault activity. While none of the faults are of the size or scope of the San Andreas Fault along the western coast of the United States, the crunch, push, and shove in New Jersey has created quite a puzzle for the scientists.

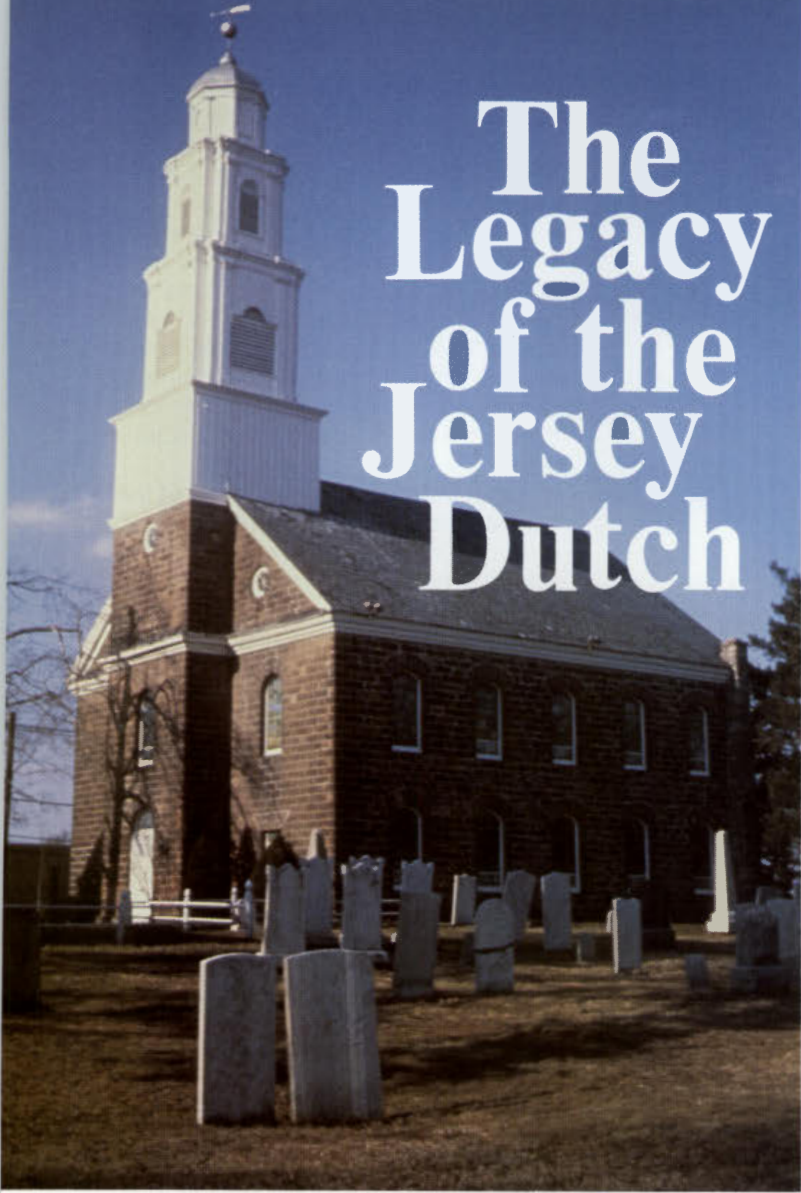
As one steps back and looks at the overall distribution of the caves in relation to the geology, one begins to understand why so many caves are little more than expanded cracks or crevices, and why so few other caves have little extensive development. A large number of caves lie directly across fault lines. These are the caves that have developed as a result of the earth cracking or fracturing as the earth's surface was crunched into new alignments. These caves generally develop along the plane of the bedrock with little or no cross-bedding extensions. An equally large number of caves are located in the traditional host rock—limestone. Depending on the expanse of limestone or its metamorphosed form at the cave site, the extent and size of the cave varies greatly. Most of these caves have been found as a result of quarrying or during the construction of highways or railroads. A great many caves that we plotted on the maps fell into areas where they should not be expected. Until they are field checked, we can only assume that small pockets of traditional host rock must be isolated within the strata of other types of rock. It must also follow that these pockets are too small to be mapped at the scale of our maps. It would also seem logical that these caves would not have either great length or size.

The next set of overlays to be developed is that of the drainage. The direction and volume of flow and whether that flow is surficial or subsurface could offer indications as to where more or additional caves might be found. There is yet a great deal of work to be done on the drainage study.

The Field Work Is Hampered

The members of the Central Jer-
Continued on page 30

The Legacy of the Jersey Dutch



BY SUSANNE BANTA HARPER

If one leaves the major thoroughfares of northern New Jersey and travels instead along the other routes, a rich architectural heritage awaits the discerning eye. The charming 18th-century farmhouses of the sturdy Dutch farmers still stand in surprising numbers. This style of architecture, called Dutch Colonial, is unique to the area once peopled largely by Dutchmen. It is particularly abundant in Bergen and southern Morris counties.

The first Dutch arrived in America under the auspices of the Dutch West India Company, formed in the Netherlands in 1621 to expand trade and set up a colony in the New World for that purpose. Most Hollanders, however, were quite content at home, so that few migrated to the fledgling colony of New Netherland. The company set about establishing the patroon system in the Hudson River valley. These patroonships, which were grants of enormous acreage to a patroon, or lord, added to the problem of attracting settlers to the colony. A few, however, were successfully established, the first in New Jersey being the Manor of Pavonia in 1630, in what is now Jersey City and

Hoboken. It was not until the fur trade with the Lenape Indians was opened to the settlers that Dutchmen moved into New Jersey in any numbers.

The settlement of the area by families hoping to establish farmsteads began to swell as religious refugees from the Spanish Netherlands and Huguenots fleeing persecution in France sought to settle in New Netherlands. The population growth began to peak after 1664 when the Dutch West India Company had been driven from the area and political control had fallen to the English. The development of Dutch New Jersey, therefore, occurred after the fall of New Netherlands to the English when many Dutch were attracted from such areas as Long Island, Brooklyn, and Harlem. Generally, settlements were near the major rivers—the Hackensack, Ramapo, Saddle, Passaic, and Pequan-nock.

In considering the cultural heritage of Dutch New Jersey, it is important to keep in mind the large numbers of settlers who were non-Dutch, especially the Flemings, Walloons, and French Huguenots. The traditions of these groups were blended with those of the dominant Dutch; most assimilated into the Dutch culture, joined the Dutch Reformed Church, and adopted the Dutch language. They had a strong Calvinistic tradition in common.

These thrifty, practical, and hardworking people learned to adjust to the new climate, both colder in winter and hotter in summer than Northwest Europe. They took advantage of the natural resources of the area, so that the natural clay of the river banks and the abundant sandstone of the region would lead them to create a new architectural style which reflected various European influences but had no direct European prototype. Rather, the Dutch and their assimilated groups developed a unique style of house that was at once functional, durable, and beautiful.

The earliest settlers, moving into the wilderness of northern New Jersey, established themselves first in cellars and dugouts, later building their houses. The first houses were one-room affairs, built with stones picked up in nearby fields and bound together with red clay mixed with straw and animal hair. The upper area of the house was constructed of shingle or clapboard. This mixture of material became a characteristic feature of Dutch colonial architecture. These single-room dwellings developed into the more common two-room Dutch house of the early 18th century, excellent examples being the Old Demarest House

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Doremus House, Montville. Built in the early 18th century.

A Tour of the Land of the Jersey Dutch

The many existing Dutch Colonial houses in northern New Jersey are one of the nation's finest architectural heritages. The style is easily recognizable and its details can be identified with a little effort.

Dutch New Jersey is both a fascinating and inexpensive historical area to visit. The following tour includes examples of the various features of the general style. It covers 45 miles and takes about an hour and a half or so to drive without stops, thus leaving ample time to view those buildings open to the public, have a pleasant lunch, and drive leisurely through the route. Take a day and travel to historic Hackensack, revolutionary Paramus, and idyllic Franklin Lakes. Tour the land of the Jersey Dutch.

Take Route 4 to Hackensack. Take Hackensack Ave. north to Main St. (.5 miles). Turn right at the end of the street. Three fine examples of Dutch Colonial architecture are clustered adjacent to the Hackensack River in River Edge.

I. RIVER EDGE

1. Von Steuben House. The original section dates to 1737 and is in the center of the building. Additions at both ends and at the rear were made later. The series of additions was completed with the present gambrel roof creating the mansion as it exists today. Open to the public.

2. Old Demarest House. Built in 1696, this house is a prime example of the early two-room style. Note the marker on the right side of the building with the date and initials of the builder's wife.

3. Christie-Campbell House. This house was originally located in New Milford and is currently being restored at its present site. The front stoop, window lintels, and gambrel roof are typical of the Dutch style.

Return to Route 4. Take 4 west to Paramus Rd. (2.6 miles). Follow Paramus Rd. north.

II. PARAMUS

4. Terhune Homestead (1.1 miles on right). Small one-room pre-Revolutionary stone house. The building is set quite far back from the road.

5. Stephen Zabriskie House (.7 miles on left). Built around 1792, this building has many alterations but the original stonework is still visible.

6. Zabriskie-Van Dien Smoke House (.4 miles on left). Built around 1800, this building has flaring eaves with narrow portico.

7. Jacob Zabriskie House (.8 miles on left). This house was built in 1826 on the site of an earlier house. Note old ice house in the rear.

Continue north in Paramus .9 miles. Turn left on Linwood Ave. Proceed .4 miles and turn right on East Glen. The Old Paramus Church is on the right.

III. RIDGEWOOD

8. Old Paramus Church. The present building was constructed in 1801 and has the typical features of Dutch churches of that time. It is on the site of an earlier church. The graveyard has many early markers. The Continental Army camped on this site.

Take Route 17 south (straight ahead) to the second exit to Saddle River Rd. north (.4 miles). Turn right on East Glen Ave. (.2 miles). Park in lot of antique shop.

9. Ackerman-Van Emburgh House, to the left of the antique shop, was built in the mid-18th century and has typical Dutch stonework. Walk around the corner.

10. Ackerman-Naugle House, circa 1701, is an early two-room style. The sloped roof in the rear indicates the addition of narrow bedrooms. The double doors in front are typical of this style.

After seeing the Ackerman-Naugle House spend a minute at the antique shop. The elderly proprietor is owner of the Ackerman-Van Emburgh House. On leaving the parking lot, turn left onto E. Glen. Drive east to Pascack Rd. (1.0 miles). Turn left and drive north on Pascack Rd.

IV. WOODCLIFF LAKE

11. Doremus Road House (1.9 miles on left). This house features typical stonework and gambrel roof. A number of later modifications are visible.

12. Wortendyke House (.9 miles on right). This house was built in the late 18th century and is a fine example of flaring eaves.

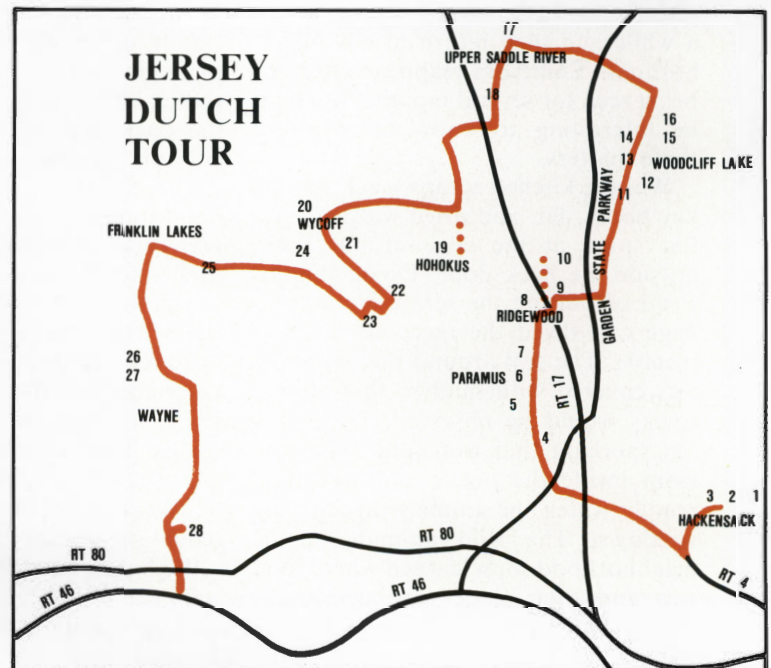
13. Peter Post House (.5 miles on left). Circa 1794, this house has many Federal style alterations but the original stonework is still visible.

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Von Steuben House, River Edge. Original section built 1737.

PHOTOS BY AUTHOR



Sixty-four Skunks in Our Backyard

SYDNEY ANDERSON AND
R. JUSTINE ANDERSON



SYDNEY ANDERSON

In 20 months, beginning in November 1975, we observed at least 64 different striped skunks (*Mephitis mephitis*) in our suburban back yard in Closter, New Jersey, only 18 miles north of Times Square in New York City. Fortunately, they weren't all there at any one time. The most we saw in any one evening was 8. The most that we knew to be present in any one month was 26 in October and 26 in November 1976. The average number per month was 17. We don't know the sizes of the home ranges of these suburban animals and we don't know how stable the home ranges are. Perhaps some individuals wander elsewhere for a while and then return to our neighborhood. Some did reappear after not being seen for several months. It would be interesting to know more about these matters.

We put kitchen scraps, such as turkey bones, fat, and dried waffles, on a flat stone at the edge of our patio outside the back door. Doing this instead of putting the scraps in the garbage can saved the raccoons a lot of trouble. The soil around the flat stone was covered with sand so that animal tracks would be observed. We had a red spotlight that we could switch on from inside the house and we could readily watch the animals through the windows. The wild animals in the neighborhood soon learned where food was and they made regular rounds. Their "game trails" were often easy to see.

In addition to the striped skunks and the raccoons we saw a few opossums, some semiferal cats, and occasionally a dog at our feeding station. A leash law was in effect and roaming dogs were not a great problem for homeowners or for wildlife. A number of other species of native mammals have also used our yard. Some, such as the red fox, woodchuck, chipmunk, cottontail rabbit, and gray squirrel were present only occasionally. The frequency varied from nearly every day for squirrels to once every few years for the fox. Other species, such as the short-tailed shrew, white-footed mouse, and meadow vole, were residents.

Our lot was about an acre and we let the vegetation have its own way, within rather broad limits, on the hillside on the back part of the lot. There was enough varied and relatively undisturbed vegetation in the neighborhood to provide favorable habitats for many species. Rows of shrubs provided shelter for moving animals.

Skunks were fairly common in the years when we collected the observations reported here. Probably they were more common than in the years before 1975, although we did not keep notes earlier. They were definitely more common than they have been more recently. We don't know what caused the reduction, perhaps some disease.

We had noticed that the skunks were quite variable in their patterns of white markings and so we began to make sketches and notes. We originally

thought that there might be as many as 10 skunks in the area. Most individuals were distinctive, as shown in the sketches. In a few cases we knew that we had more than one individual with almost the same pattern because on two evenings there were two skunks present at one time that were so similar that they could not be distinguished from each other. Many observations were too brief to permit identification of the individual. However, when we had adequate time to see the skunk from different angles and compare it with our sketches we were able in the vast majority of cases, to decide which animal it was or to make sketches and add it to our growing list. We recorded 10 skunks in the first month. As time passed we recorded more and more, until by July 1977 we had recorded at least 64. We did not continue the observations beyond that date with any great frequency because we were away for two months, thereby disrupting the feeding, and because fewer skunks were present later.

Our study was not very systematic. Whenever we had a few minutes and happened to think about it we would switch on the light and see what was happening, then make a brief note of any observations. In this way we accumulated 514 separate observations of recognizable individual skunks.

We observed groups of young skunks with adults presumed to be their mothers on several occasions. Skunks numbered 33 to 37 were proba-

bly the young of number 32; 25 to 29 were probably the young of number 23; 59 to 62 were probably the young of number 39; and 52 to 55 were probably the young of number 51. There was less variation among the members of a litter than between skunks considered at random so we suppose that some genetic control over the variable details of pattern exists, as well as a general tendency of skunks to inherit a black pelage with white markings. The genetics of skunks has not been studied much by scientists—Fruit flies and white mice are much easier to work with.

The four litters of young observed were five young first seen in July 1976, five seen in September 1976, four in June 1977, and four in July 1977.

We observed three individuals with injuries to napes or shoulders, one in January and two in March. These injuries may have been received in mating behavior. The males of many species of mustelids, the family to which skunks belong, grasp the skin of the female by biting the nape region during

copulation. A few other skunks were seen with injuries from unknown causes. Some of these animals were known to have recovered. One individual was observed on March 10, 1977, when less than a year of age, to be nearly denuded of hair. We called this one "the ghost" because of the eerie appearance when we looked out and saw a nearly naked whitish skunk wandering around. We saw this animal a number of times up to April 12 and then no more. Its condition did not seem to deteriorate in that period, however. The skin did not seem scaly or otherwise peculiar and we believed that hair was beginning to grow out although we did not examine the animal at close range.

It was our impression that a female was reasonably solicitous or at least tolerant of the young when they were small but that later she acted as though she would just as soon have them get lost.

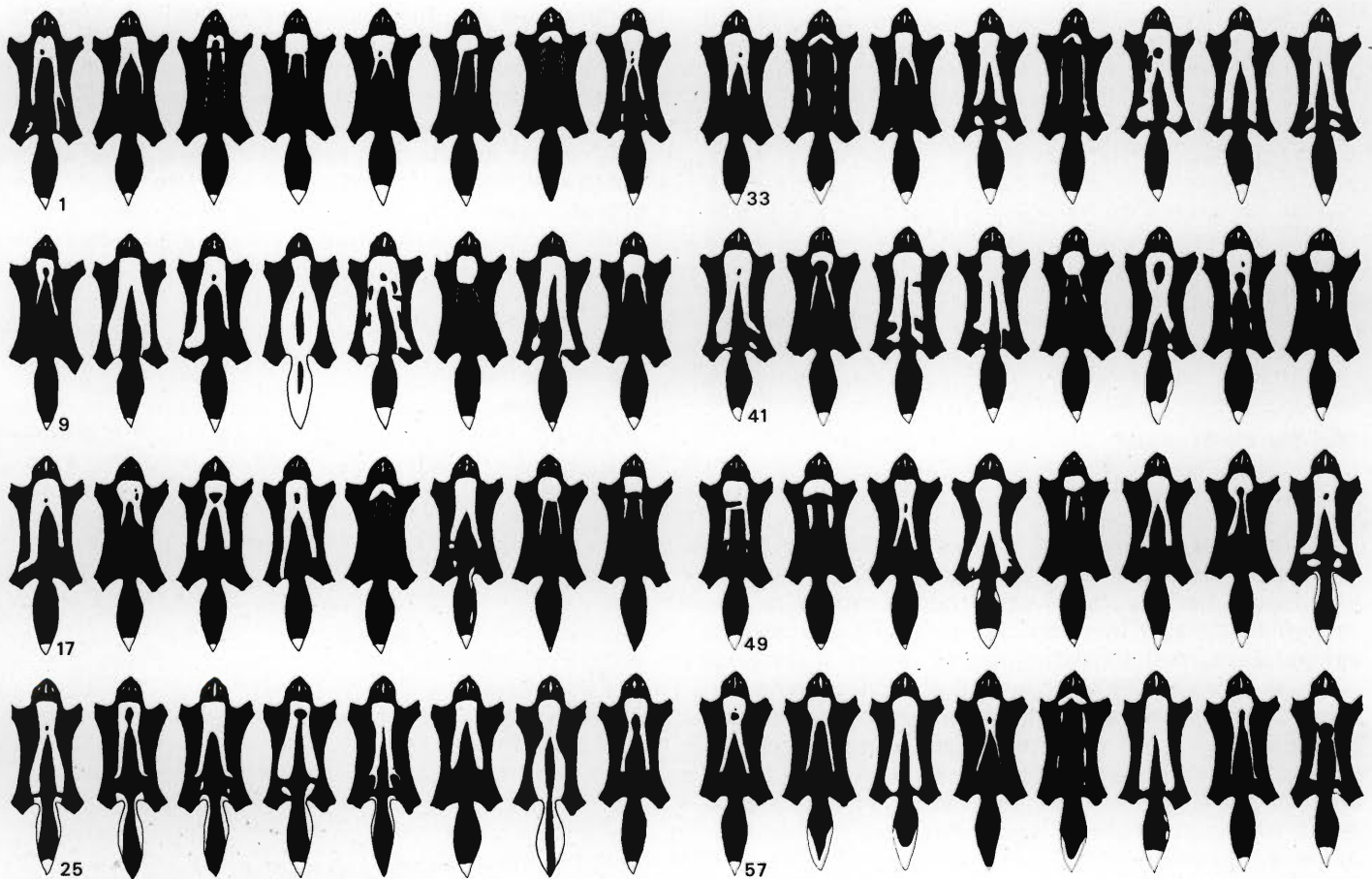
It is not easy to determine the sex of a living skunk from eight to twelve feet away and so we were not certain of the

sex of our animals.

