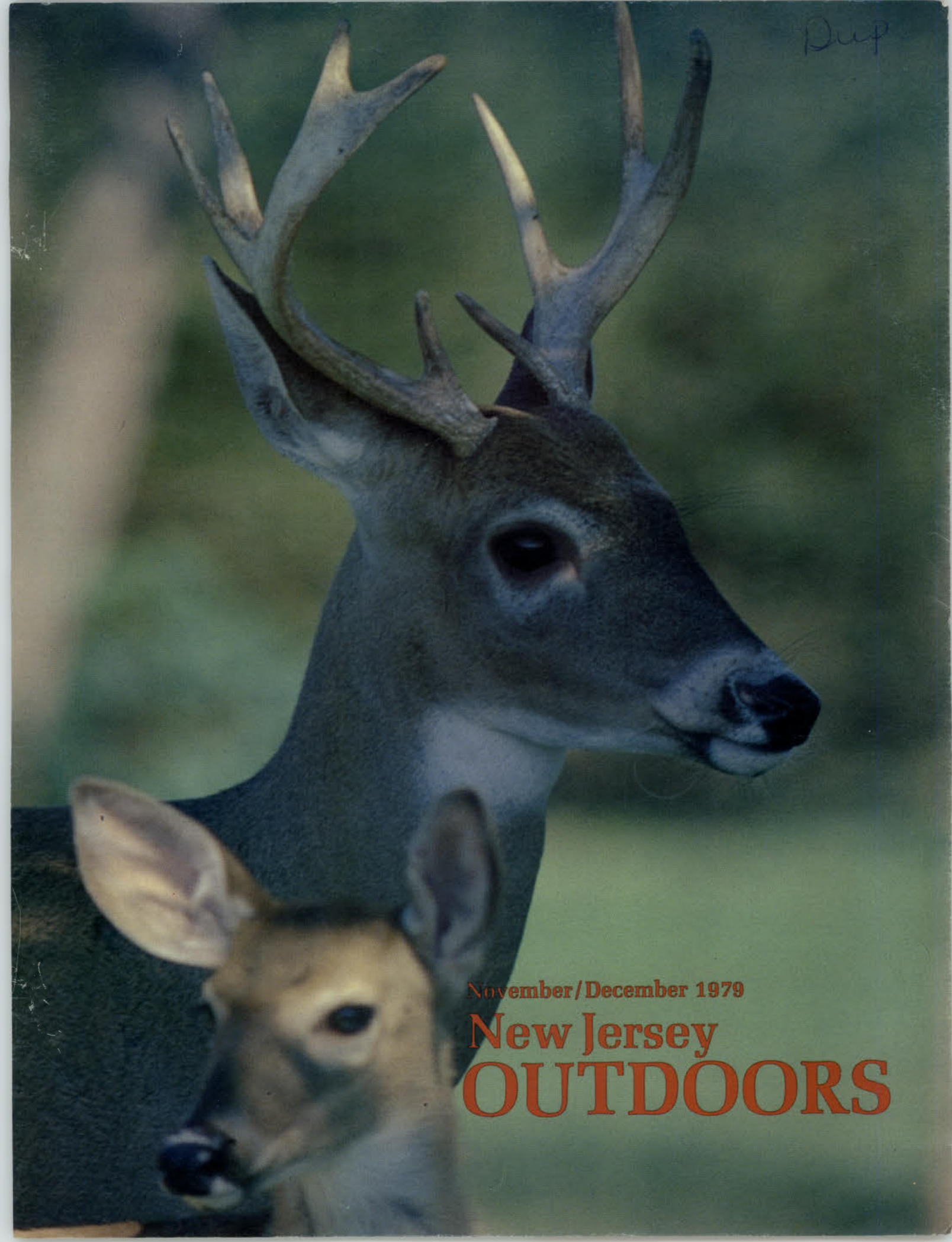

November/December 1979

New Jersey OUTDOORS

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November/December 1979
VOL. 6 NO. 6

New Jersey OUTDOORS

from the editor

Guest Editorial

We are thankful for . . .

All three generations sat down to Thanksgiving dinner together, and the youngest grandson asked the blessing. He tried to include the many things we were thankful for on that auspicious occasion, but that of course was impossible. And Grandpop presided over a succulent roast of venison. It had been in the freezer since the deer had been harvested on the morning of the first day of bow-hunting season, in Sussex County.

Other dishes, seeming without number, graced the table—blueberries from south Jersey, black caps from roadside brambles, vegetables beyond description from last summer's harvest on nearby farms, Silver Queen and Butter-and-Sugar sweet corn that had been roasted in the husks and saved for the corn pudding. Then there were pitchers of milk from Sussex County's Holsteins, and lasagna topped with mozzarella from Andover. But why go on? The supreme test is in the eating of the many good things that are strictly New Jersey!

Early winter is a time when last summer's produce in the Garden State is really appreciated. And there's more to come in the years ahead. I was driving slowly on our country road in Hampton Township when two wild turkeys stepped out of the weeds and proceeded with stately walk to the other side. On another occasion on Route 521, a wild turkey sprang from cover and flew high in the brush beyond my windshield. Those turkeys cannot be hunted yet, but some day their progeny will be the talk of future Thanksgiving and Christmas dinners.

At the moment the venison is abundant. We have counted as many as eleven deer at one time in our back yard. And for superb fowl there is nothing like grouse, and almost as good are the pheasants. When frost has heralded the small game season there are rabbits for stew, but the discriminating gourmet knows a plump squirrel is even better.

The opening of trout season brought fishermen in droves to the streams, and all summer the disciples of Izaak Walton are dropping lines from boats or doing some profitable bait casting from the banks of innumerable lakes. Bass, pickerel, perch, catfish, pike, sunnies, and much more are right there for the catching —and the eating.

But there is so much more to enjoy in New Jersey outdoors. Raccoons are as numerous and mischievous as ever. Woodchucks raise cautious heads in high grass all summer, and chipmunks scamper over stone fences all winter. Skunks and 'possums grope for tender morsels here and there with little concern for their neighbors. And we are hearing with a great deal of interest about the return of the black bear to the Kittatinny Mountains. Not long ago two cubs were busy nibbling the tender shoots of water plants near our home.

From the deck on the back of our house, we watch the hawks soaring along the Kittatinny Ridge as they take advantage of the thermals to journey southwest each fall and return each spring. And the honking of high-flying geese and ducks signal the changes of the seasons, while the Canada geese in increasing numbers are not necessarily in such a hurry to fly south, or north, but will take up permanent residence on nearby lakes and ponds.

The seasons come and go, and the first chill of autumn is in the air, not enough to bring early frost but just to give the assurance that the Garden State has brought manifold blessings to its outdoorsmen. The sweet corn is ready for the grill, and the blackberries are dripping from wayside bushes.

Someday our Thanksgiving dinner will include one of those wild turkeys. And as a climax we will have a steaming, home-grown blackberry roll garnished with hard sauce, served on Lenox china (from Boonton) of course. This is strictly New Jersey! □

Dr. Charles A. Platt

In this Issue

Our *Wildlife in New Jersey* series kicks off this issue with *Winter—It's For the Birds* by Wade Wander and Sharon Ann Brady. If you're into bird watching and bird feeders, this is a "must" reading. This article is introduced by the illustration by Carol Decker on the inside back cover.

Foresters Ed Lempicki and Mark Steinhorst, Forest Products Utilization Specialists with the Bureau of Forestry, write about a difficult logging operation in *Helicopter Logging in New Jersey.* Read how two million board feet of valuable Atlantic White Cedar were hoisted out by helicopter.

New Ways With Waste by Cliff Ross of DEP's Division of Water Resources discusses land application of sewage and industrial wastes. Although this is not a new concept, it is a process gaining wider acceptance with environmentalists and local governments in New Jersey.

"If you missed the Revolutionary War, now is your chance to have a ringside seat at a repeat performance." Read *Morristown Bicentennial* by Tony Patterson of the N.J. Division of Travel and Tourism.

Our center section, the *Environmental News,* includes a horror story written by James M. Staples titled *DEP Begins Cleanup of Hazardous Wastes.*

In the November/December 1977 issue of *New Jersey Outdoors* we featured a section of the magazine which we called the "Hunting Experience." In a similar fashion, in this issue we are printing *New Jersey's Deer Management Program for 1978-79.*

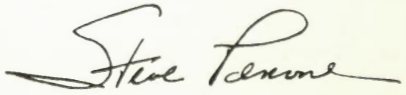
Hunting is not an "in" recreational activity like tennis, jogging or racquetball, and a great many people, especially city dwellers and suburbanities, are opposed to the killing of game. But in New Jersey hunters spent **42 million** dollars this past year for hunting equipment, licenses and related activities; there are 150,000 to 160,000 firearm hunters and 36,000 bow hunters; and during the 1978-79 seasons, hunting in New Jersey provided a total of **2.2. million** man-days of recreation. The articles and authors in this section are listed below:

The Deer Management material was written by wildlife biologists David Burke, Robert Eriksen, Bruce Hawkinson, Robert Lund and Patricia McConnell.

Author Don Reinhart says many bow hunters are missing out on an opportunity to bag a buck by *Horn Rattling for Bucks* during the fall archery season.

Only in New Jersey can a hunter track a big game animal in the snow and make a kill just two miles from the area's largest indoor shopping mall. Read *The Urban Deer Hunt* by Frank Clark.

"The woods are alive with my fellow predators. Yes, I am also one, like the hawk, and the fox; my chance is yet to come . . ." Read *The Introspective Hunter* by Ron Raleigh. □



WINTER—it's for the birds!

BY WADE WANDER AND SHARON ANN BRADY

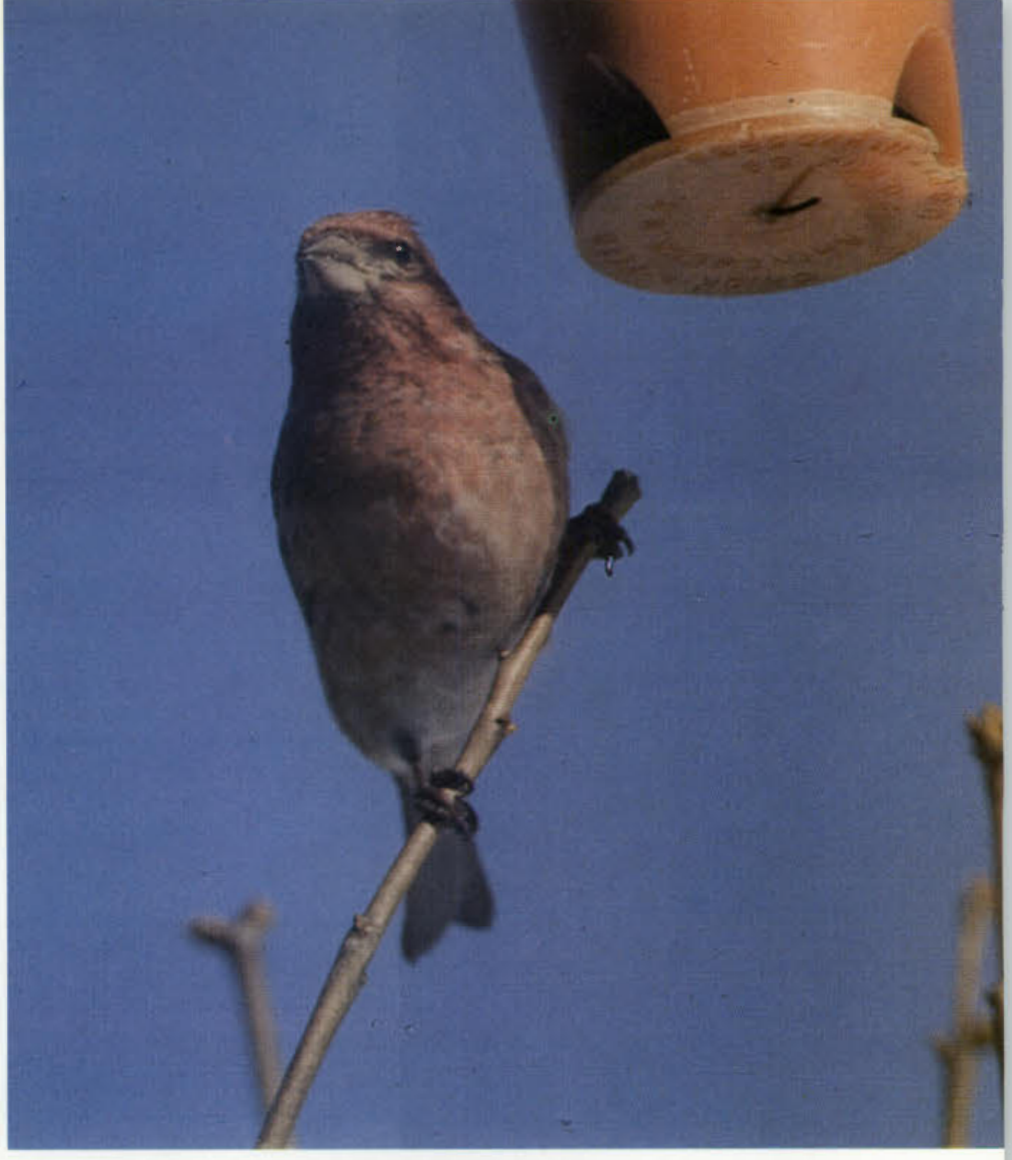
If this is the year you join the thousands of New Jerseyans who enjoy wildlife in winter by feeding wild birds, the Black-capped Chickadee pictured here is sure to become one of your favorite visitors. And he's only one of some two or three *dozen* species which may reward your feeding efforts with delightful dawn-to-dusk displays of color, sound, and activity.

To start winter bird feeding, you obviously need bird seed. Most supermarkets sell "wild bird seed" in 20-lb bags and sunflower seed in 2- to 5-lb bags (be sure to shop around—certain chains are *much* cheaper than others). Some large discount chains market seed in 40- to 50-lb quantities. An especially worthwhile source is the NJ Audubon Society, which holds Bird Seed Sales Days in October, December, and February at its Bernardsville and Franklin Lakes sanctuaries. Sunflower seed is considerably more expensive than the standard mixed seeds, but is worth it because it is preferred by many of the most attractive species—chickadees and nuthatches, grosbeaks, Cardinals and other finches. Peanuts and peanut butter are relished by many birds, as are raisins. Suet (beef fat)—available very cheaply (ometimes free!) from supermarket meat departments and local butchers—is a highly concentrated food that will guarantee you a winter-long parade of woodpeckers, and perhaps draw in some of the more unusual species in severe weather.

For a feeder, all you really need is the ground. Almost every species will feed on the ground, and some, like most sparrows, feed almost exclusively on the ground. The seed should be distributed over an area of at least several square yards to prevent overcrowding. Heavy snow can be a real problem for ground feeders, and should be cleared away from the feeding area. You can also buy (or easily make) many different kinds of pole-mounted feeders, hanging feeders, and windowsill feeders, which allow you to bring the birds closer, choose which species gets which kind of seed, and evade pests such as pigeons and squirrels. Pole feeders should be placed near shrubbery or trees to give birds approach and escape cover. Hang one or two feeders near windows for closeup looks at your visitors—you'll be surprised at how tame they'll become. Suet should be placed in trees in wide-mesh net bags or special suet feeders.

When you first put out your feeders, be patient—it may take the birds in your area a week or so to discover the bonanza you are providing! After birds are feeding regularly, fill your feeders at dusk so that seed is available when birds start feeding at dawn; put out more seed as needed during the day. Feed more heavily during and after heavy snow and ice storms, when it is especially difficult for birds to obtain natural food.

Open your feeding station when night temperatures consistently fall into the thirties—usually by mid to late November—and continue feeding through April. It's OK to start later if you like, but it is VERY IMPORTANT to continue feeding WELL INTO SPRING. Once your birds have become accustomed to feeding heavily with relatively little energy expenditure, any interruption—even for a day or two—can result in heavy mortality. Keep in mind that seed is ex-



Purple Finch. The striking raspberry-red color of the head and chest combined with clear white underparts identifies this individual as not only a purple finch but an adult male as well. The heavy conical bill is well-adapted for cracking open its favorite food—sunflower seeds.

Black-capped Chickadees at "chickadee" feeder. These tiny bundles of energy are very agile and comical feeders and are adept at hanging on to just about any surface. Constantly stocked feeders during winter help these and similarly sized species withstand our coldest days.

House Finches. The feeder pictured here is a general type that can be used by all birds. In many suburban yards throughout New Jersey, the House Finch has become a very common feeder resident. The House Finch, however, cannot hang onto the "chickadee" feeder pictured elsewhere, thereby reducing the competition for food. The female's are without red. Compare the males here with the male Purple Finch.

American Goldfinch at thistle feeder. The familiar bright yellow plumage of the "wild canary" is replaced in fall with dull greenish feathering. Goldfinches prefer thistle seeds to any other food but will eat sunflower seeds when thistle is not available.

