

September/October 1975

# New Jersey **OUTDOORS**

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**New Jersey Outdoors Magazine**

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**September/October 1975**

**VOL. 2 NO.5**

# **New Jersey OUTDOORS**

<b>Backpack Impact</b>	<b>2</b>
<i>By Duane Pierson</i>	
<b>Dinosaurs and Whooping Cranes</b>	<b>4</b>
<i>By Len Ruggiero</i>	
<b>What's on Tap for the Newark Watershed</b>	<b>6</b>
<i>By Terrence D. Moore and Susan V. Stevens Sullivan</i>	
<b>Rainfall and Rabbits</b>	<b>8</b>
<i>By James E. Applegate</i>	
<b>Treat a Wild Thing to Dinner</b>	<b>10</b>
<i>By Herschel H. Hutsinpiller</i>	
<b>Saltmarsh Water Management for Mosquito Control</b>	<b>12</b>
<i>By Fred Ferrigno, Patrick Slavin and D. M. Jobbins</i>	
<b>New Jersey — Color it Beautiful</b>	<b>16C</b>
<i>By Barry Leilich and Edie Josephs</i>	
<b>A Whale in Newark Bay</b>	<b>18</b>
<i>By Randall R. Reeves</i>	
<b>Value of a Fresh Water Marsh</b>	<b>22</b>
<i>By Lauren B. Fillmore</i>	
<b>That Ain't No Chicken Hawk</b>	<b>24</b>
<i>By Wade Wander</i>	
<b>Shot or Slugs</b>	<b>26</b>
<i>By Robert McDowell</i>	
 <b>FEATURES</b>	
<b>Reader Survey Form</b>	<b>15</b>
<b>Environmental News</b>	<b>16A</b>
<b>Assunpink Wildlife Management Area</b>	<b>17</b>
<b>1877 N.J. Hunting Scene</b>	<b>21</b>
<b>Cover Captions</b>	<b>32</b>

# **editorial**

# **what's next for Tocks?**

■ Under Governor Byrne's leadership, the Delaware River Basin Commission has asked Congress not to fund construction of the Tocks Island dam. Our Governor is determined to meet New Jersey's water needs without the dam, at least for many years to come. This is welcome news.

Alternatives that provide water for Northeast New Jersey and flood protection for those along the Delaware River were identified, and their benefits and costs documented, in the comprehensive Tocks studies completed this summer. At Governor Byrne's direction, DEP is moving ahead:

- to complete the regulatory zoning of the Delaware main stem flood-plain;
- to develop intra-state water supplies, starting with the Round Valley outlet pipeline (which will cost the State's

residents less per gallon developed than Tocks);

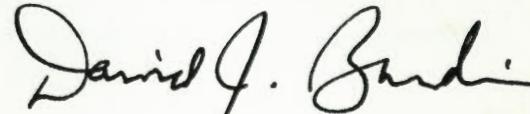
- to prepare a water supply master plan for the State, covering interconnection of water systems in the State, conservation programs and drought contingency plans as well as new supply services.

The proposed 1975 Water Resources Bond Act, which the voters will consider in the November election would help finance key alternatives to Tocks. This is a critical referendum on clean water for New Jersey.

Concerned citizens must also assure that the Federal government completes its recreational land acquisition program in this region. Continued acquisition is necessary to conserve the undeveloped resources of the valley, to enhance recreational opportunities in this region, and to land-

bank the area as a "Blue Acres" in case it should ever be needed for water supply in the future.

The Northeast megalopolis needs more high quality recreation lands such as those now being provided by Delaware Water Gap National Recreation Area along with adjacent State parks, forests and wildlife management areas. The diversity of outdoor experiences—canoeing, hiking, fishing, picnicking, hunting, nature study, camping, etc.—being provided by these agencies can be expanded as future acquisition progresses. The protection of this great natural area from overuse and misuse demands imaginative programs by the National Park Service and the various State agencies. Human satisfaction will repay the cost of these programs many times over.



## **in this issue**

More on the impact of the thousands of hikers and campers on our state parks and forests, by Duane Pierson, YCC Director at Stokes Forest and graduate student at Cornell University.

Also, how we are altering our environment and *not* by the natural processes that made dinosaurs extinct. And can some of these manmade changes make man an endangered species? A provocative article by Leonard Ruggiero of The Institute of Ecology.

Recreation for city dwellers and all New Jerseyans in the beautiful Pequannock Watershed. Newark's plans for the 35,000 acre Watershed by Executive Director Terrence Moore and Deputy Director Susan Steven Sullivan of the Newark Watershed Conservation and Development Corporation.

And believe it or not rainfall does affect what rabbits do best, by James E. Applegate, Assistant Professor of Wild-

life Biology, Rutgers University.

Read how air pollution damages plant life; by Herschel H. Hutsinpiller of the Air Pollution Control Bureau. Also, in New Jersey we have mosquito control without pesticides. This article was written by Fred Ferrigno, Division of Fish, Game and Shellfisheries, Patrick Slavin, Cumberland County Mosquito Commission, and D. M. Jobbins, of the Rutgers University Entomology Department:

Places to go in New Jersey (with maps) to observe the colorful Autumn foliage by Naturalist Barry Leilich and Environmental News Writer Edie Josephs.

Would you believe a whale in Newark Bay? Written by Randall Reeves, Director of Urban Activities at Princeton University.

And if you've wondered about the value of a fresh water marsh, read the

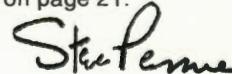
interesting article by Biologist Lauren B. Fillmore.

Want to become an expert on hawk watching? Wade Wander, wildlife biology major at Cook College, Rutgers University gives some tips.

A "how to" discussion of rifled slugs, now legal for deer hunting in New Jersey. The article was written by Bob McDowell, Information and Education, Division of Fish, Game and Shellfisheries, with photos by Harry Grosch, New Jersey Outdoors staff photographer.

This issue has a Reader Survey Form we'd like you to complete and return to us. Let us know about your interests and opinions.

And if you imagined that hunting in New Jersey was less crowded on opening day about 100 years ago, check the illustration on page 21.



# BACKPACK IMPACT



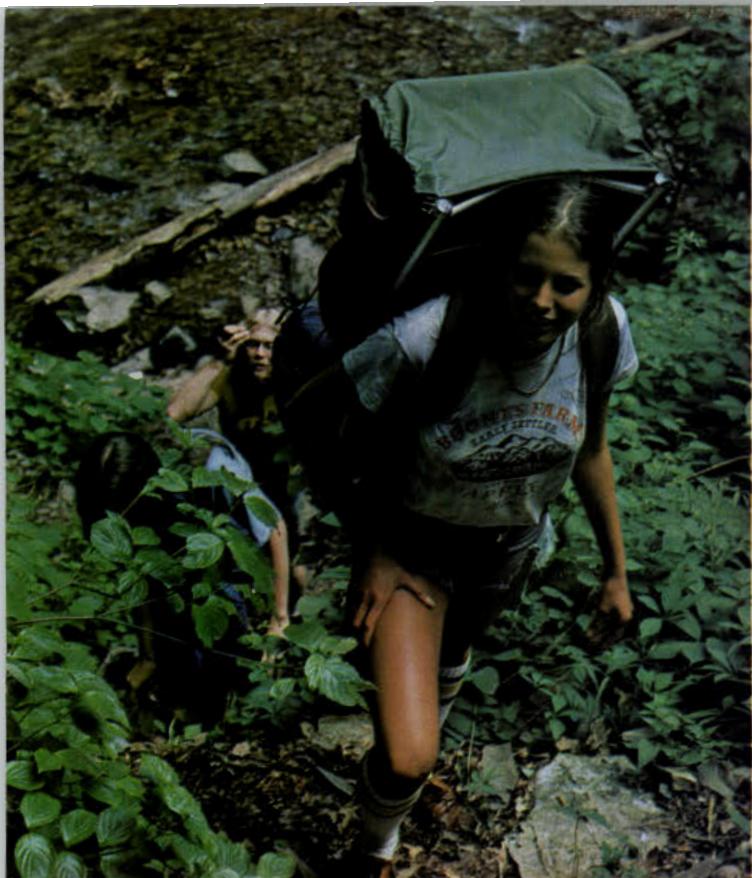
*Deserted camp scene along Dunfield Creek. Legally this is a no-camping area. Note slash marks on trees.*

**By Duane Pierson**

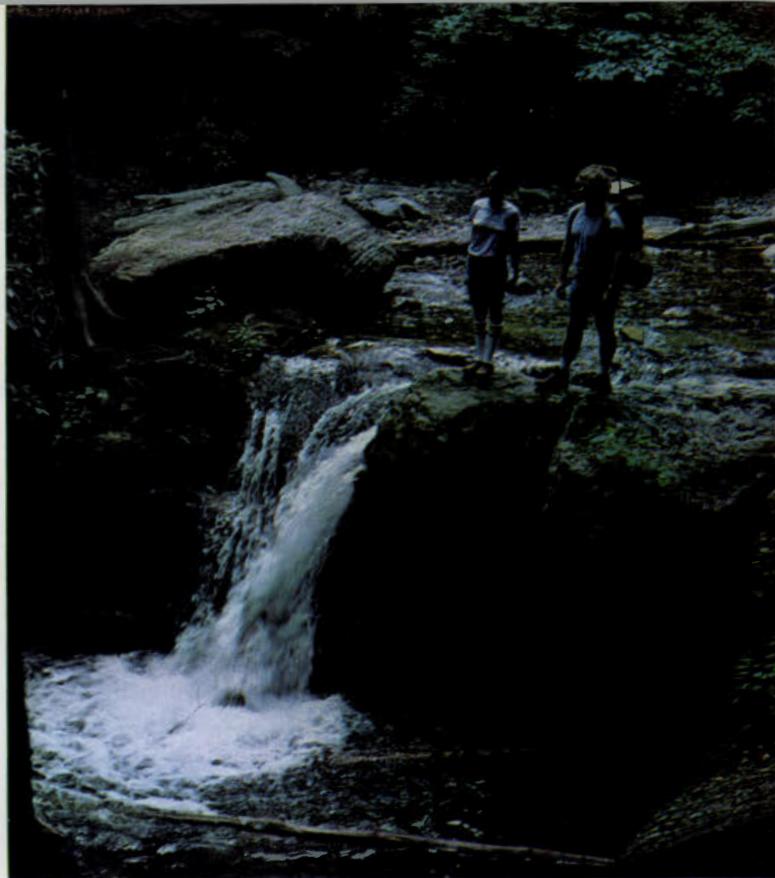
Photos supplied by the author

**How have the wilderness areas in the country's most densely populated state been faring under the recent upsurge in camping and backpacking interest? Recently a group of us set out to find the answers for ourselves.**

**We were fully aware that many people using the forests and trails of New Jersey were trained in the etiquette of camp and trail and were endowed with some positive environmental consciousness. But what of the others? How about the individual caught up in the enthusiasm of getting out-of-doors, but lacking training in camping technique? Is there really a significant increase in wilderness usage? If so, what effects were things like trash, the use of firewood, and just masses of people having on the ecology of these areas?**



*Sarah Libourel leads the pack climbing to Appalachian trail from Dunfield Creek.*



*Sarah Libourel and Duane Pierson of Sparta look over the vistas of Dunfield Gorge from falls in Dunfield Creek*

All too soon, the answers to these questions become visible as we entered the Dunfield Creek area. To those of us that know New Jersey's forests, Dunfield Creek is considered as being the most beautiful area in the state. The Appalachian Trail crosses Route 80 in the Delaware Water Gap and ascends the mountains through a beautiful gorge carved by Dunfield Creek that eventually takes you to the equally aesthetically blessed Sunfish Pond.

No sooner had we left the parking lot at the foot of the mountains than we encountered one type of modern-day camper and backpacker. Dunfield Creek Gorge is a non-camping area but yet every piece of land flat enough for a tent was occupied and the beautiful hemlock and mountain laurel was almost hidden by green and orange fabrics. As we worked our way up the Appalachian Trail, we could hear little of the forest sounds or the roar of Dunfield Creek. Several of the campsites featured speakers and tape decks playing loud music.

We stood and pondered the scene below where the creek formed two icy-cold pools. In the first, a group of young campers and their dog were swimming; while in the second, one beer can rode the swirl while another, catching the sun, gleamed up through the clear water from the bottom. Throughout the entire gorge, a piece of dry or dead wood was not to be seen, as all squaw wood had long since been burned. Many

roots and smaller trees bore scars left by searchers for fuel.

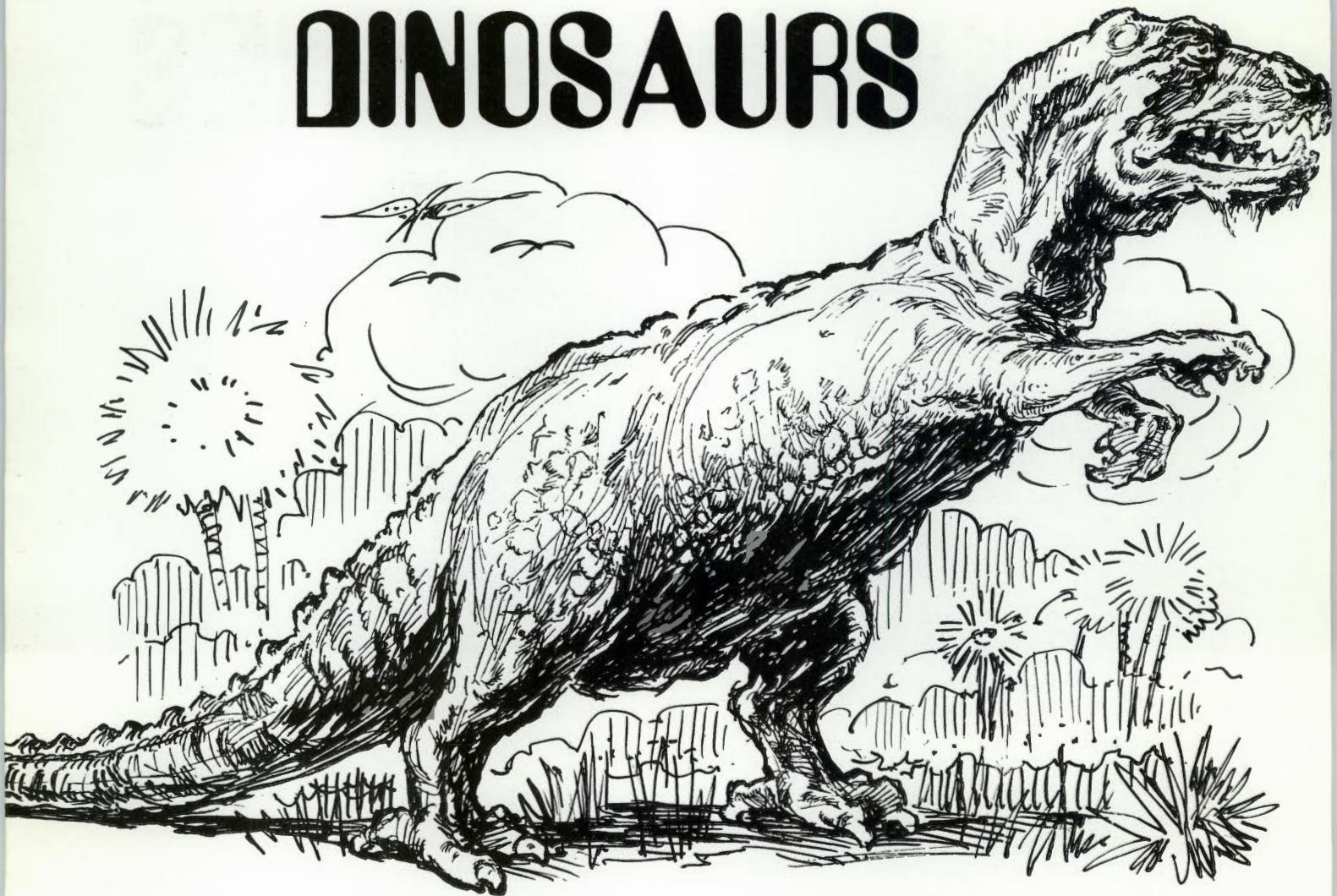
Groups of backpackers and family groups came down the trail. After conversation with many of them our spirits rose as we got into the camaraderie unique among those who experience the beauty of wild places together. But then as we passed one large group of campers, each with a can of beer in hand, several called out derisive remarks to the girls in our party. It was certainly to be a day of contrasts.

One remarkable paradox was apparent in that so many of the camping groups seemed to need alcoholic beverages in order to survive the ordeal of the outdoors. One can only ask how interested in the aesthetics of nature can these people be who need to screen the sounds of a beautiful wild area with loud music and to dull their senses with drink?

As we traveled the upper reaches of the trail we noticed abandoned camp sites with garbage neatly plastic bagged. This was commendable, but the garbage was left for pick-up in an area that could only be reached by foot and is seldom if ever patrolled by the much-overworked forest service. The filled garbage bags are perhaps the product of a generation acclimated to the amenities of civilization where garbage, if left on the doorstep, will simply disappear, as someone always takes care of these things.

*continued on page 32*

# DINOSAURS



Scalding steam spewed high into the primitive sky as the brontosaurus foraged among the megafloral vegetation. Echoing in the distance, pursuant with the timeless struggle for survival, savage screams shattered the predawn quiet. Not intimidated by the marauding predators, brontosaurus continued to feed upon the lush, green, giant plants. The morning sun brought its dim light to his primeval setting, and the prehistoric ecosystem absorbed its life giving energy just as ecosystems do today.