We observed skunks in all months of the year, but there is little or no activity during very bad weather. Skunks are not true hibernators, but they may remain in a protected den for periods of many days.

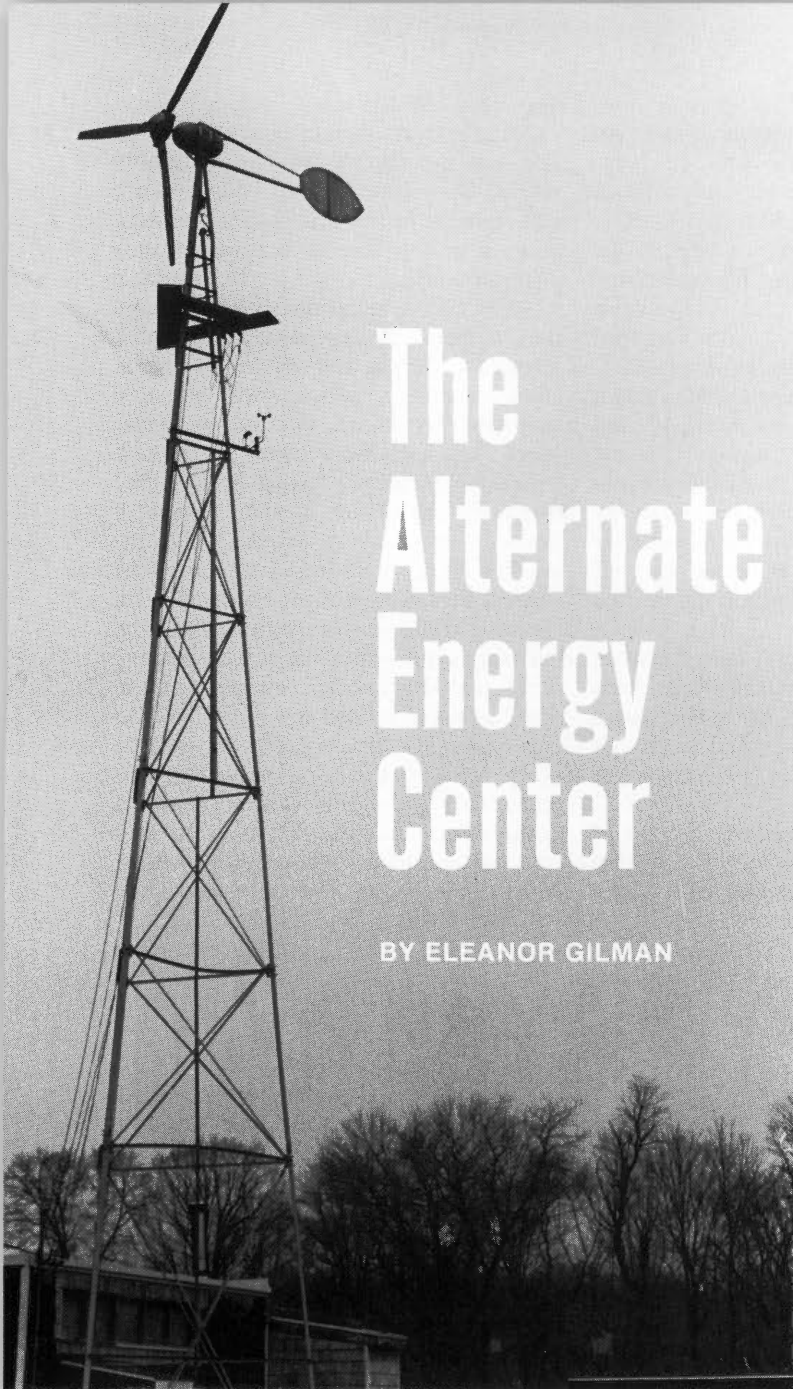
Some of the neighbors had the idea that skunks always have a powerful odor, but rarely did we smell them. Occasionally one would spray when surprised by a cat, person, or some other animal. Sometimes a skunk would also spray a bit in a disagreement with another skunk. When a skunk was sprayed on the head by another it would immediately rub its face by thrusting it along the surface of the soil. There was much more bluffing than spraying. Bluffing was postural and vocal. Two skunks contending for a bit of food would have their heads close together and would shove each other with their hips or sides. The house cats and skunks largely ignored each other but usually kept an unprovocative meter or more of distance. Arriving raccoons seemed unconcerned

ILLUSTRATION BY AUTHORS



Illustrations of sixty-four different skunks

Continued on page 31



The Alternate Energy Center

BY ELEANOR GILMAN

Wind-Electric Generator

PHOTOS BY AUTHOR

Progress is usually thought of as beneficial. In day-to-day living, we see its results frequently. The housewife leaves her centrally heated house, drives to the supermarket, and in about an hour has purchased several days' food, including meats, poultry, dairy, and produce. Her way of life is convenient and time-efficient when compared to that of her great-grandmother who probably grew much of her own food, and cooked and heated her house with a coal or wood stove. But there are two sides to the coin. We modern humans pay dearly for the progress we have made, and inflation has made things much worse.

In recent years, a "back-to-nature" movement has evolved. People are fed up, not only with rising costs,

but with additives, pollutants, and artificial ingredients. A group on the campus of Ramapo College in Mahwah is doing something about it.

The Alternate Energy Center, under the guidance of environmental physics professor William Makofske, originated in February 1975 as a student project of the School of Environmental Studies. It encompasses a greenhouse and gardens, a recycling center, a geodesic dome, a wind-electric generator providing electricity for the greenhouse, and a windmill.

The students work cooperatively, according to project director Jim Markstein. "We are interested in doing more for ourselves," he said; "in participating in providing our basic needs—food, energy, and shelter." Students learn the appropriate technology and apply it to the project.

The experimental solar greenhouse, which students built by themselves in an effort to simulate a natural ecosystem, has windows that slope at an optimum angle to capture the heat of the sun. The wood stove in the corner of the room is used as a back-up. In the center of the room, chickens live in coops under a table on which seedlings are sprouting. Rabbits occupy a hutch nearby.

Under the sloping windows grow healthy-looking turnips, beets, chinese cabbage, kale, chard, onions, and radishes. A few chicken eggs are scattered around. On the opposite wall stand tall oblong tanks of water awaiting the arrival of fish.

Everything in the house is carefully planned and all components are integrated so that nothing is wasted. For example, the waste matter from the chickens and rabbits is put into the compost pile in a corner of the structure and used to fertilize the plants.

"All materials are recycled," said Markstein. "The fish will feed on the algae in the water tanks. Their wastes will be siphoned off and also used to fertilize the plants."

In a closed environment, explained Markstein,

Greenhouse Dome



carbon dioxide is depleted. Thus, the animals are an additional asset since they provide the plants with carbon dioxide as they respire. The plants, in turn, give off oxygen, completing the cycle. The balance of nature is quite evident here.

The water in the tanks, besides serving as a home for the fish, captures heat as the sunlight coming through the window passes through it. By retaining this heat, the water also makes temperature swings in the room less extreme, thus supporting the passive solar heating system used for the structure.

Outside, near the wind-electric generator, is the windmill, sometimes known as a prairie fan. The fan provides the energy to lift water out of the ground via a pump under it. The water is drawn into a raised adjacent tank, from which it can be piped into the greenhouses and gardens.

"We learn skills as well as applying ideas," said Markstein. A greenhouse dome recently built by the students is currently being tested. Constructed with two-by-fours and covered with polyethylene and burlap, its main attraction is its low cost. A 500-square-foot dome can be built for between \$600 and \$700, according to Markstein.

Behind the dome is a plot of land that is planted every spring. "In these times of rising food prices," Markstein observed, "people are interested in some self-sufficiency."

All projects, of course, are geared to the immediate environment of Bergen County. "We wouldn't have cows here," he noted.

Organic wastes are recycled in a compost pile to maintain a fertile soil. The soils of Bergen County have been stripped of their topsoil, Markstein explained. In addition to adding nutrients to the soil, the students attempt to maintain the texture of the soil by using a biologically based approach to enhance its moisture-holding ability.

Since most Bergen County homeowners have small

plots of land, the emphasis is on getting the most out of the soil. The garden project emphasizes the intensive growing method which produces higher yields from smaller areas. The students are experimenting to learn the difference in yields between this method and standard gardening, in the process learning how to deal with constraints and solve problems.

One popular project of the Alternate Energy Center is the student-run Recycling Center. Here, glass, aluminum, used motor oil, newspapers, magazines, and ledger paper are collected.

In the planning stages is a passive solar building to be used as a classroom. "The walls will be concrete thermal mass with south-facing windows," said Professor Makofske, "to absorb and hold the heat." Shutters on the glass will reduce heat loss at night. The building will be used for workshop classes and demonstration purposes.

Although the main purpose of the center is education, it also serves local communities. "People will need places where they can learn to cope with food and energy problems," said Markstein. "They are hurt by the rising cost of things, and need information. One neat way out is by relying on themselves. They can help themselves," Markstein went on, "we can compost, we can recycle, we can garden, we can have solar energy, and we can raise small animals."

During the summer months, the center gives demonstrations for the public on growing food for the family garden, demand planting—which is the planting of vegetables that are compatible in terms of the soil—and intercropping for pest control.

Workshops are held on recycling, energy conservation, wood heat, home gardening, solar and wind energy, bicycle maintenance, food preservation, and building skills. These programs have been very successful, according to Markstein.

For more information, call The Alternate Energy Center at 825-2800, ext. 433. □

Windmill



A student brings newspapers to the recycling center





Forest Fires in South Jersey

*They're
Not
All Bad*

BY DEBORAH A. BOERNER

A Controlled Burn

PHOTOS BY AUTHOR

Fire has always been an integral part of forestry in south Jersey. In fact, forest fire technology in the state has developed mainly from contending with the wildfires that rage through sections of the Pine Barrens every spring and fall. Today, however, fire is both friend and foe to the foresters in southern New Jersey. Ever since the forester has learned to fight fire with fire, prescribed burning has proved its value in more ways than one.

The idea behind prescribed, or controlled, burning is to reduce the buildup of fuel on the ground and to break the line of fuel to the crown. Then, if a wildfire gets started, it won't reach the crown or burn as intensely as it would in a forest that's accumulated several years of leaf fall and has an intermediate shrub layer. So not only will it make forest fires easier to suppress, but prescribed burning can also reduce damage from the devastating effects of a fire

that burns fiercely.

Most important, though, prescribed burning protects nearby homes and buildings. Not always a popular idea, prescribed burning is gaining support for just this reason. With increased development in certain sections of the Pinelands, there is a greater threat of fire to private property and human life. Given the ecology of the region, the pine forests of south Jersey can go only so many years before fuel accumulates and fire becomes inevitable. This is sometimes called a fire-climax ecosystem; fire must be present to keep the forest going through its normal cycle of successional stages. Thus, a controlled burn can act as the climax that sets back forest succession just as nature would do if allowed to run its course.

Since most of the trees and plants in the Pine Barrens are adapted to fire, prescribed burning can also be used as a forest management tool.

Many pitch pines (*Pinus rigida*—the predominant tree species of the south Jersey Pine Barrens), for example, have serotinous cones. These are cones which won't release their seed until exposed to heat, such as the heat of a fire. Also, the seed won't germinate as well in thick forest litter, but prefer bare mineral soil. Thus, pitch pine needs fire to regenerate abundantly. Actually, the pines probably evolved in these ways in order to cope with fire. Whatever the case, prescribed burning, like wildfire, can cause serotinous cones to release seed as it burns off surface litter and exposes a seedbed of mineral soil for that seed to take root and grow. Therefore, if controlled burning is done right before or after a timber sale, it will assist in the natural regeneration of pitch pine.

Another advantage of prescribed burning is the very reason it has been a springtime ritual in the southern Gulf states for centuries. Burning off the litter layer causes the forest to "green up," and thus, attract more wildlife. Most white-tailed deer in the Pine Barrens have been found to be significantly smaller and less robust than those in the northern parts of the state. The effects of prescribed burning could improve this situation by providing more food to the deer in the Pinelands.

Of course, providing a suitable habitat for one species of wildlife may reduce others. Burning certain sections of woods at different times, however, will create a variety of habitats and ecotones (the edges of burned and unburned areas) where an abundance of wildlife species can exist.

The disadvantages of prescribed burning, though few, must also be mentioned. The greatest drawback is the appearance of the woodland right after it's burned. Although the blackness won't harm the trees and will disappear in a few months, the forest will assume a darker appearance for the first few weeks. Also, if the litter layer is thick, the burning may have to be repeated every three to five years. Priorities must also be established; even though it's more economical to burn 50 acres or more at a time, smaller patches are most helpful if wildlife

diversification is the primary goal.

Although prescribed burning has many benefits, it is not something a landowner can do on his own. First of all, the burning must be recommended by a forester or forest fire specialist. Since open burning is not allowed without a plan in New Jersey, the landowner must obtain the proper permit. Forestry Services will hire the fire crews, plow the fire lines, and supervise the burning. They are careful to choose a day on which the fire will be easy to control. Winter burning is generally done between October 1 and March 15 on a day when the temperature is 0-60°F. and there is a steady wind of no more than 10 mph blowing in a direction perpendicular to that of the fire lines. Thus, the fire lines must also be carefully planned and are plowed 300 to 400 feet apart at approximately a right angle to what the winter wind usually blows. Relative humidity should be 30-50%. Fuel moisture should be no more than 10% which means that there should be no snow or ice on the ground. (The best time for summer burning, done less frequently and to control hardwoods, is between June and October.) All these factors are important guidelines to creating a low, creeping fire that will burn readily but can be easily controlled.

Currently, the cost of burning is four to five dollars per acre. Under the Forestry Incentives Program, the Agricultural Stabilization and Conservation Service (ASCS) will pay up to 75% of this, if the landowner fills out the proper forms in a local ASCS office. Therefore, prescribed burning costs only about a dollar an acre, which is a small price to pay for all the protection it affords.

As recently as 50 years ago, only a few foresters and firefighters realized that fire, like rain, can be both good and bad. Today, fire has become one of the forester's best tools in south Jersey. It is used there as a fire prevention tool, as a forest management tool, and as a wildlife management tool. There's still much to be learned about fire in the Pine Barrens. However, the foresters there and researchers throughout the state have thus far done an outstanding job of adapting what is known about fire to the uniqueness of the Pineland ecosystem. □



Photograph taken only days after prescribed burn



The same spot almost a year later. Notice that charred look is gone.



Wildfire swept through here three years ago. The understory is coming back, but the trees are permanently damaged.

PROTECT WILDLIFE AND ITS HABITAT

PRESERVATION: Non-Use Of A Wildlife Area



WILDLIFE IN BALANCE with its food supply and at or below carrying capacity of habitat. Animals and habitat in good condition.



WILDLIFE OUT OF BALANCE with food supply. Threatened by starvation due to overpopulation.



CONSERVATION: Wise-Use Of A Wildlife Area



WILDLIFE in BALANCE with its food supply and at or below carrying capacity of habitat. Animals and habitat in good condition.



ANIMAL MANAGEMENT:
Scientifically controlled sport hunting removes annual surplus produced.

WILDLIFE MANAGEMENT

LAND MANAGEMENT:
Scientifically controlled habitat improvement includes water source development and vegetation renewal by clearing and burning.

WILDLIFE HABITAT

Wildlife Resource . . .

When animals are removed, population exceeds carrying capacity of habitat.



MASS DIE-OFF results from starvation, disease, and parasites. Animals and habitat in poor condition; future carrying capacity of land reduced.

Wildlife Resource . . .



WILDLIFE IN BALANCE with its food supply. Animals and habitat in good condition.

CONCLUSION:

Wildlife is a natural resource that cannot be "stockpiled." Wildlife populations must stay balanced with their food supply so that the animals and their habitat remain in good condition. Scientifically controlled sport hunting is the only logical and economical way to maintain this balance. At the same time, hunting provides food for man, who is also a predator in the food chain. Starvation and disease are the result of overpopulation, and are cruel and wasteful alternatives to hunting.

HABITAT IS THE KEY TO WILDLIFE SURVIVAL

American
Wildlife
Education
Foundation



This material was prepared by a nonprofit committee of professional wildlife biologists and conservationists to promote better understanding of wildlife management principles.

Wildlife in New Jersey



RACCOONS

L. R. RUDNICK

BY DR. DENNIS SLATE

Probably no other North American wild mammal is as widely recognized as the raccoon. Mention "ringed-tail" and "masked-face" to any farmer who has attempted to grow corn; any camper who has been awakened from golden slumber by the rattle of trash cans; or anyone who has ever seen a Sunday afternoon nature show on TV, and the

response will unmistakably be—raccoon. To the hunter, the mention of these characteristics conjures up anticipation of sporting chases in upcoming seasons, while the scars on his shins are testimony to elusive, nocturnal chases of seasons past.

Public attitude toward the raccoon is varied, to say the least. The farmer generally perceives the raccoon as a notorious, intolerable pest that will cut into his annual crop yields. Insomniac campers often lack kind words for this mischievous critter, but tolerate its noisy habits. Hunters and trappers view the raccoon as a valuable resource that will provide many hours of outdoor recreation. Trash collectors sigh at the sight of tipped-over cans along their routes. Indeed, its ability to frequently capitalize on the activities of man, its high value as a game animal, and its cute and cuddly appearance have led to a vocal love/hate relationship (and everything in between) with the public, unique to no other North American wild mammal.

In the scientific community, the raccoon has been and remains a supreme candidate for study. Through numerous hours of research, behaviorists, ecologists and wildlife biologists have gained many insights concerning the ecology and management of the raccoon. This article is designed to better acquaint the reader with one of New Jersey's most common but often misunderstood mammals. The discussion pertains primarily to the ecology and behavior to be expected of raccoons in the Northeast.

TAXONOMY—the raccoon and its relatives

The raccoon (*Procyon lotor*) is the dominant North American member of the family *Procyonidae*. Except for its Asian relatives—the red (*Ailures fulgens*) and giant (*Ailuropodamelanoleuca*) pandas, all members of this family occur in the Americas.

American relatives of the raccoon include the coati (*Nasua nasua*), Kinkajou (*Potos flavus*), olingos (*Bassaricyon sp.*), the ringtails (*Bassariscus sp.*), although there is some debate as to the taxonomic status of the latter two and the giant panda.

Procyonidae (raccoon and its allies) occurs within the order *Carnivora* (carnivores) and the class *Mammalia* (mammals). Anatomical and behavioral characteristics common to most members of this family include: medium body size; long to moderately long, furry tails; a somewhat elongated snout; prominent facial markings; five toes on the front and hind feet; semi- to non-retractile claws, bearlike locomotion; agility as tree-climbers; and omnivorous food habits.

DISTRIBUTION

The range of the raccoon extends from southern Canada to Panama. It can be found in all of the 48 contiguous States, except for arid portions of the southwest, vast expanses of coniferous forest, and at higher mountain elevations.

Several raccoon introductions have been attempted abroad. Wild populations now exist in Germany and parts of the USSR.

DESCRIPTION

The raccoon is a medium-sized mammal, easily identified by a prominent black mask extending across the eyes and cheeks and a bushy, ringed-tail. The face is broad and somewhat flattened, with a pointed muzzle, pointed ears, and medium-sized dark, glossy eyes. There are five toes with nonretractile claws on the front and hind feet. Females have six mammae. The baculum (penis bone) is well developed in males.

By about six months of age, the raccoon has 40 permanent teeth well adapted for eating a wide variety of foods. There are six incisors, two canines, eight premolars and four molars in both the upper and lower jaws. The dental formula is 3/3, 1/1, 4/4, and 2/2.

Raccoon pelage is long and dense, especially along the back. Underparts are less densely furred. In addition to a black mask, blackish fur occurs along the back from the shoulders to the base of the tail and as conspicuous patches at the base of the ears. Black also occurs as rings, alternating with lighter browns in the tail. The back of the neck varies from a yellowish-brown to a reddish-brown, while the top part of the head is brownish-gray. The sides are brown to gray, or sometimes silvery-gray in appearance. The underparts are generally rusty to gray in color. Outwardly, the raccoon appears grayish-brown, with distinctive facial and tail markings. Both sexes are colored alike; however, individual color variation can range from blonde to nearly black. Albinos or melanistic varieties occur, but infrequently.

Wild adult raccoon weights range from about 8 to 30 pounds. Adult head and body measurements range from about 18 to 36 inches. Tail length ranges from 9 to 12 inches. Heavier and larger animals tend to come from the northern part of the range.

HABITAT

Raccoons occur in a wide variety of habitats. They prefer areas comprised of mature hardwoods interspersed with patches of agricultural crops and wetlands. They occur, albeit at low densities, in the center of many of our largest metropolitan areas (eg. downtown

Manhattan), where storm sewers often serve as travel-ways and denning sites. They inhabit the treeless prairies of the Dakotas and central Canada, where deserted farm buildings provide refuge from the severe winter climate. Many of our suburban areas support sizeable raccoon populations. In fact, one of the highest densities on record—one raccoon/2.5 acres, was reported for the Clifton suburb of Cincinnati, Ohio.