PHOTOS BY AUTHORS

Hairy Woodpecker. During the colder months of winter, Hairy Woodpeckers as well as the smaller more familiar Downy Woodpecker will visit suet feeders especially in those yards near Wooded habitat. Mesh bags, like the one at the extreme left of the picture, are ideal for holding suet and can be placed against the trunk or branch of a tree or just left hanging. Suet is a fat which is an especially good source of energy in cold weather.

pensive and that you'll need a lot more than you at first expect, so DON'T START FEEDING UNLESS YOU CAN AFFORD TO KEEP IT UP. Also consider that keeping several feeders stocked, cleaned, and repaired for several months takes a lot of effort on your part—ESPECIALLY in the coldest, snowiest, wettest weather, when the birds are most dependent on you. And of course you'll be dependent on them, too, for the exhilarating sense of aliveness they bring to the bleakest winter landscape.

Some common winter birds at New Jersey Feeders:

Mourning Dove—ground feeder on small seeds, cracked corn

Downy Woodpecker—feeds on suet placed in trees

White-breasted Nuthatch—mainly a suet feeder, but also takes sunflower seeds

Black-capped Chickadee (northern NJ)—sunflower seeds, suet, peanuts

Carolina Chickadee (southern NJ)—same as above

Tufted Titmouse—another sunflower-seed specialist

Starling—a pest species aggressive toward other birds; mainly a suet and bread feeder

House Sparrow—another pest often present in dismaying numbers; a ground feeder on mixed seed

Cardinal—feeds mainly on sunflower seeds on ground or from feeders

House Finch—visits pole or hanging feeders for sunflower seeds

American Goldfinch—loves thistle seed (which is not always available) and sunflower seed

Dark-eyed Junco—Strictly a ground feeder, preferring smaller seeds

White-throated Sparrow—ground feeder

Song Sparrow—ground feeder

In some years the following species may appear at feeders in large numbers:

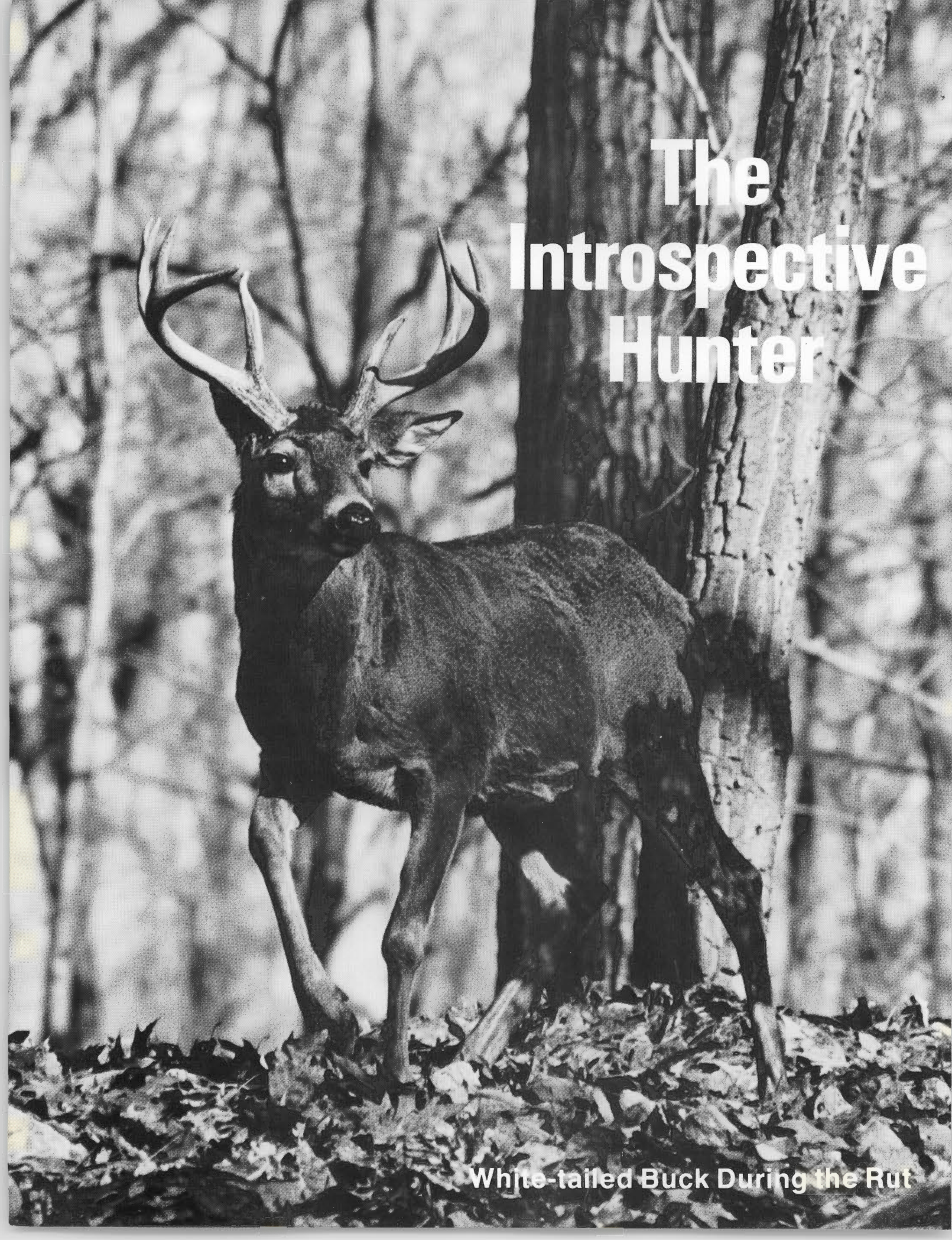
Purple Finch—prefers sunflower seeds

Evening Grosbeak—*the* sunflower-seed eater; large flocks will devour many pounds daily

Common Redpoll—eats various seeds, mainly on the ground

Tree Sparrow—a ground feeder on small mixed seeds

An excellent source of detailed information on all aspects of feeding wild birds is *The Hungry Bird Book* by Robert Arbib and Tony Soper (Ballantine Books paperback). Many field guides are available to help you identify the birds visiting your feeder. □


The
Introspective
Hunter
White-tailed Buck During the Rut

By Ron Raleigh

My old Ford van slowly chugs down the bumpy road, heading toward the place where I hunt. The fields of corn and soybean drift by my windshield. I slip off the road, ease into an open field, and pull up to the hedgerow that points the way to the place where I will be for the next few hours. I quickly jump out, put on my gear, smear on some Camo Cream and grab my bow. Before heading to the woods, I pause to turn and look backward across the road.

I was in a hurry but my pace slows as I start to unwind and the pressures of the day melt away. The raw natural beauty of the Jersey woodlands soothes my soul. I cross the field toward the stand of large white oaks that lies before me. Blue Jays call from their trees, alerting the forest to my presence. My eyes are upon a gnarled old cedar that marks the entrance to my path. At first glance the path appears to be like all the others that crisscross these woods, but this path is "mine." It has felt my footsteps many times during my trips through these woods. It is an old friend that leads me to a very special tree that stands in the back of these woods near a stream. In the daylight I find my tree with ease; in the darkness I need my friend, the path.

It is October—bow-hunting month—the month of both my madness and my sanity. The frenzied days of preparation, of practicing, and of scouting, all the hard work, are over. The days of patience, fulfillment, enlightenment, and enjoyment are here. I pause by the cedar and again glance backward. The world of stress and tension is left behind. I am entering the world the Indians called the "Wankan Tanka" or "The Great Mystery."

I follow my friend the path, and it leads me to my other friend, my tree. It is an old white oak, its limbs stretching skyward, my home in the forest. This tree has seen many seasons come and go, felt the warmth of thousands of sunrises, experienced the ravages of the wind and the biting chill of winter. It knows more than anything else the power, the cruelty, and yes, even the gentleness of nature, yet it stands silently. It has given both food and shelter to the animals of the forest, and now I come to it and it gives to me also. I climb up among her branches, sink back, and she cradles me among them. I am no longer the stranger, an intruder in the sacred domain of nature; I am a part of it.

Annie B. Dillard, in her prizewinning book, "A Pilgrim at Tinker Creek," said, "What summer conceals, winter reveals." And I say that the "fall is the revelation of that concealment." With each leaf that falls, my eyes are drawn to a heretofore unseen object; first a bird's nest and then the nest of a squirrel.

I hear the whistle of wings, my brother the hawk streaks past my tree in pursuit of his prey, a tiny field mouse scurrying toward an old, dead log. It is crushed in the powerful claws of its attacker. Death is quick. The mouse dies so that the hawk may live; it is the way of things.

The woods are silent except for the chatter of a lone squirrel in the distance. A finch lands on the limb on which I am sitting, immediately realizes its mistake, and leaves. A rabbit is munching some tender grass but something is wrong. It explodes from the scene as a red fox leaps to where the rabbit had just stood. The fox, for his impatience, has missed his chance. The rabbit will not be his dinner this day.

The woods are alive with my fellow predators. Yes, I am also one, like the hawk, and the fox; my chance is yet to come. The hour of magic fast approaches. The air draws still, the golden ball suspended by an invisible thread hangs above the horizon; its reflection sends streaks of light across the waters of the creek. A muskrat surfaces to ascertain that his course is correct and then disappears. Even the water snake slipping silently into his domain is a thing of beauty.

My senses are dulled by these flashes of color, this peace, this solitude. It is as if I am hypnotized. It has often occurred to me during these special moments that we spend the greater part of our lives being somewhere we don't want to be, doing things that we don't want to do. But when I am in my tree, during the last few glimmering rays of sunlight, there is no other place in the world where I would rather be, and there is nothing else I would rather be doing.

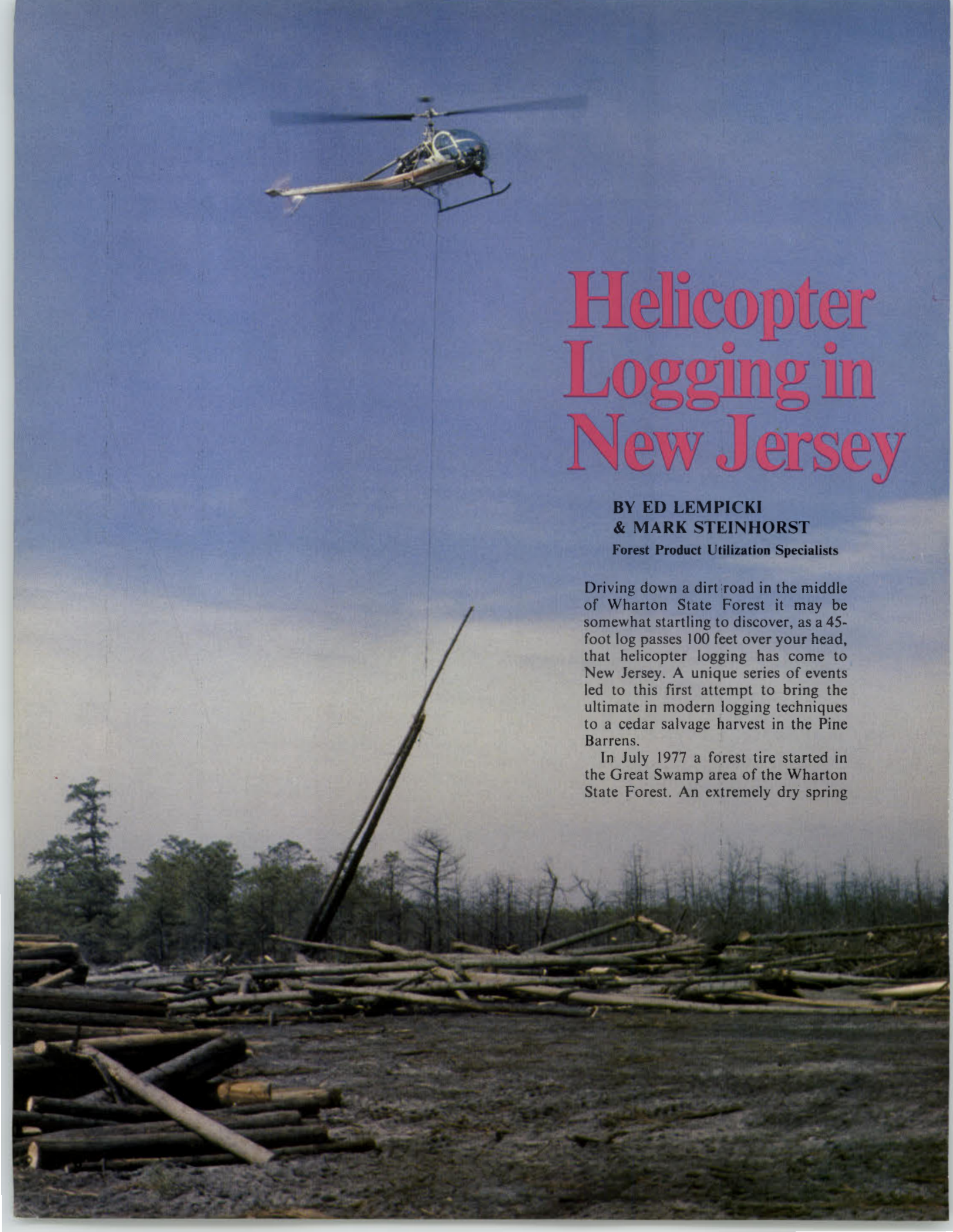
My thoughts are interrupted, my senses spring to attention. A reddish-brown shadow slips into the periphery of my vision. My pulse races, the beat of my heart is magnified a thousand times within my ears, my fingers tingle, my body trembles. Slightly, ever so slightly, my hand squeezes the grip on my bow until I feel as if the pressure will surely crush it. I breathe deeply, trying to steady myself. As I turn my head, the entire form of the creature comes into view. The visions of a massive trophy disappear and with it my tensions and anxiety. It is only a fawn nonchalantly tiptoeing its way to the old apple orchard that lies to my left. My imagination never ceases to amaze me. It has played out a scene such as this a hundred times before—a huge Pope and young buck offering me the perfect quartering-away shot at 20 paces. In my dreams, I see my arrow flashing toward its intended target but it never quite reaches its mark and my dream is left unfinished. Perhaps this is the best part of my dream. For when the arrow in truth arrives, what will be left to dream of? Maybe this is what draws me back to the fields and woodlands each fall—to seek but not find the "great mysteries."

Again my thoughts are interrupted and my mind is focused on the reality of now. A twig snaps and as I glance in the direction of where I heard it, there he is! I see him! The grey ghost appears to my right, the last beams of sunlight reflect from his snow white antlers. He stands pround and erect. He is the Monarch of this forest, the master of all he surveys.

I don't understand it. I'm still calm. I'm not shaking and quivering with excitement. Now I understand. My intuition is telling me that this is not to be the time, the fulfillment of my dream. The gathering mist pulls my scent to the forest floor like gravity gently pulling an apple from its tree. It drifts toward the buck and his nostrils are filled with the scent of a human. He blows his warning, wheels about and is gone. It took but a moment. Maybe next time.

I slowly climb from my perch and begin my trek back to my van—back to civilization. But who is to say where I have been? □

PHOTO BY IRENE VANDERMOLEN C/O LEONARD LEE RUE ENTERPRISES



Helicopter Logging in New Jersey

BY ED LEMPICKI
& MARK STEINHORST
Forest Product Utilization Specialists

Driving down a dirt road in the middle of Wharton State Forest it may be somewhat startling to discover, as a 45-foot log passes 100 feet over your head, that helicopter logging has come to New Jersey. A unique series of events led to this first attempt to bring the ultimate in modern logging techniques to a cedar salvage harvest in the Pine Barrens.

In July 1977 a forest tire started in the Great Swamp area of the Wharton State Forest. An extremely dry spring

and summer had lowered the water table so much that the rich organic layer of the swamp surface became bone dry. The Bureau of Forest Fire Management personnel dispatched to contain, control, and extinguish the fire encountered an extremely difficult situation—a smoldering and deeply burning ground fire. This particular type of wildfire does not burn in a fast and furious rampage, but instead slowly destroys the great trees above by burning the root systems below ground level. Fire fighters would no sooner get one area under control and move on than the deep-burning fire would surface and start new fires. Not until September 8, approximately two months after it started, was this fire officially declared "out."

The fire had been contained to 120 acres, where more than 4,000 cords (20,000 trees) of prime Atlantic White Cedar were killed. The trees themselves still stood intact, but their life-supporting root systems had been charred and killed as the tire burned away the organic surface 1-1/2 to 4 feet deep!