The world of the dinosaur was ecologically suited to giant land animals. If man could turn back time and visit that world, one thing is for certain—he would find no whooping cranes. Nowhere in the landscape would he find the ecological necessities for whooping crane survival. For that matter, few modern day creatures could live in the dinosaurs' world because of one word—ecology.

Ecology, defined as the study of the interaction between living things and their environment, is a far reaching term which touches on all aspects of biological existence. Life is a series of often terribly complex interactions, and it's the study of these cause-and-effect interactions which concerns the ecologist. The term ecology is broadly applied today in response to wide-spread environmental misuse, but still there are those who fail to appreciate even its most fundamental meaning. Ecology is not only something to be studied by

scientists in their laboratories. There is an applied aspect of ecology, and it is here that man gets his opportunity to provide input into the scheme of life and environment. Man would be wise if in his applications he considered ecological knowledge. Unfortunately, he has chosen to ignore most of the facts in favor of progress or economic gain. This is a sad, indeed a critical, situation and one which breeds further misunderstanding of the role of modern day ecology.

Many species of animals have become extinct in relatively recent times. Others, like the whooping crane, are likely candidates for extinction. One of the grossest manifestations of our lack of ecological understanding can be seen in statements like, "What's all the fuss about ecology? So the whooping crane is going to become extinct—that's perfectly natural—the dinosaurs are extinct, aren't they?" True, the dinosaurs are extinct—an extinction wrought over broad spans of time by *natural* environmental changes. The dinosaurs flourished in their day, much as man flourishes today. Evolution of life and of earth phased out the dinosaur as the foundation was established for more advanced life forms. Changing climate, tectonic activity, and atmospheric alterations all combined over eons of time to cause the demise of the dinosaur. These events were products of *natural* processes. Processes which made the earth suitable for life as we know it today. Life is dynamic—always changing. However, it is not

# & WHOOPING CRANES

LEONARD F. RUGGIERO \*The Institute of Ecology, Logan, Utah

the natural evolution of life which is responsible for the rapid decline in the numbers of whooping cranes. Man's doings are the instruments of environmental alteration responsible for habitats which no longer are suitable for their native fauna. This is the case with the whooping crane and a long list of others. The processes are not dynamic in a positive sense as are nature's own, but have as their impetus *development, exploitation, progress, and economic gain.*

If today's earth was occupied by an alien civilization and this civilization modified our world to suit its needs with no regard for our needs, it would be no surprise to find man's numbers dwindling. It wouldn't take many changes on earth for it to become totally unfit for human life. Just as man couldn't live in a world devoid of plants or clean water, whooping cranes can't live in parking lots or oil-choked marshes. It is not likely that such dramatic or sudden changes took place in the dinosaurs' world, but we certainly are altering our environment much the same as in this exaggerated example. Are we so shallow-minded as to think that we can haphazardly change our natural world and preserve our existence?

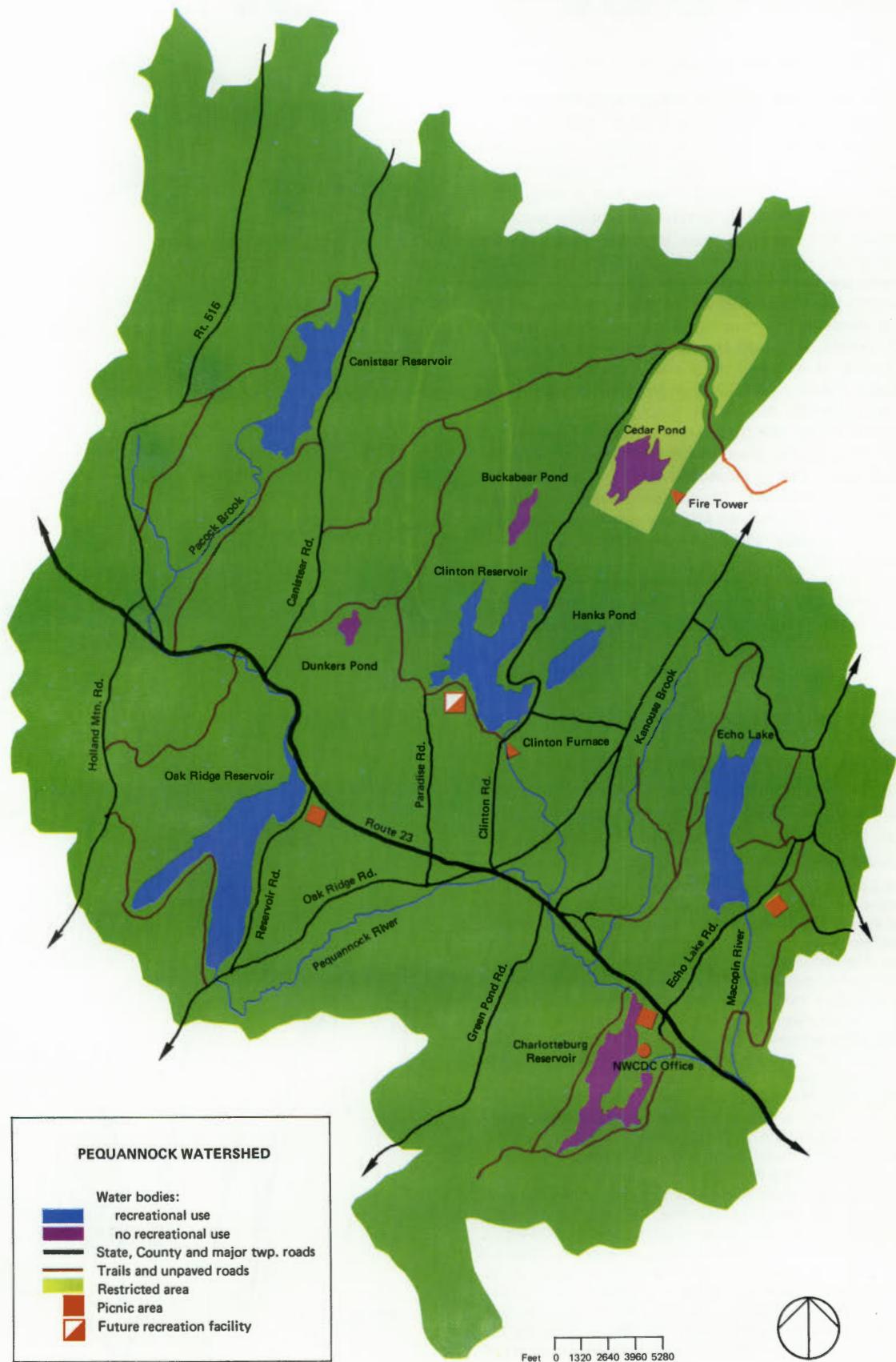
Progress and economic gain are not villains in themselves, but they have an associated cost. Our world has developed to the point where this cost is ecological. In other words, there is little we can do that does not in some way influence the relationship between animals and their environment. Be assured, we too are animals and hence are so influenced. Our sophistication and ingenuity have for the most part directed the results of our ecological misdeeds on species other than our own. This is a most temporary situation. We must temper our desire to "progress" with a thorough awareness of ecological cost. We must stop putting the whooping crane in the same category with the dinosaur.

\* The Institute of Ecology is a non-profit corporate body founded in 1970 through the efforts of the Ecological Society of America. TIE was founded having recognized the need for an organization that could address ecological problems that are so large, complex, and multidisciplinary that they go beyond the scope of established universities, institutes, or agencies. With over one hundred founding institutions, TIE's service oriented purpose is to complement and strengthen the nation's efforts in ecology. TIE is primarily action oriented and has worked on problems of national importance for government and private organizations like the National Science Foundation, the Rockefeller Foundation, the Environmental Protection Agency, the Council on Environmental Quality, the Ford Foundation, the Smithsonian Institution, the National Commission on Water Quality, and others.

In addition to TIE's involvements in high priority ecological research and problem solving, another organizational goal is expressed in the feeling that ecological knowledge needs a public forum. If ecological knowledge is to be useful in making public and policy decisions, it must be communicated and understood. The pathway by which knowledge becomes action has been badly neglected in this vital area. Consequently, TIE seeks to develop a public information and education program as initially desired by its founders. Presently, financial constraints preclude a large scale effort to implement our thinking in this area. However, a first step is allowing the public an opportunity to become aware of our scope, purpose, and intent. Public support is important in these development efforts, and questions or correspondence should be addressed to The Institute of Ecology, P.O. Box A, University Hill, Logan, Utah 84321 or Suite 101, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036. □



# What's On Tap For



# The Newark Watershed

Terrence D. Moore, Executive Director  
Susan V. Stevens Sullivan, Deputy Director / Newark Watershed Conservation and Development Corporation

*With the rapid increase in New Jersey's demand for outdoor recreation, the City of Newark's plans for its 35,000 acre Pequannock Watershed reflects the emerging State policy of multi-purpose use of reservoir systems.*

Driving north on State Highway #23 from its junction with Route 46 and Interstate Route 80 in Wayne Township is not an outing that provides evidence of New Jersey's many scenic amenities. The classic phenomenon of highway strip development, common to all of the State's older road systems, is ever present. There is a point, however, near the joining of the boundaries of Morris, Passaic and Sussex Counties, where man's "improvements" do not dominate the landscape. As one enters the Pequannock Watershed region, the forested mountains of the Appalachian Highlands, clear lakes and streams, and an occasional deer are all that may be seen. A State Park, perhaps? A wildlife sanctuary? No, every acre of this preserved natural beauty is courtesy of the City of Newark. Better yet, even with rising property taxes, and the pressures of urbanization, it's going to remain that way for future generations to enjoy.

Purchased in 1900, Newark's 35,000 acre Pequannock Watershed holdings cover portions of the three counties and six separate municipalities. The property

is the second largest body of open space and the largest municipality owned Watershed in the State. The clear lakes and ponds, green valleys, magnificent rock outcroppings, gorges, mountains, and forest cover combine to make the Pequannock an area of great scenic beauty. The five reservoirs and glacially formed ponds found here have a total surface water area approximating that of Lake Hopatcong, the State's largest inland water body.

## HISTORICALLY RICH

Historically, the Pequannock is rich in colonial and revolutionary activities. Many of New Jersey's earliest iron mining sites are located in or around the Watershed. Remnants of the iron mining days include the Clinton Furnace, one of the best preserved in the State, which is located near Clinton Reservoir. All that remains of the bustling iron community of Charlottesburg is an inn, now a private residence, located north of the reservoir which bears its name. Charlottesburg was the site of a skirmish on April 27, 1779 during the Revolutionary War.

Robert Erskine, who operated the Charlottesburg Works, gained fame as Washington's Surveyor General.

The Brown House, located near the intersection of Green Pond Road in Rockaway Township and Route 23, is one of the oldest buildings in the area. Above the doorway appears the date 1773. Now owned by the City, the house serves as a residence for the Newark Forester.

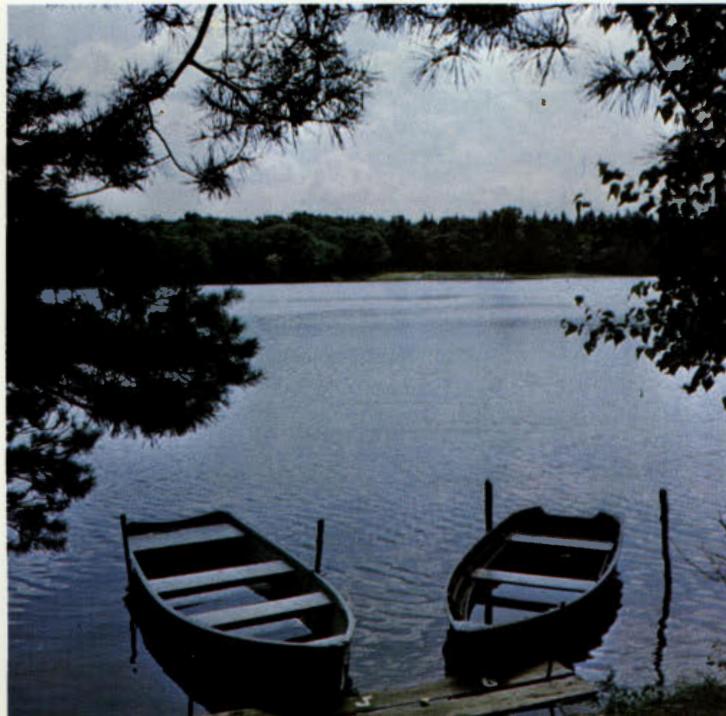
A number of old cemeteries dot the Watershed, some with markers dating to the mid eighteenth century. Perhaps the oldest of these are found on a site near Green Pond Road and the Pequannock River.

For a look at what New Jersey was like prior to settlement, a walk up Bearfort Mountain to the fire observation tower in West Milford Township affords a spectacular view of the forested watershed holdings. To the East, the twin towers of the World Trade Center may be seen on a clear day. To the North, South, and West only the wilderness of the Pequannock may be seen.

(Continued on page 30)

## Unique Scenic Water Recreation

Photos by Harry Grosch



## Clinton Furnace





# RAINFALL & RABBITS

BY JAMES E. APPLEGATE, Assistant Professor of Wildlife Biology, Rutgers University

"Bill, we got six rabbits out of that hedgerow last year, but we only started one today!"

"Yeah, I know. I've had a hard time starting them anywhere this year. It must have been all that rain we had last spring."

How many times have you heard that conversation or something that sounds almost like it? If you're a rabbit hunter, you've heard it more times than you may care to remember. Everyone has a notion of good years and bad years in small game hunting and the possible influence of weather, but it may surprise you to know that the exact relationships between rabbits and weather aren't all that clear, even to wildlife researchers.

In the first place, animal populations—especially bunnies—are the result of many factors; some of them understood, others not. These factors operate separately and also affect each other and, in general, make it awfully tough to predict rabbit population levels. What are some of these factors? You probably know some of them, but let's consider them before getting back to weather.

## Most Important Factor

The most important factor is habitat. Every rabbit hunter can look over an old hay field—with grass growing around an abandoned hay rake, a tangle of blackberries here and there, and a few trees beginning to show through the weeds—and just know that the spot is crawling with rabbits. And most of the time he'll be

right. By the same token, he'll drive right by a field that's grown up with saplings that have shaded the grass and low-growing weeds. A rabbit would have to carry a lunch box in a spot like that, and both the hunter and the rabbit know it. So, first and foremost, the type of habitat has a great deal to do with the number of rabbits we can expect on a given piece of land.

But, like Bill and his buddy, we've all been to that favorite spot that always had rabbits, and come out without needing to clean the bore of ole Long Tom. Why?

"Road kills!" you say, "I once drove along Fly Harmony Road and counted five dead rabbits in about a three-mile stretch." Road kills, and accidents in general, do take a share of the annual game crop, but they are what game biologists call a "density independent factor," which means that they take a constant proportion of the population, no matter how many or how few we have in that population. As such, that proportion doesn't change much from year to year and has very little effect on making good and bad bunny years.

Parasites and disease affect rabbit populations, as they do all wildlife. The normal rabbit, however, carries a healthy slug of parasites without showing many ill effects. Most every rabbit I've looked at in New Jersey has had the intermediate stage of the dog tapeworm, and most also have their share of mature tapeworms

and roundworms. Parasites rarely cause death in rabbits, however, so we can't blame them for bad rabbit years. Disease, on the other hand, is less constant in rabbits, and therefore more devastating when it occurs. But we have a lot to learn about predicting disease outbreaks in rabbits, so it's still difficult to predict good and bad years based on disease considerations.

### Any other factors?

"The foxes," my Dad used to say. "I saw one down the road just last week." My Uncle would agree and add, "Chicken Hawks!" for good measure. Aided by many studies, however, we've come to realize that these predators rarely keep the numbers of rabbits down. True: foxes, owls and hawks eat rabbits, but they just can't keep up with Ma Cottontail's wonderful ability to do what rabbits are famous for.

Let's take a quick side trip and refresh our memories on what it is that rabbits do best. Ma Cottontail usually roars into March pregnant, and brings forth her first litter during that month, generally four or five sons and daughters, depending on such things as age of the mama, how far north or south she lives, and (would you believe) the kind of soil she lives on.

Papa and Mama are given to some rather interesting maternity ward manners, because cottontails have what's called a post-partum estrus. In plain talk, that means that Mom's in season right after she's wheeled out of the delivery room. Mama is then impregnated for litter #2 of the season, which will arrive in just under a month. That's only a short time after she's kicked the first batch out of the house, or, more properly, allowed them to discover that Mom's no longer going to pick up the lunch tab. Litter #2 is born and Papa immediately sets the stage for litter #3; and so it goes throughout the spring and summer. Wow!

### More, More, and More

Enter the eldest daughters, who, by August and September, have entered puberty and are also capable of aiding Mom in her attempt to cover the world with rabbits. This they do almost as well as Mom, averaging about one less bunny per litter than she usually has.

Let's do some calculating now. From March to September Mom's had as many as seven litters. Since there are many reasons why she might not have all seven litters, let's be conservative and use the generally accepted figure of five litters per year, and estimate an average of four young in each litter. That's 20 bunnies. Now let's say that she had a total of four daughters in her March and April litters, each of whom had three little ones apiece during September. That's 12 more bunnies for a grand total of 32 new rabbits from one tired out Momma who started the season in March.