Raccoons are agile tree climbers and prefer the seclusion of an arboreal den. The den is normally 20 to 40 feet above the ground. Tree dens of various entrance exposures and cavity sizes are used. The most important quality of a den is that it be dry. Cavities which extend from the entrance to the base of the tree are generally avoided, at least for overwintering, because they offer little protection from moisture. Red maple (*Acer rubrum*) is a frequently used species; however, raccoons will den in any large hardwood with suitable denning cavity. Ground burrows of other animals, abandoned beaver lodges and muskrat houses, rock crevices, fallen trees, and a host of man-made structures also serve as denning sites, especially when tree dens are not available.

The den is an integral component of the raccoons' habitat. It serves as a daily retreat from nightly journeys. It provides refuge from predators, namely man and domestic or feral dogs. Breeding often takes place within the confines of the den. Newborn litters spend their first 8 to 16 weeks nursing within the den. In the northern part of its range, the den serves an added seasonal function of providing insulation from the wind and moisture during the winter.

ECOLOGY AND BEHAVIOR

Raccoons are omnivores. At times they are predators, feeding on crayfish, clams and mussels, snails, frogs, salamanders, earthworms, snakes, fish, and bird and turtle eggs. Their diet may also include small mammals, squirrels, muskrats and birds. Predatory behavior is most common during the spring and early summer, when fruits and vegetables are scarce. From mid-summer until winter they graze on a wide variety of wild and cultivated fruits and vegetables. Fleshy items, such as grapes, berries and corn are consumed through early fall. Acorns and other hard mast are eaten later in the year. Raccoons also scavenge. Unputrified carrion and fresh garbage may be eaten any time of year, as the raccoon is an opportunistic animal not likely to pass up any meals of fortuity. Scavenging behavior is most prominent in suburban and urban habitats, where fresh refuse is readily available on a daily basis. Raccoons in these habitats may even show a preference for

this dependable source of energy over natural food items.

Raccoons are nocturnal, although they may sometimes be seen sunning themselves on tree limbs near the den entrance. Occasionally, they may be observed leaving the den just before dark or tardily returning after daybreak from a belated nightly foray.

Adult males and females without litters tend to be solitary, denning and traveling alone. Females that have given birth



travel alone for about the first two to three months after parturition, then with part of all of the litter until the cubs become independent.

Each raccoon has a home range. The home range includes the denning sites and all of the land area normally traveled over. It is not defended against intrusion by other raccoons or species, as the raccoon is not territorial. The home range of one raccoon may overlap with one or more raccoons, or be totally within the home range boundaries of another raccoon. This type of spatial organization within the population leads to many areas being used by more than one raccoon. Prolonged contact among solitary raccoons or family groups within home range overlap areas is generally avoided.

Home range size varies considerably, but 200 to 400 acres is fairly typical for adult raccoons in rural habitats. Adult males tend to have larger home ranges than adult females. The home range of

juveniles is smaller than adults, and is often included within their mother's home range. Raccoons that reside in better quality habitats generally have smaller home ranges, as they do not have to travel as far as those in poorer habitats to meet their food, water and denning requirements.

A nightly journey usually does not cover the entire home range. More commonly, movement patterns shift with the seasons, with certain sections within the home range receiving heavy use during a particular season.

A typical night in the life of a raccoon begins at dusk, when it becomes restless within the den. The raccoon cautiously exits the den as darkness sets in. It may exercise a bit and reconnoiter from a nearby limb before descending the tree to begin its nightly journey. The nightly route is deliberate rather than random, consisting of a series of sojourns. Lake edges, drainage ditches and man-made water courses are frequently used as a network of travelways. Temporary stops along or slightly off the route are made for both feeding and resting. The raccoon may feed a few times during the night and probably rests for at least one short period sometime after midnight. As daybreak approaches, the raccoon returns more or less directly to its arboreal retreat.

Raccoons are promiscuous breeders. Breeding takes place from late January to mid-March. Most of the females about to turn two years of age or older breed during this period. If a female from these age classes is not fertilized or aborts the first litter, a second breeding cycle may take place two to four months later. A small percentage of females about to turn one year of age may breed during the spring but these individuals will not undergo a second breeding cycle until the following spring. Males generally do not enter the breeding population until just before their second birthday. The gestation period lasts from 58 to 63 days. The young are normally born during April, but a few litters may be born as late as mid-September due to the second breeding cycle. The female assumes full responsibility for rearing the young.

Each successfully reproducing female cares for a maximum of one litter annually. Litter size ranges from two to seven, with the average being slightly less than four. The sex ratio of newborns approximates one male per female.

At birth the cubs weigh about three ounces. They are well furred except on the belly and inner legs. Their eyes are shut at birth and remain closed for about the first three weeks. By seven weeks the young are able to walk, run and climb. They nurse for up to 16 weeks, but are usually capable of eating some solid food by nine weeks.

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RACCOONS



The cubs remain in the den for the first eight to ten weeks. By this time all of the cubs are very active and the mother may transfer the litter to a ground bed. If she does, the bedding site is frequently in marshy or swampy habitat. When the cubs are nearly weaned, around week 12 to 15, they begin to travel as a group with their mother. The distance traveled at first is restricted, but movements become progressively longer, covering more area as the summer winds down. By mid-September, the family social bond weakens. The young begin to travel and later bed without their mother, but their new found freedom usually does not extend beyond her home range. A somewhat unpredictable series of sibling-sibling and mother-sibling bonds form and dissolve during the fall period of semi-independence. As winter nears, the family social bond usually strengthens. Family members travel and bed much more frequently as a unit. They select a suitable den for overwintering, and den together or in a group of trees close together. The juveniles normally disperse the following spring.

The raccoon spends much of the winter in a dormant state. When nighttime temperatures are 28°F or less, the raccoon becomes inactive, remaining in the den in a drowsy sleep. This period of inactivity usually is two to three months in duration, but may last four months during severe winters. Dormancy is frequently interrupted during milder winter periods, but if the snow is deep the raccoon will either remain within the den or not venture far in spite of the moderating weather.

Raccoons do not experience a significant drop in body temperature during winter dormancy; therefore, they are not in a state of true hibernation. They are dependent solely on body fat accumulated during the summer and fall for

energy to sustain them over the winter. As their fat is metabolized, internal body heat is produced. This heat is lost at a relatively slow rate because of their thick winter pelage. The den offers much less resistance to heat loss than their fur, but serves the extremely important function of protection from moisture and wind chill.

Raccoons typically lose from 40 to 50 percent of their body weight during winter dormancy. Prolonged winters can be an important mortality factor, especially for the juveniles since they do not possess the fat storage capacity of adults. In one Minnesota study, 50 percent of a sample of juvenile raccoons died from winter starvation.

MYTHS

Perhaps the most common myth associated with the raccoon is that it washes its food before eating. Actually the raccoon has exceptionally well developed tactile senses in its fore paws, which allows it to identify food items by touch. When feeding on aquatic organisms in shallow water, the handling of prey underwater gives the impression of washing. This same behavior may infrequently be observed among captive raccoons, leading one to conclude that the raccoon is cleaning its food or moistening it for ease in swallowing.

Another commonly accepted myth is that the raccoon possesses superior intelligence because of its ability to open latches and doors and lift garbage can lids, etc. While it is true that the raccoon is reasonably inquisitive, its ability to solve problems is largely a function of its persistently active and sensitive front paws. The first time that a raccoon solves a mystery may take a long time; however, subsequent attempts at the same problem take considerably less time, indicating that the raccoon has a good memory.

NEW JERSEY RACCOON STUDY

In a recent cooperative study between the Division of Fish, Game and Wildlife and Cook College, Rutgers University, in excess of 17,500 trap nights (trap night = one trap set/night) were recorded from 1977-79 in an attempt to determine the population status of the raccoon in New Jersey. There were 476 different raccoons captured, marked and released on four study areas during the study. There were 214 recaptures for a total of 690 captures.

Estimates of raccoon population densities indicate that rural habitats from Monmouth to Sussex County support on the average between one raccoon/14 acres to one raccoon/40 acres. Areas composed of younger forests and a high percentage of field habitat generally had lower densities.

One interesting but not totally surprising finding was an exceptionally high average density (one raccoon/seven acres) found to occur on a suburban study site near New Brunswick, NJ. In two previous studies of suburban raccoons in Ohio, similarly high densities were observed. Collectively, these findings indicate that in certain optimal suburban habitats, raccoon populations may prosper and exist at abnormally high densities. The suburban habitat characteristics that are apparently related to such high densities include: the presence of drainage areas bordered by mature hardwoods; storm sewers; and accessibility to a daily subsidy of fresh garbage.

New Jersey raccoon populations had an average age composition of 41 percent juveniles, 22 percent yearlings, 14 percent two-year olds, eight percent three-year olds and 0.7 percent four-year olds. The oldest raccoon captured during the study was eight years old. The sex ratio was approximately even, with slightly more males.

Average litter size was 3.2 young/pregnant female. Only 24 percent of the yearling females showed signs of giving birth. Over 85 percent of the females two years of age or greater had litters.

A canine distemper antibody survey revealed that about 40 percent of the raccoons sampled had experienced and survived this disease. Raccoons from each of the four study areas were serologically positive for canine distemper. Although it is difficult to project the percentage of raccoons that annually succumb to distemper from this type of data, the antibody information suggests that there has been a high degree of exposure to the virus and that the virus has a rather widespread distribution in New Jersey.

THE FUTURE

Because of its demonstrated ability to adapt to many land use changes imposed by man, the future of the species looks promising. Local populations will certainly experience declines, as vast tracts of traditional raccoon habitat are developed. In certain developed areas—particularly low-density housing suburbs which contain the proper mixture of habitat requirements, raccoon populations are likely to prosper. Perhaps the most pressing issue in the future will be man's ability to effectively manage pest and public health problems that are certain to increase as more rural land is converted into suburbs. Raccoon hunting and trapping will remain a traditional and viable sport in rural areas, helping to maintain population levels compatible with the surrounding habitat. □



Environmental News

DROUGHT WATCH CONTINUES

The combined average of the water levels in the northeastern reservoir system fell to 47.2 percent of full on November 30, 1981. Though well above the 32.5 percent marked on the same date in 1980, the normal combined level is 74.2 percent of full. November's rainfall, despite two major storms in mid month, was only 1.27 inches—far below the normal 4.18 inches. Between May 1980 and December 1981, the rainfall deficit in the northeastern area of the state was 16.78 inches.

The more than 17 billion gallons of water saved by New Jerseyans since September 1980 when water restrictions were imposed, and occasional heavy rains, helped to keep the water supply in the northeastern reservoir system out of the danger zone as November 1981—the 18th month of the drought—ended. □

\$350 MILLION WATER SUPPLY, \$100 MILLION HAZARDOUS DISCHARGE BOND ISSUE APPROVED

New Jersey voters in the November 3, 1981 general elections overwhelmingly approved the 1981 Water Supply and Hazardous Discharge bond proposals.

Approval of the *1981 Water Supply Bond Act* authorizes the sale of \$350 million in bonds to be used for the rehabilitation, repair or consolidation of existing water supply facilities and for the planning, design, acquisition and construction of water supply facilities, all as recommended by the New Jersey Statewide Water Supply Plan, to solve water supply problems in different areas of New Jersey and to assure the availability of safe, adequate and reliable water supplies to the people of the state; and to provide a means for the payment of the principal and interest of the debt created by the sale of these bonds.

Approval of the *Hazardous Discharge Bond Act* authorizes the sale of \$100 million in bonds to finance the identi-

fication, cleanup and removal of hazardous discharges and provide a means for the payment of the principal and interest of the debt created by the sale of these bonds.

DEP Commissioner English, on November 4, said, "The votes of approval on the bond questions are a clear statement that the people of New Jersey intend to continue their historical standing as a leader among states in the protection and preservation of our resources. We are prepared to implement the new construction and remedial actions ahead to protect our groundwater reserves and ensure an adequate supply of water to our state's citizens."

In response to the mandate of New Jersey citizens, measures to implement both environmental bond acts were introduced in the State Legislature in mid November. □

MEETINGS HELD TO TELL HOW TO APPLY FOR GRANTS UNDER NEW RECYCLING LAW

The state departments of Energy and Environmental Protection sponsored a series of meetings this past November and December to inform municipal officials, public works managers, and community recyclers about the provisions of the recently enacted New Jersey Recycling Act. Major points covered in the meetings included information on

funding, recycling grants and loan programs, guidelines to discretionary grants, and how municipalities may apply.

DEP Commissioner English said, "Recycling paper, glass and other materials not only avoids landfill fees but also will qualify municipalities to receive Recycling Grants from the departments of

Continued on page 16H

TWELVE TOXIC WASTE SITES IN NEW JERSEY ON EPA PRIORITY LIST

The U.S. Environmental Protection Agency (EPA) on October 23 released its long-awaited list of "top priority hazardous waste sites targeted for action under Superfund, a five-year, \$1.6 billion federal cleanup program." Of the 114 sites on the nationwide list, 12* are in New Jersey. (The list was originally due in early summer 1981 and is part of the reason New Jersey filed suit in September against the Reagan Administration to prod EPA into moving to implement Superfund. The suit has since been dismissed.)

The ranking of the sites was based on a hazard-scoring system developed by EPA and one of its contractors, with extensive input from states and industry. The emphasis was on potential threat to public health. (See these pages, NJO Sept./Oct. 1981.)

Under Superfund, states must contribute at least 10 percent of the actual long-term costs of cleanup per site, unless the site is publicly owned. In the latter case, the state is required to pay or assure at least 50 percent of the costs.

Superfund is the name given to the Comprehensive Environmental Response, Compensation, and Liability Act that was passed by Congress in December 1980. It provides funds from the chemical industry and the federal government to clean up hazardous waste sites where responsible parties cannot be determined or cannot afford to pay for cleanup.

**Lipari Landfill, Pitman (Gloucester County); Price Landfill, Egg Harbor (Atlantic); Burnt Fly Bog, Marlboro Township (Monmouth); Goose Farm, Plumsted Township (Ocean); Lone Pine Landfill, Freehold (Monmouth); Pijak Farm and Spence Farm, Plumsted Township (Ocean); Bridgeport Rental & Oil Services, Logan Township (Gloucester); D'Imperio Property, Hamilton Township (Atlantic); Kin Buc Landfill, Edison (Middlesex); Chemical Control, Elizabeth (Union); and Friedman Property, Upper Freehold (Monmouth).* □

New Environmental Laws



About 50 new measures to improve the state's environment for the public health and welfare, and to protect our natural resources, were enacted during the 199th session of the New Jersey Legislature (January 1981-82). These include, among others, major new programs for management of hazardous waste, solid waste, water supply, and wildlife.

Both houses of the legislature (Assembly and Senate) must approve a "bill" (proposed law) before it is sent to the governor for approval. If the governor approves the legislation, he signs it into law.



David C. Mattek, DEP's Director of Intergovernmental Operations, in the article below, explains the provisions of some of

the new laws which affect the entire state and its citizens.

One of the most significant laws enacted since January 1981 is The Hazardous Waste Facilities Siting Act. This act provides the authority and a directive to the department to determine the number and type of facilities needed for the treatment and disposal of the hazardous waste generated in New Jersey and to designate sites for these facilities. The siting power overrides municipal home rule by giving DEP rather than the municipality paramount power to control land use at that site. While providing this substantive power to the department the legislature provided detailed procedures to controlling the exercise of this power. The department must involve the business and the environmental communities and most importantly the concerned local government in making siting decisions on hazardous waste facilities. Special tax breaks are provided for the host community to compensate it for providing a facility needed to sustain the economy of the adjacent region.

The department also succeeded in having the legislature place two bond issues on the November ballot—both the Hazardous Waste Discharge Bond Act and the Water Supply Bond Act were approved by the voters of the state on November 3, 1981. The Hazardous Discharge Bond Act provides \$100,000,000 to clean up abandoned hazardous waste

sites. It will complement the modest amount of federal Superfund dollars coming to the State and the now bankrupt State Spill Fund.

The \$350,000,000 Water Supply Bond Act provides construction funds for new and renovated water facilities to protect against recurring conditions of drought facing the State. It includes funds for a spectacular new project to move surplus waters from the State's existing Round Valley-Spruce Run Reservoir complex to the chronic water-deficit area of Northeastern New Jersey. Additional funds are included to conduct feasibility studies and/or construction projects on many other potential sites in the State. The bonds provide for loans to other public and private water purveyors to meet the large backlog of needs for upgrading existing water systems.

The Water Supply Bond Act passed as part of a comprehensive package to completely revise the State's existing water law. The bills implement many portions of the State's new Water Supply Master Plan. The State's water supply allocation system was completely revamped to provide for conservation and use of all the State's water in a fair and equitable manner. A third bill created a State Water Authority to construct and operate all of the State's water supply facilities.

Major new solid waste initiatives, the "Recycling Act" and the "Solid Waste Facilities Closure Act," became law. The "Radiation Incident Act" provides increased protection from a Three Mile Island type of accident. Eleven major bond appropriation acts were signed by the governor. These appropriated \$71 million from bond funds for Green Acres, sewerage, beaches, water supply, harbors and flood control projects. The law providing for a check-off on state income tax forms for a portion of taxpayer's refund to be applied to a fund for the protection of Endangered and Non-game Species of wildlife became effective with the 1982 tax year.

In summary, the legislature continued to recognize the public's desire to obtain environmental protection by enacting new environmental programs and upgrading older programs. As of this writing two months remain in the 199th session's legislative year. Several measures, including 10 appropriations bills and bills to implement the 1981 Water Supply Act and Hazardous Discharge Bond Act have been introduced for the legislature's review and action. □

COURT CLOSES COMBE FILL—FLOW OF WASTE REDIRECTED TO THREE OTHER LANDFILLS

When Combe Fill Corporation Landfill in Chester Township (Morris County) was closed on November 10 by court order, 50 municipalities in Morris, Union, Somerset and Hunterdon counties were left without a solid waste disposal facility. U.S. District Court Judge John Galgay signed the closure order submitted by trustee Bruce Scherling.

DEP, pursuant to the New Jersey Solid Waste Management Act (NJSA 13:1E et seq., as amended by Chapter 326, Laws of 1975) found it necessary to issue new waste flows for the communities affected by premature closure of the Combe Fill Chester Landfill. (The landfill closed while it still had space to legally accept garbage.)

The department surveyed Board of Public Utilities landfills within a 50-mile radius of Morris County to determine if any facilities were capable of accepting additional waste. Based on this survey, only three facilities were found with capacity to handle the increased volume—Edgeboro Sanitary Landfill in East Brunswick (Middlesex County); High Point Sanitation, Inc. Landfill in Franklin Township (Warren); and Hamm's Sanitation, Inc. in Lafayette Township (Sussex). DEP then issued a directive that redirected the solid waste flow from the affected communities to these three landfills.

In signing the directive in response to the closure and to insure the smooth flow of waste to regulated landfills, DEP Commissioner English said, "The closure of Combe Fill Landfill pointedly illustrates the need for more environmentally sound facilities in compliance with the approved Solid Waste District Plans. If one more landfill closes, for any reason, DEP cannot guarantee that the municipalities affected by the closure will have an alternate site to go to. The time for the counties to develop their own alternative is now." □

HUNTERS: TROPHY DEER DEADLINE, FEBRUARY 19

February 19 is the cut-off date for entering the annual state record deer program sponsored by DEP's Division of Fish, Game and Wildlife in cooperation with the New Jersey Federation of Sportsmen's Clubs. The competition is divided into two divisions—the 200-pound club and the antler club. Entry blanks are available from the division office or wildlife management area offices. Address all correspondence to DEP, Division of Fish, Game and Wildlife, CN 400, Trenton 08625. □

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HISTORIC NEWARK AIRPORT



Historic buildings at Newark airport.

A trio of Art Deco style buildings built between 1934 and 1938, during the development of Newark Metropolitan Airport were placed on the state and federal registers of historic places in 1980. The structures—the airway station known as the Administration Building (above), Brewster Hangar and the Medical Building—were constructed to replace outmoded facilities which had “sprung up” in response to the rapid expansion of commercial aviation in the 1930’s.

The Administration Building was the first to be built. A multipurpose facility, the two-story building provided space for, among others, passenger waiting rooms, loading rooms for air mail, commercial airline ticket counters, and offices for the airport manager, airport physician, and the State Aviation Commission. Atop the building in the rear was a 20 x 10-ft. central Air-Traffic Control Tower, a semi-circular glass room reached by a spiral stairway from the second floor.

The Art Deco design of the building incorporated large areas of glass and contained an interior of restrained, decoration which relied heavily on geometric motifs interspersed with references to the theme of flight. Decorating the second floor lobby was a monumental (1,530 sq. ft.) ten-panel mural entitled, “Evolution of Forms Under Aerodynamic Limitation,” painted in colorful abstract style by New York-based artist, Arshile Gorky, commissioned under the WPA Federal Art Project. (The abstract style of the painting was not well received and when the Army Air Force took over the airfield and terminal during WW II, the murals were painted over and eight were eventually discarded. The remaining two mural panels were discovered at the facility in 1972—they had been covered by 14 layers of paint. The panels were removed and cleaned, and displayed in the Newark Museum.)