State foresters realized that the fire-killed cedar was potentially salable and began to take the necessary steps to salvage the timber. Once the fire was extinguished, the stand was inventoried with volume and diameter classes recorded for the purpose of marketing this wood before its economic value was lost. The two million board feet of Atlantic White Cedar involved became available for an open competitive bid to interested members of New Jersey's forest industry. Sleeper Creek Corporation, of Cherry Hill, New Jersey, was awarded the contract for its bid of

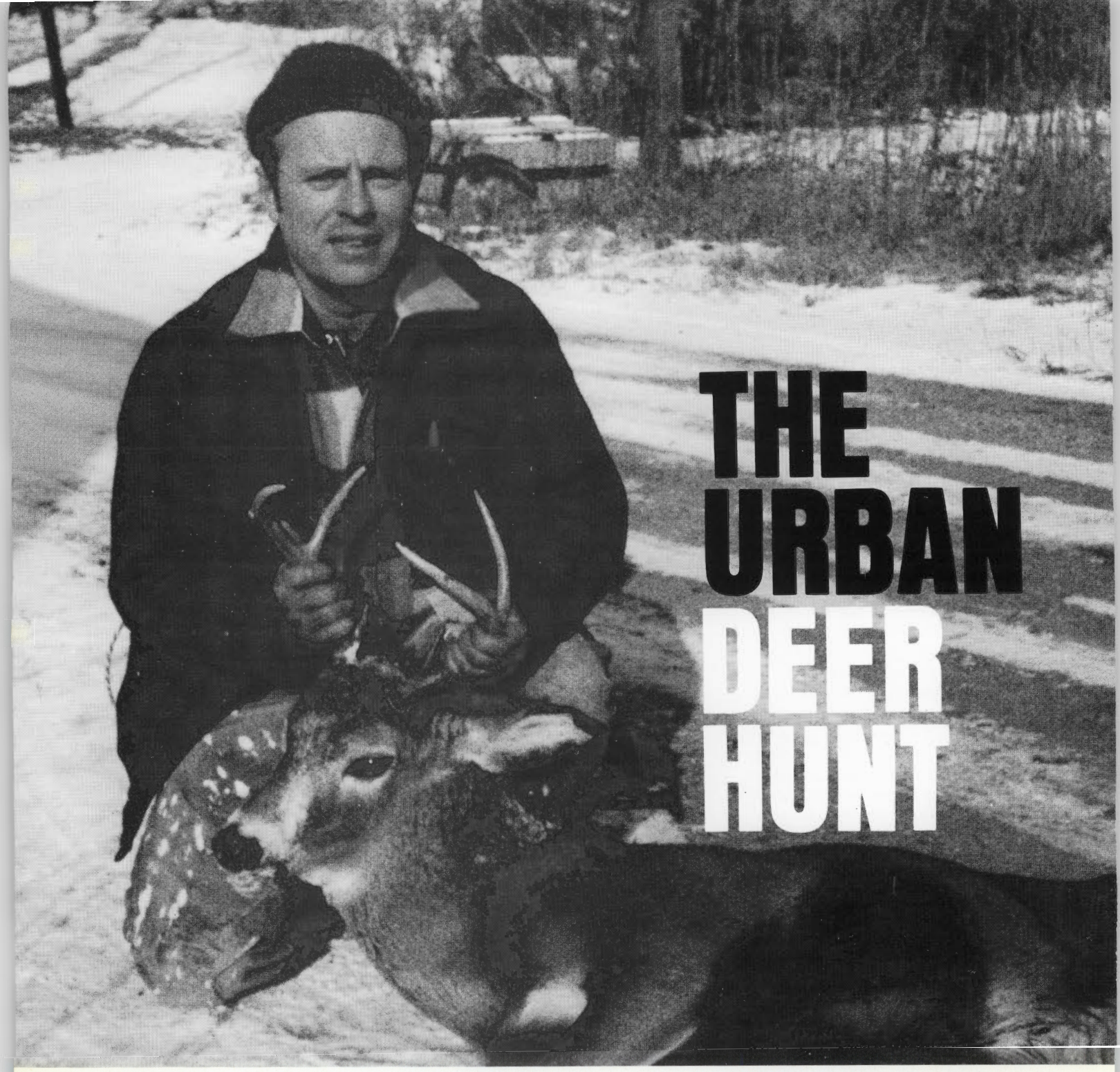
Continued on page 32

The smoldering ground fire inched its way over 120 acres of Wharton State Forest land in July 1977. Atlantic White Cedar was the principal species occupying the site.

Photos supplied by the author

The fire destroyed much of the swamp's thick organic soil layers, killing the trees' life-supporting root systems.

Tree-length logs at the staging area are bucked (cross cut) to length, stacked, and loaded on trucks for delivery to the sawmill.



THE URBAN DEER HUNT

PHOTO PROVIDED BY AUTHOR

BY FRANK CLARK

It was the fourth day of the December 1977 six-day firearm deer season in New Jersey, and I had not yet collected my buck. I had spent the first two days soaked and shivering in a telephone-pole-high tree stand in the heart of Warren County, and although I had seen more than 40 deer, as usual they were all "bald." After a day of rest the fourth day seemed to promise no better luck, with snow in the forecast and rising temperatures. I stopped at the home of my two hunting companions and attempted to enlist their company to hunt the Passaic County Hunter's Choice area—a section within the densely populated urban area of the state, which extends east of Route 202 in Bergen County, ending at the Passaic River in southern Passaic County.

A new snow, I speculated, would reveal any new deer tracks and allow a hunter the opportunity afforded to few:

the chance to follow an undisturbed set of deer tracks for miles and, with a little bit of luck, sight and maybe even harvest a deer. "Baloney!" my unconvinced hunting friends scoffed, "a deer will walk you in never-ending circles, tire you out, and romp away."

When I left their house I wished them luck, courting pneumonia in their tree stands in Warren County. As I drove toward home, listening to the weatherman speak of the impending snowfall of between four to six inches, I began to feel that I had made a good decision. For to me, it seemed more sporting actually to track down a whitetail rather than wait for it to come by my tree stand.

Next morning I awoke with a startle, my wife June, a hunter herself, shaking me, "Get up!" she urged. "It's seven o'clock and light already, and it's snowed four inches." Four inches indeed, with flurries still falling from the sky.

At 7:45 I pulled out of the driveway and pointed my station wagon north to a 1200-acre section of woodland about two miles from the center of town. I parked on a dirt driveway about 500 feet from the office building of a giant drug conglomerate, uncased my gun, and popped in three 12-gauge slugs. I carry a cut-down 12-gauge pump shotgun fitted with a 2.5 x redfield scope, a rig which has already accounted for three bucks and one doe in seasons gone by.

My trek began through a small dumping area filled with an assortment of cans, bottles, washing machines, and the battered hulk of an old car. After crossing a small stream, I entered the woods, proceeded up a ridge, and emerged in what seemed to me to be an enchanted forest plushly carpeted with the glistening new snow. After a few hundred yards of hiking, I could no longer hear the clanking of chains, the spinning of wheels, the slamming of doors. It was like hunting in the wilds of Maine or Canada. I had gone perhaps 600 yards toward a second ridge when I spotted a track and then another track to the right of the first. My pulse quickened. This was it, me against them. Two deer and a hunter in 1200 acres of surprisingly rough woodland. I wondered what the outcome would be.

The trail was surprisingly fresh, newer than I had even hoped for. I followed it hurriedly upward toward a third ridge and reached two melted spots on the whitened ground. They were "beds" where these deer, accustomed to the sounds and sights of a densely populated area, had rested on the ridgetop watching their back trail. Up and over I went, now more excited then ever, in eager pursuit of my quarry. Quickly, I followed the tracks down into a sizable basin, walking swiftly with my eyes glued to the trail. I stopped to catch my breath and, as I looked up, noticed two dark figures observing me from about 75 yards away. Before I was able to raise my gun they were off. All I saw were two white flags and a flash of antlers. What a blunder! Instead of looking along the trail ahead, I was intently watching tracks. The snow had muffled all my sound and I had walked within 75 yards of a good whitetail buck and doe without seeing them until too late. To top it off, my telescope was fogged and blurred with gobs of melting snow.

At least I had learned my lesson. From this point on I would move slowly and would carefully watch ahead, inspecting my scope often enough to keep it dry and clear.

So the stalking continued. The two deer crossed some of the toughest terrain imaginable. I backtracked and the next bed I found was only a single and I knew that two large brown eyes, radar-equipped ears, and an excellent nose were standing guard alongside those of its similarly equipped mate.

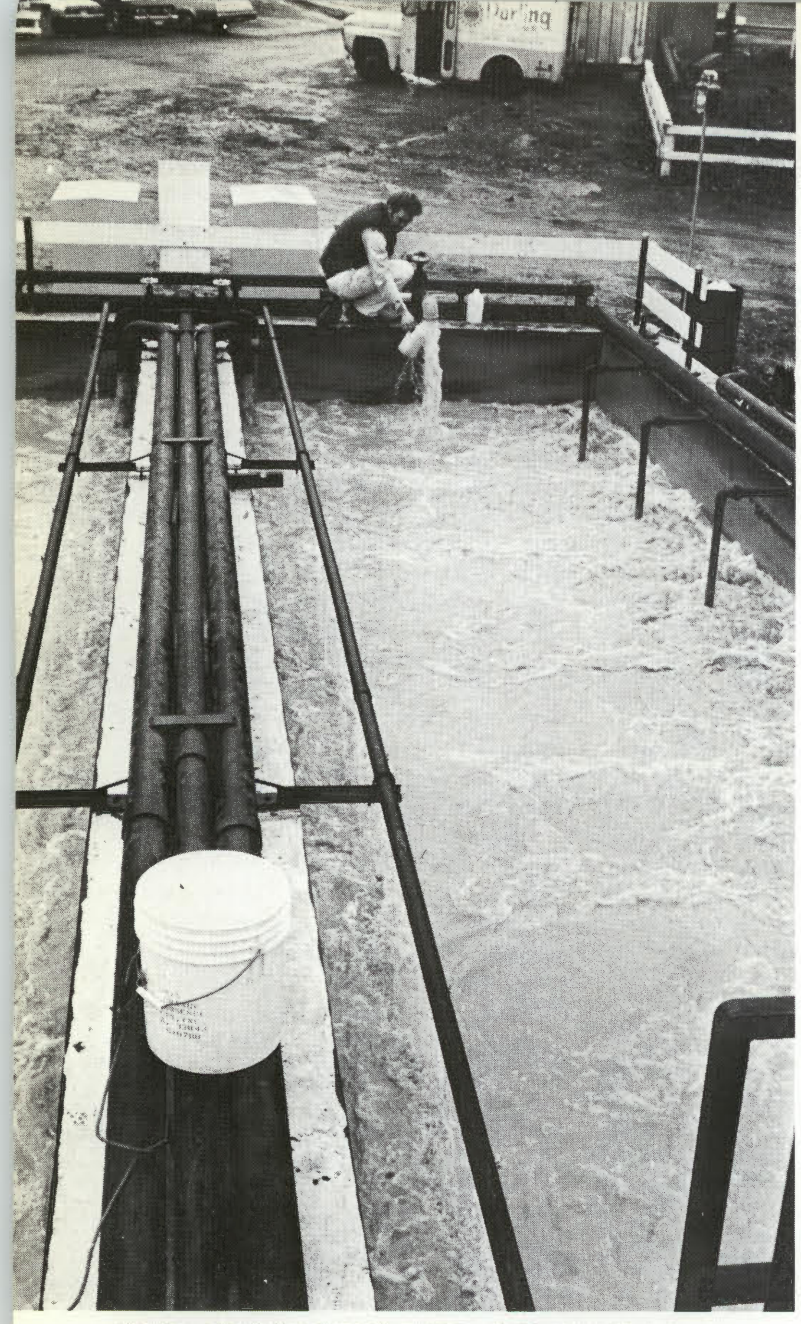
It wasn't going to be easy. The trail continued on and on, weaving and detouring through every seemingly impossible obstacle as I followed persistently, crunching through icy streams, bumping into snow-endowed trees, which gladly bombarded me with wet snow. It felt like hours and hours had passed as I took a breather. Panting heavily and perspiring quarts, I looked at my watch. It was 9:30 A.M. I had been in the woods an hour and a half.

Continuing on through a cedar tangle, I suddenly stepped into an old motorcycle trail or hiking path and, to my surprise, there were fresh human footprints following my deer! Now I was boiling. I hadn't heard a shot or seen another human in an hour and a half and in minutes would probably hear and see both. As I walked along I was surprised to see the tracks of approximately four other smaller deer mix with my two; then they appeared to split up, with one large set of tracks continuing over a stone wall and through an old abandoned pasture. Why, there were even pieces of barbed wire stretched between crumpled fence posts, relics of days gone by.

Doggedly, I stayed with the large single set of hoof prints. Minutes later a sheer cliff loomed 40 feet into the gray sky. Boy, I thought, if I or whoever else was in the woods with me were standing up there, he'd surely have had a shot. It was then I realized that those human boot prints back there in the snow had the same tread design as mine—indeed, I had crossed my own trail! Oh well, onward, and, as I silently slid through a hemlock thicket, I heard a blue jay scream. He's near, I thought, just ahead, and I kept my gun at ready with my thumb over the scope lens. I followed the run of the cliff, keeping it to my left, and observed the deer tracks slash through the mud and follow a small babbling brook. Forty yards further I placed my foot upon a rock and looked up, and, like a dream, there it was—a sizable, well-antlered whitetail buck not 35 yards distant preparing to bound away. This time, however, I was ready. Up came the 12-gauge, cross hairs on the shoulder, a thundering crescendo of echos and it was all over. Not 20 yards from where I shot him the buck lay dead, a 12-gauge slug through his heart. A fine seven-pointer. Time for dreaming was all over. Now the work came—dressing out the deer and packing the heart and liver, then tying a drag rope on both front legs and looping it over the head to the long drag home. Proud as a peacock, yes, but the realization came to me: Where was I? I suddenly realized I didn't have the slightest idea. I imagined myself dragging the animal across some irate citizen's lawn and listening for police sirens.

I dragged the buck to the top of the highest ridge in sight and listened. That whizzing sound, was it cars? You bet, so I pulled in that direction and came out on a main highway not 300 yards from my parked station wagon.

At 10 A.M., two hours from starting time, I stood proudly with a fine 135-pound, 7-point buck, just two miles from one of the area's largest indoor shopping malls, frequented by as many as 10,000 shoppers a day. A well-earned deer, a sporting kill, and the dream of a lifetime, all in urban New Jersey. □



Wastewaters treatment system at Durling Farms.

Keith Noordzy points out spray fields at Durling Farms.

NEW WAYS WITH WASTE

BY CLIFF ROSS

On a hot summer weekend, the crowds pack into Great Adventure at a rate of 36,000 to 40,000 a day, the children squealing at the elephants, lions, antelopes, giraffes, and other wild animals grazing on pasture grasses kept green by the spray from treated sewage wasteloads. Mom, Dad, and the kids enjoy the day's safari of sorts, and it's safe to say that how these sewage flows are handled is not uppermost in their minds.

Probably of all the current projects in New Jersey utilizing land application of sewage and industrial wastewaters, Great Adventure—the super attraction in Jackson Township, Ocean County—dramatizes best the alternative ideas involving central sewerage wastewater treatment plant systems.

At the famous safari park ride-through, there are 330 acres for the cheetahs, bears, baboons, rhinos, and the rest of the wild species in the "African Plain." And in the 41-acre North American animal section, bison roam along with caribou, elk, and moose. On 32 acres of these animal areas, the amusement park's sewage effluent is applied through 53 spray heads—supplying nutrients to the grass crop which is utilized by the grazing animals.

"There has been no rejection of the grassy cover by the wild animals because of the use of treated sewage effluent on the pasture lands," says an Elson Killam Associate spokesman who helped design the system.

A sewage treatment plant at the 1200-acre amusement park receives flows of up to 300,000 gallons per day on peak days in August. Although Great Adventure was designed in 1974 to accommodate 20,000 persons a day, peak attendances now climb to 40,000 persons or more. Such crowds overburden toilet facilities and other conveniences, a reason for the park's expansion program this year. Sewage-treated acreage in the wild animal areas will expand to 72 acres in the next 12 months.

The treatment plant is designed to handle an average daily flow of 200,000 gallons per day and collects sanitary wastes from several locations in the park. After treatment, disinfection, aeration, etc., the effluent is pumped to a 3.6 million-gallon lined pond for distribution to the spray irrigation system.

Spraying is done at night, at the rate of 1.5 inches of water per acre per week. The spray zones are monitored and daily records kept of each spray head. Monthly reports are filed with DEP at Trenton.

Great Adventure's sewage disposal system, using the land, is hardly a new concept. But it is an idea getting a closer look from people responsible for environmental protection. "In the case of Great Adventure," according to a DEP spokesman, "the idea was to protect, from possible degradation, some minor streams and the Lahaway Creek which flows into three nearby lakes. We had to protect the recreational values of the lakes. It was no place for sewer pipe discharges."

"Land disposal now must be considered at the conceptual stage of a wastewater project if it is to be federally funded and if onsite disposal conditions appear to make such an alternative system feasible," says Arnold Schiffman, new Director of the Division of Water Resources. With past interest and

experience in groundwater matters, Schiffman has this observation:

"Recycling wastewaters back to the earth is an old, old concept. But only in recent years has the land disposal idea found increasing popularity." He said the primary reason for this is that federal funds have become available for the acquisition of the usually large tracts of land necessary for disposal. He also noted that costs have become excessive for advanced wastewater treatment systems.