Of course, the majority of these guys never make it to the hunting season. Rex Lord, whose research on rabbits in Illinois is probably the best piece of bunny

biology available to date, estimates that on the average about 70% of the young rabbits die before they're a month old. That's about 22 of our 32 offspring. Since Rex Lord's estimate of 70% represents an average figure for many years of bunny watching, the *actual* number of young rabbits dying in any particular year could be smaller or larger than 70%. So, if 90% of the young rabbits died last year and only 50% died this year, Ma Rabbit's effort would have resulted in only three new bunnies last year but 16 this year—the differences between a bad and a great season.

Now, again, what factors determine whether 50% die or 90% die? Disease, parasites, accidents, habitat, predation and—yes—WEATHER. We recently found that rainfall does indeed affect fall cottontail harvests, but not just rainfall anytime in the spring or summer. The most important times appear to be March and September. Why March and September? We think, but we're not sure, that it's tied up with the reproduction biology that's already been described. The months of March and September together account for a potential 16 bunnies born compared to 16 in all of the other months put together. So anything that affects survival of young during these months would have a much greater effect than a lot of rain in any other 2 months. As you might expect, the months of April through August are also important, but not as important as March and September.

### Rainfall A Factor

What we found in our study was that if rainfall in March and September is light, the bunny harvest *can* be good. I say "can" because, as we just discussed, there are other things that can limit the population. All of the very good years in our study occurred when March and September rainfall were both below average. But there were some average and slightly below average rabbit years during the dry times too. It is likely that some of the other factors acted in limiting the bunny population during those years. In several years, high rainfall in the April-August period offset a dry March and September. The point here is that you're on shaky ground if you predict good years when March and September are dry.

On the other hand, whenever we had a lot of rain in March and September, our study showed that rabbit harvests were usually well below average. In 1974, for instance, March and September rainfall on the 5 areas we studied added up to 12, 12, 13, 14, and 15 inches (Average is about 7½ inches). On all of these areas, the harvest was either the worst or next-to-worst on record!

Weather does affect bunny hunting. And if you want to see what Fall may bring, check your rain gauge in March and September. If it's lower than usual, that hedgerow may hold its four or five cottontails. If it's overflowing, there will probably be a lighter-than-average weight in your game pouch. □



# Treat A Wild Thing To Dinner

BY HERSCHEL H. HUTSINPILLER

RUTGERS UNIVERSITY (COOK COLLEGE) PHOTOS

*You don't have to spend a bundle, . . . or go to a fancy restaurant, . . . or lie to your wife . . . to treat a wild thing to dinner.*

*In fact, all you need is a little basic understanding and a heart that's in the right place. You also will be helping to improve your own environment and that of your fellow man.*

Wild creatures, large and small, furred and feathered, require food for health and survival just as you and I. They do most of their food shopping at Mother Nature's Supermarket. To feed her wild customers, she stocks her "shelves" with vegetation, fruits, berries, seeds, and similar delicacies. Over the years, however, we homo sapiens have increasingly cut into Mother's operations by converting large portions of her store into highways, housing developments, parking lots, shopping centers and other anti-wildlife projects dear to our hearts.

To make matters worse, we have refined our despoliation by producing copious quantities of air pollutants which are deadly enemies of vegetation. The resulting damage to plant life hampers Mother in her efforts to stock her

fewer remaining shelves with food for her wild customers.

Each of us can help invite wildlife to "come and get it" by doing our share in curbing air pollution. Although one person's contribution to pollution may seem small, put them all together and we deal Mother Nature a mighty wallop. Perhaps you never thought of it that way, but a brief review of the sources and effects of the more common air pollutants may provide you with food for thought and our feathered friends with food for survival.

This is particularly important here in New Jersey, where open space is limited and where damage to vegetation from air pollution has been found in all sections of the State. To the expert, vegetation provides a good indicator of pollution in an area, much as the canary was used to provide early warning in mines. The trained individual is able, by studying vegetation, to identify the types of pollutants present in an area and to estimate their severity.

A number of factors have bearing on the damage which pollutants wreak on vegetation. First of all is the susceptibility of a particular plant to a specific pollutant. The

amount of a pollutant in the air is, of course, important. Other factors which have a bearing on the severity of damage include the duration of exposure to the pollutant and climatic conditions such as temperature, humidity, rainfall, amount of sunlight, etc. Of course, we cannot attempt here to explore all these factors, but we can take a quick look at the more common pollutants.

SULFUR DIOXIDE is, among other things, a ferocious killer of plant life. Where does it come from? You and I, industry, electric generating stations, etc., all produce sulfur dioxide when oil or coal is burned. You and I are responsible for less of this pollutant when we properly maintain and use our heating equipment. We also cause less sulfur dioxide when we do not waste electricity, for most of our electricity still is produced by the burning of oil or coal.

Fortunately, New Jersey has sharply reduced the levels of sulfur dioxide in its air by restricting the sulfur content of the fuel oil and coal which can be used in the State. However, the problem has been reduced, not eliminated. We still spew some of this pollutant into the air whenever we burn fossil fuel,

and we cannot prevent the winds from carrying sulfur dioxide into New Jersey from other parts of the nation.

This pollutant, as do most, enters a living plant through the tiny openings in the underside of the leaf. These are called *stomata*, and they are the routes by which life-giving carbon dioxide are introduced into the plant. The damaged area usually appears dry and parched. Mild damage may stunt growth or retard the production of fruits, berries, seeds, foliage, etc. More severe damage kills.

HYDROCARBONS are useful, but also cause problems. On the positive side, they are the main constituent of the petroleum and coal which we utilize to produce heat and energy. On the negative side, however, they cause damage to vegetation in their own right, and they interact in the atmosphere with oxides of nitrogen to produce the even more troublesome photochemical oxidants.

There are several direct effects on plant life from some of the hydrocarbons. They retard growth, cause leaves to wither and interfere with the development of buds and flowers, or cause them to drop off. Mention will be made later of photochemical oxidants, to which hydrocarbons are a contributor.

Each of us is responsible for inexcusable emissions of hydrocarbons when we fail to burn fossil fuels as completely as possible. Our automobiles contribute the lion's share of the hydrocarbons found in our air. Thus, we can reduce our individual contribution by practicing proper maintenance, developing good driving habits, avoiding unessential travel and utilizing car-pools or public transportation.

NITROGEN OXIDES, like hydrocarbons, are associated with the burning of fuels. They, also, cause damage in their own right, in addition to contributing to the formation of photochemical oxidants. The same measures we as individuals can take to reduce our emis-

*Continued on page 29*



Sulfur dioxide to Black Cherry, Bramble, Ragweed, Crabgrass and Lambsquarter, showing dry and parched appearance of affected areas.



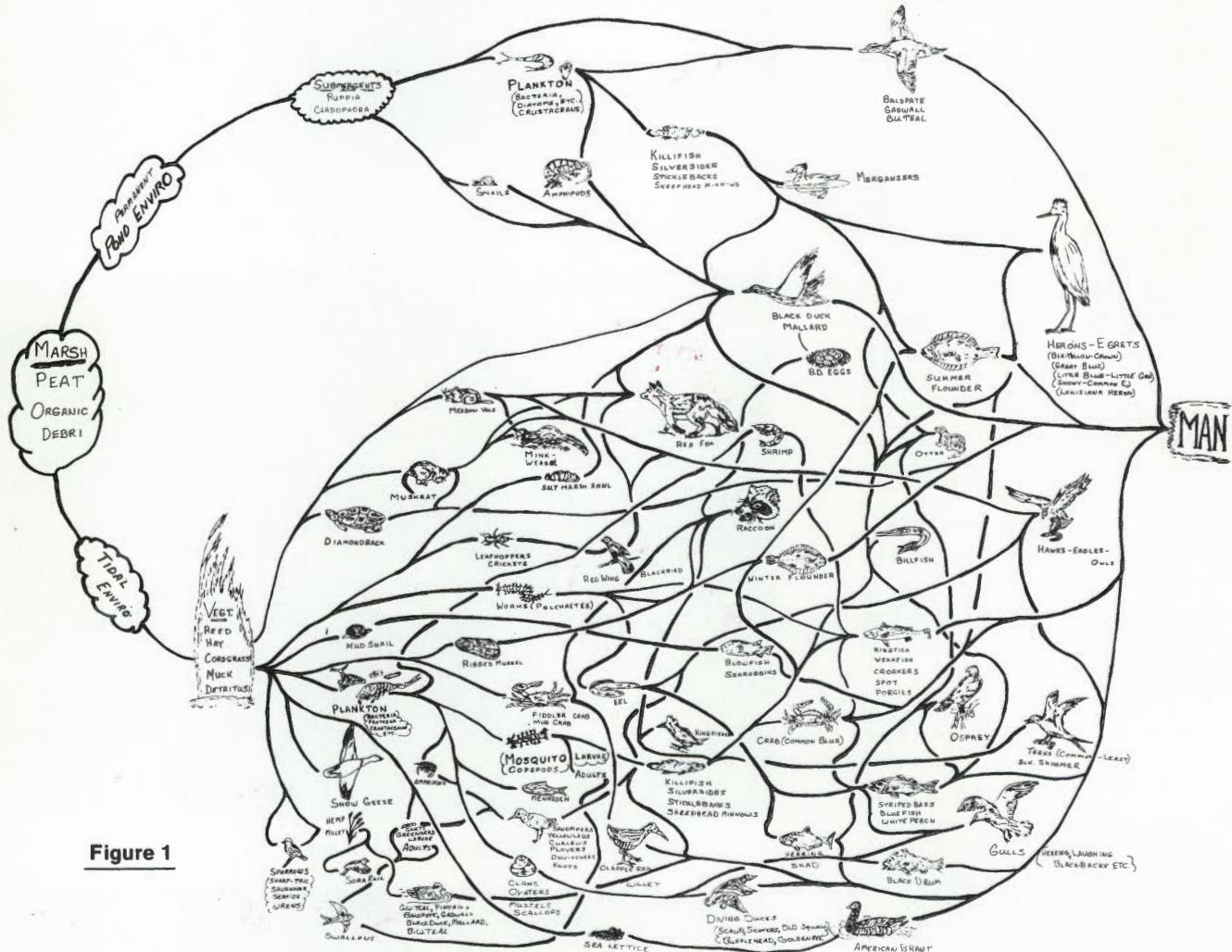
Photochemical Oxidant (Ozone) damage to Red Clover.



Hydrocarbon (in this case, Ethylene) damage to tomatoes.

# **SALTMARSH WATER MANAGEMENT FOR MOSQUITO CONTROL**

*By* / FRED FERRIGNO, New Jersey Division of Fish, Game, and Shellfisheries  
PATRICK SLAVIN, Cumberland County Mosquito Commission  
D. M. JOBBINS, Mosquito Investigation, Rutgers Entomology Department



**Figure 1**

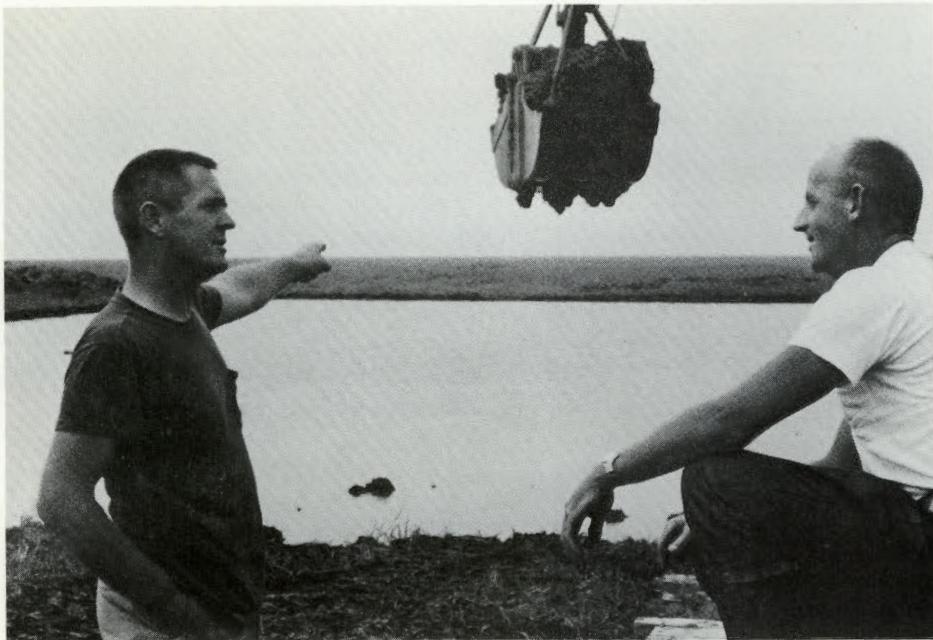
# **FOOD WEB - TIDAL MARSHES**

***OMWM enhances both branches of the tidal food web that serve important food and other sources of man and wildlife.***

Present saltmarsh management in New Jersey is a product of years of research between mosquito control and conservation agencies. On the basis of these research and management endeavors this concept of ecological approach to marsh management was adopted. This ecological approach is

based on management of major types of coastal wetlands. It is practical and sound and can be applied to similar types along the Atlantic coast. All coastal states have enclosed or tidal marshes. From Florida to Nova Scotia improved management of these wetlands would provide mosquito control and benefit

wildlife as well. Enclosed marshes or impoundments are managed either for agriculture, wildlife or mosquito control. Water manipulation in privately-owned agricultural impoundments is conducive to the production of salt hay and other crops. Under these conditions, the resulting heavy saltmarsh



**Edward Smith (left) of the Cumberland County Mosquito Commission directs construction of a permanent pond in a multi-depression mosquito producing area.**

mosquito breeding is largely controlled by insecticides. Larvicides, such as abate granules, are applied during early instars when large broods are present.

The ultimate solution for enclosed marshes is for the state to purchase them from willing sellers and then subject them to proper water level management or restore them to tides. Research is continuing on both water level management and tidal restoration technique. Management of the open tidal marsh will be the primary consideration of this article. The involvement of marine fisheries and other interests requires a technique that maintains the open character of the tidal marsh.

#### **Open Marsh Water Management (OMWM)**

OMWM is a cooperative endeavor by mosquito control and conservation agencies to perfect a quality water management technique for the mosquito breeding areas of the open tidal marsh. By continually improving on quality through trial and evaluation, the technique is becoming extremely effective in controlling mosquitoes and, at the same time, enhancing tidal marsh resources. Most of the work has been accomplished by three county mosquito commissions, Ocean, Cape May and Cumberland Counties. They work in cooperation with the New Jersey Division of Fish, Game, and Shellfisheries and Rutgers Entomology Department. A considerable amount of the management projects are funded by the State Mosquito Control Commission. Evalu-

tion of projects was made possible through the Federal Aid to Wildlife Project W-53-R.

A Cumberland County management crew under the direction of Edward Smith deserves considerable credit for perfecting the technique. In 1966, this unit tackled one of their worst problem areas, a 5,000 acre Egg Island area, six miles from the upland and riddled with depressions created by snow geese. The first year, they nearly terminated activities when their two backhoes were repeatedly bogged down in the mud. Somehow they endured the hardships and continued annually to improve on methods and equipment. They gradually progressed to their present status of treating over 1,000 acres in a single summer. This Egg Island project has been an outstanding marsh management accomplishment. It has controlled mosquitoes on over 5,000 acres of salt-marsh. It has freed over 16,000 acres of marsh and a large portion of Delaware Bay from insecticide contamination. And there are beneficial vegetational changes, increases in food chain organisms and wildlife use.

OMWM is confined to that marsh area that is slightly below to slightly above spring tide line. In New Jersey, it is closely correlated with the saltmeadow cordgrass (*Spartina patens*) and mixed *S. patens*—short saltmarsh cordgrass (*Spartina alterniflora*) types. It is in these major types, where irregular flooding from rains, storm, and spring tides occurs, that OMWM is being tried, evaluated and perfected. The reed

(*Phragmites communis*) zone, well above spring tide line, also breeds mosquitoes. However, because of the dense vegetation, equipment used in OMWM would not be effective in this zone. Major types that are regularly flooded or kept moist by daily tides such as tall saltmarsh cordgrass (*S. Alterniflora*), three-square (*Scirpus olneyi*), wildrice (*Zizania aquatica*), cattail (*Typha spp.*) and arrowarum (*Peltandra virginica*) will not produce mosquitoes and management practices here should be avoided. Most of these types do occur in the other Atlantic coastal states. Sometimes they are replaced by other major types such as the rushes or cut-grasses. Each state is aware of mosquito productive and non-productive types and their relation to mean high water and spring tide lines.

#### **Sod Disposal**

Proper sod disposal is essential to this program and is provided by the ditching machine. Even though some sod can eventually provide nesting cover for certain birds, overall improper sod disposal can create breeding areas, is unsightly, brings in undesirable vegetation, interferes with water movements over the marsh and can adversely affect marsh organisms. Original attempts to squash, grade or disperse sod were time consuming and expensive. Today, most of the sod disposal problems associated with ditching have been solved by the amphibious rotary ditcher. This mosquito controller's dream machine, consisting of a marsh buggy and mud slinger has speed and maneuverability, requires little operating and protects the environment. It can do the work of several backhoes and amphibious cranes and do it better. Within a year, virtually no visible signs of spoil exist. The thin layer of spoil on the side of the ditch becomes re-vegetated quickly. In time, it is hoped that all commissions plagued with saltmarsh mosquito breeding will convert to the rotary ditcher.