Background:

Newark Airport (now Newark International Airport) holds a special place in the history of commercial aviation in the

Continued on page 16H

PUBLIC HEARING SET FOR ‘BUBBLE’ RULES

Proposed air pollution control rule revisions (announced October 29, 1981), which could lower the cost of electricity, provide cheaper clean energy for industry, and reduce dependence on imported oil while improving or maintaining existing air quality, will be brought to public hearing on January 20, 1982 in Trenton. The hearing will be held at the New Jersey State Museum Auditorium, 205 West State Street, from 9 a.m. until the end of testimony.

The revisions concern the regulation of sulfur in fuels: The “sulfur dioxide bubble” and the “clean conversion incentive.” Both proposals were initiated by industry and developed by DEP. The environmental effects of the proposals have been carefully reviewed by DEP’s environmental scientists. Companies proposing “sulfur dioxide bubbles” or “clean conversion incentives” will be required to show that ambient air quality standards for the public’s health and welfare will be protected.

In brief, burning sulfur-containing fuels produces sulfur dioxide, an air contaminant. The “sulfur dioxide bubble” will allow the burning of less costly higher sulfur containing oil if the resulting sulfur dioxide emissions are offset by using natural gas in nearby boilers (natural gas contains a negligible amount of sulfur). The “clean conversion incentive” would permit the use of higher sulfur oil for up to two years while a boiler is being converted to burn coal or municipal solid waste. Assistant Commissioner for Environmental Management George Tyler said that the money saved by temporarily using higher sulfur oil is intended to help pay for the extensive pollution control equipment required for clean long-term burning of coal or refuse. □

DODGE FOUNDATION AWARDS GRANT TO DEP PROGRAM

The Geraldine R. Dodge Foundation of Morristown (Morris County) recently awarded a \$17,900 grant to assist in funding DEP’s Environmental Awareness and Education Program. The program is focused on educating the children of the state on the importance of clean air and water in assuring a safe environment for them and for future generations. The grant, a one-time contribution, to be matched with the state’s commitment of \$17,900, is in support of the program run by DEP with the cooperation of Cook College in Rutgers University and the state department of Education. □

CITIZEN’S GIFT HELPS STATE ACQUIRE PARKLAND

The \$650,000 purchase price for 524 acres of land recently acquired in the Ramapo Mountain region of the state park system represented only a portion of the fair market value of more than \$1 million. The difference, over \$400,000, was a gift to the state from Joseph L. Muscarelle, the former owner, who is chairman of the board of Joseph L. Muscarelle, Inc., a major construction company headquartered in Maywood. Muscarelle, active in business and community affairs, is a well-known philanthropist.

The property, known as the Muscarelle Tract, is located in Mahwah Township (Bergen County) and Ringwood Borough (Passaic). The 524-acre site connects Ramapo Mountain State Park with Ringwood State Park, and state ownership will protect the hiking trails along the highest ridge of the Ramapo Mountain from commercial and residential development. DEP received strong support for this land purchase from local residents who cited the area’s diverse flora and fauna and the combination of its natural features—wetland and mountain slope—as worthy of preservation. 1978 Green Acres bond funds were used for this acquisition which significantly adds to the supply of open space in the urbanized northeastern section of the state. □

DEPUTY DIRECTOR NAMED FOR COASTAL RESOURCES

John R. Weingart has been appointed deputy director of DEP’s Division of Coastal Resources. The division is responsible for Coastal Area Facility Review Act (CAFRA), Wetlands, and Waterfront Development permits, shore protection, dredging, state owned tidelands, local coastal grants, offshore oil and gas planning and coastal planning.

Weingart joined DEP in 1975 and from 1979 until his appointment as deputy director in November 1981, he served as chief of the division’s Bureau of Coastal Planning and Development. In that capacity he was responsible for the now federally-approved New Jersey Coastal Management Program. During 1980-81 he was staff director to the Governor’s Hudson River Waterfront Study, Planning and Development Commission. A graduate of Brandeis University, Weingart received his masters degree in public affairs from Princeton University.



"AN ENVIRONMENTAL RETROSPECTIVE"

BY BRENDAN BYRNE, GOVERNOR

History, I believe, will be kind to the efforts we have made over the past eight years to protect our environment.

We recognized that our past indifference to the fragile nature of our ecosystem had tipped the balance against nature's ability to cleanse itself, and we promoted programs to safeguard our air, water and land, insuring that future generations will always see their prosperity intimately tied to the strength of our environment.

In many areas, we have surpassed even federal mandates on the environment. We enacted the New Jersey Water Pollution Control Act in 1977, not merely to comply with federal mandates on surface water pollution, but to protect the nearly 50-percent of the state's potable water supply contained in underground streams and aquifers.

The 1978 State Safe Drinking Water Act not only met the federal standards but provided the authority to enforce the law's provisions and to insure that the water coming from our taps is indeed fit to drink.

Even as the drought of this past year forced hard choices on us, we were completing the Statewide Water Supply Master Plan published in the fall of 1981. In conjunction with the \$350 million Water Supply Bond Issue of 1981, the Master Plan will provide a comprehensive framework for meeting the State's water needs well into the next century. Other measures passed this year established an independent agency, the New Jersey Water Supply Authority, to acquire, finance, construct and operate water supply systems throughout the State.

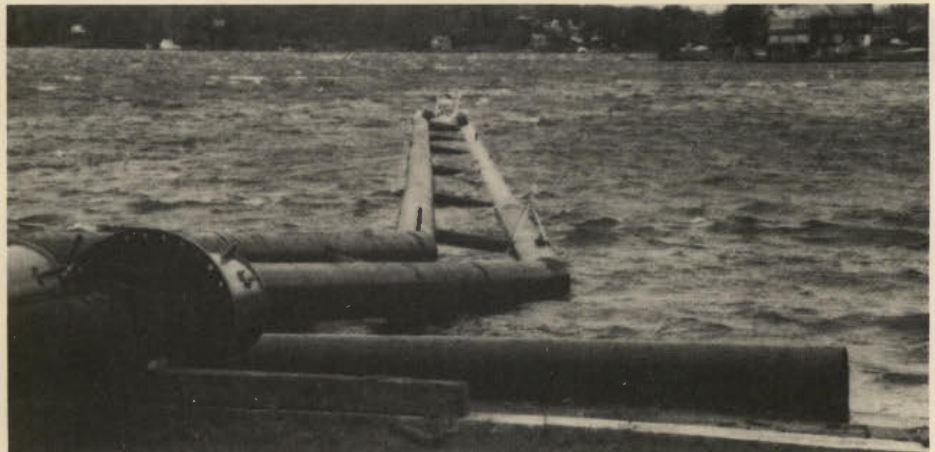
But water supply and quality remain only one area of environmental concern. We have made significant progress in protecting our air, land, sea, and wildlife.

In 1975, we made mandatory the inspection of motor vehicle emissions. The result has been a steady decrease in associated pollutant levels in our air. In the same year, we expanded our statewide air monitoring program to eventually determine the nature of airborne particulates, their levels in the atmosphere, and how best to remove them. That day is not far off.



Round Valley Reservoir—recreation area and water supply

BARRY LEILICH
MARGARET SHARP



Hopatcong pipeline, an emergency water supply project. Water pumped from the lake was carried through the pipeline overland to the Boonton Reservoir (part of the Jersey

City water supply system) whose water level was dangerously low in the drought winter of 1981.



Wetlands are marshlands or tidelands, what some call the "estaurine zone." They are the lands adjacent to the sea.

We took on the increasingly hard challenge of assuring equitable air pollution standards between the states, fighting for a toughened federal Clean Air Act in 1977, and continuing a long-standing dialogue with our sister states of the industrial Northeast on how best to standardize air pollution controls in our region.

In 1979, New Jersey became the home of the "bubble" plan, an innovative emissions control concept designed to clear the air while saving industry time and money. The approach was recently approved nationally and is now being adopted in several other states.

Our enviable list of firsts extends to a third theater of environmental protection: Our land and ocean resources.

We recognized early the delicate nature of our coastline, and implemented the Coastal Area Facility Review Act (CAFRA) to protect our 1300-square miles of beachfront from indiscriminate development and unchecked expansion. We established the Cooperative Coastal Monitoring Program, a joint effort of state, local and county agencies, to monitor our coastal waters and wetlands, and insure their safe use for recreational enjoyment and economic livelihood.

New Jersey's "Endangered Species" wildlife project was the first program of its kind in the nation to receive the backing of the federal government, and our acquisition of the Higbee Beach Wildlife Management Area in Cape May County was the only purchase made by any state specifically to protect endangered wildlife.

The 1970's brought a public outcry for the retention of open places in what was already the nation's most densely populated state. We responded with hundreds of millions of dollars in Green Acres bond funds, dedicated to the acquisition of park lands and open spaces in the state. We responded with the Delaware and Raritan State Park, and the Round Valley state recreation area, and numerous other acquisitions that have made New Jersey's park system second to none. And we created the nation's first urban state park, Liberty State Park in Jersey City.

Since its inception in 1976, Liberty State Park, an 800-acre spread along the Hudson waterfront, has become the state's most visited park. When finally completed, it will include an environmental education center, science museums, and a resting area for migrating waterfowl.

New Jersey has historically been the home of some of the most productive farmland in the country. But recent decades had seen a dramatic decrease in the proportion of land utilized by New Jersey farmers. We took steps to remove

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Tax check-off funds will work for survival of endangered species, such as the Osprey.



JAMES STAPLES

Liberty State Park, Information Plaza



BEFORE: Chemical Control Corporation site, southwest view—some of the estimated 34,000 drums of chemical waste found at the site when the State began cleanup operations in 1979.



AFTER: Same site, same view—two years, one spectacular fire and \$25 million later the cleanup is virtually complete. The State Spill fund covered \$20.8 million of the cleanup cost and the federal government provided \$4.2 million.



Unique Pinelands.

JAMES STAPLES

RETROSPECTIVE

the economic sanctions responsible for the widespread sale of farmland to developers. Our tax, funding, and acquisition policies culminated this year with the passage of the \$50 million Farmland Preservation Bond Act, designed to keep the Garden State green and growing.

Garbage disposal posed no less a challenge. We met it with innovation and determination. In 1975, I signed the Solid Waste Management Act establishing 22 statewide districts and requiring each district to present a ten-year management plan for the recycling and disposal of solid wastes. We experimented with innovative disposal techniques, such as, at-sea incineration. And we found a viable garbage recycling method in resource-recovery plants, where waste products are converted into energy or utilized for new purposes. Seed money from the 1980 Natural Resource Bond Act will soon, it is hoped, fund construction of several new resource-recovery plants.

Posing an even more immediate danger to our ecosystem was the problem of hazardous wastes. It required immediate action—and we took it. Our legislation to combat the enormous health risks posed by the indiscriminate and often illegal dumping of toxics earned New Jersey a reputation for devising solutions to the program while the rest of the nation was still awakening to the danger at hand.

In 1976 we banned the dumping of hazardous substances at municipal and county landfills. That same year we enacted the Spill Compensation and Control Act, prohibiting the discharge of petroleum and toxic wastes, and providing a clean-up fund through a levy on the production of petroleum and certain chemical products. With the help of federal authorities, we established a Hazardous Waste Strike Force in 1978 to prosecute the "backyard" and "midnight" dumpers of toxics.

The summer of 1981 brought enactment of the Hazardous Waste Facilities Siting Act, a remarkable measure providing safeguards in the siting of clean-up and disposal facilities, a comprehensive system of siting criteria and a plan of action that provides for participation by the public. Our efforts received

an overwhelming public endorsement on November 3 with the passage of the \$100 million Hazardous Discharge Bond Act. With the establishment of a Siting Commission under the Facilities Siting Act, and funding by the Bond Act, we are well on our way to controlling one of the greatest dangers of our time.

Any review would be incomplete without mention of the enormous effort we made to protect the Pinelands of South Jersey. It is a success story that will have significance long after we are gone.

At one million acres—fully 20 percent of our state's land area—the Pinelands stands as our largest tract of wilderness and one of the largest preserves east of the Mississippi. Bristling with distinctive forests and scenic rivers, it is a beautiful and environmentally fragile home to threatened species of wildlife.

From an initial conference on the future of the Pinelands called at my request in 1976, to my Executive Order establishing a moratorium on development in the Pinelands in 1978, and through the many battles that led to the enactment of the Pinelands Protection Act in 1979, I have made the protection of this magnificent tract of undisturbed nature one of my highest goals.

Construction and development regulations are now in place. It is my hope that ten, fifty or one hundred years from now, New Jerseyans will say that we had foresight; for the Pinelands, in all its splendor, will still be there.

We have, by any reasonable measure, accomplished a great deal over the last eight years. But environmental progress is not an issue for the 1970s alone. Unless we consistently guard that preserve with determined stewardship in the years ahead, all of our efforts will have been for naught.

Past gains are too often threatened by those who argue for a trade-off between environmental diligence and economic development. And too often, it involves a trade-off of future health for someone's short-term profit.

There is no future, economic or otherwise, in a polluted environment. It is, and should remain, a non-negotiable issue. For if we cannot offer pure water, air that is fresh and soil free of the toxic residue of industry—then who will want to live here? □

SOUTH JERSEY STUDIES SERIES

The Stockton State College Center for Environmental Research will offer a course, entitled "Traditional Decoy Carving and Painting," beginning January 4, 1982. The course is the last in a series of "South Jersey Studies" offered by the Center.

The course is designed to give "hands on" instruction in the art of decoy carving, and will focus on the traditional South Jersey hollow-bodied style. The use of the necessary tools, and the process of wood drying will also be demonstrated.

Classes will be held on Monday and Wednesday evenings from 7:30 to 9:30 p.m., beginning on January 4, 1982. There will be eight sessions. The instructor for the course is Anthony Hillman.

For more information on "Traditional Decoy Carving and Painting," call the Stockton Center for Environmental Research at (609) 652-1776, extension 211. □

CROP ALTERNATIVES FOR LANDOWNERS

Twenty years ago, small farms of 50 acres and under were disappearing so fast that everybody wrote them off as extinct. But a strange thing happened on the way to the funeral—small farms began to come alive again. During the 1970's the number of small farms started rising, slowly at first, then more sharply. Now the trend is curving distinctly on the plus side, indicating that the re-entry of small farms into agriculture in the 80's could be almost as dramatic as the egress in the 50's and 60's.

The 1978 census of agriculture has shown that the small farm comeback is well established across the U.S. In every region of the country (except parts of the south), there were more farms of fewer than 50 acres in 1978 than in 1974. In New Jersey small farms increased by 25% between the periods of 1974 to 1978.

The new small farms resemble those of the past only in statistical terms. These days, they are generally occupied by middle class families who farm by choice, not necessity. Most follow a lifestyle combining small scale agriculture with off farm employment. These aspirations have more to do with living in the country than growing into bigger farm businesses. (This is not to say that potential doesn't exist.) If you are considering being among this trend of new small farmers, you should seriously consider attending a series of seminars called "Crop Alternatives for Landowners." The course is offered by the Somerset County Extension Service and is designed to offer basic information for those persons interested in growing horticultural crops or managing resources as a means of obtaining additional income.

One seminar will be offered each week from January 25 until March 8, 1982. Topics discussed will be nursery crops, woodlot management, tree fruits, small fruits, Christmas trees, farmlands assessment and vegetable crops. A registration of \$4.00/person will be charged. Persons must register, in writing, by January 20, 1982.

For further information contact Clare Sperapani, Somerset County Agricultural Agent, (201) 526-6293. □

PROFITING FROM NATIVE PLANTS

Pomona, NJ—Native plants are being used around the country to solve problems on environmentally sensitive sites, ranging from landfills to housing projects, and are proving to be highly practical as well as ornamental. Used properly, they can reduce the impact of development in sensitive areas.

The conference, "Profiting from Native Plants," will be held at Stockton State College on Monday, January 11, 1982,

Continued on page 16H

Continued from page 29

REDUCE YOUR HEATING COSTS

polysulfides-based caulk are the best to use, but they're the most expensive.

A caulking gun is inexpensive to buy and with a little practice, easy to use.

Insulation: A sure cure for wasting energy dollars

Adding insulation is the *best* investment that you can make in your home's interior comfort level if you have less than nine inches of insulation in your attic. Elsewhere, insulating a crawl space, a porch, or the walls of a heated basement should payback in two heating seasons (or less) . . . and continue saving on your fuel bills every year thereafter.

There's lots of other things that you can do to save money on your fuel bill. Simple, inexpensive things like draft stoppers for electric switches and outlets in the exterior walls . . . or inside covers for kitchen exhaust fans . . . or foil-faced heat reflectors for radiators . . . or faucet aerators for kitchen or bathroom sinks . . . or a water-saver shower head (flow restrictor).

By themselves they may not seem to be very significant, but together they can add up to meaningful dollar savings over the years.

Other no-cost/low-cost improvements start paying back right away too. The cost of a modern clock thermostat that will set back night time temperature and automatically turn on your furnace or boiler before you arise in the morning should pay for itself in the first heating season. (You save money every year thereafter).

Reducing the temperature of your hot water heater to about 120°F costs nothing and takes a flick of the wrist. The few seconds you spend to "dial down" could save you a significant sum—regardless of whether your water is heated by gas, electric or oil.

Home Energy Savings Program (HESP) takes the guesswork out of home energy improvements

The New Jersey Department of Energy's Home Energy Savings Program (HESP) can help take the confusion and guesswork out of your thinking about home energy improvements. Here's how:

If you own or live in a one-to-four family house (or, as a renter, pay any fuel bill), you're eligible to receive a comprehensive whole-house energy audit for \$15. (Qualified senior citizens and the disabled receive the audit FREE under New Jersey's Life-

line Credit Program).

- A specially trained utility company representative will visit your home at a day and time convenient for you (weekends excluded) and point out places where you're losing costly heating (and cooling) energy. Your heating furnace or boiler also will be checked with instruments for efficiency.

You'll receive detailed written recommendations and cost estimates on steps you can take to reduce or stop wasting your energy dollars. You'll also receive lists of nearby participating suppliers and contractors who will warranty their installation of U.S. Department of Energy-approved materials for a full year, if you decide to make energy improvements.

- You'll receive an inspection by a building inspector or trained utility representative of the work done by HESP-listed contractors.

- You'll receive protection against poor workmanship, improper installation or other problems with contractors or suppliers through a free conciliation service of the New Jersey Department of Energy.

All HESP services are available free whether or not you receive an audit. If you do have an audit, you are *not obligated* in any way to purchase anything or change anything in your home.

HESP is a one-stop shopping idea designed to help New Jersey residents learn how to save money on their home energy costs and were to obtain tested and approved systems, devices and materials from contractors and suppliers who will warranty their work. HESP is sponsored by the New Jersey Department of Energy in cooperation with the New Jersey electric and gas utilities and the Fuel Merchants Association.

If you'd like to learn more about what areas in homes are energy wasters and steps you can take to stop wasting your energy dollars, "How to Do It: New Jersey Home Energy Savings Workbook #2" is available FREE for the asking. To obtain a copy or to schedule an audit, you may call the Energy Information Line at 800-492-4242. The phone call is FREE.

To schedule an audit, you may also call the electric or gas utility that services your area. (You'll find their telephone number on your utility bill.)

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Energy Auditor = Energy Advisor

Think of an energy auditor as an advisor or consultant. Auditors are highly trained energy specialist who are tested and certified by the New Jersey Department of Energy. They are *not* sales people, insurance adjusters, building inspectors, tax assessors or health & safety inspectors. As an advisor, your auditor cannot make you change anything in your home . . . spend any money . . . or undertake any legal obligations.

As an experienced specialist your auditor is familiar with retrofit possibilities and their costs and benefits. His or her expertise can uncover many hidden things that may be wasting your energy dollars.

(You may also invite your auditor into your home with confidence since the appointment is made at a day and time convenient for you, and your auditor is identified with a photo ID badge.)

WILLIAM O. DOUGLAS SCHOLARSHIP PROGRAM

DEP recently established a William O. Douglas Scholars Program*—a scholarship and research program for doctoral candidates in the disciplines of Environmental Economics or Physical Environmental Science. Under this program, qualified individuals accepted as scholars will be employed on a full-time or part-time basis for the summer and on a part-time basis during the academic year. Each scholar's stipend will be based on current degree level and/or experience.

Only those who possess a masters degree and are currently working toward a doctorate (Ph.D.) in either specialty are eligible to apply for a place in the program. The deadline for receipt of applications at DEP for full-time summer employment is April 1 (1982); for part-time employment, May 1.

For further information or applications write to The William O. Douglas Scholars Program, DEP, Office of Science and Research, CN 402, Trenton 08625.