About 35 spray irrigation and percolation-lagooning systems are operating today in New Jersey. And according to Schiffman, "It's no longer an idea monopolized by some South Jersey food processors as was the case 25 years ago, since we now find a variety of land disposal applications all over the state." For example:

- Spray irrigation is serving a 1500-unit housing complex in Morris County, protecting a nearby tributary of the South Branch of the Raritan River.
- On golf links at retirement communities in Middlesex and Ocean counties, fairways and greens are protected from drought days with treated sewage wastes from the communities.
- At a Swiss-based flavor and fragrance manufacturer in Plainsboro, Middlesex County, industrial effluent is mixed with domestic sewage and sprayed over acres and acres of surrounding green lawns.
- A big paper manufacturer in Atlantic County carefully monitors its effluent for toxic substances and heavy metals.
- Land-disposal systems serve East Windsor Township, Mercer County, and Waterford Township, Camden County, where municipal utilities authorities have been required by DEP to protect low-flow streams from the likelihood of degradation from discharges of municipal sewage treatment plants.

Senior-citizen housing projects and the latest in townhouse-condominium developments are in the forefront in using spray irrigation to dispose of sewage wastes. Here the wastes are given the required conventional biological treatment, chlorinated, lagooned, and then sprayed on the land.

At the Princeton Meadows complex, a sewer system serves all residential and recreational areas and present and future industrial and commercial sites, with the treated sewage ultimately sprayed at night on the 18-hole golf course. The 10-year development project, with 2000 apartments at present and a thousand more to be constructed, now generates half-a-million gallons of wastewater daily which are given secondary treatment, then held in deep lagoons for up to 12 days before being sprayed on the links.

PHOTOS BY EDUCATION UNIT, N.J. DIVISION OF FISH, GAME AND SHELLFISHERIES, HARRY GROSCH, PHOTOGRAPHER

Princeton Meadows—spray irrigation of golf course.

Golf course superintendent H. Leroy Tindall and treatment plant superintendent Amerigo Pesces say they have never heard a single complaint from golfers or apartment dwellers about odor problems or any other complaint that might conceivably be associated with spray irrigating the links. "They couldn't care less about the disposal of sewage wastes on the course," said Tindall. "What they want are well cut fairways and keeping the greens in shape." At the nearby Rossmoor retirement community near Jamesburg, a similar system is in operation. Here wastes are treated and piped to golf course spray fields.

A large Ocean County retirement community, Crestwood Village, with its 10,000 population, employs a large spray irrigation system from April through November each year. The municipal collection system for the 160 acres of senior-citizen housing in the South Jersey pines produces 700,000 gallons of treated effluent daily that are discharged by spraying on the land. Crestwood's system, in use since December 1975, includes monitoring wells located around the perimeter of the property and in open spaces where natural drainage and the land's topography suggest their location. Crestwood Village has a secondary treatment plant complete with its own certified laboratory, where groundwater samples are analyzed to check the quality of the water after spraying takes place.

In Morris County near Budd Lake, more than 1000 housing units have been carved out of Mount Olive Township's rural countryside in the past five years. And sewage wastes from the condominiums, garden apartments, and single-family homes are treated on the 1100-acre site, chlorinated, and piped to 33 acres of Valley Brook. This tributary of the South Branch of the Raritan River is thus protected from the heavy sewage discharges of the community. Michael Cush, supervisor of the 145,000 gallon-a-day biological treatment plant, monitors the system daily; he checks the oxygen level of flows, which get exceptional treatment through a final extra step—filtering the wastewaters through sand that removes any last solids "to make sure they aren't pumped out to the spray fields where they could lodge in the nozzles of any of the 60 spray heads."

Spray irrigation and other land disposal of sewage or industrial wastewaters has the unqualified support of the U.S. Environmental Protection Agency, and it operates now with a mandate that says for projects under the Clean Water Act of 1977, "innovative" land disposal methods must be given first consideration before conventional sanitary sewer systems will be approved. EPA will not fund secondary treatment for land disposal projects unless there is strong justification.

Interviewed last fall, Thomas Jorling, former EPA Official for Water and Hazardous Materials said: "We have strong instructions to EPA staff and to the states that the analysis required must be convincing in the rejection of land treatment. I anticipate that we will be rejecting several state plans in the years ahead for failure to give adequate consideration to land treatment and other alternatives."

But there's more going on than bureaucratic pronouncements. The U.S. Corps of Engineers is presently involved in land-disposal pilot projects in cold-dominated regions; and in Colorado at the Air Force Academy, golf is played on a spray-irrigated course which handles the effluent from the large complex of academy buildings.

And while it might seem that golf courses lead the way in

Continued on page 30

HORN RATTLING FOR BUCKS

BY DON REINHART

PHOTOS BY GULIO SANTOPADRE

Most bow hunters are missing out on an opportunity to bag a buck during the fall archery season. I am talking about the hardly used method of rattling horns to call in a buck. I'm sure almost everyone has heard of rattling horns but few have actually ever attempted to try it. I for one can vouch for its success and I would like to describe some of my experiences using the horns and maybe I can convince others to give it a try.

The first time I tried rattling horns for bucks was about ten years ago during the bow season. I hunt the Far Hills section in Somerset County. Every attempt I made using the horns always spooked the deer and I abandoned that method and continued to hunt in the normal manner.

During the second week of the 1977 bow season I observed something which changed my feelings about using the horns again. While posted on the edge of a field in the afternoon, I saw five deer enter on the right side of the field. Three were does and two were four-pointers who started to hit their antlers together in a mock fight. Meanwhile three deer entered the left side of the field. One was a six-pointer and the other two were does. They were out of sight of the other herd because of the slope of the land. Even though the six-pointer couldn't see the other deer he left the two does and a walked straight line to where he heard the bucks sparring. After seeing this I decided to try once again to rattle up a buck, especially since the rutting season was just starting.

The next morning out, I did rattle a buck using the horns but he winded me before he was close enough for a shot. This same morning my brother Gene was hunting with me and had seen two of the biggest bucks he ever saw. One was a fourteen-pointer and the other was an eight-pointer. They came within thirty yards but he couldn't get a shot. After hearing him describe the fourteen-pointer, which he felt would score well up in the trophy book, the next day at work I rearranged my schedule to be off either in the morning or the afternoon for the rest of the season.

For the next two weeks I rattled nine bucks up to my tree stand, some as close as ten yards away, but I held off, hoping for a crack at the fourteen-pointer. Gene was also using horns and he manged to rattle up six bucks. One was the big-eight pointer, which he saw running through the woods about 100 yards from him.

As soon as he started hitting the horns, the buck made a 90-degree turn and came running straight towards him. He stopped about eighteen yards away, Gene took a hasty shot but missed him clean. He

Author displays horn-rattling form

described the deer as definitely looking like he wanted to get into a fight with another buck.

During the season we rattled in fifteen bucks but never did see the fourteen-pointer again. Even though both of us probably could have taken a buck, this new experience was so exciting we held off, thinking we had a good chance of getting one of the trophy bucks.

Some of the bucks were called from various situations. One was walking through the woods when I saw him and as soon as I rattled the horns he turned and came straight towards me. Another was with a large herd and when I rattled the horns he left the herd and came to me. Still another I called back three times. When this one approached within fifty yards I stopped rattling. After he went past me about fifty yards I rattled again. He turned around and came right back. This method was repeated three times and then he finally left. I also rattled up a buck while two does were bedded down under my tree stand not twenty yards away.

I think my most exciting experience rattling the horns was one day on a morning post. I was just about to leave my tree stand when I spotted a buck down in a hollow about two hundred yards away.

As soon as I rattled the horns he stopped and looked in my direction. I hit the horns again, he turned and headed up the hill straight towards me. When he was about eighty yards away I stopped hitting the horns as I felt he was so close that he might detect my movement. He kept coming and finally stopped twenty yards from my stand.

He just stood there trying to locate what he thought were the bucks that were making all that racket. While he stood there he started to paw the ground and savagely attacked a small bush with his antlers. He did that for a few minutes then just slowly walked away.

After seeing this happen right in front of me, it unnerved me so much, I think that if the buck had been the fourteen-pointer I had been hunting, in all probability I would have blown the shot.

The technique used to rattle the horns is not difficult at all. The real secret of success is the timing of the rutting season. The prime time is usually the first week in November, but good results can be obtained during the last week of bow season.

The best selection of antlers would be from a six-pointer with heavy tines, as the sound travels farther with thicker antlers. Two sets of antlers can be used or cut off both horns from one set and tie them together with a length of string so they can be hung from a limb when not in use.

I usually wait until about one hour after sunrise before starting, to give myself a chance at any deer that might be moving near me.

To start rattling just grasp the antlers at the base and bang them together with the heavy main beams hitting first. With the antlers still touching, begin a twisting motion so that the tines start hitting each other. Separate the horns and pause for about ten seconds, repeat the same action three or four times, then wait about a half hour before rattling the horns again.

If you call a buck to within your area you might have to rattle the horns again so he can pinpoint where the rattling is coming from. Don't continue hitting the antlers when the buck gets within 80–100 yards as he is now close enough so as to spot your movement. Hang up your horns, pick up your bow and get ready for some action that you've never experienced before.

The Ford Mansion

CREDIT PHOTOS TO MORRISTOWN NATIONAL HISTORIC PARK

MORRISTOWN BICENTENNIAL

BY TONY PATTERSON

If you missed seeing the Revolutionary War, now is your chance to have a ringside seat at a repeat performance.

On the first day of December, uniformed members of the Brigade of the American Revolution will march into Morristown, just as the Colonial Army did in 1779 to take up winter quarters at Jockey Hollow.

This two-day celebration of great moments in history will include the line of march of troops, an artillery display and commemorative ceremonies at Ford Mansion, which was George Washington's headquarters.

The Ford Family may have suspected at the time that they and their house would go down in history the moment they invited the Father of our Country to use the house as his headquarters. Shortly after the invitation was extended, George Washington and his staff were like members of the family.

Unfortunately, the Ford Family was now forced to live in only two of the rooms of the large mansion. While they paid the price of sacrificing comfort for patriotism, they were also given the added privilege of being privy to the sights and sounds of history in the making.

Visitors to this 1979-1980 winter encampment celebration will also be privy to history. For along with watching the line of march, other sights and sounds will include the crack of gunfire, the roll of drums and the smell of outdoor cooking as modern man and woman don the costumes of our forefathers and relive the rugged winter of 1779.

John Dwyer, a Federal Parks Ranger, is coordinator of this year's event which includes all encampment arrangements. Jim Holcolmb will supervise all bicentennial events.

According to Dwyer, groups participating will include: Morgan's Rifles, Morristown; Lamb's Artillery, Morristown; Proctor's Artillery, Randolph and the First Continental Regiment, Pottstown, Pa.

"I like to call the original encampment The Miracle of Jockey Hollow because when Washington's Army arrived here they were a ragged bunch of civilians and when they left they were an army of disciplined soldiers."

Dwyer added that "before the Continental Army won the War for independence, they had to first win the battle of the Jockey Hollow Winter." □

PHOTOS PROVIDED BY N.J. TRAVEL AND TOURISM

SCHEDULE OF EVENTS
MORRISTOWN BICENTENNIAL 1979-80
MORRISTOWN, NEW JERSEY

December 1-2, 1979	**MARCH INTO MORRISTOWN by units of the Brigade of the American Revolution with appropriate ceremonies at the Ford Mansion, Morristown Green, and encampment in Jockey Hollow.**
February 1980	**WASHINGTON'S BIRTHDAY special events at the Ford Masion.**
April 17, 1980	**JOCKEY HOLLOW ENCAMPMENT commemorating the recognition of America by the Parliament of Ireland in 1780.**
May 8-9, 1980	**SEMINAR ON THE ROLE OF FRANCE IN THE AMERICAN REVOLUTION at Fairleigh Dickinson University with participation by Morristown National Historical Park staff.**
May 10, 1980	**LAFAYETTE RETURNS CELEBRATION which will be held at the Ford Mansion in connection with the return of Lafayette to Washington's Headquarters. Representatives of Lafayette's family, French and American government officials, and state and local dignitaries are expect to attend.**

In addition to the above events Morristown National Historical Park will provide a program of monthly candlelight concerts at Washington's Headquarters and various living history programs.

This calendar of special events is planned and coordinated by the Morris County American Revolution Bicentennial Committee. Inquiries should be made to Morristown National Historical Park, P.O. Box 1136B, Morristown, New Jersey 07960, telephone 201-539-2085.

FOR MORE INFORMATION ON NEW JERSEY, CONTACT TOURISM BOX 400, TRENTON, N.J. 08625 OR CALL (609) 292-2470

WILDLIFE BOOKSHELF

BASS ALMANAC

By Lamar Underwood
NICK LYONS BOOKS
Doubleday & Company, Inc.
Garden City, N.Y. 1979
$15.95

Lamar Underwood's list of contributors reads like the roster of the bass fishing Hall of Fame. The smooth, uncomplicated writing styles together with superb photography and graphics makes the entire work a breeze to read and understand. The almanac is about as complete as you can get and has application to New Jersey, Florida, Texas, Mexico, Cuba, or just about anyplace else you could expect to find a bass. Producing a "complete" manual on bass is no easy trick, for bass fishing is probably one of the most refined, technical, and (sadly) one of the most computerized and "gadget-ized" varieties of angling there is. The average professional bass boat is better equipped than the most modern naval sub-chaser. Had we had a few of these bass boats in the early days of World War II, Admiral Donitz's U-boats would never have had a chance. Fortunately, the almanac's "Boats and Power" section doesn't end up as a technical manual as well it might have.

Easily my favorite sections were "Cooking Your Bass—Basics and Beyond," which has some mouth-watering recipes, and "Fireside Bassing," a section reserved for fish tales, which is truly a delight. The most controversial section would be that on tournaments, which many people find repugnant and contrary to their concepts of what type of attitude fishing is supposed to foster, i.e., the argument of contemplative vs. competitive angling. The section appears slanted towards the pro-competition attitude and suggests those that oppose this may be doing so for strictly selfish reasons. These few pages alone could turn many people off to the entire work and confirm their worst suspicions about professional bass fishermen. It's something you can't read without becoming polarized to one camp or the other. For the record: the possession limit for bass in New Jersey is five and if a tournament contestant has six in his possession, be they live or dead, the contestant is in violation of the law, no matter what his intent is. He can of course catch all the bass he wants as long as he's not holding onto more than five bass while he's doing it. If he brings in six or more bass to the dock to be weighed, he'll be arrested for possessing over the legal daily bag limit. □

By Robert Soldwedel

Guide to Wildlife Management Areas

The revised and expanded edition of the "Guide to Wildlife Management Areas" is available now.

The new guide, 120 pages of articles and maps in three colors with full color wildlife photographs on front and back covers, is priced at $3 per copy.

Descriptions of the 57 wildlife management areas include locations, hunting and fishing information, as well as data on Wildlife Management Areas Regulations, parking and access roads.

The maps illustrate the boundaries, wooded areas, fields, lakes, streams and marshlands. Also depicted are the roads and highways leading into each management area.

Send a check or money order for $3 to:

Wildlife Management Guide
Division of Fish, Game and Shellfisheries
P.O. Box 1809, Trenton, N.J. 08625

Environmental News

HARRY GROSCH

Governor Brendan Byrne displays the signed marine fisheries bill which creates a state management program for commercial and recreational marine fisheries in New Jersey. Senator Frank J. Dodd (left) sponsored the bill (S 1399) which also creates a Marine Fisheries Council. Jerry F. English (right) is Commissioner of the Department of Environmental Protection, the state agency responsible for the implementation of this program.

Local program

Dep to award flood control project grants

The $25 million Emergency Flood Control Bond Act, approved by New Jersey voters in November 1978, included a provision for 50 percent grants for approved local projects. Grants of up to $1 million are available for local projects. An additional $100,000 is available for each extra municipality involved in a regional project. Regulations incorporating suggestions received at a February public hearing were adopted by DEP and became effective on June 22. The regulations set procedures for determining eligibility, establishing priority lists and awarding and administering grants. (Copies of the regulations may be obtained from Chief, Bureau of Flood Plain Management, Division of Water Resources, Box CN-209, Trenton 08625.)

The application deadline for the first round of local emergency flood control grants was August 20. Twenty-seven applications were submitted timely to DEP. These are currently under review.

FUNDING: On September 17 Governor Byrne signed legislation appropriating $10 million from the Emergency Flood Control Fund—the first money authorized for spending from the bond issue. The law, Chapter 196, P.L. 1979, sets the distribution of the funds as follows: $7 million for matching grants to local governments towards the purchase and development, maintenance and construction of flood control projects; $3 million to draft a statewide flood control plan and the delineation of flood plains. Part of the $3 million will also be used to help counties prepare their own regional flood control plans. □

Most New Jerseyans Favor Stronger Clean Air Rules

Environmental Protection Commissioner Jerry Fitzgerald English views the results of an Eagleton poll released in mid-September as new evidence that the state's policies on air pollution control are on the right track. The poll, conducted in April by the Eagleton Institute of Politics of Rutgers University, is part of a larger study being done by the Center for Coastal and Environmental Studies at the university on the economic impact of the state's clean air efforts.