Pond construction is presently accomplished by the amphibious crane. Sod should be graded without creating depressions. Proper handling of the sod and new equipment still requires refinement. A machine like the rotary ditcher that could remove a swath of six feet or more at a depth of six inches would be an enormous asset to the management unit. Ponds may take the shape of the breeding area or may be squared off to facilitate construction by the equipment operator. Pond depths of six inches to one foot promote the best waterfowl usage. Deeper sections or edges should be installed to insure survival of killifish during periods of droughts.



*This quality rotary ditcher is fast, efficient and eliminates the environmental problems associated with improper disposal.*



**Constructed pond radials provide access for killifish to mosquito breeding depressions and save valuable permanent water systems on marsh surfaces.**

Photos supplied by the author



**Ditch laterals take on a variety of shapes based on the distribution of mosquito breeding depressions.**

#### **Objectives**

There are three major objectives for OMWM. It must:

1. Control mosquitoes.
2. Eliminate insecticides.
3. Enhance the tidal food web.

Mosquito control in the first objective must be thorough enough and involve all genera in order to adequately serve the second objective of phasing out insecticides. Enhancing the tidal food web (Figure 1), which serves important food and other sources of man and wildlife, is essential, for support from other agencies. In this web there are, two major branches. One branch goes to the permanent ponds with all its associate food chains. The other is the tidal branch where abundance and availability depends on the tidal life line. To encourage support from all important resource agencies concerned with tidal marshes, OMWM is designed to improve both the permanent pond and tidal branches of the tidal food web.

#### **Techniques**

There are three basic alterations used in OMWM: tidal ditches, ponds and radials. Most of the time the alteration selected depends on the distribution of breeding depressions and their proximity to tidal ditches or natural ponds. Sometimes, when water surface is lacking, ponds should be encouraged. When numerous natural ponds are present, pond radials and ditches are preferred.

To illustrate how OMWM actually works, a comparison is made of two techniques, grid ditching, and OMWM on the same piece of marsh. On one-half grid ditching was previously applied and engineering principles were utilized. The tidal ditches were cleaned, grids were established and water hydraulics and circulation were excellent. However, even with the use of these engineering principles, the three major objectives were not adequately served.

## NEW JERSEY OUTDOORS READER SURVEY

The grids did a fine job of removing surface water and during some floodings stranded larvae in depressions. During periods of excessive flooding, most depression not connected by grids had sufficient water for mosquitoes to complete their life cycles. Because only a few depressions were directly connected, the percent of control was low. Insecticides had to be used and they were easily carried to the tidal ditches by the grid system. The tidal branch of the food web was improved. Tall *S. alterniflora* volunteered along the grid ditch edges, along with fiddlers, snails, mussels, and other organisms. However, the permanent pond branch was adversely affected by drainage of the natural pond. This resulted in complaints from waterfowl hunters and other interests concerned with this branch of the tidal food web.

If the same marsh was subjected to OMWM, all three alterations would be used. The technique does not require any engineering know-how, just an experienced marsh management unit, some knowledge of marsh ecology and a lot of common sense. Together a wildlife biologist and entomologist could stake out depressions and agree to the following alteration. In one area where there is a linear distribution of breeding depressions, a main ditch is dug. The main is connected on both sides to increase longevity and circulation. Some depressions were filled by the rotary ditcher, others were connected by short laterals. The rest of the breeders near tidal ditches were subjected to tidal inundation by laterals shaped according to their distribution. No alterations were wasted in areas where mosquito breeding did not exist, as in the case with grid ditching. Pond laterals were used to link depressions to the natural pond and provide access to killifish. Where numerous depressions were present, a pond was constructed. Adjacent breeders were covered and the spoil graded. The spoil graded.

Regardless of weather or flood conditions, OMWM adequately serves all three objectives. The combination of radials and ditches removes surface water adequately. All depressions are either filled or connected to a pond or tidal ditch. Daily tidal inundation and permanent pond access eliminates nearly 100 percent of the mosquito breeding. With mosquitoes controlled, insecticide use is terminated and annual savings of insecticide costs are expected for over a forty year period. Both the tidal (mains, laterals) and the permanent pond (pond radials, pond) branches of the tidal food web are enhanced, resulting in support for concerned agencies.

This survey was designed to help us plan future issues of New Jersey Outdoors. It can be cut from the magazine without damage to the reading matter. Please answer questions carefully and send to the address listed below.

1. Circle the appropriate answer and fill in blanks.
  - A. Age (1) under 20 (2) 20-29 (3) 30-50 (4) over 50
  - B. How many children under 18 in your home? .....
  - C. Your educational level
    - (1) less than four years of high school
    - (2) high school graduate (3) attended college
    - (4) post graduate degree
  - D. Occupation .....
2. What are your interests? Your favorite hobby or sport? .....
3. How did you first learn about New Jersey Outdoors?
  - A. another reader
  - B. exhibit or educational program
  - C. state fair
  - D. newspaper, magazine or radio
  - E. other
4. How long have you been reading New Jersey Outdoors?
  - A. less than a year
  - B. 1-2 years
  - C. 2-5 years
  - D. 6-10 years
  - E. over 10 years
5. How many people read your copy of New Jersey Outdoors?
6. What do you generally read first?
  - A. editorial
  - B. recreational articles
  - C. environmental news
  - D. wildlife management articles
  - E. nature study
  - F. pictorial essays
  - G. historical
  - H. features
7. Rate the following topics 1-8 according to your preference:
  - A. .... outdoor recreation
  - B. .... natural resource conservation
  - C. .... environmental quality
  - D. .... pictorial essays
  - E. .... historical
  - F. .... nature study and environmental education
  - G. .... land use planning
  - H. .... wildlife management
8. Have you ever given New Jersey Outdoors as a gift subscription? ..... To a School? .....
9. Do you save your copies of New Jersey Outdoors? .....
10. Do you read or subscribe to other publications of this type? .....
11. Are you active in any local or national conservation/wildlife organizations? ....., .....
12. Do you think New Jersey Outdoors is effective in its efforts to inform and educate the people of New Jersey about our environmental problems and the conservation of our natural resources? Are our outdoor recreational articles informative and entertaining? Write suggestions below. (Attach separate sheet, if required)  
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.....  
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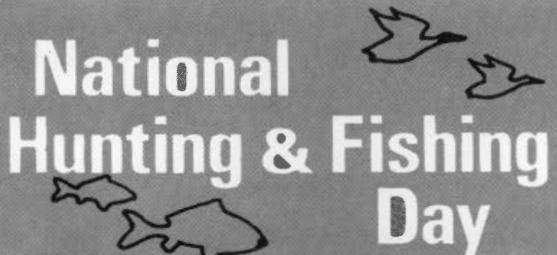
Thank You

Please send to  
New Jersey Outdoors Reader Survey  
P.O. Box 1809  
Trenton, N.J. 08625

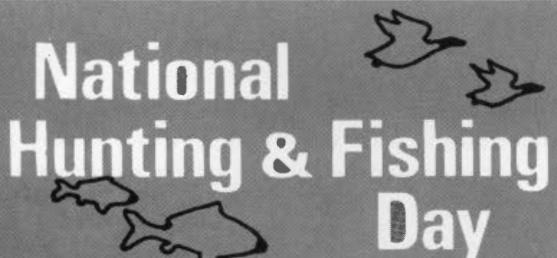
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**questionnaire and**  
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**SEPTEMBER 27, 1975**



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#### **Present Needs**

With the increased interest in protecting valuable marshes, it is essential that mosquito control put its best foot forward and obtain support from the resource agencies involved. In the interest of quality the U. S. Fish and Wildlife Service has requested standards for water management from various states that could be used to improve quality and screen projects. These standards would also identify a management technique and its effects. The environmental impact statements, riparian or other permit applications could be submitted to obtain blanket coverage for the technique over a large area. If approved, time consuming and costly procedures would not be necessary every time the same technique is used. The standards submitted for OMWM, are:

1. OMWM must be confined to the *S. patens* or mixed *S. patens*-short *S. alterniflora* or types of similar elevation that are irregularly flooded by rains, spring or storm tides. It should never be employed on types that do not breed mosquitoes and are regularly inundated or affected by daily tides such as tall salt marsh cordgrass, wildrice, cattail, arrow-arum or threesquare.
2. All alterations directly affect mosquito breeding depressions. The three basic alterations include ditches, ponds and pond radials.
3. The type of alteration used will depend on the distribution of breeding depressions, their proximity to natural ponds and tidal ditches and the overall character of the marsh.
4. Both an entomologist and wildlife biologist are involved in the planning and staking of alterations prior to construction.
5. The amphibious rotary ditcher is used for digging ditches and radials and the amphibious crane for ponds. Impoundments and ditch plugs are not used in this particular management technique.
6. The rotary ditcher eliminates sod disposal problems associated with ditches. Spoil from ponds should be graded to the lowest possible level without creating depressions.
7. All mosquito or other ditches encountered that are not breeding mosquitoes will not be cleaned or altered in any manner.
8. Proper evaluation is important. Mosquito larval dippings, vegetational mil-acre plots, invertebrate square meter sampling and wildlife census are recommended.
9. Insecticide use is gradually phased out as OMWM progresses to eliminate breeding acreage. When the project is completed all insecticide use is terminated. □



# Environmental News



PHOTO SUPPLIED BY N.J. DEPT. OF ENVIRONMENTAL PROTECTION

**WATERLOO VILLAGE.** An early (1740) English farming community, Waterloo became an important forge in 1763. Munitions were produced here for the American troops. After a decline, prosperity returned in 1834 when Waterloo became a main depot on the Morris Canal. Although most of the land and several buildings are publicly owned, the village is administered by a private corporation. Pictured above is the restored gristmill on the banks of the canal. Located near Stanhope in Sussex County. Admission charge.

## GOVERNORS SAY "NO" TO TOCKS DAM

Governor Brendan Byrne, joined by Governor Sherman W. Tribbitt of Delaware and Governor Hugh L. Carey of New York (through his representative, Ogden Reid, commissioner of New York State's Department of Environmental Conservation), voted on July 31 to request the U.S. Congress to provide no funds for construction of the Tocks Island Dam, but to continue land acquisition in the area for a river based park. (Governor Milton J. Shapp of Pennsylvania cast the only affirmative vote. Thomas Schweigert, representing the U.S. Secretary of the Interior, abstained.)

The action taken by the three states at the annual summit meeting of the Delaware River Basin Commission in Newark will probably put an end to the controversial project for the time being.

Governor Byrne's action came after the completion of a special independent and comprehensive study of the entire Tocks project that began in December 1974. The study, performed by URS/Madigan-Praeger and Conklin and Rossant (New York-based consulting firms) showed that, even if New Jersey's economy continues to grow at normal rates, the state will not require—until into the next century—the water supply

which would be provided by the project.

Byrne visited the Tocks Island area last August, and canoed down the Delaware River. He said at that time that he was impressed with the natural beauty of the valley, and would support the Tocks project only if it were demonstrated that there was no alternative to it. The consultants' study showed that New Jersey could meet its water supply needs for the next 25 to 50 years by the development of intrastate water projects. Not only will these projects meet the demand for water, they will do so at less cost to the state than the cost of Tocks water.

(Continued on page 16D)

## \$36.5 MILLION WATER FUND

Governor Brendan Byrne on July 17 signed into law a bill appropriating almost \$36.5 million from the 1969 Water Conservation Bond Fund to DEP for grants for the construction of sewerage facilities by local governmental units, the construction of the Round Valley Reservoir outlet release pipeline and the development of a comprehensive state water supply master planning report.

The new law, Chapter 158, P.L. 1975, authorizes the disbursement of close to \$20.3 million to local governmental units in the form of state-aid grants to partially finance (15 percent of eligible cost) 16 sewerage projects in 10 counties. These projects have already received federal grants. Based on state Department of Labor and Industry formulas, it is estimated that these sewerage projects will generate about 4,000 construction jobs.

The measure also provides DEP with Water Conservation Fund money for two state projects:

—The construction of the initial section of the Round Valley Reservoir (Hunterdon County) outlet release pipeline is allotted \$15 million. (The initial section will run from the North dam to the South branch of Rockaway creek in the vicinity of Whitehouse Station.) The pipeline will make available large reserves of water to millions of users in the densely populated northeast region of the state.

—The water supply master plan, allotted \$1.2 million, will recommend projects to meet New Jersey's water needs through the year 2020. A contingency plan for possible periods of drought will be included.

The law lists the name, eligible cost, state aid, and authorized disbursement for each project. DEP administers and supervises such projects through its Division of Water Resources. □

## POLLUTION CONTROL AID FOR SMALL BUSINESSES

Environmental Commissioner David J. Bardin on July 15 urged early enactment of H. R. 78, a congressional bill authorizing the federal Small Business Administration to guarantee loans made to small businesses for the purchase and installation of pollution control devices.

In his statement before the House Subcommittee on Small Business Administration (SBA) and Small Business Investment Company (SBIC) Legislation of the House of Representatives in Washington, D.C., Bardin said, "This legislation is needed to assist small business to acquire pollution control devices on the same terms as those now available, in a practical matter, only to large business."

Bardin pointed out that in New Jersey large industries can benefit from the state's Industrial Pollution Control Financing Act. Small businesses, however, are at a disadvantage in obtaining needed credit rating and favorable financing. Bardin, noting that small businesses contribute significantly to the pollution problem and must, therefore, be considered in the state's overall environmental program, said, "The Bureau of Air Pollution Control issues approximately 300 enforcement orders per year that call for the installation of control devices to remove undesirable air emissions. Our records indicate that approximately one half of these are issued to small businesses."

Bardin said that implementation of the federal SBA Pollution Control Device Guarantee Program would not require any extension of bureaucratic organization or any revisions of current procedures in DEP.

## EPA AWARDS \$1,920,000 GRANT FOR AIR POLLUTION CONTROL

The federal Environmental Protection Agency (EPA) has awarded New Jersey a grant of more than \$1.9 million to assist in the maintenance of its air pollution control program for fiscal year 1976 (July 1, 1975 through June 30, 1976). The program is administered by the Bureau of Air Pollution Control within DEP's Division of Environmental Quality.

Governor Byrne said the grant will provide "approximately 55 percent of the funds required during the current fiscal year, with New Jersey providing the remaining 45 percent."

The money will be used to support a variety of air pollution control activities. These include air quality monitoring, enforcement of control regulations, support of the motor vehicle inspection/maintenance program, issuance of permits and certificates, and review of applications and impact statements for new facilities.

## Status report:

### FEDERAL SEWER FUNDS

As of June 30, 1975, the status of the federal wastewater construction grants administered by DEP was as follows:

- All fiscal year 1973 funds (\$154 million) and fiscal 1974 funds (\$231 million) had been obligated.
- Forty percent (or \$115 million) of fiscal 1975 funds also had been obligated. Unobligated fiscal 1975 funds of \$140 million, plus fiscal 1976 funds of \$661 million now available, total \$801 million.

## Ongoing project:

### TRI-STATE AREA OZONE STUDY

The initial result of a study, "Aerial Ozone Measurements Over New Jersey, New York and Connecticut," indicates that air entering the northeastern tri-state Air Quality Control Region may already be substantially polluted with ozone.

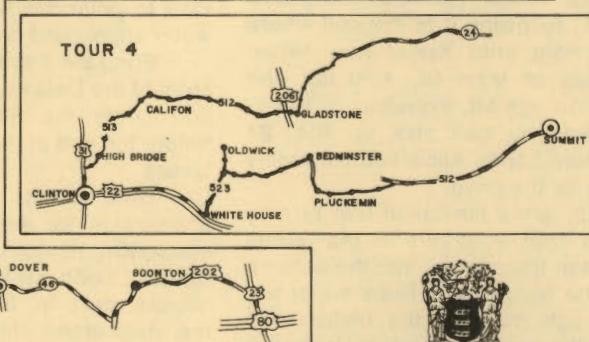
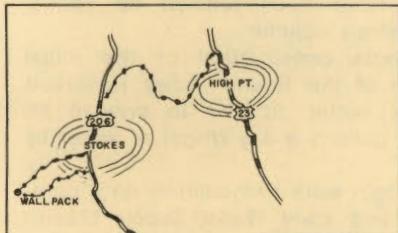
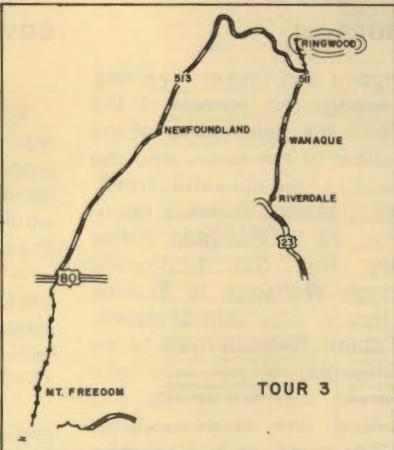
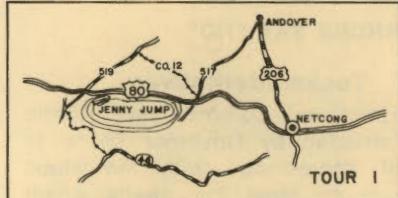
The pollutant ozone, a highly irritating gas, is formed by the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Besides its irritant properties, ozone, even at low concentrations, seriously damages many kinds of plants, as well as such materials as rubber, textiles and dyes. Unlike the ozone layer in the rarefied stratosphere, this ozone is concentrated relatively close to ground level and is generated at least in part by man's activities.

The study is part of a continuing project being conducted by DEP in co-operation with the New York State Department of Environmental Conservation and the Interstate Sanitation Commission. A report on the study was given in early summer at the 68th Annual Meeting of the Air Pollution Control Association in Boston.