*The scholarship program is named for the late U.S. Supreme Court Justice William O. Douglas. A polio attack suffered when a child sparked Douglas' lifelong love for the outdoors as he hiked mountain areas near his home to build strength in his weakened legs. A naturalist, Douglas traveled extensively to gather material for his books on conservation. He died in 1980. □

WORK BEGINS TO REPAIR STORM DAMAGE AT SHORE

Emergency shore protection projects in three communities battered by the nor'easter of this past November 14-15 were approved and underway before the end of the month. In Sea Isle City and the Strathmere part of Upper Township (Cape May County), the projects involved the building of temporary gravel dunes to protect the county highway, vital underground utilities, and two dozen private homes. In Bradley Beach Borough (Monmouth) the project involved bulkhead repair. The storm washed away more than five feet of beach sand, exposing and demolishing bulkheading and parts of the boardwalk, posing a danger to Ocean Avenue, only several feet west. The costs of the projects will be shared on a 50-50 basis by the communities and DEP. Funds from the 1977 Beaches and Harbor Bond fund provide DEP's (state's) share of the costs. □

1982 DEP CALENDAR AVAILABLE

The artwork in the 1982 DEP Calendar consists of the 12 prize-winning posters submitted in DEP's second annual Poster Contest held in the Spring of 1981. This contest is open to all New Jersey students from primary grades through high school, with prizes for each category.

As the subject of the contest was water and its uses and conservation, the 1982 calendar features general information about water and about DEP water-related programs.

To obtain a copy (or copies) of the 1982 calendar, fill in and return the coupon below. The calendars are free, but please enclose \$1 for **each** DEP calendar ordered to help defray mailing costs. Hurry! the supply is limited.

**CALENDAR PROJECT
OFFICE OF THE COMMISSIONER
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL
PROTECTION
CN 402
TRENTON, NEW JERSEY 08625**

Please send _____ copy (copies) of DEP's 1982 Calendar. Enclosed is \$ _____ (@ \$1.00 for **each** calendar ordered, to help cover cost of handling and mailing).

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

16H



Courtesy of Yale University Art Gallery

'GENERAL GEORGE WASHINGTON AT THE BATTLE OF TRENTON'

Painted in 1792, in Philadelphia, by the American painter John Trumbull (1756-1843). Medium: Oil on canvas. Size: 92½ inches x 63 inches. Yale Art Gallery. Gift of The Society of the Cincinnati, 1804.

On June 15, 1775 (more than a year before the Declaration of Independence on July 4, 1776) George Washington, at the age of 43, was unanimously elected general and commander-in-chief of the army by the Continental Congress. He was president of the Constitutional Convention, which met in Philadelphia in 1787; and, Washington became the first president of the United States of America, serving two terms (1787-97). He refused to consider a third term as the country's chief executive and instead, returned to his home in Virginia—Mount Vernon—to take up the responsibility of running the family plantation. Washington died December 14, 1799 at the age of 67.

Continued from page 16A

RECYCLING LAW

Energy and Environmental Protection."

Mary T. Sheil, administrator of the Office of Recycling, explained that municipalities may be eligible to receive up to three different grants—Recycling Grants based on tonnage of materials recycled, Administrative Grants to offset the costs of recycling programs, and Educational Grants to help publicize recycling. For further information, contact the Office of Recycling, N.J. Department of Energy, 101 Commerce Street, Room 204, Newark 07102. Phone: 201-648-6295. □

Continued from page 16C NEWARK AIRPORT

United States. Opened in 1928, it was the first great commercial airport in operation in the nation. During the early years of its existence one-third of the world's air traffic passed down its runways. Advances in engineering and communication technologies were pioneered there, and the first all-passenger trans-continental flights began in 1930 from Newark to the West Coast. The military took over the facility during World War II and runways were lengthened and additional facilities built. At war's end, the airport was returned to the city. In 1945 Newark requested the Port Authority of New York and New Jersey to consider taking over Newark Airport, along with Port Newark. In 1948, the Port Authority assumed administration of the airport and began the major expansion program that continues to the present. In 1978 the airport was designated a National Historic Civil Engineering Landmark by the American Society of Civil Engineers. □

Continued from page 16F

NATIVE PLANTS

and is sponsored by the New Jersey Cooperative Extension Service, the South Jersey Resource Conservation and Development Council, and the Stockton Center for Environmental Research.

The morning session begins at 8:30 a.m. with a keynote speaker from the Department of Agriculture, who will discuss new market demands for landscaping with native plants. Other morning topics include making native plants a business opportunity, understanding their ornamental concept, and how to work within given limitations to make use of these plants. The afternoon session will give nurserymen, landscapers, and interested citizens the "nuts and bolts" in growing, using, and maintaining native plants.

The conference will be expanded in the evening to include municipal officials charged with developing and implementing environmental design strategies. There will be a business card exchange to connect those with problems to solve, and those with expertise to offer. The evening session begins at 7:00 p.m. on the same day.

The conference will cost \$10.00 for the day session; \$5.00 for the evening session; and \$15.00 for both sessions.

For a descriptive brochure, please write the Stockton Center for Environmental Research, Stockton State College, Pomona, New Jersey 08240, or call Debbie Wozniak at (609) 652-1776, ext. 211. □



MOUNT HOPE MINE

PHOTOGRAPHS BY HARRY GROSCH

BY CLIFF ROSS

The old Mount Hope Mine in Rockaway Township's can't be easily consigned to the dustbins of the past. A visit to the mine gives you a feeling that iron mining in New Jersey could come alive at a moment's notice. Still standing is all the evidence of a once-prosperous industry; a large structure housing huge electric motors and hoist machinery with cables as thick as your arm, and a surrounding cluster of buildings tells you it had to be a busy place only a few years ago.

Approaching the mine via the access road off Mount Hope Road you see the "skip" house looming over everything else, and inside is the man-hoist which can carry a visitor 100 feet below the surface into a maze of tunnels and dripping walls.

The main shaft at the old pre-Revolutionary mine actually plunges 2750 feet into the earth, one of the deepest vertical mine shafts east of the Mississippi River. And 150 yards from its mouth you see mounds of black iron magnetite concentrates—as rich as the best Swedish ores according to State geologists. Small wooden signs stick out of the mounds reading "Property of the Bethlehem Steel Company."

As old mines go, you're looking at the real thing. From all appearances you could crank it up and go right on mining for another 260 years.

It was during a visit to Mount Hope that Ken Cramer, supervisor of the mine, was telling about the operation, touching on some of its rich history, its valued contributions during all this country's wars, and its service during the recent bad drought emergency of 1980-81.

A visitor from Trenton interrupted to ask about the large wire baskets hanging from the ceiling in the "change house" like so many bird cages. They hung in rows 20 feet overhead.

"Back when the mine was busy," Cramer began,

"each miner had his own wire basket where he could store his soggy work clothes after coming up out of the mine at the end of a day. He could strip off his soaking wet clothes, put them in a basket and hoist them up to the ceiling." Then the big ceiling fans would be turned on to circulate air through all the baskets of clothes, and by morning the miners' clothes would be dried out and ready to put on for another day's work down in the mine.

Water in the mine and wet mine clothes brought up the subject of Mount Hope water used during the recent drought emergency, a special subject of interest to one of the Trenton visitors, State Police Sgt. 1st Class John Ouweleen, a member of the Governor's Water Emergency Task Force. Cramer explained that more than 500 million gallons of good water are stored below the 1000 feet level—of good quality and in a mine that is recharging water at a rate of one million gallons every 24 hours.

Another Trenton visitor, State Geologist Frank Markewicz, observed how the old mine shafts and tunnels of North Jersey mines were looked upon as possible alternative sources of supply during the height of the drought. With nail-chewing at its worst among the drought-watchers in Trenton, and some reservoirs down to 19 days supply, the Water Emergency Task Force was looking in several directions Markewicz said. "Pumping water out of an abandoned mine isn't too unrealistic," he added.

Markewicz mentioned a memorandum, *Iron Mines as a Possible Source of Water During a Drought Emergency*, prepared by the New Jersey Geological Survey, which analyzed six old iron mines with data on their water storage capacity estimated from information on the depth of their shafts and miles of tunnels. "Alto-

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MOUNT HOPE MINE

gether it was estimated the mines had a total water storage of nearly 4.5 billion gallons—a rough estimate,” said Markewicz, “and Mount Hope was the only one that tested good—clean water, accessible and a below-surface recharge rate fine.” (Two of the old mines—Peter’s and Cannon’s Mines, for example, were reported used as dump areas by an automobile assembly plant and the water was found to be contaminated.)

As it turned out, Ken Cramer explained, Mount Hope became an emergency source of water for 40 days, pumping at the rate of two million gallons a day into nearby Mount Hope Pond and then flowing into a tributary of the Rockaway River which leads into the Boonton Reservoir, chief storage supply for Jersey City Water Company’s 300,000 customers.

Besides learning about Mount Hope’s contribution of nearby 100 million gallons of water to a rationed population during the drought, the Trenton visitors accepted an invitation to go down into the mine. All the while, Ken Cramer, drawing on his own rich background and past associations with Mount Hope, related some of the lore of iron mining in the Mount Hope-Dover mining region of Morris County.

He related how ore was being taken from the Mount Hope property as early as 1640, noting that it wasn’t until 1710, however, that the first ore sale was formally recorded. An estimated 20 million tons of ore has been extracted from the mine since the mid-1600’s.

Mount Hope was an active mine during George Washington’s campaigns, he said, and according to New Jersey historians there is a General Washington letter written in 1777 that tells of “between 80 to 100 iron works great and small operating in Morris County.” And he wrote that “Munitions poured from the forges and furnaces particularly those at Hibernia and Mount Hope: Shovels, axes, cannon, cannon balls, grapeshot and other supplies went to the Continental Army throughout the Revolutionary War.”

Ken Cramer said Mount Hope seemed to have the best lasting qualities of any of the mines of North Jersey. He said workings at Mount Hope were extended underground sometime before 1855 and he recalled times when furnaces were still operating in Wharton, Hibernia, and Mount Hope and when Dover’s newspaper was called “Iron Age.” He drew a picture of “Rolling mills, a foundry, a pig iron plant . . . ore being smelted and shipped by barge on the old Morris Canal. I can remember all these things well,” he said. “It was the area’s big industry—5,000 to 10,000 people with jobs in the mines, rolling mills, foundries. The smelting and finishing mills turned out I-beams, bar stock, angle irons. Many Hungarians and other newly arriving immigrants came into the area in the early 1900’s to work these mines.”

Mount Hope remained a productive mine well into the 20th century, serving the nation’s needs again during war-time—this time World War II. “The mine was a marvellous asset during World War II and it was operated in three shifts, around the clock,” said

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Shown hoisted to the ceiling in the “change room” are some of the open baskets used by miners for storage of their wet mine clothes where fans helped blow clothes dry before another day’s work in the tunnels below.

At the “ten hundred level” (1,000 feet below the surface), Mine Superintendent Ken Cramer in the hard hat drives a battery-powered mine car for visitors Frank J. Markewicz, left, and the State Police representative on the Governor’s Water Emergency Task Force, Sgt. First Class John Ouweleen. The tracks are submerged in a foot of water.



Round Valley Recreation Area

a place for all seasons

BY ARLINE ZATZ

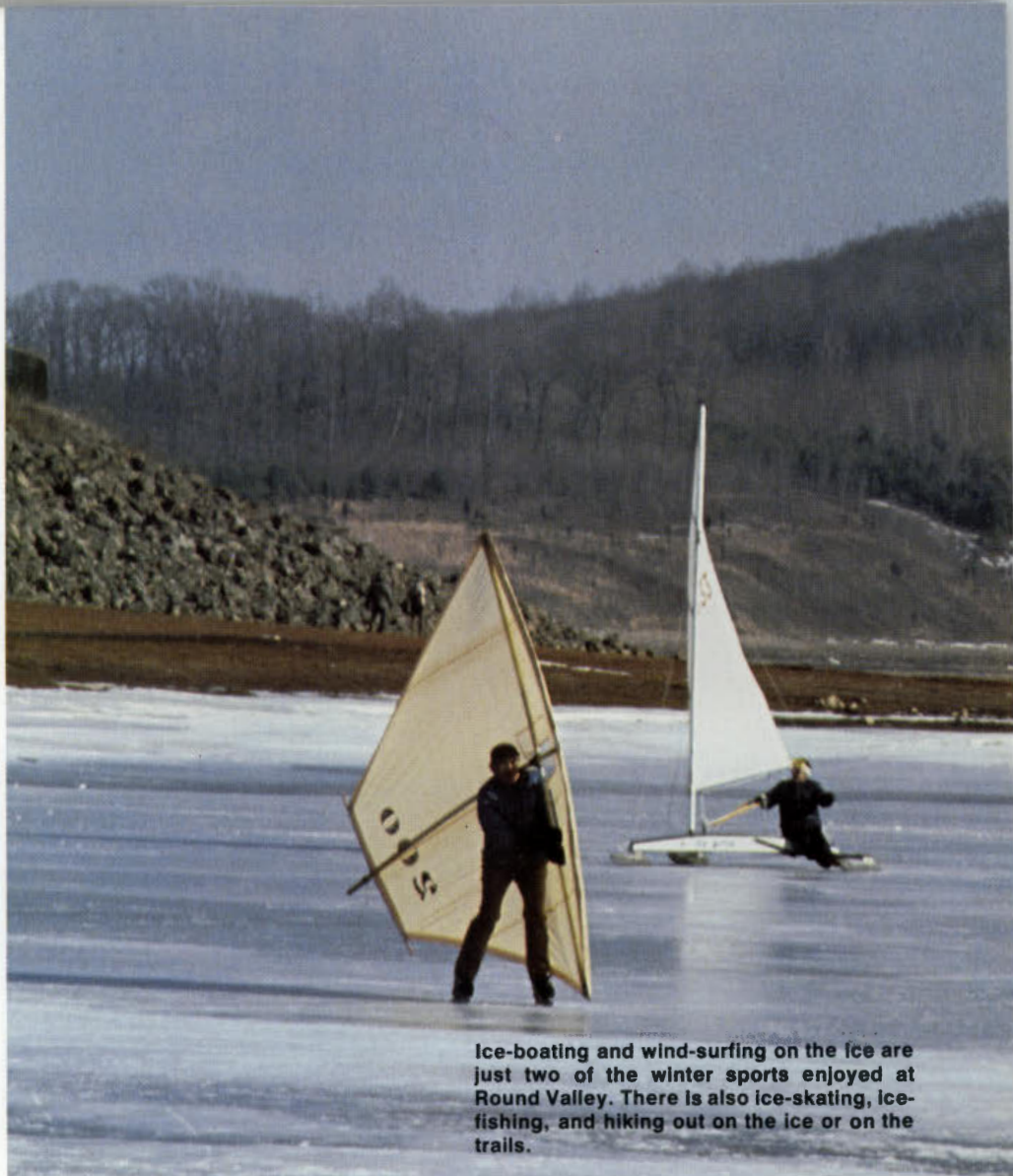
More than twenty years ago, a natural horseshoe-shaped valley in the beautiful rolling hills of Hunterdon County was dammed. It became a huge hole in the ground, and what makes this hole in the ground so wonderful is the 55 billion gallons of water which it holds. It is known today as the Round Valley Reservoir, and a visitor to Round Valley Recreation Area, along the reservoir's banks, may take advantage of the recreational activities available year round.

During the winter months things are really hopping here. When the reservoir is frozen, ice skaters can perfect their footwork down at the east end from early morning into late evening hours. Ice-boaters and skate-sailors may glide quietly over the ice, while the 400-foot hills surrounding the reservoir seem to float by.

The only regulations for "skate-sailing," according to the Bureau of Parks Management, is that a minimum of two skate-sailing participants are required at all times in order to provide a buddy system for safety; that participants must follow safety standards set by the Skate-sailing Association of America; that all participants are prohibited from the restricted areas in the vicinity of the dams, and that skate-sailing is permitted only on such days and hours authorized by a representative of the Bureau of Parks. The rules for ice-boating are similar.

If you've just gone to watch this exciting sport and you feel chilled, why not warm up by taking a walk around the reservoir? Even when snow is down on the trail, it can be a lot of fun. Or, if you wish, wait until spring and take a most enjoyable hike over the new six-mile trail. (Hikers must register at park headquarters before venturing out and sign in when returning.)

At the start of your walk, you'll see the one-mile wide and three-mile-long reservoir. After a short distance, you'll be headed through open fields which then lead to woods. To avoid the fenced in dam area, the trail turns out onto the road for a bit, but then heads up over the hill, following the ridge line. At the top of Cushtunk Mountain, plan to relax a



Ice-boating and wind-surfing on the ice are just two of the winter sports enjoyed at Round Valley. There is also ice-skating, ice-fishing, and hiking out on the ice or on the trails.

ARLINE ZATZ

while and have a snack or lunch.

At the southern side of the reservoir you'll be able to peek in on the rustic camping area. Enjoy the solitude and when you're ready, turn around and take the trail back to the starting point.

If you're hankering for adventure, plan a visit back here for a different kind of experience—back-country camping. There are 116 campsites here and if being away from cars and noise is what you want, this is the place, indeed. The only way to the campsites is by foot or by boating across. Surrounded by trees two-thirds of the sites are near the water and privacy from your neighbors is assured. Though fires are permitted in provided rings, it is a good idea to carry a stove. There aren't any tables or benches provided in the 20'x 20' sites, but water is available from the well in the area. If you want to experience backpacking, this remote area provides a good opportunity in lovely surroundings. On a warm day, plan on taking a dip in the crystal-clear water since swim-

ming is permitted in the roped-off area; however, life-guards, do not patrol here.

Those of us a little less hardy will appreciate the excellent large sandy beach on the western shore. During summer months, the swimming area—separate from the reservoir—has life-guards, and a kiddie pool and playground are next to the beach. Stow your belongings in the locker room and take a refreshing shower before returning home.

Those who would rather boat directly in the water rather than on ice in winter months will love it at Round Valley, since the vast area of water—2000 acres of it—makes it worthwhile. A free boat launch is provided north of the day-use area and sailboats, motorboats (up to 10 horsepower), and canoes are permitted.

Don't forget your fishing rod and tackle either, for 19 species of fish have been taken from this reservoir. These include stocked rainbow and brown trout, large- and smallmouthed bass, and sunfish.

New Jersey State Library *Continued on page 29*

New Jersey

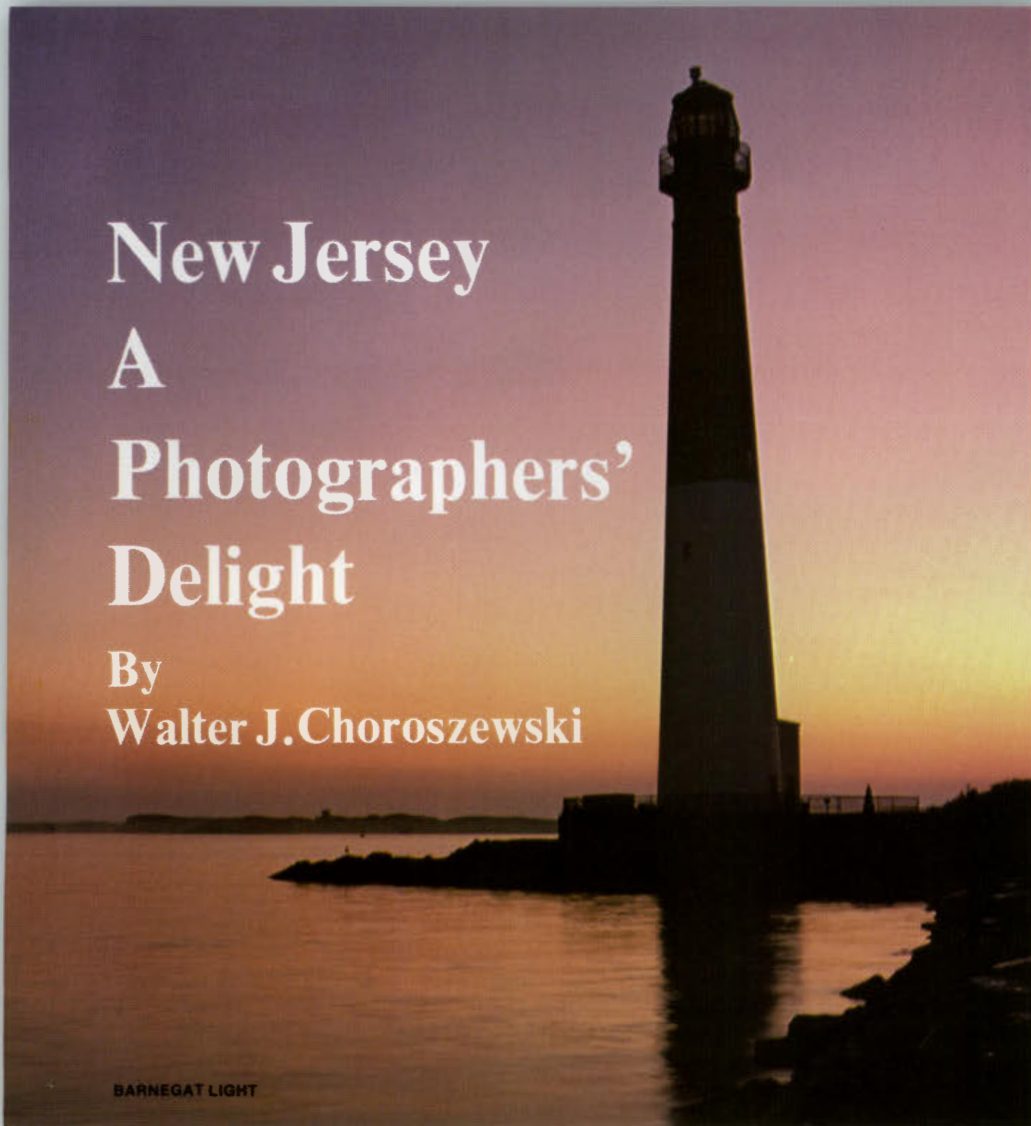
A

Photographers'

Delight

By

Walter J. Choroszewski



BARNEGAT LIGHT

PHOTOS BY AUTHOR

I always felt there was more to New Jersey than met the eye. The many crossings from my present residence in New York to my native Pennsylvania gave me only a hint of New Jersey's true beauty. It was not until I photographed *NEW JERSEY: A SCENIC DISCOVERY* for Foremost Publishers that I truly learned to appreciate the variety and natural splendor within the state.