The poll reports that most New Jerseyans supported stronger efforts to control air pollution and rejected the suggestion that enough was already being done by a 68 to 25 percent margin. When asked if stronger efforts were still favored even "if they caused taxes to go up," a majority still favored such measures by a margin of 55 to 40 percent. By a similar margin of 51 to 43 percent, the Institute also found that New Jerseyans favored stronger efforts even "if they lead to higher prices." According to the poll, state residents considered air pollution to be a serious problem, along with unemployment and inflation.

"New Jerseyans have a long record of concern for their environment and have frequently demonstrated their willingness to share in the reasonable costs of a first rate environmental program," said Commissioner English, citing as an example the record of strong public support for environmentally related bond issues.

George J. Tyler, director of DEP's Division of Environmental Quality, said, "DEP has made every effort to ensure that its air pollution control policies are designed to produce maximum results with the smallest possible impact on the economy. We believe that this policy is our best response to people's legitimate concerns about economic problems we face." He noted as an example the department's continuing efforts to force the federal Environmental Protection Agency (EPA) to enforce environmental standards equally across the nation so

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$130,000 IN FEDERAL AID FOR WATERFRONT PLANNING

Environmental Protection Commissioner Jerry Fitzgerald English in mid-September announced that the department had received a $130,000 grant from the National Oceanic and Atmospheric Administration (NOAA) to help complete the state's coastal management program. The grant will support DEP's coastal planning work in the northern waterfront and Delaware waterfront areas. The grant also will fund some of the activities of the Hudson Waterfront Planning, Study and Development Commission, which DEP staffs. In addition, the grant provides final payment for the planning of an urban waterfront demonstration project at Exchange Place in Jersey City.

David N. Kinsey, acting director of DEP's Division of Coastal Resources, said the grant was made possible by New Jersey's participation in the Federal Coastal Zone Management Program. Under this program, DEP expects to complete preparation of a Coastal Management Program for New Jersey by the spring of 1980. NOAA in September 1978 approved the first part of the state's coastal program for the Delaware and Raritan bays and Atlantic Ocean Shore Segment of the coastal zone. The remaining work, to be funded under this grant, will be focused on the state's developed waterfront areas along the Delaware and Hudson rivers and tributaries. □

SIX GRANTS AWARDED FOR SPILL RESEARCH

DEP recently announced the award of six grants totaling almost $155,000 to finance research in the prevention and cleanup of oil and chemical spills, and the effects of such spills on the marine environment. The six projects, selected after comprehensive review by scientists from government, industry and the academic community, were among the 45 research proposals received by DEP between January 1 and March 1 from New Jersey and out-of-state scientists. Funding for the research grants comes from the New Jersey Spill Compensation Fund, implemented by the state in 1977 under the provisions of the Spill Compensation and Control Act.

The grant award projects include oil monitoring research, effects of petroleum on molting blue crabs, development of a way to monitor petroleum uptake and release by hard shell clams, recovery of oiled grasses in marshes, research on extractable hydrocarbons in Raritan Bay and adjoining river mouth sediments, and the use of water jets in oil spill cleanup. □

KINSEY HEADS COASTAL RESOURCES

David N. Kinsey, 32, of West Windsor was named acting director of DEP's Division of Coastal Resources on July 30. Kinsey will oversee coastal and tidelands management; maintenance of navigation channels; protection of the shoreline; and the New Jersey Marine Police. He joined DEP in 1975 and served as chief of the Office of Coastal Zone Management where he was in charge of coastal planning and administered the state's Coastal Area Facility Review Act (CAFRA) permit program. Kinsey was graduated from Dartmouth College with a B.A. degree in Government/Architecture and received his doctorate in Public Affairs from Princeton University. □

SNOWMOBILES

- Prohibited in wildlife areas
- OK at some state parks/forests

Snowmobiles are not allowed on state fish and wildlife management areas because their use is not compatible with the primary purpose of the areas—providing a safe habitat for birds and game. Snowmobiles have caused damage to tree and shrub plantings, hedgerows, and grain patches meant for winter feed for birds and game, and cover in general. Wildlife have been harassed by snowmobilers traveling close to and into winter cover or feeding grounds. Repeated disturbance of wildlife during periods of severe cold and snow or ice, especially of deer in wintering areas, could jeopardize their ability to survive until spring.

Snowmobiles **ARE** permitted on specifically marked trails, and open field acreage in some state parks and forests. For example, High Point State Park (SP) has 20 miles of trails for snowmobiling; Ringwood SP, 19 miles; and Stokes State Forest, 23 miles. Washington Crossing SP has 150 acres of open fields for use by snowmobiles and Swartswood SP, 41 acres. A list of areas where snowmobiling is allowed is available from DEP's Division of Parks and Forestry, Box 1420, Trenton 08625. □

HAZARDOUS WASTE DUMPS TO BE CHECKED ON A WEEKLY BASIS

Under terms of a new law (Chapter 186, P.L. 1979) DEP is required to inspect, at least once a week, solid waste disposal facilities which handle hazardous or special wastes. (There are approximately 40 such facilities in the state. Inspections have been on a monthly schedule.) The law authorizes DEP to assess the facilities inspected for costs incurred in conducting the weekly checks.

At the bill signing on September 6 Governor Byrne said the law "emphasizes New Jersey's commitment to provide a continuing public response and monitoring of the disposal of chemical wastes and potential hazards to our environment. . . . We want to insure that maximum safeguards are employed in the handling of hazardous waste materials. This law, along with the Special Advisory Committee on Hazardous Wastes, the Hazardous Waste Task Force, and the new criminal code provisions which impose substantial penalties on those who indiscriminantly dispose of chemical or toxic wastes, should strengthen our efforts in this area." (See these pages, NJO Sept./Oct.) □

An ounce of prevention . . .

CHECK MERCURY VAPOR LAMPS IN SCHOOL GYMS FOR DAMAGE

With the 1979-80 indoor sports season underway, school and community center gyms throughout New Jersey are being used by thousands of players and spectators in the late afternoon and evening hours. Many of the gyms are lit with mercury vapor lamps which have high efficiency and long life as compared with incandescent and flourescent lights. (There are more than 25 million mercury vapor lamps in use nationwide—mostly in gyms, sports arenas, commercial stores and industrial facilities.) As long as the outer envelope of such lamps is undamaged, there is no ultraviolet (UV) radiation safety problem.

A high flying basketball can break the protective outer envelope of a light. There have been scattered incidents of UV radiation exposure in school and other gyms around the country in recent years, including two in New Jersey (one in a school in 1977 and the other in a community center in 1978), and all have been traced to a broken mercury vapor lamp in the facility. In the New Jersey incidents, several spectators who sat un-

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DEP BEGINS CLEANUP OF HAZARDOUS WASTES

JAMES M. STAPLES

PHOTOS BY AUTHOR

A team of workers hired by the Department of Environmental Protection spent the long, humid summer unpacking bottles, vials, boxes and flasks, identifying their contents and then repacking them. It was step one in the "defusing" of the toxic wastes at the Chemical Control Corporation buildings beside Front Street on the Elizabeth waterfront.

Chemical Control is one of a number of companies in the business of hazardous waste disposal for various chemical companies. Early this year DEP took legal steps to bring about a cleanup at Chemical Control because it deemed the amount and kinds of wastes which had accumulated at the Elizabeth facility to constitute a hazard.

In its legal pleadings, DEP emphasized to the courts that the assortment of toxic chemicals at the three-acre site harbors the potential for an explosion or fire in the crowded metropolitan area. Smoke from such an outbreak would contain combinations of many chemicals.

An estimated 34,000 drums of chemical wastes, many of them leaking their contents onto the ground, and hence into the state's waters, were crowded on the site and in a pair of buildings there. In some cases the drums were stacked four-high. The inventory ranged from explosives like nitroglycerine and picric acid and poisonous gases to outdated birth control pills. There were quantities of pesticides and polychlorinated biphenyl (PCB) residues, plus cyanide, low-level radioactive materials and substances containing concentrations of viruses and bacteria.

DEP moved onto the site during April of this year, shortly after Judge Harold Ackerman in Union County Division of New Jersey Superior Court appointed a receiver to carry out the property cleanup. Appointment of a receiver of this type is believed unique.

Daniel J. O'Hern, then the commissioner of DEP, designated Dr. Glenn Paulson, at the time Assistant Commissioner for Science and Research, to head the Chemical Control "task force" within the Department. Dr. Paulson has been succeeded by Deputy Commissioner Betty Wilson. From the outset, on-scene supervision has been the job of Karl Birns, chief of the Office of Hazardous Substances Control. DEP's legal team is headed by Deputy Attorneys General Steven Tasher and Ronald Heksch.

Before effective cleanup of the jumbled inventory of chemicals could begin, it was necessary to remove the explosives, dangerous gases and the worst toxics to reduce the peril of explosions and resulting fires. This nerve-wracking task was even more difficult because the site was so packed with drums that workers had little elbow room to handle materials. In addition to that, a frequent lack of labels and packing slips made it necessary to chemically analyze the contents of many containers.

View of part of collection of drums at Chemical Control, as seen from second-story loft. Even a wide-angle lens is inadequate to show all.

Deputy DEP Commissioner Betty Wilson talks to two key members of the Chemical Control "Task Force" at the site in Elizabeth. They are Deputy Attorney General Steven Tasher, center, and Karl Birns, chief of DEP's Office of Hazardous Substance Control. Wilson is Task Force chairperson.

Many of those containers, especially inside the buildings, were "lab packs," drums into which smaller boxes and bottles are placed. It is inside these catch-alls that small quantities of explosives have been found repeatedly.

Because the biggest concentration of lab packs was inside the buildings, the decision was made to concentrate on an upstairs loft where about 900 such drums were stored.

The loft was pronounced "defused" shortly before Labor Day. It was there that workers employed by Coastal Services, Inc., of Perth Amboy, spent the summer unpacking, sorting and repacking. This was important because it was learned early that ill-advised combinations of explosives and poisons were often packed together in a single drum.

As drums were moved out, workers were able to garner space where a long table was erected. On it the Coastal Services employees placed hundreds of glass containers of varied descriptions, segregating them in groups according to the nature of their contents and thus earmarking them for safe repacking.

Workers were also able to conduct basic chemical tests in the loft to roughly ascertain what they had found. But far more sophisticated testing often had to be done in order to identify chemicals.

Coastal Services, Inc., was hired by DEP to conduct the entire Chemical Control operation. DEP personnel, under

Continued on page 16D

New Jersey State Library

News Capsules

RECYCLE CHRISTMAS TREES

Your yule tree's "life" need not be over after the holiday season. Use the evergreens as windbreaks for exposed flower beds, "plant" the tree as a bird feeding station, or trim off the branches and place them as protective cover around rose bushes or other plants and shrubs. Discarded Christmas trees can be used as "sand dune builders," a long-standing practice in some coastal communities. Inquire at your municipal building to find out if there's a tree recycling project in the area—the wood chips make excellent mulch for gardens and shrubs. □

EARLY WARNING FOR BOATERS

The Marine Sanitary Device Federal Regulations go into effect on *January 30, 1980.* The regulations require vessels with a permanently installed head facility (toilet) to have some type of sanitation treatment device or holding tank. The rules, set by the U.S. Environmental Protection Agency (EPA) in 1976, are part of the national clean water program, which by 1980 will prohibit any raw sewage discharge into U.S. waters, and in some areas, any type of sewage, treated or not. Further information is available from DEP's Bureau of Marine Law Enforcement, Box 1889, Trenton 08625; or from the Commander, 3rd Coast Guard District, Boating Safety Division, Governors Island, N.Y. 10004. □

NEW AUTHORITY FOR MARINE POLICE

A law enacted earlier this year gives the New Jersey Marine Police the same authority and enforcement powers over motor vehicles operating on frozen lakes, ponds, bays and other waters of the state as they have over power boats and other marine craft on nonfrozen waters. The law, Chapter 58, P.L. 1979, has been in effect since March. □

PAULSON TO AUDUBON SOCIETY

Dr. Glenn Paulson resigned his position as DEP's Assistant Commissioner for Science to become Vice President for Science with the National Audubon Society in New York City. Paulson, who joined the department in 1974, was responsible for analysis of various scientific/environmental problems during his five-year association with DEP. □

SUMMER DAY TRIP AND YCC YOUTH PROGRAMS A SUCCESS

There are more than 130,000 New Jersey youngsters this year whose happy memories of their participation in DEP-administered summer programs provided plenty of material for their "What I Did on My Summer Vacation" compositions on their return to school in September.

The **Youth Recreation Opportunity Project,** financed with a $400,000 appropriation by the state legislature for the summer of 1979, made it possible for over 130,000 youngsters (up to the age of 18) from low and moderate income families to enjoy recreational and cultural day trips. The outings included visits to state parks and forests for swimming, camping and nature hikes, as well as historic and educational tours and bus trips to zoos and baseball games. In addition to the busing program, resident and day camp "camperships" were provided for about 550 youngsters at state approved camps. There were 67 youth-serving nonprofit agencies, statewide, participating in the program this year. (Sponsoring organizations take care of incidental costs and provide supervisors and counselors: State funds, transportation and camping.)

The Youth Conservation Corps (YCC), a federal/state program which offers work/education experience (for pay) in the outdoors to high school age young people, employed 90 girls and boys at resident camps, and 279 at 23 nonresident camps in the state over an eight-week period this past summer. The youths worked on conservation projects involving construction, stream clearing, erosion control and trail development while learning about the environment; and enjoyed recreational outings. (For the first time, DEP subgranted funds for YCC pilot programs to selected county park agencies. Reports indicate that all were successful.) □

SLUDGE MANAGEMENT

Regulations on reporting procedures for public and private producers of sewage sludges, and operators of industrial pretreatment facilities are scheduled for adoption by DEP this fall. The regulations will assist the department in establishing a statewide sludge management strategy. Land-based alternatives for ocean disposal of sludge will be measured in terms of impacts on air, surface and ground water quality. The regulations require disclosure of chemical and metal contents of sludge. A public hearing on the rules was held in June. □

Continued from page 16A

CLEAN AIR RULES

as to avoid an excessive burden on New Jersey and other northeastern states.

Tyler also observed that DEP consults extensively with industrial and environmental groups before adopting any new air pollution regulations in an effort to produce an efficient and effective program. "There is no question that we have made significant progress over the years in reducing air pollution in New Jersey. The public's demand for further effective action on our part strengthens our resolve to ensure the right of every New Jerseyan to breathe clean and healthful air," Tyler said. □

Continued from page 16B

CHECK MERCURY LAMPS

der a broken mercury vapor lamp and basketball players who performed under a damaged lamp suffered short duration skin and eye problems.

DEP's Bureau of Radiation Protection urges personnel at schools and other buildings which have existing installations of mercury vapor lamps—particularly in areas where they may be vulnerable to damage—to set up a regular schedule to check the lamps for breakage. If the outer bulb of a mercury or multi-vapor lamp is broken and the arc tube is operating, TURN LAMP OFF to prevent exposure to ultraviolet energy. All mercury replacement lamps should be of the *fail-safe* type which automatically shut off when damaged. This is one instance when the old saying, "An ounce of prevention is worth a pound of cure," rings true. □

Continued from page 16C

HAZARDOUS WASTES CLEANUP

Birns' supervision, are on the scene each workday overseeing the activities of 10 to 20 Coastal Service employees.

Anyone entering the premises must wear protective clothing as a safeguard against exposure to poisonous or carcinogenic substances. This means that a worker or DEP supervisor presents a futuristic aspect, clad in white jumpsuit and shoe coverings, gas mask, gloves, protective goggles and often a helmet over head coverings.

Inside the buildings at Chemical Control, a visitor is reminded of scenes from a science fiction movie, perhaps one in which explorer-scientists dressed like astronauts cautiously make their way through deserted buildings in a city stricken in mid-breath by some cataclysmic event.

This article will be continued in the January/February 1980 issue of *New Jersey Outdoors.*

New Jersey State Library

Don't Pick Up Car-killed Deer

I have been a Conservation Officer assigned to Gloucester County for the past thirteen years and have excellent rapport with the local and state police in my area (especially with Trooper Warren Mabey, who happens to be my son).

On 2/25/79 at 7:00 p.m. I received a call from Trooper Mabey advising me that when he arrived at a reported car-deer accident, the deer was gone. A witness had seen a car stop and stated that a well-dressed man got out and put this small button buck into the trunk of his car and sped away. The witness gave Trooper Mabey the license number of the car. The look-up came back to a man who lives a couple of miles from my home.

I proceeded to the address, but the house was dark and no car was in the driveway. I played a hunch and waited nearby in my car. After an hour and a half had passed, the car in question pulled into the driveway. I pulled up behind the car, and before I even got out of the car I could see blood on the bumper and all over the man's good suit and shoes. The man was not a typical deer violator. I asked him if the deer was still in the trunk and he said "yes." I removed a very bloody deer that had already been gutted. The trunk of this fine Oldsmobile was a mess!