The study, based on two survey flights made in the summer of 1974, suggests that air contaminant releases upwind of New Jersey may have a significant impact on the ozone levels downwind. Researchers found that ozone carried into the tri-state air shed by prevailing southwest winds from Baltimore, Wilmington and the Philadelphia-Camden area reached concentrations of 30 to 40 percent above the federal standards.

Dr. Ralph Pasceri, supervisor of DEP Air Quality Services and Evaluation and director of the New Jersey ozone study program said that more flights were made this past summer over the states of New Jersey, New York, Connecticut, Delaware, Maryland and Pennsylvania. Still to be determined is whether the excessive ozone levels resulted from man-made causes, natural causes, or a combination of both.

Another significant program is an ongoing, cooperative effort between Bell Labs of Murray Hill (N.J.) and the state which is directed towards a systemic, statistical and chemical study of photochemical oxidants. Bell Labs has broken ground in these areas. It has assembled a comprehensive air pollution data base incorporating pollution and meteorological data from the eastern seaboard states, ranging from Virginia to Rhode Island. Their work has demonstrated that ozone levels are definitely elevated in areas downwind of urban areas such as Philadelphia-Camden and northern New Jersey-New York.

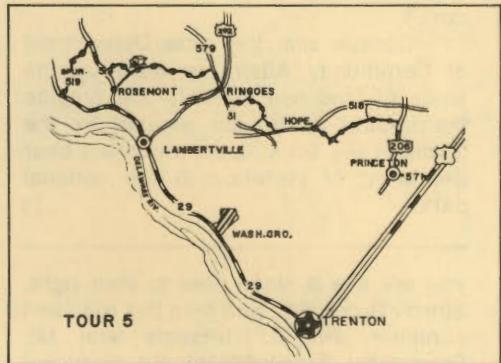


TOUR 2



## NEW JERSEY COLOR IT BEAUTIFUL

BY  
Barry Leilich, Naturalist, Bureau  
of Parks and Edi Joseph, Environ-  
mental News



**TOUR MAPS.** The simplified, sectionalized tour maps (above) are designed for use along with a regular roadmap of New Jersey. Remove the "New Jersey—Color it Beautiful" story from NJO and attach it to the New Jersey map in your auto's glove compartment and you are ready to go!

In October, the annual spectacle of fall foliage unfolds in New Jersey drawing thousands of tourists to see and photograph the brilliance of leaves turning yellow, gold, red, orange and purple.

Far to the north in the High Point-Stokes Forest area, as the days grow shorter and the nights grow colder, the trees change quickly, with gold, scarlet and orange leaves usually approaching maximum intensity early in the month.

Farther south the color change—the yellow of the ash trees, the reddish purple of the sumac, the bright red of the swamp maple—usually peaks in mid October.

Whether the traveler drives through the areas or walks through one of the many hiking and nature trails in our state parks or the Appalachian Trail, the splendor of nature's autumn show of

flaming foliage can not fail to please.

A word of caution to foliage followers—because location and weather conditions play an important role in nature's leaf-turning timetable, DEP's state park and forest rangers recommend that a phone call be placed to a nature area in the vicinity of choice before taking to the road with family and camera. Given below are four such beauty spots representative of the regions described in the suggested tours:

**NORTHWEST REGION:** Stokes State Forest, Phone: 201-948-3820

**NORTHEAST REGION:** Ringwood State Park, Phone: 201-962-7031

**CENTRAL REGION:** Washington Crossing State Park, Phone: 609-737-0623

**SOUTHERN REGION:** Wharton State Forest, Phone: 609-561-0024

### FIVE TOURS TO VIEW FOLIAGE

To see New Jersey's flaming foliage at its best, here are some suggested automobile day trips. Included are routes—please use the sectionalized maps shown in conjunction with a regular roadmap of New Jersey; and what you will see. Make sure there's film in the camera!

**TOUR 1.** Essex, Morris, Sussex and Warren counties. Take Route (Rte.) 80 to Netcong and Rte. 206 to Andover. Then take Rte. 517 south to Rte. 611 and turn right to Tranquillity. Return to Rte. 517 south and continue to Allamuchy where you turn right onto County Road 12 (Allamuchy-Johnsonburg Rd.) into Johnsonburg. Turn left onto Rte. 519 to Jenny Jump Forest. Stop at the Forest Headquarters for extensive panoramas and display. Continue on Rte. 519 south to Hope and turn left at the Old Mill, over the mountain and past the Great Meadows to Rte. 46. You can stay on Rte. 46 for the trip home, or take Rte. 10, if you prefer.

On this trip the traveler will drive through upland forested areas separated by farmland. Along the route the vista will include forests of oak (red leaves), hickories (golden yellow), and beech (pale yellow) with an understory of dogwood (red), birch (yellow) and maples (red, scarlet). In the wetter areas the red maples dominate.

**TOUR 2.** Essex, Morris, Warren, Sussex counties. Take Rte. 23 to Mountain View. Bear right onto Rte. 202 south through Lincoln Park, Towaco, Boonton and Parsippany; right turn on Rte. 46. In Dover, turn left onto Bergen St. and immediately bear right onto Clinton (Rte. 15) and continue through Wharton, Hurdtown, and Sparta; take Alternate Rte. 517 to Newton. Take Rte. 206 to Ross Corner; turn left on 206 through Branchville to Normanock in Stokes State Forest where you may obtain a map of the forest. Proceed through forest, stopping at Tillman's Ravine, the most striking forest glen in the state. Continue down mountain and across Flatbrook to Wallpack Center. Turn right and drive through Peters Valley and Bevans to Rte. 206 at Tuttles Corner; turn left on 206, continue through Hainesville to Rte. 653, bear right to Mashipong Rd. which merges with several other roads before junctioning with Sawmill Rd. Turn left on Sawmill to Rte. 23 south for your return trip. If you happen to miss a turn, simply continue on Rte. 653. It will take you to Rte. 23 a bit down the road. Allow about two hours for the drive.

This trip will take the traveler across the farmlands between Newton and Branchville and into the oak dominant

(Continued on page 16D)



# News Capsules

## BIKE RIDER'S MANUAL

"Everything You Have Always Wanted To Know About BICYCLING . . ." is a 4" x 8", 16-page handbook for bike riders that recognizes that almost half of the bike riders today are over 18 years of age, and though ecology, excercise, and economy oriented, may be "rusty" in the "do's and don'ts" of the sport. For a free copy of the manual, write to the New Jersey Office of Highway Safety, 4 Scotch Road, Trenton 08628. □

## PEREGRINE FALCONS RETURN

During this past summer, the peregrine falcon, one of the nation's endangered wildlife species, was returned to New Jersey and once again fly over the tidal marshes of Barnegat Bay. The peregrine falcons, which have not nested in New Jersey for the last 20 years, were fledged from man-made nesting platforms as part of a cooperative research study between the Peregrine Fund at Cornell University and DEP's Division of Fish, Game and Shellfisheries through the Endangered and Nongame Species Project. □

## OYSTERS 'R' IN SEASON

### YEAR-ROUND

With a stroke of his pen, Governor Byrne on July 2 laid to rest that "old saw"—oysters "r" in season only during months that contain the letter "r." (Biologists and oystermen have long known that oysters are edible every month of the year.) The new law, Chapter 134, P.L. 1975, which amends a 1931 statute (R.S. 50:3-11), permits oysters to be taken from the leased beds in Delaware Bay during the formerly closed months of July and August. Oysters can now be marketed during this period, benefitting both the oyster industry and the consumer. □

## LAND DONATED TO PEASLEE WILDLIFE MANAGEMENT AREA

The Peaslee Fish and Wildlife Management Area, which lies partly within Cumberland, Atlantic and Cape May counties, is larger by 100 acres thanks to the generosity of Anthony Imbesi of Estell Manor, Atlantic County. The land gift was announced by Russell Cookingham, director of DEP's Division of Fish, Game and Shellfisheries, in July.

Cookingham said, "The 100-acre tract is an especially desirable acquisition because it lies within the state holdings, and straddles State Highway No. 49. Having this land under state jurisdiction will facilitate better wildlife management in the area. □

(Continued from page 16C)

## FOLIAGE TOURS

forest of Highpoint and Stokes. The red, scarlet and orange-red leaves of the oaks mingle with the pale yellow of the beech, the yellow of the birch, and the yellow-orange-red of the sassafras trees.

**TOUR 3.** Essex, Morris, Passaic counties. Take Rte. 23 to Pompton Plains and Riverdale; Rte. 511 (Ringwood Avenue) through Wanaque to Erskine R. R. Manor House. Also visit Skylands, about ½ mile south. Retrace route to the Village of Ringwood Manor and take Rte. 511 to Hewitt, then left on Rte. 513 for West Milford and Newfoundland. Then, take Ridge Rd. into Berkshire Valley Rd., following it to the end where you turn right onto Kenvil Ave. When Kenvil ends at Main St., turn left and continue through Mt. Freedom to Mendham where you can pick up Rte. 24 for the return home. Allow approximately two hours for the drive.

This trip, while similar in leaf turning display to Tour 2, differs in that areas of evergreen trees break into the autumn show of the hardwoods. The traveler will pass through many of the undisturbed areas of the state as well as farmland on this drive.

**TOUR 4.** Essex, Morris, Somerset, Union counties. Take Rte. 24 through Morristown to Ralston. Turn left at Roxiticus Rd. Turn right at Jackson Ave. in Gladstone, go one block and turn left two blocks and make a right onto Rte. 512 (Pottersville Rd.) to Fairmont and Califon. Turn left on Rte. 513 through High Bridge to Rte. 31. Turn left on Rte. 31 for one-half mile then bear right to Clinton; take Rte. 22 to Whitehouse and Whitehouse Station. Take Rtes. 523 and 517 to Oldwick. Back-track to Rte. 523 and turn left to Lamington and Bedminster. Follow Rte. 206 south to Rte. 202, then to Washington Valley Rd. in Pluckemin where you turn left. Continue to Rte. 512 in Summit. Continue on 512 to Rte. 24 where you head for home.

On this trip the tourist passes through many woodlands dominated by orange-leaved chestnut trees. Other forest types found along the route are red and scarlet leafed maples, pale yellow leafed beech, and red leafed oak.

**TOUR 5.** Hunterdon, Mercer and Somerset counties. Take Rte. 1 to Rte. 571. Travel through Princeton until you reach Rte. 206. Turn right onto 206 and proceed north. Just past the Nassau Gas Co. turn left onto Cherry Valley Rd., follow signs for Hopewell. (Note: Cherry Valley Rd. becomes Rocky Hill Rd. half way along.) At the intersection of Rocky Hill Rd. and Carter Rd. turn right. In Hopewell, turn left onto Rte. 518 (Note: 518 spur and 518 will form a fork, take the road to the right). Driving along 518

(Continued from page 16A)

## GOVERNORS SAY "NO"

### Tocks alternatives

Environmental Commissioner Bardin was instructed by Governor Byrne to proceed immediately with the steps necessary to meet the needs which would have been fulfilled by Tocks. These steps include:

— Begin construction of the initial section of the Round Valley Reservoir release outlet pipeline to provide 80 million gallons a day (mgd) of water by 1977

— Begin work immediately on a comprehensive state Water Supply Master Plan to point the way toward other new water supply and conservation projects

— Bring the floodplain along the main-stem of the Delaware River under regulation under the Floodplain Zoning Act before the end of the year to reduce flood losses

— Take actions necessary to include a provision for the installation of water conserving devices in the Uniform State Building Code. (If installed in all the new houses built in the northeast part of the state alone, this step could save 28 mgd by the year 2025, at virtually no cost.)

— Consult with the state Department of Community Affairs to draw up the kinds of land use controls and provide the impact assistance needed by the towns in the Tocks area which will bear the brunt of visitation to the national park. □

you will see a small road to your right, Stoney Brook Rd., turn onto this road and continue until it intersects with Mt. Church Rd. Stoney Brook Rd. becomes Mountain Rd. here and is not paved. Follow Mountain Rd. until it intersects with Linvale Rd.; turn left and proceed to Rte. 31. Turn right onto 31 and travel to Ringoes. At Ringoes Rtes. 31 and 579 form a fork—take Rte. 579, the road to the left. At the first intersection out of Ringoes, turn left towards Rosemont. Just past the Sergeantsville Covered Bridge (Note: This is the only remaining covered bridge in NJ) you will see a road to your right, turn right and stay on the paved road. Turn right onto Rte. 519 and proceed north; at the intersection of Rte. 519 and 519 spur turn left. Turn left onto Rte. 29 and follow signs to Trenton. You can visit Washington Crossing State Park as you travel towards Trenton.

Driving through this area the tourist will see woodlands dominated by red leaf oaks; other forest trees include yellow leaf hickories, red leaf maples and dogwoods and the maltese red-yellow-orange leaf sassafrases. □

## Assunpink Wildlife Management Area

# RISING SUN LAKE

Rising Sun Lake is the product of the joint efforts of the U.S. Soil Conservation Service, the New Jersey Division of Fish, Game and Shellfisheries, the U.S. Fish and Wildlife Service and the New Jersey Green Acres Program. It was built to provide flood protection for the Assunpink Creek drainage, fish and wildlife habitat, and recreation; and it was first filled in 1971.

The fisheries management program here is directed toward a warmwater fishery based on largemouth bass as the major game species. Largemouth bass and bluegill were originally introduced in 1971.

Parking and launching facilities for both car top and trailer boats are available at the lake's primary access site off the Roosevelt-Clarksburg Road. Only electric motors are permitted. The majority of the impoundment's shoreline is easily accessible to bank fishermen.

During the fall the lake is a popular resting spot for migratory waterfowl and this makes it popular with duck hunters.

#### Location:

**General:** Assunpink Fish and Wildlife Management Area in western Monmouth County.

**Specific:** Northeast corner of the Fish and Wildlife Management Area, approximately mid-way between Roosevelt and Clarksburg on the South side of Rising Sun Tavern (Roosevelt-Clarksburg) Road.

#### Chemical Features:

**pH:** Slightly acidic, generally about 6.4

**Dissolved Oxygen:** Adequate for fish life at all depths except in summer when it is generally adequate only between the surface and a depth of 10 to 12 feet.

A variable level water release capability is a feature of the dam. It benefits the fish production capabilities of both the impoundment and the stream below. Cold oxygenated water is maintained in the stream below and the volume of lake water capable of supporting fish is increased by the drawing off of some of the deep oxygen depleted waters that are present during the summer.

**Productivity:** Moderate

#### Biological Features:

**Aquatic Vegetation:** Limited to the extreme eastern end of the pond and shallow perimeter waters.

**Water Color:** Normally a slight brownish tint.

#### Fish and Fishing:

**Largemouth bass:** Excellent. Population checks have invariably found large numbers of bass in the two to three pound class. Reproductive success has not been sufficient to maintain year class strength in some years and in these instances supplemental stockings of yearling bass have been made.

**Sunfish:** Both bluegill and pumpkinseed are present, with the pumpkinseed being the more numerous. Possibly as a result of their abundance, the growth-rate of the pumpkinseeds appears to be below average. It is recommended that this species be actively harvested to encourage better growth.

**Brown bullhead:** Abundant with excellent size fish taken.

**Other species:** The following have been verified:

Creek chubsucker

Golden shiner

Banded killifish

□

Photo by Harry Grosch



# Clapper Rail Production Up

The highest level in the 21 years of clapper rail (or mud hen) nesting production has been recorded in Cape May County this year. A total of 43 nests have successfully hatched on the 93 acres of salt marsh surveyed. Over 65% of these hatched before July thus assuring plenty of flight stage birds for the September 1st opening day of rail season.

Atlantic and Ocean Counties surveys indicate production above average but later hatches.

Thus, a good season should be available to any hunter willing to brave the heat, mud and mosquitoes while searching for the secretive clapper rail of our coastal salt marshes.



*The whale's powerful tail flukes that once propelled it through the ocean off the New Jersey shore.*

# A WHALE IN NEWARK BAY

BY RANDALL R. REEVES

*... have a care how you seize the privilege of Jonah alone; the privilege of discoursing upon the joists and beams; the rafters, ridge-pole, sleepers, and underpinnings, making up the framework of leviathan; and belike of the tallow-vats, dairy-rooms, butteries, and cheeseries in his bowels.*

—From *Moby Dick, or The Whale*, by Herman Melville

On Saturday April 12 a young male fin whale (*Balaenoptera physalus*) was discovered floating in Newark Bay. The Coast Guard secured the dead animal to some pilings near Bayonne and contacted Jim Mead, Curator of Marine Mammals at the Smithsonian Institution in Washington. Since 1972 Jim has been trying to "salvage" as

many stranded sea mammals as he can along the U.S. Atlantic seaboard. New Jersey beaches have been a surprisingly productive source of stranding reports in recent decades, no doubt because the density of human habitation makes it unlikely that a beached whale will go unnoticed. Jim has collected remains from five whales\*, two bottle-

nosed dolphins, a striped dolphin, a harbor porpoise, and several seals from the New Jersey coast during the past three years. Each instance provides new insight about the abundance, seasonal distribution, life-history, health, and mortality of these fascinating but poorly understood creatures.