As a child growing up in the coal regions of Pennsylvania, my impressions of New Jersey were stereotypically simple. For one, I knew it was an industrial state when a few of my uncles moved there for employment in the 1950's. I was also aware of its warm climate because my Uncle Peco's tomatoes would ripen almost a month before my father's. I also heard stories of the beautiful white beaches and boardwalk amusements from a sun-bleached blonde girl named 'Sandy', who occasionally visited a neighbor of ours.

All of these images were correct but far from a complete picture of a state that I grew to love. No one told me about the tall hemlocks that guard the fragile Tillman Ravine, nor of the rolling fog that spills off the Raritan River at sunrise, nor of the sea of magenta cranberries that float atop Pine Barren bogs in October. These are just a few of the many spectacular sights I cherished during the production of my book.

From the spring of 1980 through the winter of 1981, I crossed the many highways and country roads of New Jersey, driving over 30,000 miles, while photographing almost 10,000 Kodachrome images. The book is a coffee table volume containing 88 full color scenes that depict the natural beauty of the state, its natural resources, and historic landmarks, while incorporating a human interest element. I'm often asked about my favorite locations within the state, and my choices are many. I would like to share some of them with you.

I have an affinity to the Kittatinny Mountains, perhaps stemming from my own Pocono Mountain roots. Stokes State Forest is one of my favorite haunts with its spectacular visits along the road to Sunrise Mountain. It was a rainy Monday morning in June when I first carried my camera into Tillman Ravine within Stokes Forest. There was a mist rising through the towering stand of hemlocks that lined the small but mightily Tillman Brook. The time-worn rocks supporting the falls were lavishly covered with delicate ferns and mosses. The sensation was awesome; I was convinced that I was not in New Jersey at all, but rather in a rain forest of the Pacific Northwest.

Near Stokes Forest, running along the Delaware River from the majestic Water Gap up through New York State, the Old Mine Road has a peaceful presence that takes you on a journey somewhere into the 18th century. The road, built by the Dutch in 1640 to transport the copper they found in New Jersey's mountains, is the oldest highway in America. Three hundred forty years of history laid before me as I traveled this road, a road where I captured photos of mountain farms and towns with cemeteries bearing the historical family names of 'Beavans' and 'Schooley'.

Further inland, I found many wonderful images along the banks of the South Branch Raritan River, perhaps the state's most beautiful river. I particularly remember one January morning when I was the first to set foot in a new fallen snow, and photographed the white mushroom-like tufts of snow which capped the many rocks of the river bed in the Ken Lockwood Gorge near High Bridge. This part of the river has a rugged appearance in contrast to its gentle passage through the farms of Neshanic and South Branch. It was on these flats that the eerie morning fog spills off the river into the fields, and is illuminated to a fiery pink by the summer sunrise.

The constant surprise of New Jersey's varied landscape was refreshing to me, especially my discovery of the thousand square mile tract known as the Pine Barrens. I camped in its forests, canoed its rivers, and drove across the seemingly endless, straight and sandy roads that transect its terrain, yet lead nowhere. I waded waist high through a bog of floating cranberries, enjoyed picking and eating the sweet harvest of Chatsworth blueberries, and

OLD RED MILL-CLINTON



KEN LOCKWOOD GORGE



GREAT FALLS-PATERSON



SUNRISE MOUNTAIN

swam through the embrace of the many water plants that thrive in the pristine waters of the Pinelands. Photographing the flora and fauna of such a rare environment was truly a pleasure. Unfortunately I never caught a glimpse of the legendary 'Jersey Devil'.

I guess its the water in us all that draws us to the sea, and although I am a child of the mountains I felt quite at home along the 127 miles of coastline. I spent countless hours photographing and experiencing the shore, often leav-

ing home in the middle of the night to welcome in the sun at the Sandy Hook or in the shadow of the old Barnegat Lighthouse. I enjoyed exploring the dunes of Island Beach State Park, traveling the roads that weave through the Great Bay Wildlife Refuge near Tuckerton, and jumping in the waves at the many fine beaches from Manasquan to Cape May.

Stokes State Forest, the South Branch river, and points in the Pine Barrens and along the shore, are only a

fraction of the many scenic locations I found in New Jersey, but they are some of my favorites. As an out-of-state photographer who spent a year photographing and experiencing the state of New Jersey, I can confidently say it was a pleasant surprise at finding a truly beautiful state.

NEW JERSEY: A SCENIC DISCOVERY
is available at the Walden and Dalton
book chains

ACID RAIN

BY RONALD HARKOV
AND KATHY BRODY

If current trends continue, rainfall in the State of New Jersey will reach an acidity level comparable to that of vinegar. Acid rain. The news headlines have been filled with information about acid rain. It is a local, regional, and international problem with serious long-term consequences. Underlying is a conflict over potential low-cost energy self-sufficiency versus the possibility of significant environmental destruction. The scientists concerned about acid rain have said that this is not a simple issue of snail-darters but rather, it is a wide-ranging issue that may have a substantial impact on human health and welfare for many years to come.

Acid Deposition

Actually, the term "acid rain" is a misnomer of sorts; the proper description of this pollution problem is acid deposition. Acid deposition consists of two separate, but interrelated phenomena—wet deposition (acid rain) and dry deposition (Fig. 1). Wet deposition comprises gases, liquids, and particles removed from the atmosphere during precipitation. Dry deposition consists of gases and extremely minute particles that are removed from the atmosphere only when they contact a surface such as a tree, a lake, or a building.

The increased incidence of acid deposition has been traced to the extensive combustion of fossil fuels by industrial societies of the western world. Coal combustion is the single most important contributor to this problem. If current energy/environment policy forecasts are realized, expanded coal burning without stringent pollution controls could result in more intensive and extensive acid deposition. It should be noted, however, that the acid deposition problem does not revolve solely around coal combustion. The second largest contributor to this phenomenon is mobile transportation (cars, trucks, and buses).

Based on chemical theory, normal rainfall (wet deposition) should have a pH of 5.6, since normal rain can be viewed as a dilute solution of CO_2 in water $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{H}^+$ (Fig. 2). The term pH refers to the concentration of the hydrogen ion (H^+) in a solution and is used by scientists as the standard measure of acidity. A pH of 7.0 is neutral, and going down the scale from 7.0 to 1.0 represents increasing acidity. Because pH is based on a logarithmic scale, each

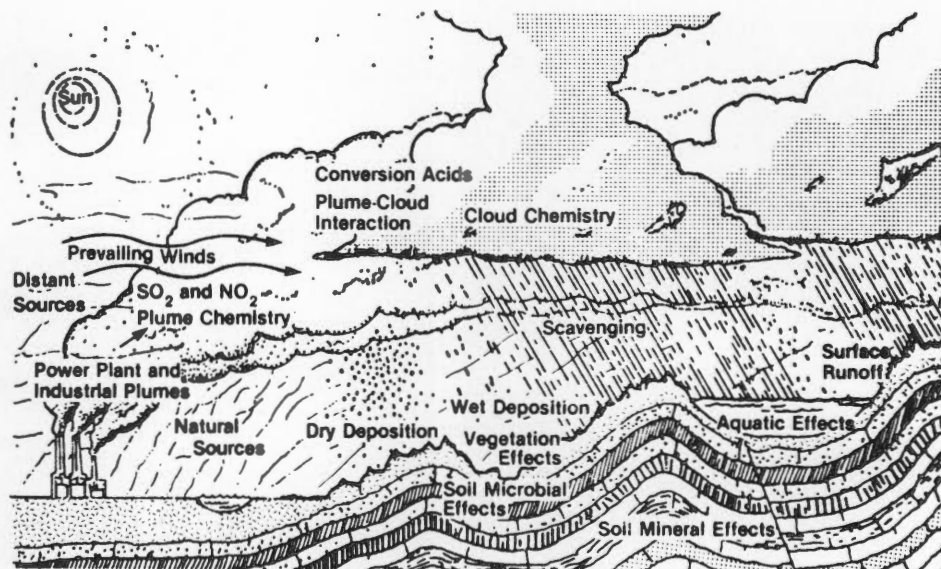


Figure 1.—The formation, atmospheric transport, and deposition of acid precipitation (Adapted from figure in "The Acid Precipitation Problem," U.S. EPA Environmental Research Laboratory, 1979).

U.S. EPA Environmental Research Lab., 1979

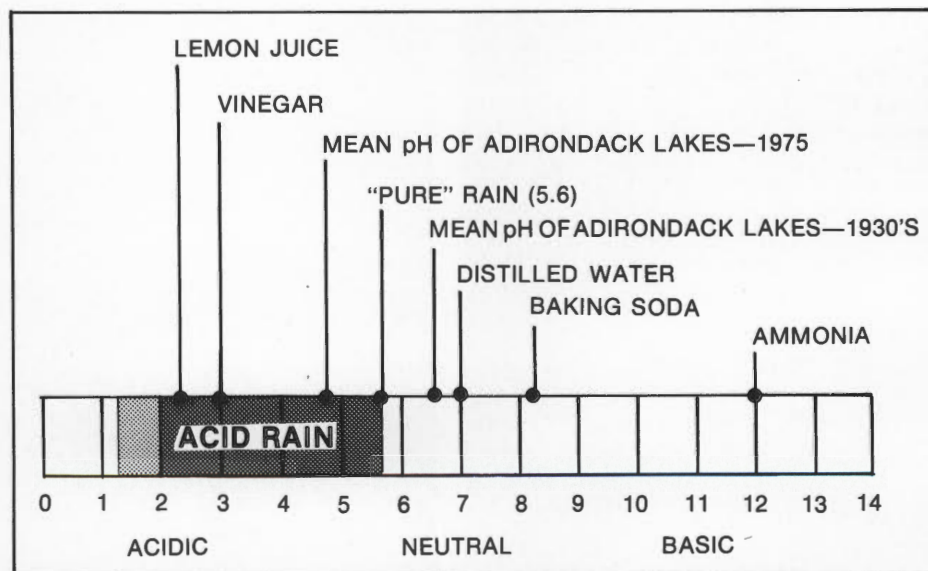


Fig. 2. Location of some common substances on the pH scale.

U.S. EPA Environmental Research Lab., 1979

unit increase or decrease actually reflects an increase or decrease of the H^+ concentration by a factor 10. Small-scale rainfall monitoring by a limited number of researchers in New Jersey has confirmed the presence of acid deposition in the state. Most recently, the New Jersey Department of Environmental Protection has been studying acid deposition and has found that rainfall pH in New Jersey is about 4.0, or about 40 times more acidic than normal rainfall.

The primary components of acid deposition in North America are two extremely potent inorganic acids—sulfuric (H_2SO_4) and nitric (HNO_3) acids. Stationary combustion sources—industries and utilities—make the most significant contribution to the precursors of sulfuric

and nitric acids, SO_2 and NO_x . Sulfur dioxide (SO_2) contributions to the atmosphere result to a large extent from coal combustion, and NO_x results primarily from mobile transportation sources. However, it is important to realize that many other sources contribute to acid deposition.

The conversion of SO_2 and NO_x to their highly acidic forms, sulfuric and nitric acids, occurs through a series of photochemical atmospheric reactions which are only partly understood. In the eastern United States, SO_2 emissions result in approximately 70% of the acidity of acid deposition, while NO_x emissions contribute about 30%. In California, where mobile sources make the largest contribution, the bulk of the acidi-

ty in acid deposition is attributed to NO_x emissions.

Long-Range Transport

Acid deposition is a long-range, inter-regional problem. Its precursors and major components may be transported many hundreds of miles from their original source. Ironically, the past air pollution control practice of using tall smokestacks to increase the dispersal of pollutants may be the primary cause of the interregional nature of the acid deposition problem today. As a result, coal burned in the midwest (Ohio, Illinois, Indiana) with poor air pollution control devices is a major component of the acid deposition problem in New Jersey, New York, New England, and even Canada.

For Ohio, Illinois, and Indiana, coal usage means employment and income for the people of these states. However, the coal found in these states is high in sulfur. This sulfur reacts during combustion to form SO_2 , which is ultimately converted in the atmosphere to H_2SO_4 .

Since the United States Environmental Protection Agency has not established uniform, nationwide air-pollution emission standards for SO_2 , utilities and industries using coal in these midwest states are permitted to emit greater amounts of SO_2 than those in certain northeastern states such as New Jersey. In fact, air pollution regulations have been so stringent in New Jersey that SO_2 is not considered a major pollution problem in the state.

The people in the midwest appear to be paying for their shortsightedness. A recent EPA-funded study has predicted that if current air pollution trends continue in this region, more than 54,000 excess deaths and more than a billion dollars in crop losses will occur in the Ohio River Valley by the year 2000. Contrast this with New Jersey, where SO_2 controls have been successful; New Jersey has saved at least \$116 million dollars per year owing to the resultant reduction of sickness and death in the state.

SO_2 from coal can be effectively controlled by a series of programs starting with the cleaning of coal (that can remove up to 80% of its sulfur content) and by using various air-pollution control techniques. Unfortunately, SO_2 control programs are costly and in the current economic climate, the concept of quality of life often seems to take the back seat to short-term financial gains. The NO_x problem is similar for utilities and automobile manufacturers; control costs are high, and in these economic hard times these industries do not favor the use of such control practice.

Effect of Acid Deposition

Sterile lakes in Canada, New York, and New Hampshire are just the tip of

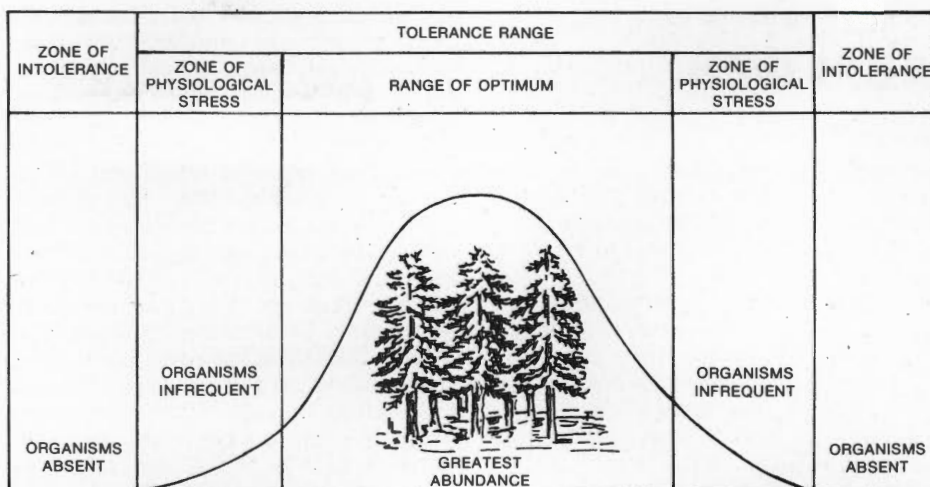


Fig. 3. Law of tolerance.

U.S. EPA Environmental Research Lab., 1979

Table 1.
SUMMARY OF EFFECTS OF
pH CHANGES ON FISH

pH	Effects
3.0- 3.5	Toxic to most fish; some plants and invertebrates survive.
3.5- 4.0	Lethal to salmonids. Roach, tench, perch, pike survive.
4.0- 4.5	Harmful to salmonids, tench, bream, roach, goldfish, common carp; resistance increases with age. Pike can breed, but perch, bream, and roach cannot.
4.5- 5.0	Harmful to salmonid eggs and fry; harmful to common carp; tolerable lower limit for most fish.
5.0- 6.0	Not harmful unless >20 ppm CO_2 or high concentrations of iron hydroxides present.
6.0- 6.5	Not harmful unless >100 ppm CO_2
6.5- 9.0	Harmful to most fish.
9.0- 9.5	Harmful to salmonids, perch if persistent.
9.5-10.0	Slowly lethal to salmonids.
10.0-10.5	Roach, salmonids survive short periods, but lethal if prolonged.
10.5-11.0	Lethal to salmonids; lethal to carp, tench, goldfish, pike if prolonged.
11.0-11.5	Lethal to all fish.

U.S. EPA Environmental Research Lab., 1979

the iceberg of possible future environmental casualties resulting from acid deposition. To briefly depict the potential environmental effect of acid deposition, Fig. 3 illustrates the Law of Tolerance in biological systems. Within a given range of environmental conditions, an organism may exist without exhibiting any indication of stress. These conditions are known as the optimal range or the range of greatest abundance. Outside of this optimal range, organisms cannot survive. The example in Table 1 shows the effect of pH on the ability of fish to survive in aquatic systems. For most fish

the optimal range for pH is 5.0 to 9.0. Outside of this range, survival for most species is unlikely.

In a terrestrial ecosystem, the evolving processes that cause soil formation naturally lead to increasing soil acidity. Acid deposition can enhance and speed up this process, which ultimately results in decreasing soil fertility. Unfortunately, the process of acidifying our aquatic and terrestrial resources is primarily a one-way street; once the resource is damaged, there are few natural or man-made options to rectify the situation.

Presently, there is a small but increasing body of information that can be used to predict long-term effects. Certain effects of acids on biota and ecosystems have been known for some time from studies of acid-mine drainage, accidental acid gas leaks and emissions, and from limited laboratory experiments. For example, a paper published in 1927 from Cornell University, discusses the use of sulfuric acid as a weed spray. Thus, some of the herbicidal effects of acid deposition have been known for more than 50 years!

In some instances the current acid deposition problem is acute. For example, during spring thaw in the northeastern United States and Canada, acid snowmelts contribute a rather large slug of acid to streams and lakes. However, it is difficult to extrapolate from these gross examples of acid contamination of the environment to the current acid deposition problem since the situation we are now confronting is largely a chronic, long-term problem. Scientists conducting research on acid deposition must develop a strategy to experimentally simulate the effect of a moderate acid input to our environment over a long period. Studying high acid inputs over a short period is not an entirely valid model of the long-term process. This task continues to present a great challenge to scientists. At the same time

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ACID RAIN

we can and must make certain regulatory decisions to control acid deposition; we cannot wait for the real-world acid deposition experiment to be completed.

Since no one governmental office, university, research laboratory, or consulting firm can master the broad interdisciplinary nature of the acid deposition problem, the federal government has taken the lead and has initiated a 10-year National Acid Precipitation Assessment Plan which involves 12 different federal agencies. This extensive plan will ultimately examine many aspects of acid deposition that are of national concern. However, three important issues relating to the New Jersey environment are essentially ignored in

the federal approach: toxic contamination of groundwater, mobilization of toxic compounds in reservoir sediments, and the effect of acid deposition on the New Jersey Pine Barrens.

The State of New Jersey has more than its fair share of active and abandoned chemical landfills and dumps. Owing to the acidic nature of current rainfall, there is reason to be concerned that such acidity may enhance the movement of certain of these toxic materials into potable groundwater supplies. The heavily industrialized and urbanized State of New Jersey also has a significant number of reservoirs that have bottom sediments contaminated by toxic materials such as PCBs, lead, and cadmium. Although at present there is little danger of these toxics entering the reservoir system to any significant extent, increasing the acidity of these reservoirs will cause the movement of this material from a benign state in the sediment, into a potentially hazardous state in the water

column. Finally, the Pine Barrens are New Jersey's last remaining natural resource that is largely unspoiled. The ecosystem of the Pine Barrens is extremely diverse and unique, making it a natural treasure worth preserving. Yet, acid deposition threatens the waters and biota of this extremely delicate ecosystem.

In conclusion, the resolution of the acid deposition problem, like that of most other environmental issues, revolves around both technical and policy decisions. The selection and enforcement of the most rational regulatory posture hinges on economic as well as scientific judgments. The technology to control acid deposition exists. There is also indisputable evidence that acid deposition is leading us on a path to serious environment degradation. But the question remaining is what balance we as a society choose to strike between short-term economic benefits and long-term environmental risks. □

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MOUNT HOPE MINE

Cramer. Mount Hope mine was still going strong in 1959, and was then reported to be the oldest operating mine in the country.