When I asked him why he stole the deer, he claimed that he has hunted for 20 years and never killed a deer. When he saw the dead deer on the rural road, he could not resist the temptation. I issued him a summons for violation 23:4-43 which he pleaded guilty to the next day and paid $100.00 and $10.00 costs.

Save yourself embarrassement and possible fine. If you should see a dead deer along a highway, leave it there and notify the local or state police who will notify the Division of Fish, Game and Shellfisheries and a Conservation Officer will pick it up and dispose of it according to the Fish & Game policy. □

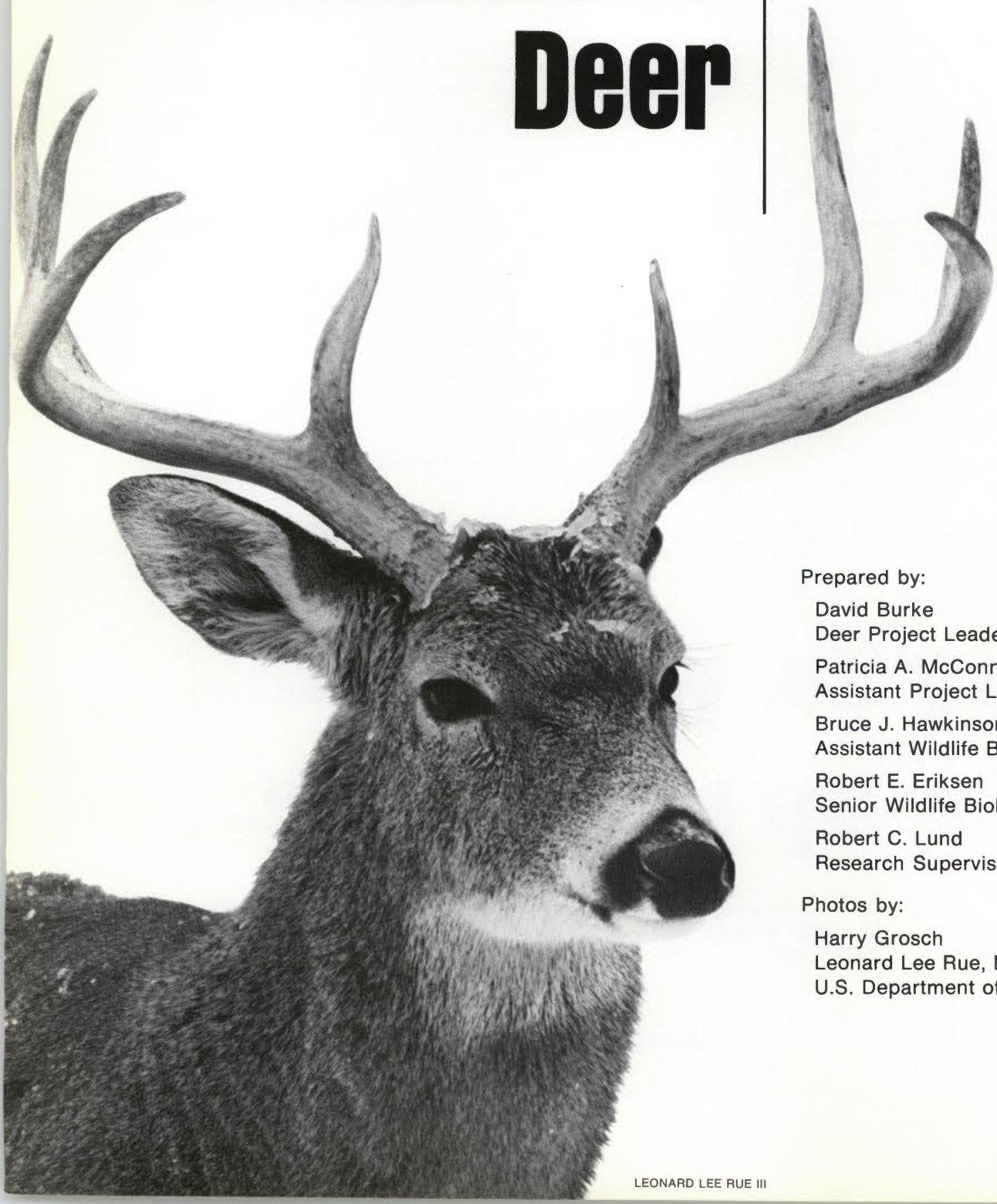
Conservation Officer Walter Mabey

Help the Garden State live up to its name. Don't litter.

A public service message of this publication and the New Jersey Council on Advertising.

New Jersey's White-tailed Deer

A Report on New Jersey's Deer Management Program for Fiscal Year 1979.



LEONARD LEE RUE III

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PROJECT W-45-R-15: "A STUDY OF THE NEW JERSEY DEER HERD"

Fiscal year 1979 was the fifteenth year that the Division of Fish, Game & Shellfisheries received funding under the Federal Aid In Wildlife Restoration Act for project W-45-R, "A Study of the New Jersey Deer Herd." Seventy-five percent of the research costs were contributed by the U.S. Fish and Wildlife Service and were raised from excise taxes on sporting arms, ammunition and other hunting equipment. The remaining twenty-five percent of research costs for this project were provided by the Division and were derived from the sale of hunting licenses, deer permits, etc.

This study provides much of the information required for managing New Jersey's deer resource. A list of research jobs included in the project for fiscal year 1979 follows. (Findings from several research jobs are discussed in subsequent sections.)

LEONARD LEE RUE III

With his white-tail flashing, this trophy buck runs at full speed.

PROJECT TITLE: A Study of the New Jersey Deer Herd (P.R. Project W-45-R-15)

Study Plans and Jobs

Study Plan I: Annual Deer Mortality

Job I-A—Determination of the Size and Distribution of the Annual Deer Harvest

Job I-B—Summation of the Extent of Deer Mortality other than Legal Harvest

Study Plan II: Condition, Productivity and Mortality

Job II-A—Collection and Evaluation of Age, Sex, Weight, Antler Beam and Antler Point Information from the Annual Deer Harvest

Job II-B—Collection and Evaluation of Reproduction and Condition Data Throughout the Winter-Spring Period

Job II-C—Mortality and Morbidity of Deer

Study Plan III: Deer Range Survey

Job III-A—Map the Extent and Quality of Deer Range

Job III-B—Location, Classification and Cataloging of Winter Range

Job III-C—Evaluation and Modification of Deer Management Zones

Study Plan IV: Population Inventory

Job IV-A—Calculation of Fall (pre-hunting) Populations

Study Plan V: Collection, Evaluation and Dissemination of Deer Resource Information

Job V-A—Preparation, Publication and Distribution of an Annual Deer Publication

Job V-B—Bow Hunter Harvest, Recreational and Demographic Survey

1978-79 DEER HARVEST

The 1978-79 deer hunting seasons in New Jersey produced an all-time record harvest of 15,818 deer, surpassing the prior record of 14,419 deer established in 1977-78. Included in the harvest were 249 deer taken under New Jersey's first, separate muzzle loader season. The total buck harvest of 8,690 during the five deer seasons was second only to the record established in 1977 (9,329 bucks). Although many Garden State deer hunters may refer to the "good old days," the fact remains that the statewide deer harvest has never been greater. Of 322,567 deer harvested since 1909—206,192 (64%) were taken during the last 20 years or since the first significant either-sex deer seasons were held.

FALL BOW SEASON
(October 7—November 9, 1978)

New Jersey bowhunters harvested 2,361 deer during the 1978 fall season. The total is slightly below the 1977 record harvest of 2,381 deer. Antlered bucks (1,146) comprised 48.5% of the bow harvest. Saturdays, holidays and the last day of the season were the major hunting days for bowmen. As in prior years, license sales indicate that the sport continued to grow in popularity in 1978.

SIX-DAY FIREARM SEASON
(December 4—December 9, 1978)

Although the 1978 "firearm buck" season did not establish a record harvest, many sportsmen will remember the opening day as one of the warmest, with 60°+ temperatures throughout the State. Despite balmy conditions on opening day, the season got off to a good start and by the end of the week 7,017 deer were registered at mandatory check stations. The total included 26 antlerless deer from zone 36, the "hunters' choice area."

This season provides the most man-days of recreation of any of the deer seasons.

SPECIAL PERMIT, MUZZLE-LOADER SEASON
(December 11, 12 and 13, 1978)

The 1978 special permit season for muzzle-loader deer hunters was the first separate season authorized in New Jersey. A total of 1,422 permits were issued and 249 deer were taken during the three-day season.

The new season was established to meet the demand created by an increasing interest in black powder shooting and primitive weapons hunting. By allocating some of the either-sex deer quota to this season, approximately four times the recreation days are provided per deer harvested as in the one-day, either-sex shotgun season.

SPECIAL PERMIT, SHOTGUN SEASON
(December 14, 1978)

A total of 25,273 permits were issued for the either-sex season in zones 1-22, 27, 29, 35, 37, 38, 39 and 40. The

harvest of 5,911 deer was attributable in part to the excellent weather conditions on the day of the hunt. The hunter success rate for all areas which were open was 23.4%.

The harvest reached management objectives established for the zones which were open for the season.

WINTER BOW SEASON
(January 6—January 20, 1979)

A total of 280 deer were taken by bow hunters during the winter season, establishing a new record. The season was the fourth held and the second which encompassed two full weeks with three Saturdays. Although weather conditions are an important factor, the season is gaining in popularity.

When results of the fall and winter season are combined, the total (2,641) establishes a new high for bow hunters. This impressive tally attests to both the skill of the sportsmen and the effectiveness of the bow and arrow for deer hunting.

Table 1—Number of legal deer reported harvested in each season in New Jersey in 1978, by zone.

Zone #	6-Day Firearm	Fall Bow Season	Shotgun Permit Season	Muzzle Loader	Winter Bow	1978 Total
1	204	34	248	15	11	512
2	98	19	43	3	4	167
3	137	54	218	8	8	425
4	398	123	534	22	10	1087
5	418	110	563	10	11	1112
6	151	84	182	6	10	433
7	261	106	265	16	10	658
8	680	223	760	32	23	1718
9	193	81	198	7	22	501
10	462	261	559	27	9	1318
11	475	197	750	24	12	1458
12	414	188	452	24	23	1101
13	120	42	133	1	8	304
14	227	110	205	7	16	565
15	99	30	66	1	7	203
16	146	37	64	3	1	251
17	94	15	58	1		168
18	117	41	82	2	3	245
19	101	31	28		7	167
20	110	16	25			151
21	207	28	85	3	3	326
22	76	25	27	4	4	136
23	286	81		3	9	379
24	225	21		3	6	255
25	79	25		3	4	111
26	261	46	20*	6	6	339
27	93	42	48	2	3	188
28	72	29		1	6	108
29	170	110	121	3	11	415
30	35	10				45
31	117	26		1	2	146
32	156	23		5	13	197
33	39	8		5	3	55
34	136	16		1	11	164
35	70	26	5		4	105
36	41	9				50
37	19	14	46			79
38			100			100
39	18	11	12			41
40	12	9	14			35
Total	**7017**	**2361**	**5911**	**249**	**280**	**15,818**

*Deer taken on the National Aviation Facility Experiment Center (NAFEC)

Table 2—Number of legal deer reported harvested in each season in New Jersey in 1978, by county.

County	6-Day Firearm	Fall Bow Season	Shotgun Permit Season	Muzzle Loader	Winter Bow	1978 Total
Atlantic	458	76	20	13	16	583
Bergen	8	3	7			18
Burlington	687	165	104	6	23	985
Camden	84	18	2	1	1	106
Cape May	116	19			10	145
Cumberland	348	94	42	8	19	511
Essex	2	2				4
Gloucester	90	38	2	2	5	137
Hudson	—	—	—	—	—	—
Hunterdon	1333	611	1767	83	43	3837
Mercer	274	126	329	17	17	763
Middlesex	153	59	118	4	8	342
Monmouth	188	52	120	3	5	368
Morris	486	196	558	16	23	1279
Ocean	475	92	240	9	10	826
Passaic	87	33	111	3	3	237
Salem	245	142	128	4	11	530
Somerset	416	163	432	9	35	1055
Sussex	683	184	803	33	29	1732
Union	—	—	—	—	—	—
Warren	884	288	1128	38	22	2360
Total	**7017**	**2361**	**5911**	**249**	**280**	**15,818**

TROPHY DEER

Most deer hunters are not terribly choosey about the bucks they harvest. Few hunt for record book animals alone, but consider any antlered buck a trophy worth remembering. The odds are against bagging a record deer. In the back of every deer hunter's mind, however, is the thought, "This might be the year that I bag the buck of a lifetime."

Such a buck must have a number of things going for him. The land on which he lives must be rich and fertile. Cover must be adequate to allow the buck to survive for several years in spite of pressure from automobiles, dogs, hunters and development. The deer must, in effect, beat the odds.

Each year, a number of hunters bag deer which are record book material. Recognition is given these hunters through the New Jersey Trophy Deer Program. This program, sponsored by the New Jersey Federation of Sportsmen's Clubs is run by the Division of Fish, Game and Shellfisheries. (Navy Arms and Neshanic Depot Antiques help sponsor the muzzle loader program.) The Boone and Crockett method of scoring big game animals is used to rate the animals entered in the competition.

Deer which qualify are entered permanently in the state record book. There are categories for typical and non-typical antler development in both the Archery and Firearm groups. Exceptionally heavy deer are placed in the 200 Pound Club. This year, the competition was expanded to include deer taken with muzzleloading rifles. The top three scores in each group receive wall plaques and are guests at a banquet held at the Sportsmen's Federation Convention.

Just how do the record holders manage to take such fine animals? They'll never say exactly, but you can be sure more than a little woodsmanship is involved. These hunters know how to read "the signs" and were fortunate enough, after locating a likely spot, to be there at just the right time.

This might just be your year to bag a trophy deer. If you harvest an exceptional deer, write to the New Jersey Division of Fish, Game and Shellfisheries, P.O. Box 1809, Trenton, NJ 08625, for details on the Trophy Deer Program.

1978 TROPHY DEER PROGRAM FIRST PLACE WINNERS

	Typical	Non-Typical
Firearm	Mike Minotty Salem County 149-3/8 points	No Entries
Archery	Robert Messinger Hunterdon County 141-3/8 points	Dennis Sedenio Gloucester County 134-7/8 points
Muzzleloader	Sal Bellomo Somerset County 89-8/10 points	No Entries
200 POUND CLUB		
Firearm	No Entries	
Bow and Arrow	George McVaughn Mercer 212-1/4 points	

HARRY GROSCH

These outstanding trophy deer reflect successful deer management efforts in New Jersey.

HARRY GROSCH

A proud Mike Minotty accepts his trophy for best Typical Firearm Buck from John Volk, President of the New Jersey Federation of Sportsmen's Clubs.

DEER MORTALITY OTHER THAN LEGAL HARVEST

Although the deer harvest includes the majority of all deer killed in New Jersey, additional factors come into play in the death of some deer. Other deaths occur as a result of vehicle collisions, a wide variety of accidents, dogs, illegal shooting and damage control permits.

Most road-killed deer and many other deer mortalities are discovered and reported to the Division of Fish, Game and Shellfisheries by the general public and local police. Division personnel, such as Conservation Officers and an assigned dead deer pick-up agent are responsible for removal of these deer. Information on each deer mortality is recorded on "Deer Mortality Report" forms and sent to the deer project. Location, age, sex, cause of mortality and other information is included on the report form. This data, when combined with harvest records and estimates of winter losses provides a more accurate measure of the total annual mortality. The lower jaw and/or female reproduction system may also be saved for examination.

During fiscal year 1978-79, 3,105 deer killed by automobile, 105 cases of other accidental death, 131 illegal cases, 59 killed under damage control permits and 788 deer reported missing or stolen were recorded by the deer research project. The total of 4,188 non-hunting mortalities is the highest on record. Table 3 summarizes the information collected over the past 15 years ("missing or stolen" cases are omitted). The percentage of sexes represented in the accidental kill are 38% males and 62% females.

Table 3—Summary of Past Incidence of Deer Reported Killed Accidentally, Illegally and Under Damage Control Permits. (Fiscal 1965-79)

FISCAL YEAR	NO. ACCIDENTAL	NO. ILLEGAL	NO. PERMIT	TOTAL
1964-65	1,964	207	35	2,206
1965-66	1,982	207	36	2,225
1966-67	2,166	187	69	2,422
1967-68	1,970	215	26	2,211
1968-69	1,895	174	31	2,100
1969-70	2,212	222	16	2,450
1970-71	2,452	281	6	2,739
1971-72	2,248	230	19	2,497
1972-73	2,833	312	19	3,164
1973-74	2,210	307	31	2,557
1974-75	2,133	301	58	2,494
1975-76	2,537	173	21	2,736
1976-77	2,686	158	11	2,930
1977-78	3,227	162	55	3,444
1978-79	3,210	131	59	3,400

DEER CONDITION

A total of 3,447 deer were examined by Division personnel for age structure, weight, antler points and antler beam diameter during the 1978-six-day firearm season, representing 49.1% of the total deer harvested. During the 1978 either sex shotgun season 5,308 deer or 89.8% of the total harvest were examined for weight and age information. Selected data is summarized in Table 4.