I happened to be in Boston at a

\*A 53-foot fin whale floated ashore at Brigantine Beach near Atlantic City five weeks after the incident discussed in this article.

whale symposium when this particular fin whale was reported, and Jim Mead was one of the principal participants in that scientific gathering. Since he had flown up to Boston from Washington, he asked if I might drive him to New Jersey Sunday night. The carcass had been transported by truck to Brigantine Wildlife Refuge near Absecon, New Jersey, where a clean stretch of sand would provide a fresh-air laboratory. Two other scientists, Ed Mitchell and Steve Katona, joined us for the trip to Brigantine. Ed is a cetologist (studier of whales) who works for the Fisheries Research Board of Canada and who is principally concerned with whale populations in the northwest Atlantic. Steve is a marine biologist at College of the Atlantic in Bar Harbor, Maine, who has organized the Maine Coast Whale Sighting Network. The network enlists the help of local fishermen and boaters in gathering data about cetaceans in the Gulf of Maine. Both welcomed the opportunity to accompany and assist Jim in the investigation of the fin whale. Barry Peers, one of Jim's technicians, and Peggy Edds, a whale enthusiast, rounded out our whale dissection crew.

It was Steve's first baleen (non-toothed) whale, although he had examined a few stranded odontocetes (toothed cetaceans), including several harbor porpoises and a pilot whale. For me, it was the first "work-up" since the hapless frogs that we laid

open in zoology lab at the University of Nebraska. Jim and Ed, of course, found the enthusiasm of the two neophytes a source of bewilderment and much amusement. How could anyone, they reasoned, be so excited about this greasy, smelly, tiring business which has become for them little more than a necessary but often unpleasant routine. Nevertheless for me, a non-scientist, the whole undertaking had a once-in-a-lifetime quality about it that made the adrenalin flow all day long.

## 2nd Largest Species

The fin whale is the second largest whale species, which incidentally makes it the second most massive creature ever to inhabit the earth. This youngster was but half-grown, though it stretched no less than 37 feet from the tip of its snout to the notch between its tail flukes and probably weighed around 10 tons. Surprisingly enough, fin whales like this one are not uncommon in our area. Fishermen off Montauk Point, Long Island, report regular sightings, as do boaters and fishermen who frequent the Baltimore Canyon off the Delaware and Maryland shores. Presumably the Hudson Canyon off New Jersey is an equally popular lingering place for the migrating finniers; however, little effort has been made to document their presence there.

Though some fin whales may spend much of the year in our area (a dead

whale, thought to be a finner, appeared in New York Harbor on Christmas Eve in 1964), most are assumed to be passing through in the spring on their way to preferred summer feeding grounds in waters east of Nova Scotia and south of Newfoundland as well as in the Gulf of Maine. Unlike the great blue whales that dine only on select species of shrimp-like zooplankton (krill), finbacks eat both zooplankton (mainly euphausiids but also copepods) and shoaling fishes. Their less highly specialized diet accounts in part for their relative abundance and their cosmopolitan distribution. Upwards of 3,000 fin whales are thought to survive in the western North Atlantic, this despite their serious depletion by modern whaling.

## What Killed it

Why did this individual die? Unfortunately we never figured that out. Although its intestines harbored a "normal" array of parasites, it appeared to be a basically healthy animal. A cylindrical hole, about eight inches across and a foot deep, was apparent on its left side behind the dorsal fin. Ed speculated for a time that it was a harpoon wound, but there was no evidence of shrapnel or tearing inside. Also, to our knowledge no one is doing any fin whale killing nowadays in the western North Atlantic. Although lampreys are known to attack baleen whales, this wound did not resemble the scars normally attributed

Photos supplied by the author



*Jim opens the whale's viscera with a cut along the ventral surface. Note the grooves on the belly, which characterize the several species of Balaenoptera.*



*Jim stands on the whale's rostrum to take measurements. Ed (white shirt) visits with onlookers and snaps pictures. White, brush-like stuff hanging from the whale's upper jaw is baleen.*

to these external parasites. The muscle inside the wound had been washed clean by the waves, but it appeared to be the only part of the carcass that had begun to deteriorate.

The immediate cause of death may have been a collision with a ship. The whale's skull had been fractured, several ribs were broken, and a good deal of internal hemorrhaging had occurred. A vertebra had been jarred loose, and it had apparently perforated one of the whale's lungs. Jim concluded that the same blow that caused the vertebral dislocation had made the hole in the whale's side.

Whales are, for the most part, expert navigators, so it's difficult for me to understand why this one didn't avoid whatever struck it. Fin whales, however, are known to bump into ships from time to time. In fact, Samuel Rhoads in his *Mammals of Pennsylvania and New Jersey*, written over seventy years ago, noted in reference to fin whales that "these stranded animals on our New Jersey coast have been often crippled far at sea by collision with passing vessels." Especially while feeding, finbacks are observed to swim about with little regard to nearby ships, as if preoccupied with the task of satisfying their gigantic appetites.

Aside from trying to divine why it died, Jim and Ed were particularly interested in this whale for several other reasons. Cetologists have claimed over the years that certain species of baleen whales do not eat while they are migrating. This "migratory fasting" notion is supported by the records of South African cetologists, whose investigations of killed animals show that migrating fin whales moving northward from the Antarctic as the southern winter approaches become progressively thinner and yield less and less oil. We were disappointed to find nothing in this fin whale's stomach. It would have been interesting to discover what it had been eating. For, contrary perhaps to conventional wisdom, it had been feeding within a day or two before it died. Its lower intestines were brimful of a brick-red paste, the unusable residue of a recent feast. The fact that it had been eating suggests that there is food for fin whales in April in the New York Bight, the 15,000-square-mile piece of ocean off New Jersey and southern Long Island. The area may be productive enough to sup-

port a small wintering population, or this youngster simply may have stopped for a meal or two *en route* to its northern summering grounds.

#### Young Whale

Ed Mitchell was especially enthusiastic about this individual because of its youthfulness. Most of the specimens that he has worked with over the years were taken by the now-defunct Canadian shore whaling industry. A 50-foot length limit ensured that juveniles like this one were significantly under-represented in his sample. Ed is involved in a long-term study of fin whale earplugs. The waxy, striated plugs found in the ears of baleen whales provide a promising method of age determination. Cetologists are still at odds about how many light or dark bands represent one year, but it is agreed that a highly reliable age estimate can be made by counting these "growth rings" on the earplugs. Since Ed and Jim are quite certain that this whale was a yearling when it died, it is essentially a known-age animal; and its earplugs will provide a useful data point in Ed's analyses.

Baleen plates, the keratinous filters that hang from the upper jaw of fin whales, are also used for assessing age. Parallel ridges and grooves on the baleen are apparently formed according to seasonal variations in the whale's metabolic rate. The main problem with this method is that baleen is constantly wearing down and being replaced, so that no more than about five years' growth is carried on a plate at a given time. This whale was certainly less than five years old, so its baleen plates can probably be relied upon to give a fairly accurate indication of its age.

#### Parts Analysed

Jim collected various other parts of this animal for use in ongoing studies. Skeletal materials, including the relict pelvic bones that betray the whale's land-based lineage, were taken to the Smithsonian and stored. Tissue samples were sent to a Department of Interior laboratory in Denver for use in chemical and heavy metal analyses. Parasitic worms—nematodes from the kidneys and flukes from the colon—were forwarded to interested parasitologists. In every way he can, Jim Mead tries to turn a dead whale's demise into a boon for the scientific community.

#### Not Many Left

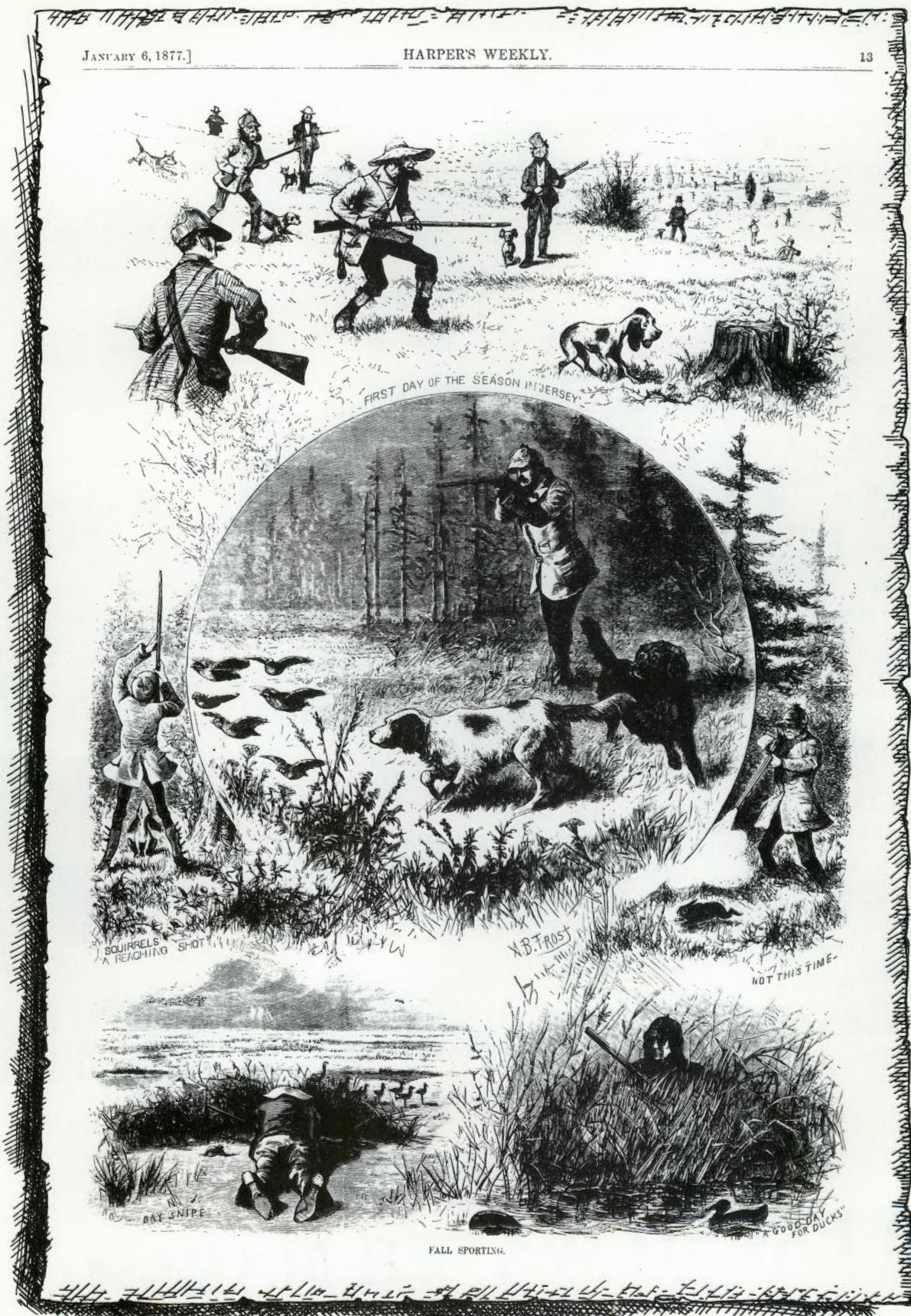
Strandings are sad events, because there aren't very many leviathans left in the oceans of the world. Human predation has directly accounted for the precipitous decline of many whale stocks. The impact of pollution, underwater mining activities, and noisy ship traffic may ultimately prove even more insidious than whaling in reducing whale numbers. Situated as they are at the top of certain oceanic food chains, marine mammals tend to accumulate relatively high concentrations of chemicals in their tissues. Very little is known of the effects of heavy metals and pesticides on cetacean reproductive potential. Increased human traffic in the expanses of the ocean not only makes collisions more likely, but the noise and turbulence that boat engines generate may impair the ability of whales to communicate with each other and thereby reduce their ability to mate, to care for their young, and to carry on other less obvious but equally vital social interactions.

The best thing that can be said about a stranding is that it reminds us that the whales are still out there. And as cetologists like Jim Mead, Ed Mitchell, and Steve Katona are able to examine more beached specimens, they may unravel more of the mysteries that shroud our understanding of these vanishing beasts. We may then inch toward a heightened appreciation of "the mighty monarchs of the deep."

#### What you can do . . .

Care and concern among coastal inhabitants—fishermen, nature lovers, sportsmen, sunbathers, etc.—can be expressed by reporting strandings to the Smithsonian's Marine Mammal Salvage Program (202-381-5151). Small cetaceans (dolphins and porpoises) and seals, no matter how common and inconsequential they may seem, can sometimes reveal more to science than the more obtrusive great whales. A live mammal that comes aground should be kept moist, and its blowhole (in the case of cetaceans) should be kept clear of sand and water. The nearest National Marine Fisheries Service Laboratory (at Sandy Hook, N.J., 201-872-0200 in most instances) should be notified immediately.

*The author wishes to thank Dr. E. D. Mitchell and Dr. James Mead for reviewing the manuscript and offering helpful suggestions.* □



**AN OLD AND ANCIENT SPORT—OPENING DAY HUNTING IN NEW JERSEY.** This illustration by A. B. Frost in the January 6, 1877 *Harpers Weekly* reveals that almost a hundred years ago the New Jersey fields and forests were no less crowded than they are today.

ILLUSTRATION PROVIDED BY JOHN CHATELLIER



PHOTO BY DON SMITH

### *Muskrat Trapping*

# VALUE OF A FRESH WATER MARSH

By Lauren B. Fillmore

*The data for this article was collected by the author while doing a G. H. Cook Honors project at Cook College, Rutgers University.*

The first sight of a fresh water marsh produces lasting impressions. Later when you hear the word "marsh", waves of wind blown cattail are remembered and the smell of the muddy ooze seems fresh. These are only surface impressions compared to what actually exists in the fresh water marsh.

My first encounter with a fresh water marsh left many of these impressions, as well as additional ones. The muskrat houses were easily spotted. The skat of a river otter or beaver cuttings were more exciting to find. Although I never saw the otter or beaver, occasionally a muskrat would swim by just before darkness.

Bird life is abundant, especially waterfowl. You can hear the heavy wing beat as swans fly across the pond. In the spring yellow warblers flashed back and forth across the woods-edge. The glimpse of a red-tailed hawk returning to its perch after a search for prey is a sight to remember.

Compatible with this wildlife are the people who use the marsh. In the autumn hunters enjoy the waterfowl, upland and deer hunting on adjacent uplands. The onset of winter brings the fur trapper after muskrat and the occasional mink. With warmer weather, bird watchers and fishermen use the area for their pleasure.

For me the marsh has a greater value as a place to enjoy and observe the out-of-doors. How does my value compare to the one given to this land by developers? Can a person place a tangible value on a piece of fresh water marsh? How high a value does the marsh have to the others who use the area and to the wildlife the wetlands support? What is the value to people of the wildlife found on the marsh?

Some of these questions are difficult to answer and these values are hard to measure. What is the value of being able to spend an afternoon birdwatching and seeing a Blackburnian warbler or a pied-billed grebe?

For my senior research project I elected to define such a value. I wanted to find a tangible economic figure for the land kept in its present state that would balance some of the conventional factors that encourage the destruction of this natural site. The fresh water marsh is especially important as habitat for the rare river otter and other aquatic animals. Still these fresh water marshes are being drained at an alarming rate by those who are not concerned with these natural values.

The value of this habitat for muskrats is essential. In turn the value of muskrats to people is one measurement relatively easy to make. After choosing

this approach to the problem of determining a tangible economic figure for the marsh my work was under way.

First I had to determine the number of muskrats supported per acre of marsh. The marsh being large and me being an inexperienced trapper, I chose a sample area to trap. With records from my traps and with the data from other trappers, I was able to determine the muskrat population in this area.

The pelts were prepared for sale after being examined for disease and parasites. The skins were sold for an average price of \$2.50 per pelt, the exact price depending on the size, the color and the quality of the pelt. Long guard hairs over a soft undercoat is the best quality of fur. A black color phase occurs in muskrats which gives a pelt a rare quality.

Muskrats are prolific breeders producing enough young each season to return the population number to its original state even if seventy-five percent were trapped in the winter. More detrimental to the muskrat population is the destruction of their habitat.

Not many muskrats live longer than one year. I discovered this by ageing the pelts and finding that four out of five were juveniles. Juveniles, those born in the previous summer, have reached adult size by the fall. Their age can be determined by the pattern of pigment on the pelt.

In the sample area five muskrats were supported per acre. This is a large number when it is projected over the hundred acre marsh. With approximately five hundred muskrats on the marsh, a proficient trapper can harvest 375 pelts in a season. No matter how hard a marsh is trapped, research has shown that only seventy-five percent of a population can be caught. This leaves a number large enough to replenish the population each year.

If a person trapping this marsh received an average price of \$2.50 per pelt the value of this marsh to him would be \$937.50. Each year this fresh water marsh will bring almost one thousand dollars to the trapper who uses its muskrat resource. This is only one small fraction of the total value of a fresh water marsh.

How do the other values of a fresh water marsh measure up? Would you rather spend a summer evening fishing than seeing the early show at the neighborhood theater? Does that mean your hours of fishing are worth slightly more than the price of a theater ticket? These comparisons are arbitrary and vary from person to person. However next time someone says "wouldn't it be a good idea to drain that swamp." Think of its value to you as a sportsman, as a naturalist or as a person who just likes to know that the fresh water marsh still exists in New Jersey. □

# that ain't no chicken hawk!

WADE WANDER

*Wildlife Biology Major Cook College*

PHOTO BY LEONARD LEE RUE III



*Red-Tailed Hawk*

**HAWKS**—the strong, silent, and haughty kings of the bird world. Spotting one in the sky splices any day outdoors with extra excitement. Unfortunately, though, many of us who thrill to the wild spirit they symbolize cannot tell one species of hawk from another. To many people, every hawk is a "chicken hawk," and hunters have been known to mistake them for legal game. Since it really isn't all that hard to name that dot in the sky with reasonable accuracy, I hope that the identification hints below will help make hawkwatching more satisfying for people and safer for the hawks.