"It was something to see," said Cramer taking his visitors around the lower caverns of the mine, "when this place was going strong. Men working in tunnels going out three miles laterally from this deep shaft and many of the tunnels now holding hundreds of thousands of gallons of water."

At the time, Cramer said, there were more than 120 miners employed in two shifts, taking out 2,000 tons of Mount Hope's high grade ore a day. Nearby Scrub Oak (formerly called Repolgle), according to Cramer, kept 400 miners busy mining the rich ore that was shipped to Sparrow Point, Md. and to Conshohocken, Pa. for smelting by the Allan Wood Steel Company. This made iron mining still a factor in the local economics well into the 1950's and with the seventies, ore was still being mined at Mount Hope under a new owner, Halecrest Industries of Edison, N.J. Through an arrangement with the Bethlehem Steel Company, ore was stockpiled for future use.

Nevertheless, iron mining in New Jersey was on the way out. In this connection, a Halecrest spokesman interviewed in a mining trade magazine in October, 1976, was quoted as saying: "Right after the Korean War is when the iron-ore industry in this area really died. Only two or three mines lingered on through the Fifties and Sixties. Those that survived the Fifties and the flood of foreign ores into this country didn't make it through the Sixties."

The picture today at Mount Hope holds out some hope that it can become a productive mine again, for at one time in more recent years there was talk of producing ore to supplement Bethlehem Steel's requirements for its eastern facilities. But that might be just talk.

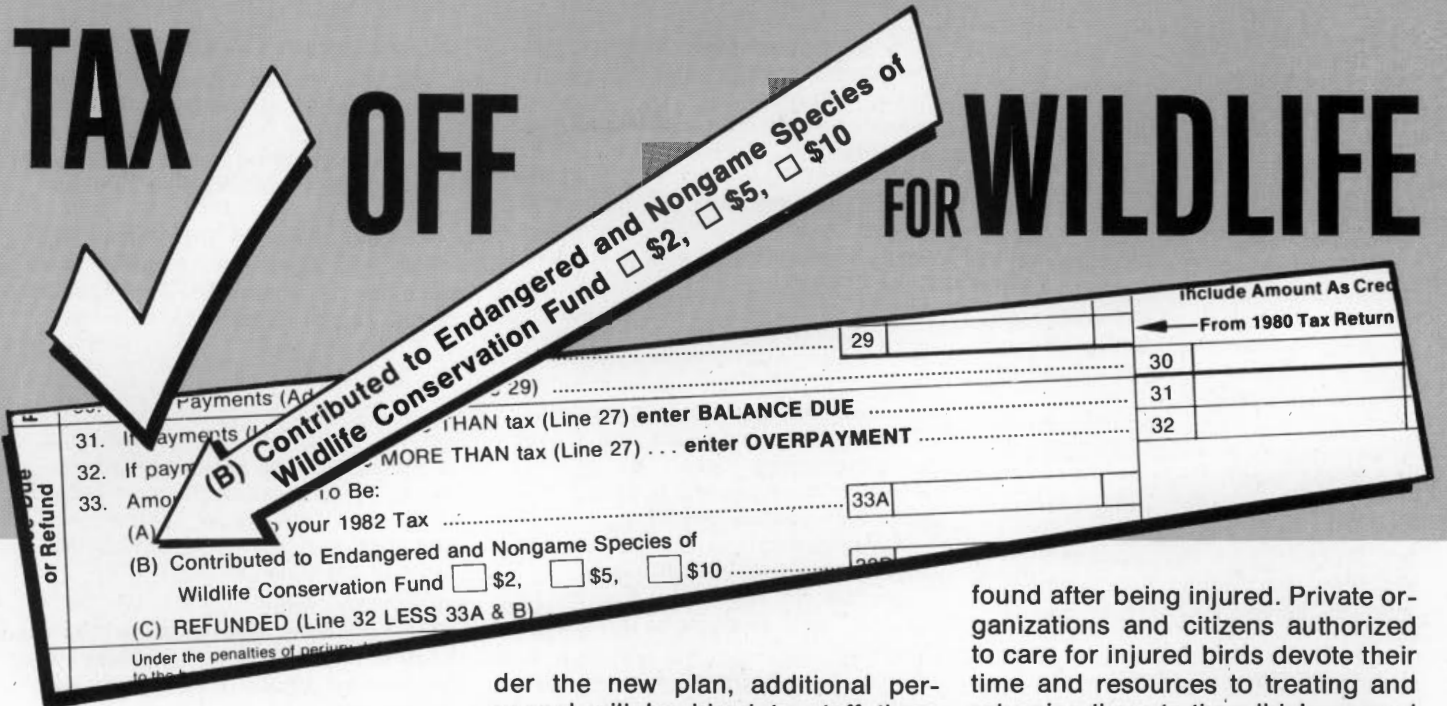


"If there's ever the possibility that iron mining will return to New Jersey" says Frank Markewicz, "it will be right here in Mount Hope." And this is an opinion that Ken Cramer can agree with.

"There's this hoist house equipment and power distribution plant still in fine condition," he notes. "There's the lump-ore mill and the concentrate mill. There is the 750-foot per minute man-cage hoist which is served by a 900 horsepower generator—all in good shape." And he adds a word about "the concentrate mill with its two parallel circuits equipped with two 9 x 13 foot rod mills, screens, magnetic separators and filters."

Someone said later, summing it up, that Mount Hope has the proud history, "looks ready to go if there's another war, God forbid, and has a lot of good standby water in case of another bad drought." □

TAX OFF FOR WILDLIFE



JoANN FRIER

The dream that has been fostered by the Endangered and Nongame Species Project for the past eight years can come true with the help of New Jersey's taxpayers. By checking a box on your 1981 state income tax return form you can contribute to the welfare of over 600 species of wildlife throughout the state. The "Endangered and Nongame Species of Wildlife Conservation Fund" has been established to provide taxpayers with the option of donating \$2, \$5, or \$10 of their tax refund to support this worthwhile effort of DEP's Division of Fish, Game and Wildlife.

Since 1973, the Project has been responsible for administering a complete nongame program, but, despite many significant accomplishments, survival from one year to the next has always been a financial struggle. The revenue expected from the new tax check-off will be used to reorganize, expand and improve existing programs and to increase manpower to provide better service to the people and wildlife of New Jersey.

At present, a staff of three biologists operating out of the Trenton office is responsible for all nongame, endangered, and threatened wildlife species and their habitats—from the rattlesnake dens of the northwest corner of the state to the least tern colonies of Cape May. Un-

der the new plan, additional personnel will be hired to staff three district offices, with administration remaining in Trenton. Each office will have two biologists and a Conservation Officer specializing in nongame management and enforcement. Establishing offices throughout the state will enable the Project to respond to the specific needs of a particular area. District offices will improve communication with regional and state agencies, local governments, and conservation groups, promoting cooperation in a common effort to protect, study, manage, and control nongame and exotic wildlife species. The increased manpower will also enable the Project to coordinate with the Bureaus in the division, other DEP agencies, and federal and local governments to ensure wise management of public lands to help all wildlife.

Research will continue on individual species to define life history, distribution, and habitat requirements. However, a broader wildlife community approach will be emphasized for the benefit of all species—plants, animals, game and nongame. Urban wildlife management will be included in New Jersey in the first such statewide effort. Through project sponsored programs, city and suburban dwellers will learn to maximize and enjoy the diverse wildlife of their parks, open lands, and backyards.

More and better facilities to care for injured wildlife are needed in New Jersey. Nongame birds and especially birds of prey are regularly

found after being injured. Private organizations and citizens authorized to care for injured birds devote their time and resources to treating and returning them to the wild. Improved financial circumstances will enable the project to become involved, not only in the closer regulation of rehabilitators, but also in the coordination of rehabilitation efforts, sponsorship of training programs, and possibly even partial reimbursement of expenses. Rehabilitation coordination efforts will also expand to include people who care for injured reptiles and small mammals.

The current popularity of the project's endangered species movies, slide talk, and information publications indicates that there is a great need for more and better teaching aids relating to endangered and nongame wildlife. A major effort to provide New Jersey teachers, youth group leaders, and libraries with high quality education materials on a regular basis will be undertaken. Urban wildlife issues will be introduced in the schools as part of the urban wildlife management program.

Regional law enforcement officers specializing in nongame and exotic wildlife enforcement will be able to provide the public with quick responses to complaints and control of violators.

Wildlife management is especially challenging in New Jersey, the most densely populated of the 50 states. You can take an active role in meeting this challenge by checking Line 33B on your 1981 state tax return. Help make the new improved Endangered and Nongame Species Project a reality. □

A Tour

14. Wortendyke Homestead (.1 mile on left). This unusual two-story house is the second built on this site. Its size and style are indicative of the prosperity of its builder.

15. Wortendyke Barn (directly opposite Homestead). This is one of the very few Dutch-style barns in existence. It is maintained by the Bergen County Board of Freeholders and is open to the public.

16. Pascack Reformed Church (.3 miles on right). Built around 1800, this is a typical Dutch church.

Follow Pascack Rd. until it terminates in Grand Ave. (4.4 miles). Turn left. Proceed 3.3 miles to Upper Saddle River Rd. (Grand Ave becomes Lake St. as you enter Upper Saddle River.)

V. UPPER SADDLE RIVER

17. Hopper-Goetschius House (on far right corner of Lake St. and Upper Saddle River Rd.) The original section was built around 1702. This house exhibits three levels of finish in the stonework. The grillwork under the eaves is a later addition.

Proceed south on Upper Saddle River Rd.

18. Abram Ackerman House (1.6 miles on right). Built around 1750, this is perhaps the best example of the Dutch Colonial style. The original section is the smaller wing with the gable roof. The later, larger home has a gambrel roof.

Proceed south to the end of Upper Saddle River Rd. (.3 miles). Turn right onto East Allendale Rd. Bear left at the fork (.5 miles) to Allendale. Turn left onto Franklin Turnpike (.2 miles). Proceed to Wycoff Ave. (2.4 miles). One block beyond Wycoff Ave. is the Hermitage Project.

VI. HOHOKUS

19. The Hermitage Restoration Project (on right). The original wing on the right side of the building is believed to date to the mid-18th cen-

tury. Many alterations have created the "gothic cottage" that is presently being restored.

Return to the corner of Wycoff Ave. and Franklin Turnpike. Turn left on Wycoff and drive west. The road becomes Franklin Ave. as you enter Wycoff. Continue until you intersect with a second Wycoff Ave. (3.1 miles).

VII. WYCOFF

20. The Brownstone Inn (far corner of Franklin Ave. and Wycoff Ave.). Circa 1757, this inn was a stopover between New York and Philadelphia. The proprietor maintains that Washington stopped there. The interior, although much altered, boasts an original 18th-century fireplace.

After leaving the Brownstone Inn proceed west on Wycoff Ave.

21. Wycoff Reformed Church (.2 miles on left). Example of Dutch-style church.

Continue on Wycoff Ave. to Lafayette St. (2.3 miles). Turn right.

22. Van Horn House (on corner of Wycoff and Lafayette). This house is a prime example of additions to an early house as the owners prospered. The smallest section is the original section, circa 1742. Note the more finished stonework in the largest section.

Continue on Lafayette to Ravine Ave. (.5 miles) and turn right onto Ravine.

23. Unidentified House in the Dutch manner, (.3 miles). This house has a number of features associated with the Dutch Colonial style and is dated 1770. It is probably the second house on the site.

Turn left onto Grandview Ave. Proceed to Goffle Hill Rd. (.5 miles). Note the view of New York City on the left. Goffle Hill Rd. becomes Sicomac Rd.

24. Stagg Homestead (.8 miles on right). The current building, circa 1812, is evidence of the growing prosperity of its owners and replaced an earlier building.

Continue west on Sicomac Rd. which becomes Franklin Lakes Rd (Rt. 502 West).

VIII. FRANKLIN LAKES

25. Van Houten House (2.5 miles on left), corner of Franklin Lakes Rd. and Wynadote Dr. Fine example of unsupported flaring eaves in back of house. Some modifications are apparent.

Continue west on 502. Follow 502 West as it turns left (.8 miles) and becomes Breakneck Rd. Continue on Breakneck Rd. 2 miles.

IX. WAYNE

26. Van Riper-Hopper House (on right). Built in 1786, this house is open to the public. The original small section to the left became the slave quarters when the larger house was added. It exhibits many typical features of the Dutch style.

27. Van Duyne House (in rear) shares the site with the Van Riper-Hopper House. It is being reconstructed by the Wayne Historical Society and is an example of the two-room style Dutch house.

Continue west on 502 until it dead ends into the Hamburg Turnpike. Turn left and proceed .8 miles to Valley Rd. Turn left. Follow Valley Rd. to French Hill Rd. (3.3 miles). Turn left and then left again immediately onto Totowa Rd. Proceed .5 miles.

28. Dey Mansion. Built around 1740, this building is essentially a Georgian mansion but exhibits many Dutch features, revealing the background of its owner and builder. Dutch antecedents visible in the Dey Mansion include the gambrel roof, use of varied building materials, and a carefully finished front with a less finely finished rear. This house is open to the public and is interesting to tour. It was used as headquarters by Washington.

This property also has an early-style two-room house and a number of buildings from the Terhume estate.

When leaving the Dey Mansion turn right onto Totowa Rd. Drive .5 miles to corner of River Dr. Turn left. Just south of the intersection, Rt. 80 and Rt. 46 may be entered. □

The Legacy of the Jersey Dutch

in Hackensack and the Van Duyne House in Wayne. Both are owned and maintained by historical associations.

As the style developed, more carefully cut stones were used in the corners for greater structural strength. Eventually these evenly cut stones were used across the entire

front of the houses for a more finished look. The frugal Dutch continued to use the rougher stones for the sides and backs of their homes. The growing use of the finished stone is considered clear evidence of the use of slave labor in the area. This is substantiated by the fact that the English proprietors granted 75 acres to anyone bringing a slave into the colony. No doubt, there was a labor shortage in Dutch New Jersey as in the rest of the colonies. Certainly, there were no professional architects, carpenters, or



Christie-Campbell House, River Edge. Originally located in New Milford, is being restored in River Edge.



Old Demarest House, River Edge. Built 1696.

builders. The Dutch farmhouse was built by the farmer, his grown son, his wife, a neighbor or two, and his slaves if he had any.

One technical problem that arose in the construction of the stone house was connected with the use of clay as mortar. The red Jersey clay, while basically impervious to moisture, was subject to washout in heavy rains. Gradually there arose the custom of extending the eaves well over the front and rear of the house to protect the mortar, while the use of wood or shingle for the upper portion of the sides reduced the maintenance and repair of the side masonry.

Perhaps the most outstanding feature of Dutch Colonial architecture is the graceful roofline that developed. The flaring eaves, reflecting a Flemish influence, are characteristic. In America these overhanging eaves were often combined with a curved gable. Although originally built without supports under the overhang, by the late 18th century very extended eaves had pillars added. The Von Steuben House in Hackensack and the Van Riper-Hopper House in Wayne have this feature, as do many of the Dutch houses that are still functional homes. In some of the smaller houses two very small narrow bedrooms were built at the rear, in which case the roofline was extended downward in a straight slope reaching quite close to the ground. The Ackerman-Naugle House in Ridgewood is an example of this development.

A particularly notable feature of the Dutch farmhouse is the gambrel roof, which appeared early in the 18th century and is especially prevalent in Bergen County. It differs from English gambrels in the location of the break in the roofline, which occurs high up in the Dutch style, where the upper slope is normally 23° and the second slope 45°, sweeping downward into a wide flaring eave. This style is unique to northern New Jersey and southern New York. Very often houses with the familiar Dutch gambrel have wings with gable roofs, the smaller wings usually represent an earlier small house, while the larger section with the gambrel roof is an addition representing both a growing family and growing prosperity. The Abram Ackerman House in Saddle River is a prime example of this characteristic.

In examining Dutch houses one quickly observes that there is no chimney work on the exterior walls, although multiple chimneys are apparent on the roofs. The chimney

structure of Dutch houses was always built within. Although most houses of this style originally had large bake ovens projecting on the exterior of the kitchen, these have been demolished in recent decades.

A favorable exterior feature of the Jersey Dutch was the front "stoep." These were built at the front door with facing benches on either side of the doorway. On warm summer evenings these stoops were popular gathering places for family conversations. The Christie-Campbell House in Hackensack exhibits a traditional stoop, and also presents a fine example of trapezoidal window lintels. Early lintels were usually wooden or stone blocks, but the trapezoidal stone came into use before the Revolution. Occasionally lintels of brick placed sideways served the same function.

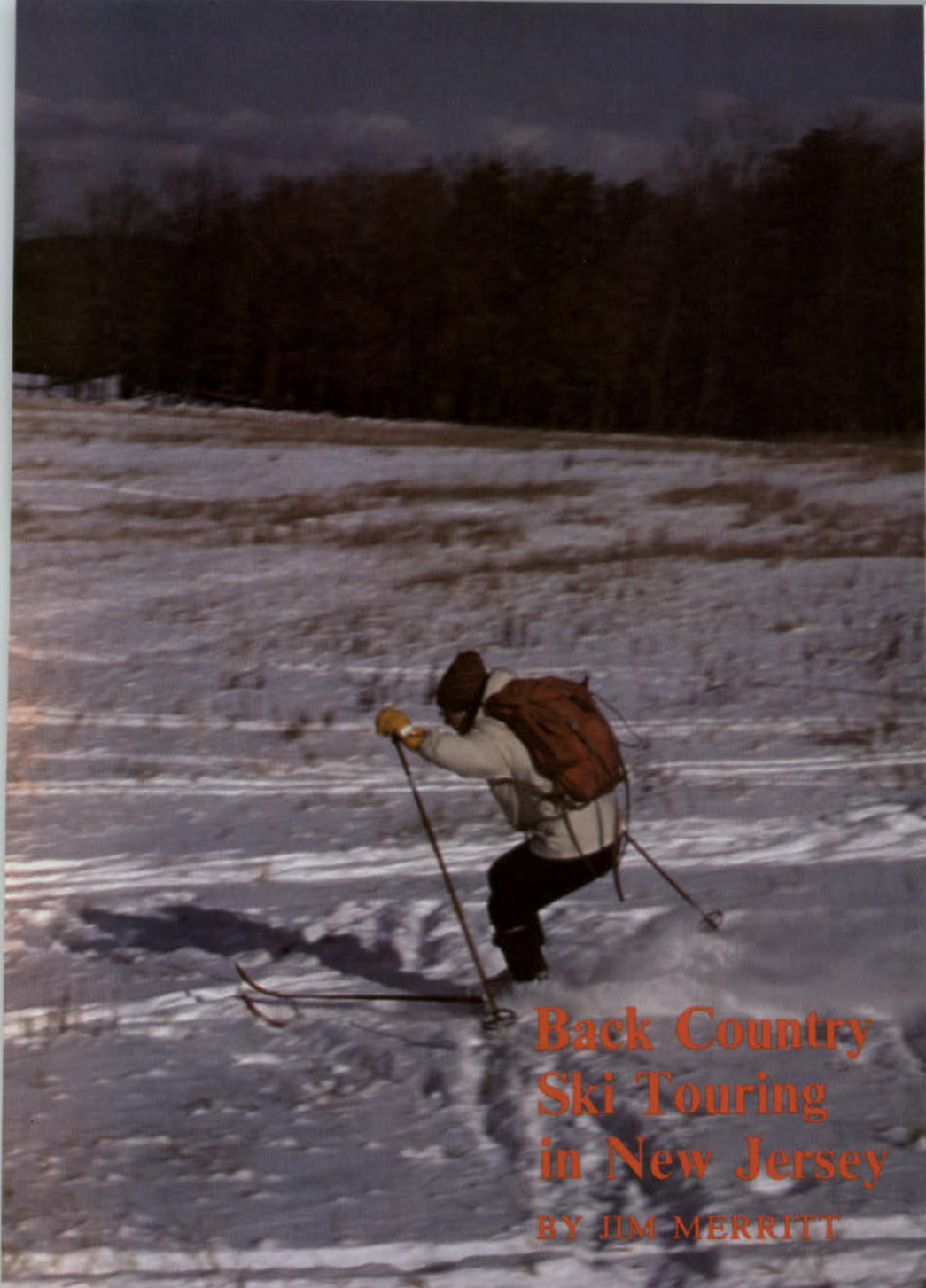
An unusual and popular window style developed during the 18th century. This employed three rows of glass panes on the upper sash and two rows of glass panes on the lower sash. This style can be seen on the Van Riper-Hopper House in Wayne.

Dutch houses always had exterior cellar entrances. In the early two-room houses there were normally two separate cellar entrances. The Old Demarest House in Hackensack presents a fine example of the two-room Dutch cottage with two separate cellars, each with its own entrance. The attic areas in Dutch houses were intended for storage, not living quarters, although occasionally the attic would be used for a sleeping area for children. Originally the attic was reached by a ladder; later in the eighteenth century, a boxed-in stairway afforded access to the attic from the kitchen.