The data on antler beam diameter and number of antler points are valuable in determining the relative health of a deer herd. This information mirrors the productivity of the land. As can be seen by this condition table, antler beam diameters greater than 20 mm for yearling males come from agricultural areas of the state. The average number of antler points (4.9-6.1) is correspondingly higher than the rest of the state.

Yearling male dressed weights were highest in zones 11, 12 and 14, or areas of intensive agriculture. Crops such as corn and soybeams are ideal for deer growth and health maintenance. The lowest dressed weights occurred in zones 21, 24, 26 and 32. These areas have generally infertile soils and habitat that support less deer. This and additional information is used in making management decisions concerning harvest quotas.

HARRY GROSCH

Deer checks stations provide the opportunity to collect a wide range of information on the hunter harvest.

Table 4—Deer Condition Data by Deer Management Zone for 1978

DMZ	1-1/2 year old Males (Yearlings)				1-1/2 year old Females	Fawns Average Weight	
	% of Buck Harvest	x weight* (lbs)	x Antler Diam. (mm)	x Antler Points	x weight (lbs)	Male	Female
1	78.7	8.95	16.2	3.0	78.6	46.7	45.2
2	79.6	104.2	18.8	4.0	90.9	65.8	57.1
3	48.1	82.2	15.6	2.5	73.5	45.7	42.4
4	81.1	91.3	16.1	3.3	78.6	49.3	47.5
5	82.9	104.4	19.4	4.5	88.2	59.6	55.3
6	70.96	93.0	16.8	3.2	75.0	47.5	44.6
7	87.9	111.0	20.3	4.9	89.9	64.1	60.7
8	87.4	106.7	19.1	4.5	92.1	62.3	57.1
9	83.8	102.6	18.9	4.3	79.0	54.9	54.5
10	91.3	108.7	20.2	5.1	92.9	66.3	60.9
11	78.8	116.1	21.0	5.2	95.3	69.7	63.7
12	76.5	115.9	21.5	5.4	95.3	70.1	63.3
13	72.4	108.6	19.2	4.0	94.1	67.2	55.9
14	71.2	116.5	21.1	5.8	93.3	71.2	63.2
15	80.0	111.8	22.0	6.1	97.6	71.6	60.9
16	40.4	98.2	18.9	4.5	78.8	57.4	52.2
17	45.5	113.2	21.8	6.0	90.4	60.6	50.8
18	47.5	81.2	15.0	3.2	64.5	41.8	39.6
19	58.3	94.3	18.2	4.2	50.5	50.6	39.6
20	51.1	84.7	15.4	3.1	68.0	66.3	55.5
21	41.4	72.9	12.8	2.6	64.2	39.6	38.4
22	58.3	78.8	15.3	3.6	61.3	47.8	35.7
23	42.5	80.0	15.5	2.9			
24	36.2	73.8	14.5	3.1			
25	57.1	89.5	17.5	3.1			
26	52.5	74.3	15.0	3.2	75.5	43.5	40.1
27	75.0	115.2	20.4	5.6	103.8	67.9	64.9
28	71.9	109.9	20.6	5.4			
29	83.6	112.8	20.1	5.2	96.4		
30	77.8	93.6	14.3	2.5			
31	63.5	90.1	16.3	3.7			
32	34.5	72.4	14.2	2.4			
33	46.2	77.7	17.0	3.4			
34	46.2	80.8	14.3	2.8			
35	58.3	106.3	19.8	4.9	98.0	80.0	—
36	40.0	90.0	10.0	2.0		76.0	60.0
37	42.1	82.2	17.0	2.4	73.4	46.0	44.0
38	0	97.2	15.8	2.6	85.0	55.0	50.0
39	0	70.0	13.0	—		60.0	57.3
40	100.0	98.7	18.2	4.8	71.5	38.3	42.7

*All weights in Table are Dressed Weights taken in December.

DEAD DEER SURVEYS

Each March and April, project personnel organize and conduct searches on known deer wintering areas in order to assess deer mortality during the winter-spring period. During March and April of 1979, dead deer searches were conducted on 13 areas totaling 2,405 acres. Although a total of 30 dead deer were located, the number was much lower than for 1978. Only two mortalities involving malnutrition were noted; these deer were found in Atlantic County. In general, the winter of 1978-79 was far less severe than the preceding winter.

Table 5—Summary of dead deer surveys (1970-1979)

Year	# Areas Searched	# Acres Searched	# Dead Deer Found	Auto	Illegal-Accidental	Malnutrition	Dog	Other	Unknown
1970	6	1875	26	1	10	1	4	0	10
1971	11	3674	46	1	11	17	2	0	15
1972	11	3674	11	0	10	0	0	0	1
1973	10	3620	31	0	7	14	0	0	10
1974	9	2040	18	0	3	5	0	0	10
1975	12	3090	19	0	10	2	0	0	7
1976	11	2070	21	2	12	2	0	0	5
1977	12	1544	18	1	10	1	0	0	6
1978	19	3473	123	1	11	52	42	1	16
1979	13	2405	30	1	3	1	0	1*	24

*Malnutrition and pneumonia
NOTE: Some of the deer reported above are included in Table 6.

Mortality and Morbidity Study

Monitoring the health of New Jersey's deer herd through routine diagnostic services allows for the early detection of epizootic and exotic pathogens, overpopulation and environmental pollution. The information obtained from the study is used in formulating management programs including the objective of maintaining a productive, healthy deer population.

During fiscal year 1979, the Division's wildlife pathologist performed necropsies on 26 white-tailed deer. Table 6 summarizes the autopsy findings for 25 deer.

Table 6—Summary of Diseases and Mortality Factors Diagnosed for 25 Deer in New Jersey (1978-79)

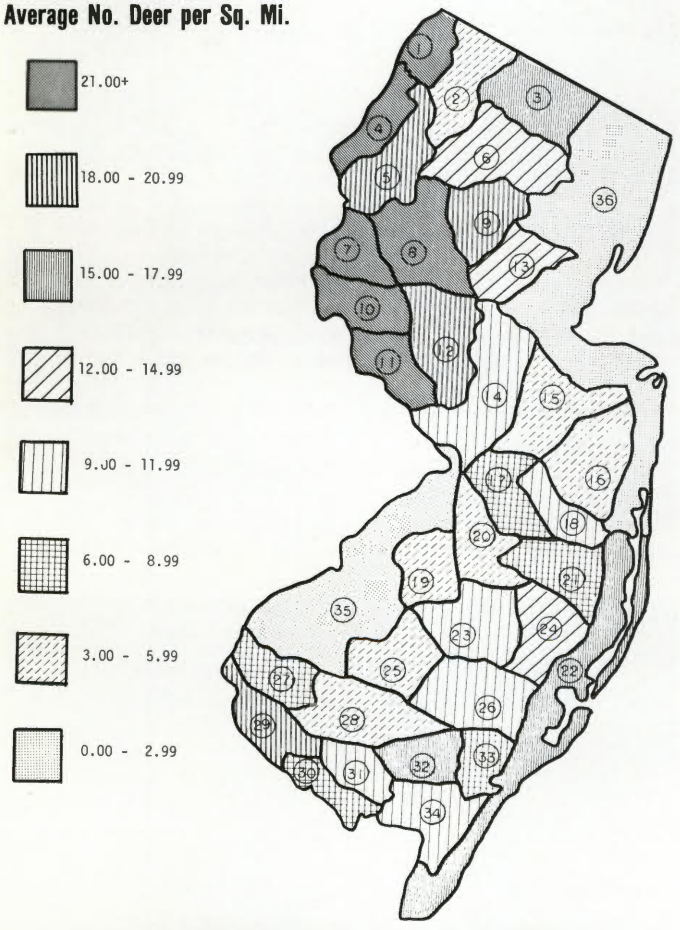
Disease or Mortality Factor	Percentage of Cases	Number of Deer	County
Dog Predation	20	3	Hunterdon
		2	Sussex
Starvation	16	1	Sussex
		1	Morris
		1	Hunterdon
		1	Atlantic
Trauma-Fractures	8	1	Sussex
		1	Morris
Bullet Wounds	8	1	Hunterdon
		1	Sussex
Arrow Wounds	4	1	Hunterdon
Automobile	4	1	Hunterdon
Pneumonia—Viral (Viremia)	12	3	Hunterdon
Aspiration	4	1	Hunterdon
Peritonitis	4	1	Morris
Neoplasia	8	1	Sussex
Developmental Abnormality	4	1	Middlesex
Unknown	8	1	Somerset
		1	Morris

DEER RANGE MAPPING

The map below illustrates minimum deer population densities in New Jersey's 36 management zones. The estimates are *minimum* population estimates based only on the hunter harvest. The average number of deer per square mile was determined from a four year average (1974-1977) and the total area of undeveloped land in each zone. Local populations vary significantly. For example, the fall deer density in some areas of DMZ 10 exceeds 100 deer per square mile. In contrast, many undeveloped sections of zone 35 have no deer herds due to the lack of sufficient cover (i.e. woodlots or wooded bottom land).

During fiscal year 1979, deer project personnel compiled land use data, established permanent survey points for future reference, inventoried winter range (Passaic, Sussex and Warren Counties) and began evaluating deer management zone boundaries, particularly within the inner coastal plane. Since deer are a product of the land, land use data and trends are important management parameters!

Minimum Deer Population Levels for New Jersey Deer Management Zones (1974-1977)



THE BOW HUNTER HARVEST, RECREATIONAL AND DEMOGRAPHIC SURVEY

During 1978-79 a telephone survey was conducted by deer project personnel and Eagleton Institute at Rutgers in order to collect recreational and demographic information and also to determine hunters' attitudes toward their sport. This research data is being used for the better management of the deer resource and to improve, if necessary, the bow hunters' recreational experience.

Although 15.5 percent of the 1977-78 bow season's hunters did not hunt during 1978-79, there was a slight increase (2.0 percent) in the total number of bow hunters. This was due to new hunters taking up the sport and a return of hunters who dropped out of bow hunting prior to 1977, who decided to try bow hunting again in 1978-79. One reason given by those individuals choosing not to hunt was that they were "too busy". Others said that they had lost interest in the sport. Bad weather was cited by those not participating during the winter season. As a result of this survey, it was determined that 34,091 licensed hunters were afield during the fall season and 9,567 bow hunters were active during the winter season.

The number of days that a hunter was in the field averaged nine for the fall and five for the winter. Generally, the majority hunted less than five days. The total number of "man-days" utilized by all licensed hunters for both seasons was 349,331. Most of the hunters used private land.

The three most popular counties used for bow hunting were Hunterdon, Sussex and Warren. Most hunters stayed within one county during any one season.

It appears that the winter bow hunters are the *serious* bow hunters in New Jersey. (These individual tolerate cold and inclement weather encountered during the winter season.) Most of these sportsmen (96 percent) also hunted the fall season.

Compound bows were chosen almost 2 to 1 over other conventional bows. (Compound bows were legalized in 1972 and have gained in popularity each year.)

One of the most important aspects of this survey was finding out the hunters' views on improving the archery deer seasons. Fifty-five percent of the hunters believed that these seasons could be improved in some way. The rest were satisfied with the current regulations. Those hunters having complaints were then requested to list specific problems and their solutions. The following table is a synopsis of these responses:

Table 7. Respondents recommendations for improving archery seasons

		Percentage	
	Category	**Fall**	**Winter**
A.	Time/length of season	(51.3)	(55.0)
	Lengthen season	30.5	37.3
	Start season later	7.8	9.8
	Sunday hunting	4.5	—
	Shorten season	1.7	3.9
	Other	6.8	4.0
B.	Conflicting seasons	(20.7)	(11.8)
	No overlapping seasons	7.3	2.0
	No small game interference	3.9	3.9
	Stop early squirrel season	2.2	2.0
	Separate gun and bow seasons	6.7	3.9
	Other	0.6	—
C.	Site improvements	(9.1)	(9.9)
	More open ground	0.6	—
	More public ground	4.5	5.9
	More management areas	0.6	—
	Plant more deer food (bait areas)	2.8	2.0
	Other	0.6	2.0
D.	Legal changes	(5.3)	(3.9)
	Legalized bow releases	0.6	3.9
	Make hunter safety tests more strict	1.7	—
	Other	3.0	—
E.	Better communication	(2.4)	—
F.	Miscellaneous	(10.2)	(17.7)
	Improve deer population	1.1	5.9
	Stop development	1.1	—
	Allow 2 deer per hunter	.6	2.0
	More conservation officers	.6	5.9
	Other	6.8	3.9
G.	Don't Know	(2.2)	(2.0)

New Jersey State Library

The majority of responses centered around increasing the length of the seasons; therefore, improving the hunters' recreational opportunity. Mild complaints were voiced over the early grouse, woodcock and squirrel seasons. However, a few hunters revealed that the increased number of hunters during upland game seasons caused the deer to move to a greater degree, therefore, making their hunting more enjoyable. Ironically, "better communication between biologist and hunter" was listed which was precisely the point of this survey.

The age structure of bow hunters is presented in the following table:

Table 8. Age Structure of 1977 Purchasers of Bow Hunting Licenses

	Percentage	
Age	**Fall**	**Winter**
15-20	13.4	14.9
21-30	29.9	32.6
31-40	29.5	25.8
41-50	16.1	10.9
51-60	7.2	12.8
61-70	3.9	2.0
70 or greater	—	1.0

There is slight difference in the ages of bow hunters between seasons. Ninety-eight out of every 100 bow hunters are male.

As a result of the economic information asked in the survey, it was found that most bow hunters are regularly employed and financially secure. Most bow hunters live in areas classified as "new suburbs".

Hopefully, the hunters who participated in this survey realize that it was done to assist them in their pursuit of bow hunting recreation. Their cooperation is deeply appreciated.

POPULATION CONTROL AND EITHER-SEX HUNTING SEASONS

Wildlife management has been defined as "the science and art of changing the characteristics and interactions of habitats, wild animal populations and man in order to achieve specific human goals by means of the wildlife resource." In the management of New Jersey's deer resource, the Division of Fish, Game and Shellfisheries' goal is to develop and maintain a healthy and productive deer population while at the same time maintaining this population at a level compatible with other land uses. One means of obtaining this goal is through the use of sport hunting as a tool of deer population control.

In the early 1900's, deer were a novelty in New Jersey, with hunting seasons either completely closed or highly restricted. Antlered bucks-only hunts, first held in 1909, were the rule. This continued, with minor exceptions through 1951. Bucks-only seasons allowed deer populations to increase all but unchecked, since a given buck can breed with several does and not all bucks are necessary for breeding purposes. In addition, the firearm deer season in New Jersey is held after the peak of the "rut" or breeding season, which helps assure that all receptive does are bred.

With the successful reestablishment of deer throughout the state came problems. As early as the late 1940's, farmers and other landowners were demanding increased deer harvests to alleviate damage to crops and ornamentals. Since bucks-only hunts had obviously not had a controlling effect on deer numbers, the Division of Fish, Game and Shellfisheries recommended a controlled harvest of antlerless deer (does and fawns) as well as adult bucks. Because of the strong "bucks-only" tradition established in New Jersey's hunting fraternity, early efforts to control deer numbers through

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This cedar stand shows a symptom of overpopulation—overbrowsing.

LEONARD LEE RUE III

Although this fawn may look alone, its mother is nearby.

LEONARD LEE RUE III

A doe and her fawn check out potential danger.

either-sex hunting seasons were strongly opposed. However, as time passed, the need for control became more acute and in the late 1950's and early 1960's a variety of experimental either-sex seasons were held. These included a three-day permit season held in 1959 (restricted to ten northern counties); a statewide season in 1962 and a "party permit" in 1962 and 1963 in which a group of four hunters could obtain a permit to harvest an antlerless deer. This season format was abandoned in favor of the either-sex permit system in 1964, the system currently in use.

The either-sex permit system limits the number of hunters permitted to take antlerless deer in a given area. Each area is assigned a permit quota based on the size of the deer population, past hunter success (number hunters/deer killed) and the management goal for the area (increase, stabilize or decrease the deer population).

For many years, permit quotas were assigned on a county basis. However, there were some problems associated with this method. Vast differences in deer population and range conditions often exist in a single county. In addition, county borders were often unrecognized by hunters in the field and either-sex harvests were hard to control since there was no means of directing hunting pressure within a county.

With the adoption of the mandatory deer check station system in 1972, a means was now available for collecting and analyzing deer population data from geographic areas smaller than counties. This information led to the development of the Deer Management Zone concept in 1974. Check station data, and that produced by other research efforts, permitted the division of the state into 36 Deer Management Zones ranging in size from 90 to 344 square miles. Each zone represents an area with similar deer herd characteristics (weight, antler growth, reproductive rate, etc.), land ownership, land use and trends, soils and vegetation. Under this system, the need and degree of population control is dictated by the needs and characteristics of the deer and its habitat. Hunting pressure could now be better directed to areas of need.