Hawks are one of the few kinds of birds that can best be identified in flight. The flight behavior of a hawk, together with its size and shape, can identify the bird for you just as an invisible warbler's song can tell you its species. You can identify a hawk by its coloration—but you'll seldom get close enough to see the subtle patterns of its plumage. For these reasons, and since almost all hawks are spotted on the wing, the descriptions which follow are keyed mainly to flight characteristics.

**TURKEY VULTURE**—This may well be the largest bird you will ever see—its wingspread often reaches six feet. In flight, it is by far the most graceful of all our birds of prey, often soaring for hours on wings tilted above the horizontal, rocking back and forth as though unstable. From beneath, the spread wings appear two-toned—the flight feathers being decidedly lighter in color. The vulture's small head and bill and long narrow tail separate it immediately from the similar-sized eagles (only at close range is the bright red featherless head of the adult visible). This bird is a common resident throughout New Jersey except in the northeastern section.

**SHARP-SHINNED and COOPER'S HAWKS**—These two species are always difficult for hawkwatchers to separate, even under ideal conditions, so I'm treating them together for easiest comparison. Both belong to the family of hawks

known as accipiters, or bird hawks. They are small (blue jay size) to medium (crow size), with short rounded wings and a long narrow tail, and can readily be identified by their "flap-and-sail" behavior in flight. By flap-and-sail I mean a repeated pattern of about three or four flaps followed by a short sail on spread wings, lasting about two or three seconds. The Cooper's hawk is the larger of the two, and has a rounded end to the tail in contrast to the straight-edged tail of the "sharpie." DON'T rely on size and tail-shape characteristics alone to separate these birds, however. I have found the noticeably slower flaps of the Cooper's hawk and its longer head and neck to be far better distinguishing features. These accipiters can be recognized from the buteo hawks by their smaller size and from the similar-sized falcons by their rounded wings. In New Jersey, both birds are generally seen only during migration, the "sharpie" being very common and the Cooper's very uncommon; the best time to see them is the last two weeks of September and the first two of October. Another member of this family, the goshawk, is only an occasional visitor to northwestern New Jersey. If you're lucky enough to see one, you'll know it as an accipiter by its flapping and sailing, by a white eye streak, and as this species by its large size (wingspread 3½ feet).

**RED-TAILED and RED-SHOULDERED HAWKS**—Both of these birds belong to the buteos—the family of large hawks with broad wings and broad rounded tails. Although the red-tail is probably our most well-known hawk, it is certainly not our most common. You may have trouble separating it from the similar-sized but less common red-shoulder if you don't know that the two species have distinctive flight patterns. The red-shoulder will almost always flap-and-sail like an accipiter, but the red-tail prefers to soar in wide circles and will never flap-and-sail continually. You'll find that this characteristic is invaluable for identification when the red tail

of the adult red-tailed hawk isn't visible. The red-shoulder is one of our most beautifully marked hawks, but unfortunately its narrow black and white tail bands and the red "shoulders" for which it is named can be seen only at very close range. It is not often encountered except on migration (and then not too commonly); however, the red-tail is a fairly common year-round resident in the northwestern counties.

**BROAD-WINGED HAWK**—Although this may well be New Jersey's most abundant hawk, it is seldom seen by those not familiar with its secretive habits. Its very broad wings and tail and endless soaring in wide lazy circles immediately mark the broad-wing as a buteo—you can tell it from its close kin the red-tail and red-shoulder by its noticeably smaller 3-foot wingspread. Broad-wings are common summer residents of fairly large deciduous wood-lands throughout the state. During September, though, they put on a spectacular show, migrating in huge "kettles" of up to 1000 or more that can be seen from several hawkwatching ridges in the state.

The other buteo found in New Jersey is the rough-legged hawk, a rare winter visitor to our coast. It is slightly larger than the red-tail, with longer and slimmer wings and a long narrow tail.

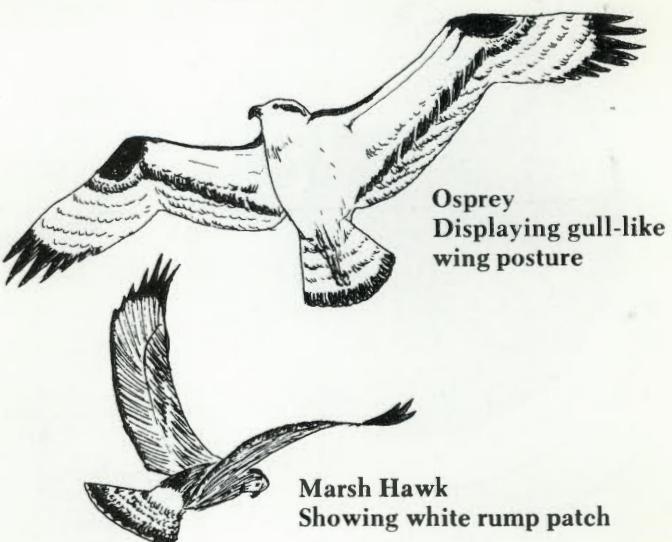
**Bald Eagle**—Although this striking bird is rarely seen in the state, I feel it deserves a place here because everyone should know how to identify our national symbol. Of course the adult's white head and tail are like no other bird's; the immature eagle, however, which is more commonly seen, is plain brown all over except for a wash of white under the tail. At first glance, you might mistake it for a turkey vulture, but a second glance will show you that the eagle soars on flat wings without rocking and has a large wide tail and massive head and bill. The bald eagle can be seen during autumn migration, especially in September from inland ridges and in winter in southern coastal areas such as Brigantine National Wildlife Refuge.

**OSPREY**—The osprey is a large bird (wingspread 5 feet), dark above and white below; in flight it displays a distinctive crook in its wings at the "wrist." This characteristic it shares only with the gulls, and you can tell it from the larger members of that group by its dark back, heavier appearance, and shorter neck. The osprey is a common migrant through New Jersey in late April and September; it may occasionally be seen in summer fishing near large bodies of water or along the coast, where it is reappearing as a breeder.

**MARSH HAWK**—This hawk flies with an odd, butterfly-like grace all its own, holding its wings in a shallow V like a turkey vulture and flapping-and-sailing somewhat like an accipiter. It's much smaller than a vulture, however, and its long narrow upturned wings separate it from the others. The marsh hawk's distinctive white rump patch, often visible for great distances, clinches the identification. This bird is a fairly common migrant in the state, and a winter resident in our coastal marshes.

**KESTREL**—Better known to many of us as the sparrow hawk, this is the smallest and only common member of the falcon family. In fact, this is the only falcon you're ever likely to see; the merlin, or pigeon hawk, and the peregrine falcon are found only rarely in New Jersey, and the latter is in danger of extinction. Falcons can be identified by their small to medium size, pointed wings, slim body, and long tail. The kestrel flies like all falcons, with strong, steady, almost constant wingbeats, and when hunting it commonly hovers in

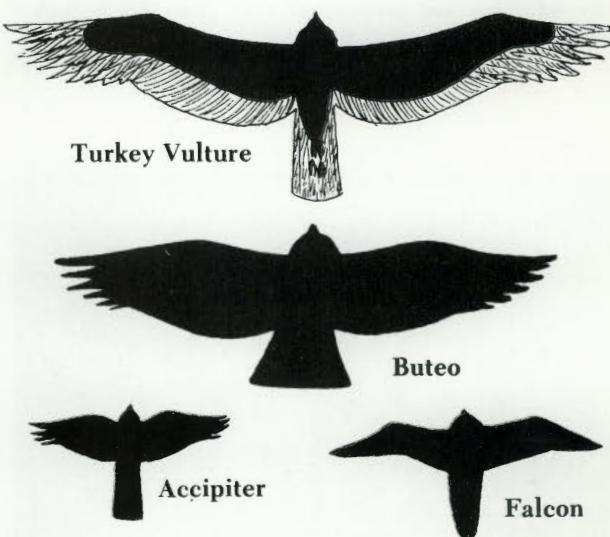
## HAWKS IN FLIGHT



Osprey  
Displaying gull-like  
wing posture

Marsh Hawk  
Showing white rump patch

## OVERHEAD FLIGHT SILHOUETTES



Turkey Vulture

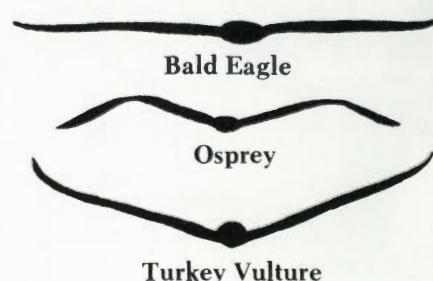
Buteo

Accipiter

Falcon

## FLIGHT PROFILES

Showing different wing positions  
of similar-sized birds



Turkey Vulture

place, unlike any other similar-sized hawk. It is a common permanent resident in open country throughout the state.

These hints on identifying New Jersey hawks won't make you an instant hawk expert, but an interest in and a little knowledge of hawks can really make the outdoors a greater place to be. □



**Whether you decide to hunt with slugs or buckshot, you should test the accuracy and grouping of your gun. This buckshot pattern shot at 30 yards would do the job.**



**Before you hunt with rifled slugs in old double barreled Betsy you should see if they shoot where you aim. Some shotguns will shoot buckshot well but do poorly with slugs.**

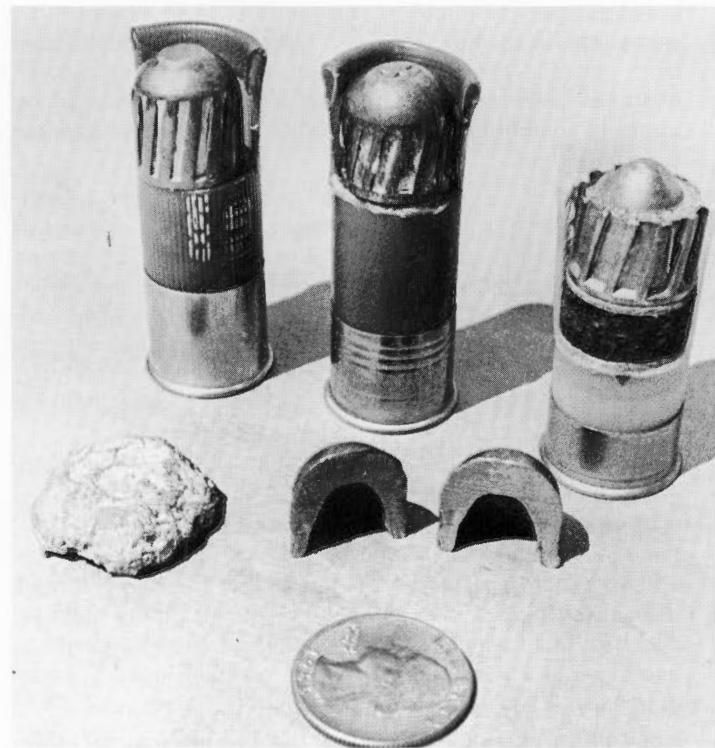
# Slugs

BY BOB McDOWEL

Rifled slugs for deer hunting will be legal for the first time in New Jersey for the 1975 deer season, a result of a recommendation by Division personnel and follow-up action by the Fish and Game Council.

Hunters will now have the choice of buckshot or slugs. Their type and style of hunting, their gun, and the area they hunt will dictate which will be best. However, hunters must still use either 12 or 10 gauge shotguns.

Some hunter, when told that slugs will be legal, said, "Boy that's great, we can use a 'punkin ball'." But that's not quite true. The modern rifled slug is quite different from the solid lead ball that used to be called a "punkin ball". A rifled slug is a hollow, round-nosed lead



*In the back row are three rifled slugs manufactured by different ammunition companies. The barrel of a shotgun is smooth, therefore, the rifling is on the slug to spin the projectile for greater accuracy. Contrary to what some believe the slug is not solid but hollow and weighs 7/8 of an ounce. Upon impact the slug flattens to about one inch in diameter.*

# or Shot?

HOTOS BY HARRY GROSCH

projectile with rifling lands and grooves on the sides.

There is quite a bit of misinformation and false beliefs about what a rifled slug will or won't do. Ballistic engineers still argue over whether the slug actually does spin due to the rifling. However, the weighted nose and the thin sides of the slug that press against the barrel wall are thought to be the major reasons for their accuracy.

In the proper shotgun, with a good sighting system, slugs can be very accurate with three inch groupings at 50 yards common. This type of accuracy is possible, but we emphasize, only with the proper gun and sighting system. Perhaps your old double-barreled favorite may



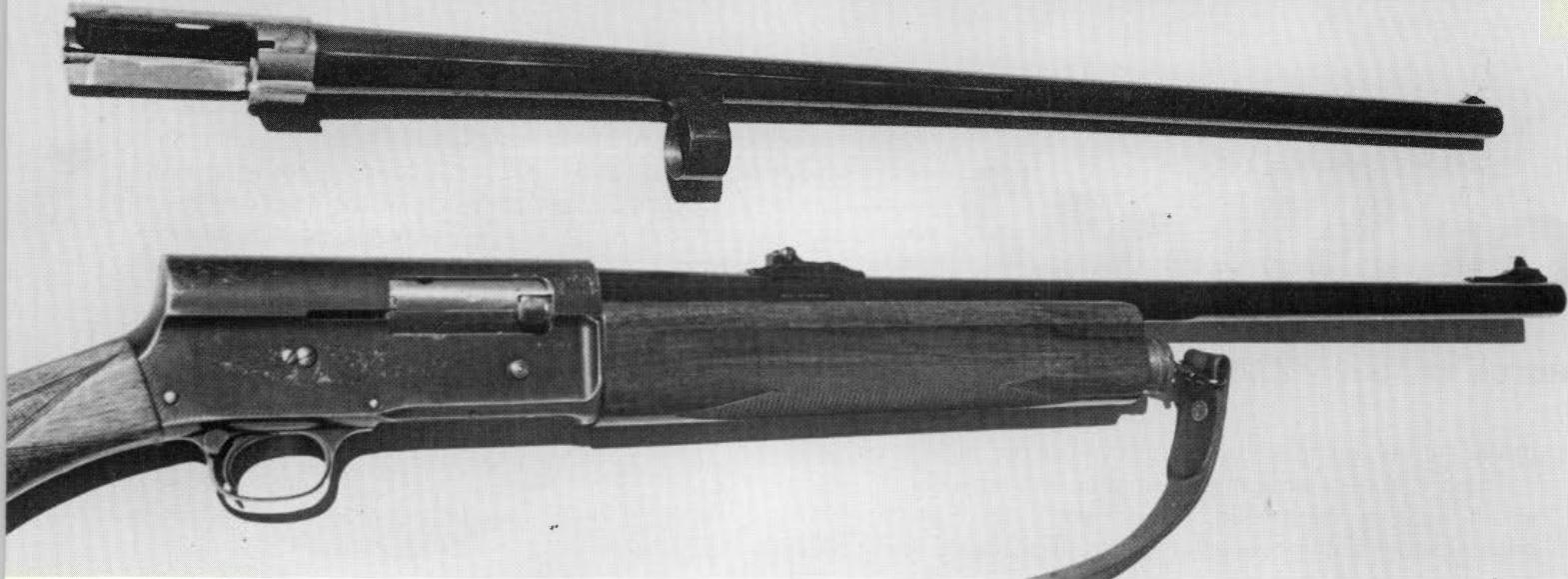
This standard open type of rifle sight or a receiver site may be fitted to your shot gun. It is recommended that a rifle type sighting system be tried and used to gain the most accuracy from the rifled slug.



This target tells the story. In the center is a five shot group fired from an Ithaca Deer Slayer equipped with a 1.5 power scope at a range of 30 yards. The hole in the lower right of the black was the first round. The other five rounds were fired after scope adjustments were made.



Sighting in with slugs should be done from a solid rest such as a table with sand bags. A good back stop is always a must when target shooting.



*Some makes of shotguns have interchangeable barrels. The manufacturers often offer slug barrels with rifle sights that will fit one of these guns.*

throw a beautiful buckshot pattern but you better try slugs before you hunt. Double barrels have a reputation for not shooting slugs accurately.

As indicated some sort of sight is necessary for accurate shooting and on some models of shotguns, mostly auto-loaders and pump guns, scope sights can be installed. Open rifle sights or peep sights fixed to the receiver may also be used and are more reasonably priced. Regardless of your personal choice, good sights are a must for slugs.

The choke of the shotgun whether it be full, modified, improved cylinder, or cylinder, has little effect on the accuracy. Two different guns, both with full choke, will shoot slugs differently—one more accurately than the other. The variation is in the individual gun and not the choke. In addition, the fear of "shooting out", the choke is unfounded. Modern slugs will not harm your barrel. The real question is, will your shotgun regardless of choke, shoot slugs?

When the decision to legalize rifled slugs was made, two major considerations were the effectiveness and safety of slugs. Information obtained from Winchester Western Division of Olin Industries and the National Rifle Association indicates the rifled slug is a more effective load for deer, than buckshot, in "terms of accuracy, range and destructiveness". This same data indicated an effective range of 35 yards for buckshot and 60 yards for slugs. Both velocity and energy are greater for slugs as the following table indicates.