The most common Dutch house in northern New Jersey was built one and one-half stories high. Only a few had a full two stories, and many of these were a result of expansion. Early floor plans consisted of two adjoining rooms with an exterior doorway into each room. These houses had no hallways. As larger homes became necessary and desirable, the early houses were often converted into slave quarters, with larger houses being built adjacent to them. These more impressive buildings had center hallways running the depth of the house with double Dutch doors at each end.

The typical Dutch farmhouse in New Jersey often combined a series of additions, a combination of gable and

Continued on page 32



Back Country Ski Touring in New Jersey

BY JIM MERRITT

Delaware Water Gap NRC

WENDOLYN TETLOW

Each year more ski tourers are taking advantage on publically owned land to pursue their favorite winter activity. Several state parks and forests in the northwestern corner of our state have trails specifically designated for ski touring. Many miles of abandoned roads in the Delaware Water Gap National Recreation Area have also been set aside as touring trails. The gently rolling hills in our northern counties provide ideal terrain for this invigorating winter sport. Old farm roads take the path of least resistance, providing

moderate inclines and gradual descents. Quietly traversing through fields in various stages of succession it is often possible to see a variety of wildlife that would otherwise be disturbed by the heavy foot of the summer hiker.

For those who are interested in getting off the beaten path, hiking trails provide access to more remote areas. Often these trails lead to scenic areas such as hemlock ravines with frozen waterfalls. They are generally narrow and often have short steep sections with sharp turns or switchbacks. Such

trails are recommended for tourers with more experience. Skiers should be able to stop and make controlled turns before venturing out on these trails.

If you are interested in getting into some of these backcountry areas you might want to inquire about one or more of the tours listed below. All tours are led by volunteers and are free. These tours are a minimum of ten kilometers and last three to five hours. Participants should wear a small pack containing lunch, a hot drink, and spare clothing including a change of socks. Please remember the trails are often difficult, and as such are unsuitable for beginners. As a courtesy, please call the leader one week in advance for information. □

January 3

Allamuchy State Park—Ten kilometers over rolling hills on old roads through a semi wild area. Hike if no snow.

Meet at 10:00 a.m. at Panther Valley Shopping Center.

Leader: Steve Spafford, vice president NJ Nordic Ski Club. Phone 201-948-3895 (home).

January 10

Stokes State Forest—Ten kilometers along closed roads. The leader is a wildlife expert who will point out winter wildlife habitats.

Meet at 10:00 a.m. at Stokes Forest Office.

Leader: Bob Byrne-NJ Division Fish, Game and Wildlife. Phone 201-852-2565 (office)

January 17

Delaware Water Gap National Recreation Area—Fifteen Kilometers into the backcountry of the Recreation area led by a park ranger.

Meet at 10:00 a.m. at District Ranger Office

Leader: Phil Campbell-District Ranger Phone 201-948-6500 (office)

February 7

Delaware Water Gap National Recreation Area—Ten to fifteen kilometers to a frozen waterfall. Hike if no snow.

Meet at 10:00 a.m. at District Ranger Office

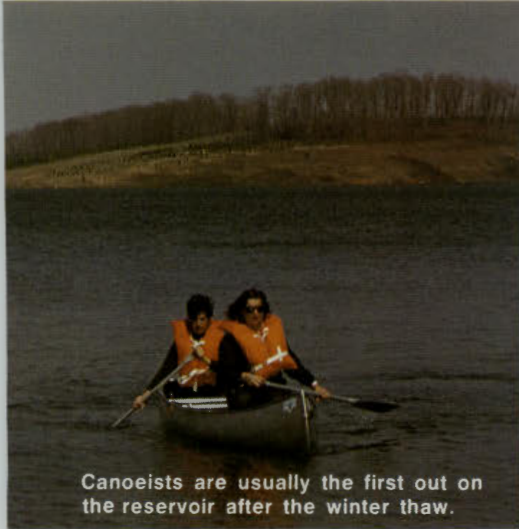
Leader: Jim Burnell, NJ Nordic Ski Club. Phone 201-884-2485 (home).

February 21

High Point State Park—Ten to fifteen kilometers—Ski on closed roads around monument at the highest elevation in NJ.

Meet at 10:00 at the Park Office
Leader: Jim Merritt, NJ School of Conservation. Phone 201-948-4646 (office).

Round Valley



Canoeists are usually the first out on the reservoir after the winter thaw.

JOEL L. ZATZ

If you only want to come to spend a few hours just sitting and watching the activities all around you, do so. Sitting high on the knoll overlooking the park and reservoir is a good way to spend a day, anytime, any season. Bring a pair of binoculars and watch the activities below you or the birds flying overhead. (Round Valley is well known to area birders as a good spot to see many species of water birds, including an occasional rarity.)

Round Valley Recreation Area, administered by the Division of Parks and Forestry and Green Acres, is open seven days a week. Stop at the park office for maps and regulations when you arrive.

Day-use fees are charged only from Memorial Day weekend to Labor Day. On weekends, the fee is \$4 per car and during the week it is \$1 per car. Camping is \$5 per night year round.

Boaters should pay strict attention to the blinking light system at the boat launch area as the bowl shape of the valley causes changing wind conditions, which may be hazardous at times.

Picnic sites have tables and grills. Two are in a woodland setting; one is atop a knoll.

A picnic lunch at any of these spots is lovely, or bring a sandwich to eat on the trail. All picnic areas provide access for the handicapped and during winter months, the restrooms are heated.

Round Valley is located in Lebanon off Route 22, from which Lebanon-Stanton Road exit leads directly into the park. □

HOW TO REDUCE YOUR HEATING COSTS THIS WINTER

How costly was last year's heating season for you? You *know* it won't be cheaper this year . . . unless you take steps to reduce energy use now.

There's lots of things you can do to cut down on the amount of fuel your gas furnace or oil boiler uses and still maintain the level of warmth that you like in your home. Some are simple practices that don't cost anything to do; or it may cost very little to do. These are the simple things that you can do yourself, using inexpensive materials. And they should be done **FIRST**.

Other improvements are more complicated. These measures may require a contractor and cost more to do. The point, though, is: once you've made energy conserving improvements, they begin to pay for themselves *right away*. You use less fuel to heat your home . . . and *continue* to use less gas or oil *every year!*

Your furnace and boiler

Routine servicing and periodic checkups of your furnace or boiler can reduce the amount of fuel you use by about 10 percent. A service contract is a good arrangement for an oil burner or steam heat boiler.

Your oil burner should be adjusted and cleaned at the beginning of each heating season. You begin to save money when your oilheat serviceman:

- ✓ adjusts the fuel-to-air firing rate to the proper level;
- ✓ changes the oil burner nozzle;
- ✓ changes oil and air filters.

For gas furnaces, your local utility or gas company servicepeople:

- ✓ check the operation of the main gas valve, pressure regulation, and safety control valve;
- ✓ adjust primary air supply nozzle for proper combustion;
- ✓ replace or adjust fan belts where necessary.

During the heating season, it's essential to clean or replace the furnace filter every 30-60 days. (You'd be surprised how much gas you'll save by maintaining a clean furnace filter!)

A hot water/steam system should be serviced by:

- ✓ bleeding air from the system. Air keeps out hot water. Once or twice a year, open the valve at the top of each radiator and hold a bucket under it as accumulated hot water comes out.
- ✓ cleansing the boiler water of

sediment twice a year. You can do it yourself after your serviceman shows you how. In the winter, drain a bucket of hot water through the bottom tap once a week. (This will stop sediment from accumulating at the bottom of the boiler, which actually prevents the flame from your burner from heating the water efficiently!)

There are other low-cost or no-cost things you can do to prepare for winter heating. Like insulating all pipes or ducts that pass through unheated spaces. Use duct tape to seal connections between ducts; then use two-inch blankets wrapped around ducts. (Be sure to seal the blankets together where the edges meet!)

Insulating ducts in unheated crawl spaces, basement or garage will also reduce your energy use in the summer if you have a central air conditioning system. In a typical house, properly installed adequate duct insulation can pay for itself in the first heating season. You pocket the savings thereafter.

Caulking

There are plenty of places for the warmth in your home to escape outside. (And that means you'll need more heat to replace that escaping warmth.) Places where water faucets and electrical lines come into your house are heat wasters. Spaces around these pipes and wires should be caulked to prevent warm house air from escaping.

If you have older storm windows, they should be thoroughly caulked from the inside *and* the outside where the metal joins the window frame . . . (but don't cover the drain holes in the storm window at the sill).

The most effective sealing by caulking is at sills, where the house meets the foundations and at any other place where two *different* types of building material join. (Such as where aluminum siding meets the wood frame around windows or doors.) You'd be amazed at the amount of cold that infiltrates through these tiny fissures *all around* your house!

Butyl, latex or polyvinyl-based caulk is good to use because it bonds to most surfaces and is more durable than other less expensive caulking compounds with an oil or resin base. Silicones, polyurethane and

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In the Environmental News

CAVING



Flies are not the only critters that learn to walk on walls.

sey Grotto, share the conviction that there are yet caves to be discovered within the state. The geographical location as well as the demographic makeup of the populace tends to restrict any attempt at serious ridge walking. Located as we are at the fringe area of the most populated region of the country, the properties are all, or so it seems, posted "No Trespassing." There is no unowned land within the state and all boundaries are contiguous. Some of the area within our target region was to have become part of a federal tract for reservoir and recreation use. Although the proposal was defeated, the issue was emotional, traumatic, and for some costly, in that some properties were in fact condemned. Today, any strangers in the region are viewed with great suspicion and rarely, if ever, is permission given to enter upon another's property. About the only lands to which access may be had are those in the public domain. And that is not true in all cases either.

Despite these restrictions, more than 100 caves have been explored and mapped over the years. New Jersey has about 225 square miles of limestone. With an average of about one cave for every 10 square miles, only 20 caves extend for more than 100 feet and only 10 caves ever had any formations. As you can see, a cave is truly a rare phenomenon, and its speleothems even more so.

Preserve And Protect The Caves

I'm sure you have realized by now that this article is not about to pinpoint any cave locations. There are several reasons. In 1954 and again in 1961, when the announcement of a cave discovery complete with a description of the cave, its formations, and its location appeared in a news article, it took less than 30 days in each case before the cave was vandalized and the formations destroyed.

There are countless episodes, nationally, where youngsters aware of a cave opening, decided to emulate the adventures of Tom Sawyer. Unfortunately, such youngsters are nearly always ill equipped and bold beyond their knowledge and ability. Rescues are all too often required and injuries are not unknown.

There are far more closed caves than open ones, and the owners are often openly hostile. In the case of an industrial owner, any negative publicity such as rescues and/or injuries is felt economically. It doesn't take long before the pressure will force closure of the cave. A private owner will feel the pressure to close the cave from his friends and neighbors, especially if one of their children is the focus of an incident. Unfortunately, once the pressure becomes effective, access to the cave is denied to all comers, experience and qualifications notwithstanding.

Control, Not Closure

There are several tried and proven measures that will keep a cave open and accessible. The best and most popular method is a locked gate installed in the cave entrance. The key is usually available from the owner. One such owner has only a few conditions: that the trip be limited to one-half day; that the trip be on either a Saturday or Sunday; that the key be picked up and returned in person; and that reserva-

tions be made in advance. There has been no trouble during the past four or so years that the cave has had this same owner. This is a statement that could not be made on behalf of the previous owner, who attempted to keep the cave closed.

"But the cost of installing a gate! And all that concrete and masonry work, not to mention the cost of the labor itself." Many owners of gated caves felt exactly the same way at first. But once they began to discuss the problem with friends, neighbors and local caving organizations, they found new friends and helpful neighbors. The cost of materials was shared between many and the cavers turned out in force to provide the labor. The project developed strong bonds of friendship while simultaneously preserving and protecting a wild cave.

Even more important than protecting the cave is the preservation of its speleothems and the very special habitats that sustain them. The formations consist of calcium deposits and are far more fragile than their appearance would lead one to believe. A simple soda straw (a hollow, tubular stalagmite) requires an average of 125 years to grow a mere one inch. These fragile formations break very easily and once damaged, they are destroyed forever.

Scientists agree that caves have a kind of life cycle, moving from creation, to maturity to death. Our field work has taken us to caves in various stages of this cycle. South of Washington, in Morris County, a farm field is developing a case of potholes. A drainageway along the eastern side of the field, following the base of the road berm, also has several potholes within its stream bed. Both the ditch and the potholes in the field are in a fairly straight southward line intersecting an east-west drainageway along the southern edge of the field. This stream also has a large pothole directly in line with those in the field. Vince Keppler, Of Oxford, N.J., a member of the National Speleological Society, has been watching the progress of this apparent mini-karstal area. Of the pothole in the east-west stream bed, Mr. Keppler reports that he has dug down to a depth of nearly six feet. While this hole captures nearly all of the water flow in this stream,

the hole is not much more than a "chuck" hole. After every rain, this hole fills with silt. The stream, although dry when we saw it, looks as though it might run 12 to 18 inches deep and perhaps two to three feet wide. As the stream bed nears the road, it widens to about 20 feet where it passes beneath the road. A frozen puddle of water lay beneath the bridge. About 100 feet east of the bridge, the dry stream bed passed beneath an abandoned railroad span. Directly under the tracks was another puddle about 20 feet across and also frozen over. We cracked the ice. Our best guesstimate of the water depth was two to three feet. The dishing of the stream bed was obvious—another pothole. This is obviously an area that has a subsurface drainage pattern. How long will we have to wait before we will have a new cave to explore?

High in a quarry wall, west of Hope, in Warren County, is a crawl hole with a stream trickling out and down the quarry wall. The water seems to come from the groundwater seeping through from the surface above. The cave has a few benches in the passage as it extends for about 80 feet, but it is a hands-and-knees crawl all the way. The cave is a home for a horde of camelback grasshoppers and at least one bat. Other than a few small soda straws, it has no formations.

Close by a residential area in Newton, Sussex County, is a nice little cave. After a 10-foot belly crawl, the passage splits, leaving a choice of

left or right. The ceiling at this point is about three feet high. To the left the cave narrows and pinches out. To the right, following a two and one-half inch pipe, one travels nearly 15 feet to a pool of water. The passage sumps (water to the ceiling) in water that is crystal clear. Cute cave. The entrance is 40 feet down an abandoned well. The pipe was a part of the water supply equipment.

State-owned land near Round Valley reservoir, Hunterdon County contains the largest accessible cave in the state. At this writing the cave is officially closed. Apparently the only cavers in the state observing this posting are the organized cavers—NSS and Grotto members. This is one group of people least likely to be involved in a caving incident. The Northern New Jersey Grotto long ago submitted a proposal aimed at opening the cave under controlled and safe conditions. Central Jersey Grotto is currently preparing their own proposal for attaining the same goal. It is most unfortunate that here is a unique environmental resource, on public owned/public use land ideally suited for novice caving experiences, subsurface cartography training, and environmental awareness sessions, to name but a few potential uses. While most cavers I have talked to appreciate the motive and intent of the state, few feel that the actions taken by the state are having any effect toward the solution of the problems that caused the closing. Some of these cavers have as much as 20 years' experience in un-

derground exploration. Others are spelunkers who earn their living as regional planners, and environmental engineers, and all are concerned about those youngsters who choose to explore dangerously and in ignorance of the need for ecological preservation.

The National Speleological Society is concerned about the preservation of caves and their speleothems. Functioning through their satellite organizations, called Grottos, with a total active membership of more than 500 cavers, exploration and mapping of caves is carried out throughout the United States as well as in many other countries around the world. Cavers come from every walk of life, each interested in some speleo specialty and all equally concerned with safety and ecology.

New members are a necessity to any organization if it is to sustain itself and grow. The National Speleological Society would like to see all cavers join under the national umbrella. This would potentially add to the wealth of information being assembled and would undoubtedly show profits in the area of caver-owner relationships. It should also further the knowledge and concerns of environmental matters and the preservation of speleo life and habitats.

Taking nothing but pictures; leaving nothing but footprints; and killing nothing but time, the cavers exert every effort to cave softly. It is in their interest. It is their world. □

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Sixty-four Skunks

about the bluffing by skunks at the feeding station. The raccoon would walk right up and take the food, which the skunk would yield after an initial bluff. On one occasion we put the bones of a turkey out and four skunks arrived and began feeding. A few minutes later four raccoons arrived and took possession. The skunks stayed nearby and dragged unguarded bones off under a shrub when the opportunity arose.

On many mornings, the results of

nocturnal activities of skunks were evident in our front yard where they had been digging, presumably for grubs of Japanese beetles or other insects.

We have no direct evidence of mortality of our skunks but we did observe many skunks killed on roads in Bergen County in these years. Probably vehicles are a major cause of death for medium-sized native mammals in suburban areas.

The development of suburban habitats has been detrimental to some species of wildlife but it has been neutral or positively beneficial to other species. Skunks, raccoons, and opossums probably have benefitted. In addition to

natural sources of food, the placement of food outdoors for pets certainly benefits skunks and other mammals as well. There are people who like to watch mammals as well as those who like to watch birds. Some of these people feed the mammals deliberately; many other people feed garbage to animals unintentionally.

The ecology of urban and suburban wildlife has been little studied. Our observations have been somewhat casual but they do add something to knowledge and to awareness of wildlife. The amount of variation in color patterns that we found in this one local population is also noteworthy. □

The Legacy of the Jersey Dutch

gambrel roof with flaring eaves, and a mixture of building materials, including red New Jersey sandstone and mortar on the first story, and clapboard, shingling, and occasionally brick on the second. It is interesting to note in this energy-conscious age that the thrifty and practical Dutch built their homes to maximize solar heat. The broad front side of the house generally faced south. In the winter the sun pours into the rooms, warming them, as a greenhouse. In the summer, when the sun's rays beat down from a higher angle, the overhanging eaves shield the windows from the intense rays, keeping the interior cool. As a result, many of these houses do not face the roadway adjacent to them.

Another unique feature of Dutch building in New Jersey was the Dutch barn, quite different from the familiar 19th-century English barn. Dutch barns were built with steep roofs reaching low to the ground. The doors were placed in the gable end. The center of these barns was used for threshing, with a hayloft above. The animals were kept on either side. The Wortendyke barn in Woodcliff Lake is one of the few existing Dutch barns and is in excellent condition. It is maintained by the Bergen County Board of Chosen Freeholders and when open offers a display of farm equipment.

The Dutch were devout Calvinists and although less austere in their habits than the Puritans in New England, their church nevertheless provided a center for their communities. Most of the early Dutch houses were built within a five-mile radius of a Dutch Reformed Church. The early churches were small octagonal buildings, the first in New Jersey being built in Bergen in 1680. During the 18th century, a square plan developed with a steep pitched roof. These gradually became more like English churches in style, adopting a rectangular plan. However, the penchant for sandstone is visible in these later churches, as is the tendency to use finished stone in the front and rougher stone on the side and rear. Notable examples include the Old Paramus Reformed Church in Ridgewood and the

Pascack Reformed Church in Woodcliff Lake.

Dutch Colonial architecture is a unique style developed in northern New Jersey and southern New York. It is a hybrid, representing influences of the Flemish and French Huguenots as well as that of the dominant Dutch. Although various aspects of the Dutch style can be traced to many countries of Protestant Europe, the whole is unique, a style influenced by the character of the people, modified by the climate, determined greatly by the materials available. It was achieved in stages, arriving at its most typical form by the mid-18th century. The distinctive style is due partly to the fact that the Dutch remained isolated from the expanding English culture and architectural styles. Thus, they maintained their own building style for more than 200 years. Only the Spanish style of the Southwest retained greater isolation from the predominate English influence.

The term Dutch Colonial has been challenged as a misnomer by some scholars who see the Flemish influence as being by far the strongest European influence in the style. Yet the settlements in New Jersey were in fact dominated by the Dutch in language, religion, and general culture. The houses most often bear the names of the Dutch families who built them. Finally, students of the style seem to agree that while Jersey Dutch architecture reflects influences from Europe, the final style is an American original, reflecting the personality of the thrifty, practical people who built the homes. □

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Continued from Editorial

In this issue:

Cross Country ski touring is becoming one of the most popular winter activities in our state. Author Jim Merritt, N.J. School of Conservation, invites us to *Back Country Ski Touring in New Jersey* on five separate weekend trips in January and February.

Author Arline Zatz urges us to visit *Round Valley Recreation Area* for skate sailing, ice skating, and ice fishing in the winter; and for swimming, canoeing, and fishing in the summer. Of course, you can hike the trails in all seasons. Ms. Zatz, a free lance writer, has been published by National Geographic, The New York Times, The Asbury Park Press, and other regional

publications.

Tax Checkoff for Wildlife by Joann Frier reminds us that as New Jersey taxpayers we can contribute to the Endangered and Nongame Species of Wildlife by checking off \$2, \$5, or \$10 on line 33B of the N.J. state income tax return. It's so easy to support this worthwhile effort of DEP's Division of Fish, Game and Wildlife.

FRONT COVER

Old Fashioned Winter—Photographed by David A. Bast

INSIDE BACK COVER

Raccoons—Illustration by Carol Decker (See article on page 14.)

BACK COVER

Horses at Belle Meade—Photographed by Walter J. Choroszewski (See article on page 20.)



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