#### COMPARISON OF 12 GA. 2-3/4" MAGNUM 00 BUCKSHOT AND 7/8 OZ. RIFLED SLUG

	Muzzle Energy		Muzzle Velocity	
	0 Yards	50 Yards	0 Yards	50 Yards
Mag. 2-3/4" 00	1325	975	*210 ft. lbs.	110
7/8 Slug	1600	1175	2175 ft. lbs.	1175

\*Energy per pellet

Correspondence with states that allow both rifled slugs and buckshot, and have similar hunting conditions did not indicate the use of either slugs or buckshot to be a major safety consideration. Maximum travel of 12 gauge slugs compared with 00 buckshot fired at a 30 degree angle indicate slugs travel 200 yards farther. When compared to 000 buckshot slugs travel 182 yards farther. Though this is a difference of 182 yards when comparing elevated shots there is little difference between loads when fired from a level position like those encountered when shooting at a deer.

#### MAXIMUM HORIZONTAL DISTANCE (30° ANGLE)

Load	Distance
12 Ga. Mag. 000	635 yards
12 Ga. Mag. 00 2-3/4"	610 yards
12 Ga. Mag. Rifled Slug 7/8 oz.	817 yards

This fact plus the experiences of our neighboring states (New York, Maryland, Delaware, and Massachusetts) indicate from a safety standpoint that slugs differ little from buckshot. In fact, some observers felt that because of the multiple pellets of buckshot and their erratic flight pattern beyond 50 yards, rifled slugs were safer.

#### FIRED PARALLEL

Load	Avg. Distance (Yards)	Range (Yards)
12 Ga. 00	159-181 (2 shots)	121-192
Rifled Slug	186 (4 shots)	162-203

In summary, the characteristics of the hunter and his mode of hunting, the ability of his shotgun to accurately shoot rifled slugs, the type of sights on the gun and personal preference should be the elements weighed when the question of "slugs or shot" is asked prior to the 1975 deer season. □

## TAKE A WILD THING TO DINNER

sions of hydrocarbons also will serve to reduce our output of nitrogen oxides. The direct damage inflicted on vegetation by this pollutant includes necrosis, or death, of plant tissue, retarded growth, and reduced production of foliage, fruits, berries, seeds, etc.

**PHOTOCHEMICAL OXIDANTS**, commonly called "smog", are an unholy mixture usually attributed to the interaction in the atmosphere between hydrocarbons and nitrogen oxides. We can help curb the formation of photochemical oxidants by utilizing the same measures which will reduce our emissions of its two principal precursors, hydrocarbons and nitrogen oxides.

This pollutant is somewhat different from some of the others in that it can be expected to build up during otherwise pleasant days, especially when there is an abundance of sunlight to hasten the interaction. Another of its characteristics is that it can develop locally near the sources of emission on still days, or many miles "downstream" when air movement is adequate to transport the precursor pollutants away from the area of emission.

Although photochemical oxi-

dants are infamous for their far-reaching effects on human and animal life, on visibility and on things, we are interested here only in their effects on the food supply of wildlife. Oxidants are particularly destructive of plant life in that they can cause the stomata of the leaf to close, thereby denying the plant access to the carbon dioxide which it must have to manufacture its own food.

These, then, are the major pollutants which affect wildlife by limiting the production of food. We could have considered other pollutants, but they would be of much less importance than those which we have mentioned. Because of space limitations, no effort has been made to enter into a scientific review of the effects of air pollution on vegetation, nor of the direct effects of these pollutants on the health of wildlife. An adequate discussion of these aspects would fill a book.

However, it is hoped that this brief discussion will alert the reader to an aspect of wildlife management which has not received the attention which it warrants.

None of us (singly) can alter the course of events which is damaging to wildlife. However, each of us can do his part to insure that the needs of man are filled wisely and in such a manner as to

minimize the threat to nature. We can:

1. Support land use planning designed to channel necessary growth and development in such a manner as to provide for the needs of man in a reasonable manner, while at the same time minimizing the wanton destruction of our remaining natural resources.
2. Reduce the individual contributions from our automobiles, a major source of air pollution, by maintaining them in the best possible operating condition and by eliminating unnecessary driving, utilizing carpools and public transportation whenever possible.
3. Promote efficient conversion of energy by maintaining our home heating systems in good operating condition, and by restricting the unnecessary pollution-producing use of fossil fuels by conserving electricity and by avoiding wastage through excessive heating and squandering of hot water.

If this brief discussion has introduced you to something which you have not considered before, well and good. Help Mother Nature, and she will help you! Our wild friends also will benefit. □

## MERCURY ANALYSIS OF CRAB SAMPLES COLLECTED IN SAWMILL CREEK-HACKENSACK MEADOWLANDS

During late July of 1973 and 1974 crab samples were collected by Division personnel and submitted for mercury analysis. These crabs ranged in size from four to six inches as measured point to point across the shell. All specimens collected were sorted based on sex and the uncooked edible portions were filleted from each group in sufficient quantity to satisfy the analysis needs. The number of crabs necessary to prepare the edible meat composite ranged from two to eleven individuals. The results from this analysis follow:

COLLECTION DATE	SEX	HG (PPM)
31 July 1973	M	0.13
31 July 1973	F	0.13
31 July 1974	M	0.26
31 July 1974	F	0.19

The analysis results indicate that the composite samples submitted fall well below the current one-half part per million (0.5 ppm) guideline established by the Food and Drug Administration (FDA) as the maximum allowable concentration of total mercury allowed in fish intended for human consumption. This survey and investigation is continuing to the end of 1975.



**Clinton Reservoir**

## **What's On Tap For The Newark Watershed**

(Continued from page 7)

### **ABUNDANT WILDLIFE**

Wildlife within the Watershed is abundant. The area provides excellent habitat for white tailed deer and a wide variety of small game. Among the latter include mink, beaver, and otter. Black bear and bobcats have also been sighted in the northern reaches of the property. Some care must be taken when hiking in the Watershed for both the rattlesnake and copperhead find the area well suited to their respective life-styles.

Fish found in the reservoirs and streams are equally abundant and include varieties of trout, pickerel, perch, and bass. A few of the Watershed's streams are among the last in the State which contain naturally regenerating trout populations. According to the New Jersey Department of Environmental Protection, the Pequannock Watershed represents the last relatively unexploited fishery resource in the State.

### **BREAK WITH TRADITION**

Traditionally, public access to the Pequannock Watershed has been severely restricted by Newark. With the election in 1970 of Mayor Kenneth A. Gibson, however, the City began to take a second look at one of its major resources. With funds provided by the Ford Foundation and the New Jersey Department of Community Affairs, Gibson commissioned the Office of Newark Studies of Rutgers University to conduct an environmental inventory of the Watershed to determine if the City's policies should be revised. In 1972, the resulting report recommended that Newark allow

multi-purpose recreational use of the property and on a minimal scale, controlled development activities. The Newark Municipal Council approved the creation of a non-profit agency, the Newark Watershed Conservation and Development Corporation to administer the property for the City, and to undertake an Overall Conservation and Development Plan for the Pequannock Watershed.

### **WATERSHED PLAN**

The Pequannock Watershed Conservation and Development Plan, released in June 1975 results from four years of environmental analysis including studies of soils, slope, geology, hydrology, vegetation, climate, and wildlife. It preserves for future generations approximately 90 percent of the Watershed for conservation and recreation uses. Approximately 10 percent of the land will be leased by the City for development under carefully defined controls and standards. The objectives of the plan are to enable Newark to meet the \$1.5 million tax payments it must make to the six local municipalities yearly, and to generate enough revenue to allow the conservation and recreational uses on the remaining lands.

The plan is guided by a strong respect for the natural landscape. Land use decisions evolved through the careful analysis of the property's environmental characteristics. Properties were selected for future development solely on the basis of natural determinants, i.e., the ability of the soils, geologic formations, hydrological systems, etc., to absorb development without adverse environmental impacts.

A limited amount of acreage, approximately 4300 acres, was determined to be suitable for development. Of this, less than 3000 acres is targeted for development during the next 30 years on lands leased by the City.

Parcels scheduled for development fall within five general planning districts. The proposed land use mix within each district varies depending on the physical aspects of the site, the character of surrounding development and existing market potentials and constraints.

Indicative of this approach, the central focus for development in the Canistear Reservoir district, located near state lands leased for skiing facilities, is to be commercial recreation. Primary and vacation homes are planned in addition to a hotel, golf courses, boating and supporting facilities. In other districts, the development parcels are located adjacent to, or in close proximity to existing residential areas. New development is planned to include clustered housing, community and specialty shopping areas and research and light industrial activities. A balanced mixture of mutually supporting development is planned overall.

### **CONTROLS AND STANDARDS**

Rigorous development controls and standards will be applied to all new development. Many of these regulations will be far more stringent than local subdivision and building controls. They include specifications for sewerage and other utilities, provisions for the control of erosion and water run-off; requirements for buffer zones around all water

bodies and a range of other environmental safeguards.

Protection of the visual environment will also be provided through substantial setback requirements which will serve to shield development from major roads, and other site planning and landscaping provisions. An architectural review process will be implemented to maintain high standards for the design of all new facilities.

#### **CONSERVATION**

The plan provides that the vast majority of the Watershed (30,000 acres) will continue to remain in its natural state. To preserve the variety of physical formations, vegetation and wildlife within the Watershed, a series of conservation measures have been adopted. Most important is the regulation of the level and type of human activity to be permitted in different sectors of the property. Public access to several major areas will be restricted to protect properties critical to the water supply system and highly sensitive natural environments. Major conservation zones include:

- the area draining into Charlottesville Reservoir (the terminal reservoir in the system)
- areas which comprise the headwaters of streams
- lands abutting streams and water bodies (500 to 1,000 foot buffer zones)
- the Cedar Pond and Uttertown Bog (a major wildlife habitat)
- other areas with unique vegetation and important wildlife habitats

Conservation efforts will include the continuous monitoring of environmental conditions in the Watershed. This is necessary not only to be alert to any impacts or changes brought about by increases in recreation or development activity but also to better understand the interrelationships among the various natural systems within the Watershed. The Watershed can serve as an excellent laboratory and testing area for experiments to improve man's harmonious relationship with nature. As an example, a cooperative project with the Massachusetts Institute of Technology is now underway to explore the potential for solar energy applications in the Pequannock.

#### **RECREATION PROGRAM**

Perhaps the most welcome change to be brought about through the Plan is the opening of the Watershed to the general public for a broad range of recreation activities.

Construction of a public recreation facility in the vicinity of Clinton Reservoir and Hanks Pond will take place this year.

Designed for year-round use, the facility includes a dining hall, meeting area, inclement weather shelters, swimming and canoeing facilities. Funded by the Bureau of Outdoor Recreation, and the City of Newark it is planned for use as a day camp during the summer months under the administration of the Newark Recreation Department. Organized groups from other localities will be able to make use of this facility on an advanced reservation basis.

Canistear Reservoir and Echo Lake are to be opened for both swimming and boating in the future. These lakes are among the largest remaining undeveloped water bodies in the State and offer exceptionally unique and scenic water recreation settings. Boating will be restricted to canoeing, row boating and sailing. Use of electrically powered boats may also be allowed under a strict inspection program to protect against the danger of lubricating oils seeping into the water.

#### **Hunting & Fishing**

Hunting and fishing programs are expected to attract many sportsmen to the Watershed in the future. All major water bodies except Charlottesville Reservoir and Cedar Pond have been opened for fishing. Access to rivers and streams, however, will be restricted. This is a necessary precaution until investigations can be conducted to identify what, if any, levels of human activity may be compatible with maintenance of water quality standards. The streams of the Watershed contain some of the last remaining naturally regenerating trout populations in the State and are classified as FW 1 waters, the highest possible category for water purity.

Fisherman throughout the State are experiencing their first outings on the reservoirs of the Pequannock Watershed this season. Under a limited permit program, offered at a small fee to offset operational costs, approximately 3,000 anglers are testing their skills in New Jersey's newest fishing resource. The fishing program will be gradually increased as studies indicate the advisability of such actions.

Extensive areas within the Watershed are suitable for small and big game hunting. An experimental hunting program was conducted this year. This experience will be reviewed and analyzed in cooperation with the Division of Fish, Game & Shellfisheries of the Department of Environmental Protection to determine the scale of hunting activity that may be permitted in the future.

#### **Hiking & Skiing**

For those who wish only to enjoy the Pequannock's scenic qualities many

rewarding experiences will be forthcoming. The existing network of old iron mining and logging trails will be expanded into a twenty-six mile hiking trail system. During the winter months, cross country skiing will be accommodated. Twenty miles of bicycle trails and fifteen miles of bridle trails are to be provided in the future. Disappointment is in store, however, for those who see the Watershed as a new area to try trail biking and snow-mobiling. No motorized vehicles will be allowed off of existing roadways.

#### **Camping**

Campers will find the Newark Watershed ideal because of the variety of recreation activities that will be available. Campsites will be located to fit any camper's interest from access to water bodies to a true wilderness experience. Approximately 1,000 acres will be set aside as picnic areas for day-trippers.

It is not difficult to see that Newark's Watershed will be a major new recreation resource in the State all year long. To ensure that it remains so, Newark will limit densities of use for each recreational activity.

Some may find it surprising that the State's largest city has taken the time and care to produce a plan for property which is located thirty miles distance from its boundaries. In reality, the City's development plan has turned out to be an innovative conservation plan, the use of a small amount of acreage to preserve a larger amount. Since the Pequannock supplies one half of the City's potable water, no other result would have been acceptable. The plan now allows Newark, which pays approximately \$1.5 million a year in property taxes on the Pequannock, to raise sufficient revenue while protecting its water supply source.

Is the City committed to intelligent land-use in the Pequannock? Mayor Gibson states the City's policy as an attempt to be guided by the environmental constraints of the Watershed, rather than an attempt to improve upon nature. This is the only way to ensure that the opportunities offered by this land will remain for generations to come.

#### **For Further Information:**

##### **The Newark Watershed Conservation and Development Corporation**

605 Broad Street, 15th Floor

Newark, New Jersey 07102

Telephone: 622-4521

or

Post Office Box 319

Charlotteburg Road

Newfoundland, New Jersey 07435

Telephone: 697-2850 □

*continued from page 3*

## **BACKPACK IMPACT**

A sign appeared ahead on the trail. It was one of those cardboard posters found frequently in camping areas stating, "Take only pictures, Leave only footprints." An obscenity was written across it.

The trail approaching Sunfish Pond was littered to a degree, but not as badly as we expected in relation to the other abuses we encountered. On a couple of occasions we observed hikers picking up other peoples' trash and stuffing it in their packs.

Sunfish Pond, of course, is one of New Jersey's truly beautiful natural areas. What a shock awaited us there on this day. A monument sat battered almost beyond recognition. Nearby a pile of garbage, mostly in plastic bags and comprised for a good part from beer cans and wine bottles, took up an area equal in volume of two automobiles.

There is no camping or swimming permitted at Sunfish Pond. Yet, the area abounded in tents, while a group of people swam nude and not far away a group of Boy Scouts from a nearby camp were swimming in bathing suits. The area was completely scoured of any squaw wood, and any particle of wood that looked like it could possibly burn, was hacked in futile attempts at dislodgement.

The remainder of our trek repeated many of the scenes, but climaxed fittingly when we ended our excursion in the Worthington State Forest group camp site, where a group of good-timers had carved on separate trees, in two-foot high letters, ROCK AND ROLL.

Questions hung heavy as we left this beautiful area. What can be done? Is the forest going to have to adapt to the people, or are the people going to adapt to the forest?

How do we reach the insensitive users of our forest and park lands in order to raise their level of consciousness so that they don't deface, leave trash, and intrude on the rights of others?

It is obvious that most of the people met on the trail or around camp sites appreciate and love the areas they are visiting and will do anything to preserve them for those who follow. Good manners and good judgement are what is required of that minority of people who cause the problems. Could it be possible that one day every user of state park and forest lands will have to take an environmental sensitizing course, just as hunters now have to take a hunter education course?

Most campers and backpackers have traditionally picked up any trash encountered on the camp site or trail and packed it out. Recently too many of us have given up in despair at the magnitude of this task. It is imperative that we all renew our efforts to pick up trash, to educate all we come in contact with, to speak up to those we see abusing our forest areas.

Only a casual reading of the newspapers makes it obvious that the State of New Jersey is incapable of doing more. Money is unavailable and budgets are slashed to the bone as our Forest and Parks Division struggles to keep up with an ever-increasing demand on its facilities.

Let's take into consideration only the trash problem. If various environmental, conservation, and scout groups would make all-out efforts to clean up park, camp site, and trail areas, and then maintain the clean-up of these areas periodically, it would be a great assistance to the harried Forest and Parks people. For some people, a little trash on a trail suggests that a little more won't hurt. A little litter serves as an advertisement for more. We can only raise the consciousness of those who despoil our natural areas by concerted hard work.

Something has to be done as our forests cry for help. They cannot take much more abuse, nor can they accept much more neglect from their friends. The environmental impact statement is written in the rubbish extending from Dunfield Creek to Sunfish Pond. □

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### **FRONT COVER**

Beaver Brook—Fall in New Jersey by David A. Bast photographed with a 4x5 view camera. See article on page 16C: New Jersey—Color It Beautiful.

### **BACK COVER**

Young man with Canada Goose—By Pete McLain, Ektachrome Professional film.

### **INSIDE BACK COVER**

New Jersey Pine Barrens—photographed with Infrared film and filter with a 35mm Canon/RF by David M. Campione. The infrared creates a vivid autumn landscape.