The current system, which allocates a number of either-sex permits on a zone basis is the best system yet devised for controlling deer populations through either-sex hunting.

How are the number of permits allocated to a given zone determined? The attainment of the goal established in a given management zone, be it to increase, stabilize or decrease the size of the deer population, is dependent on the number of adult females that are allowed to be harvested. Past studies indicate that a harvest rate of .30 to .35 adult does to adult bucks in the harvest will allow the population to increase; .40 to .45 bucks would have a stablizing effect and .50 would result in a decrease. These rates are not absolute, and vary from zone to zone, but they help illustrate how the system works.

Once this is established, the structure of the antlerless deer kill determined from the examination of data collected during previous years is examined to determine the rate at which adult does enter the harvest. This varies from zone to zone; the percent of adult does in the either-sex harvest in Zone 6 may be 62.5 compared to 48.0 percent in Zone 5. This figure allows the determination of the size of the total antlerless kill that must be obtained to harvest the desired number of adult does. For example, if the anticipated buck kill from Zone 10 is 639 and a reduction in the herd is desired, a harvest rate of .60 adult does/adult bucks would be needed (639 x .60 = 383 adult does). Since data from previous seasons has shown that approximately 53% of the antlerless kill is adult does, then 383/.53 or 723 antlerless deer (does and fawns) should be harvested to obtain the desired harvest of adult does.

This is a simplified example of how permit quotas work. Additional information such as quality of the deer and its habitat must also be taken into consideration. Harvest rates are adjusted to achieve a desired deer quality goal (antler growth, weight, reproductive rate). The goals are understandably higher for the higher quality agricultural areas than are those for the central pine barrens.

White-tailed deer now occupy most undeveloped lands which are capable of supporting them. With few exceptions, deer populations are presently at maximum allowable levels and the control of populations through either-sex hunting is a natural outgrowth of a successful deer restoration program. It will continue to be the major means of deer population control as long as there are deer and people and room for both.

SPECIAL AREA DEER MANAGEMENT PROGRAMS—NAFEC

One of the many functions of the deer project is to provide the technical assistance necessary for implementing and continuing wildlife management plans on unique or special areas such as parks, military reservations, fenced areas, large private land holdings, etc. Specific deer management programs for such areas are often necessitated by land use, land ownership, the fact that the areas are totally enclosed by fences, deer damage, the need for population control and other factors which are unique to the special areas. The trend toward deer management programs on special areas is increasing.

The National Aviation Facilities Experimental Center (NAFEC) is an installation of the U.S. Department of Transportation, Federal Aviation Administration, located at Pomona, Atlantic County. The facility functions as an experimental center, military base, training area and airport. A large portion of the Atlantic City Reservoir adjoins NAFEC and is enclosed by a common fence.

The complex includes: large expanses of grassland adjacent to runways and buildings, oak pine-upland, hardwood and southern white cedar-lowland, and a reservoir. White-tailed deer have inhabited the area for many years.

U.S. DEPARTMENT OF TRANSPORTATION

Lush grasslands surrounding airport runways often attract wildlife. The Division has assisted several airport facilities in developing programs which reduce the potential for aircraft-wildlife accidents.

The presence of deer and other wildlife has often conflicted with NAFEC operations. An early attempt at alleviating deer-aircraft problems involved trapping and removal of deer by the Division; however, this program was terminated statewide during the 1960's. In 1967 and 1968, controlled deer harvests were conducted to reduce the resident deer population. After 1969, no population control measures were authorized and the deer population increased. Deer-aircraft accidents and near accidents also increased. From 1972 through 1976, six deer were struck by aircraft. During February of 1977, the Division made recommendations to alleviate deer-aircraft problems at the Center. One recommendation was to conduct a controlled deer hunt in December. NAFEC officials did

not accept this recommendation until December 20, 1977, after other control measures had failed, and two additional accidents and several near accidents had occurred. (Over 70 deer were observed on runway areas at times during the fall of 1977).

Despite the short period of time available to develop and implement a controlled hunting program, and efforts to halt the program by various protectionists, a total of 53 deer were harvested by New Jersey sportsmen on January 7, 14 and 21, 1978. On February 10, 1978, a helicopter survey of 975 acres of NAFEC indicated a minimum of 25 deer present.

Although there were no deer-aircraft accidents during 1978, the Division recommended continuation of the controlled hunting program. On December 16, 1978, a total of 20 deer were removed by special permit holders.

Utilization of a controlled hunting program at NAFEC proved to be an effective and safe management tool. The potential for a serious or even fatal deer-aircraft accident was reduced; wasteful non-hunting mortality (dog predation) was eliminated; the remaining deer herd was brought to a level below the carrying capacity; and, many New Jersey sportsmen benefitted directly.

THE ANTLER CYCLE

White-tailed deer normally begin antler development at 10 months of age. Some believe that the small round 'buttons' of the fawn buck are developing antlers, but this is incorrect. These circular protuberances are actually the terminal ends of the antler pedicles, the bony extension of the frontal bone from which the antler will be formed. The pedicles can be felt when the animal is about 2-3 months old and seen at 6 months, when they are approximately 1-1/2 inches long. At 10 months of age, the skin covering the pedicles breaks with the onset of antler growth.

The normal cycle of antler development begins in early April, with the increasing periods of daylight. This increased exposure to light stimulates the pituitary, a gland located within the basal area of the skull. The secretions of this gland indirectly stimulate the male sex glands or testes which produce the hormone testosterone. It is this hormone which actually initiates the process of antler development.

The newly forming antlers first become obvious in May. During this initial period of development, growth is very rapid, as much as 1/2 inch a day. Usually the first fork will appear before the end of the month.

By June, assuming the animal is in good physical condition, the second fork may appear. During the entire period of development, the antlers are covered by the protective epidermis or velvet. Supplied with nerve endings and blood vessels, the velvet not only protects, but also supplies the antler with the nutrients needed for proper development. Seemingly they sense the fragility of their antlers at this point of development and the bucks become quite solitary, spending much of their time in heavy cover.

Maximum width or spread is attained by July. By now most of the points have been formed, and the calcification process, which will eventually turn the entire structure to bone, begins at the antler base.

The hardening process is almost complete by the end of August. The antlers, which until then were no more than masses of connective tissue produced by the dermis (second skin layer), become impregnated with lime.

The shedding of the velvet in September marks the final stage in the development cycle. The testosterone level in the blood rises markedly, completing the hardening process and causing the blood vessels at the antler base to constrict. Now, with the blood supply cut off, the velvet soon dies and is quickly removed by the animal.

THE CYCLE OF ANTLER DEVELOPMENT IN THE WHITE-TAILED DEER.

A buck may polish his antlers for weeks following the loss of the velvet, giving the points a bright ivory appearance. It is of interest to note at this point, that the staining of the antlers is caused principally by the bloody residue of the velvet and not by the sap of trees and shrubs upon which they were polished.

January is the principal time of antler loss in the more northern portions of the white-tail's range. Now the blood vessels, which have fed the spongy core of the antler, are constricted by the increase of bony tissue around the base. The antler now dies and granulation tissue is formed within the base of the antler pedicle, as the blood vessels increase in both size and number. The connection between the antler and pedicle is thus broken and the antler is dropped, exposing the red, socket-shaped terminal end of the pedicle.

Usually, both antlers are dropped within a few hours of each other. There have been reports, however, of days or

even weeks elapsing between individual drops.

Though it does not always hold true, it is generally accepted that older bucks will begin antler growth earlier and drop them sooner than younger animals. Furthermore, a healty deer is more likely to drop its antlers before one that is in poor physical condition.

Of interest is the fact that in tropical areas where there is little climatic variation, and subsequently no definite breeding season, antlers are formed and dropped throughout the year.

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Small saplings are utilized for rubbing off velvet before rutting season and for "sparring."

SPIKES OR RACKS

At least three factors control the extent of antler development:

1. age
2. hereditary background
3. quality and quantity of available food plants.

Generally, the older the animal the larger the antlers. Between the ages of 1-1/2 and 3-1/2 years, there is a rapid increase in antler beam diameter. From 4-1/2 to 7-1/2 years, the increases continue, but at a much slower rate. Points generally increase to the age of 4-1/2 years, after which they usually stabilize.

A young buck in excellent physical condition may have more points than an animal many years his senior, (suffering from malnutrition or the infirmities of age). In fact, very old individuals (10 years plus) may have no antlers at all. This can be explained as a function of inadequate supplies of essential hormones. However, few deer in the wild reach such an advanced age before man and nature take their toll.

When considering extensive areas, the effect of natural selection on the genetics of the various races of whitetailed deer is obvious. In general, those races inhabiting the more northern sections of North America exhibit appreciably larger antlers and greater body size than their southern counterparts. The value of this size variation can be explained by 'Bergmann's Rule' which states that in warmblooded species, the larger the animal the less relative surface area is exposed to the environment. This permits minimal heat loss, allowing the northern races to adapt better to the severe winters typical of their range. The weight variations exhibited by the 30-odd subspecies or races of the white-tailed deer range from 50-pound adult bucks of the Florida Keys to the 400-pound monarchs of Minnesota and Wisconsin.

When speaking in terms of limited areas, diet is probably the most important factor controlling antler development. To be more specific, it is the quantity and quality of the forage available during the *previous winter* which exerts the major influence. This is especially true for young animals (less than 3 years), where body growth and maintenance take precedence over antler growth. Usually, only those individuals attaining good body growth will develop large antlers.

Poor soil conditions and the associated lack of minerals and proteins in the available forage plants will significantly reduce antler growth. In contrast, bucks of the same age inhabiting areas with productive soils will achieve a greater degree of antler development.

The maintenance of an adequate food supply is of paramount importance in both developing and maintaining optimum antler growth. Unlike the pheasant and cottontail, members of the deer family are capable of destroying their own range before any major mortality occurs. This results not only in fewer animals and submarginal antlers, but far more important, a habitat so severely damaged by over-browsing that its capacity to support deer in significant numbers can be destroyed for generations.

PHOTOS BY HARRY GROSCH

"You are what you eat" was never more clearly illustrated than by the antler development exhibited by these two N.J. bucks. Both are the same age; however, the one on the right inhabits an area having adequate supplies of high quality forage, while the other an area where food supplies are low, both in quantity and quality.

DEER HABITAT RELATIONSHIPS

The white-tailed deer, like all forms of wildlife, is a product of the land. The quality of the soil and the plants produced by it directly influence the quality and productivity of deer populations. It is the quantity and quality of the available food and cover plants which determine the number of deer a given area can support. This is termed the area's carrying capacity.

A knowledge of the factors affecting carrying capacity is essential to the understanding of deer-habitat relationships. Maximum carrying capacity refers to the number of deer that the habitat will support at a strictly maintenance level. However, game managers attempt to hold deer numbers below this level at what is termed the optimum carrying capacity: the number of deer the range can support in good condition, on an annual sustained-yield basis, without depleting or damaging the habitat. This helps to insure a relatively stable population, year after year, rather than a population which fluctuates markedly with little control.

Food and cover are usually the most important of the several factors that influence carrying capacity. If a deer does not have enough to eat, it cannot survive. On the average an adult deer requires 5 to 7 pounds (green weight) of forage per 100 pounds of body weight a day. But it is not just the total amount of forage or browse consumed that must be considered. The quality or nutritional value of the food is of equal or even greater importance. Just as "all that glitters is not gold," "all that is green is not deer food." For example, a deer will starve on a five-pound diet of rhododendron, but will do quite well on the same amount of Atlantic-white cedar.

Productive deer populations are typical of habitats producing adequate supplies of high quality foods. Compared with populations forced to subsist on food sources limited in quantity, quality, or both, the does on good range produce more fawns, fawn survival is higher, weights are heavier, losses to disease and other sources of mortality are less, and antler growth is greater.

Though the importance of food in determining the carrying capacity of deer range cannot be overemphasized, it is not the only element that must be considered. The need for cover, and most especially winter cover, cannot be ignored.

Cover provides protection from both weather and enemies and, as recent studies have shown, it may have the psychological value of fostering a sense of security in deer which may be important in helping maintain an animal in good physical condition. However, protection from the extremes of temperature, wind, and, to a lesser extent, deep snow during the critical winter period appears to be the primary function of cover.

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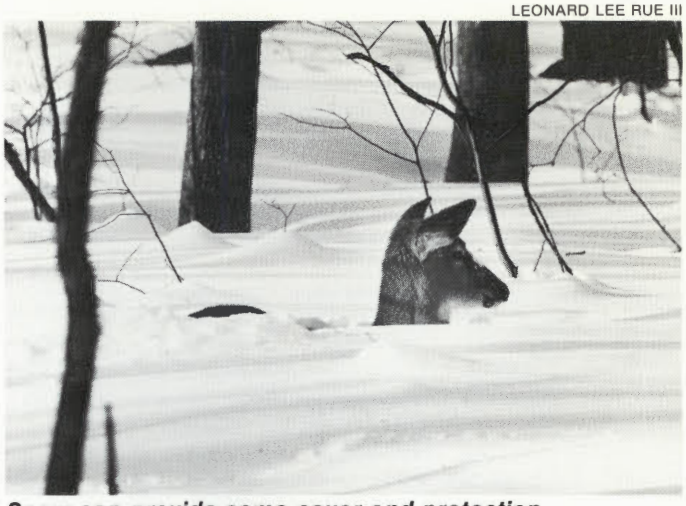

Snow can provide some cover and protection.

The importance of cover becomes more apparent when one realizes that the winter range may be as little as 10 percent of the total deer range. Yet if it is damaged or lost, through urban development indiscriminate timber harvest, or through over-browsing by the deer population that it supports, the ability of the surrounding habitat to support deer is greatly reduced.

During severe winters, deer may enter these wintering areas in December or early January and remain there for three months. Survival during this critical or "pinch period" of the year, depends on the ability of the wintering area to provide the deer with at least the minimum necessities for survival. There must be protection from the elements to minimize the loss of heat and energy reserves of fat within the deer's body. There must be food in close proximity to quality cover. The Atlantic white-cedar swamps of New Jersey's southern deer regions are excellent winter areas capable of providing both quality cover and food. Unfortunately, many of these areas have been damaged, not only through indiscriminate logging, fire, or urban development, but by the activities of the deer themselves. Wintering areas carrying deer populations that exceed the maximum carrying capacity are all too common. The result is that many areas are now

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Deer will concentrate heavily during the winter months.

traps instead of refuges. Heavy browsing has damaged and killed many food plants. Continued browsing pressure can destroy the range to the point where it may take from 10 to 30 years to recover and be able to support a significant deer population again. In these areas, deer live-trapped and tagged during the winter as part of the Bureau of Wildlife Management's deer research program show marked weight loss through the winter. It is true that many deer lose weight during winter, even on good deer range, but not to the extent that has been recorded on many of the over-browsed winter areas. Fawns weighing as little as 26 pounds at ten months of age have been recorded in March, in some areas. It is significant to note tagging studies in New Jersey have shown that fawns which weighed 35 pounds or less at the time of capture in February or March were never recorded in the tag returns in subsequent years, although fawns of heavier weights were. Obviously, the mortality of these animals is high. Dead deer searches, conducted by the Division in April, have recovered as many as twenty starved deer per square mile with the majority of the loss being fawns. This winter loss is probably much more extensive than these figures indicate since many deaths go unnoticed in the Pine Barrens, where deer deaths occur over an extensive area.

Starvation losses are the most obvious result of permitting a deer population to exceed the carrying capacity of its range. Less obvious is the reduced productivity of those deer that remain. Bucks which produce sub-legal antlers, does that produce fewer fawns, and fawns which never see their first winter are real but seldom realized drains on deer populations.

It is a basic fact of deer biology that deer can and do destroy their own range. This is why deer managers are so concerned with keeping deer in balance with the available habitat. They know that an over-abundant deer herd can "eat-out" an area to the point where it may take years for the range to return to its former productivity, if indeed it ever can. Without an annual harvest of bucks, does and fawns, it is only a matter of time before the range will be damaged beyond practical repair.

One can argue that by habitat improvement programs such as planting, cutting, or certain methods of burning, the range can be improved and thus support more deer. This is quite true. However, habitat improvement must go hand in hand with control of deer numbers if the gains made are not to be lost immediately to hungry mouths. Increasing food supplies without control only leads to bigger problems and more drastic remedial measures.

Supplemental or winter feeding is not the answer either. Dumping corn, hay, or turnips to feed hungry deer treats a symptom and not the cause. The symptom is hungry and starving deer. The cause is too many deer. Winter feeding can never be recommended to support a deer population that has exceeded the carrying capacity of its range. At best it does no good; at worst it leads to an increased concentration of deer which not only eat what is put out, but everything else within reach. Losses in areas where winter feeding is practiced can be much greater than those on similar sites where the animals are dependent on natural food sources alone.

It is no longer the public's choice whether does and fawns live or die. It is nature's choice. If the hunter does not take the surplus; disease, malnutrition, predation, road kill, and other sources of nonhunting mortality will. Should we refrain from shooting does and fawns in December, only to drag their rotting carcasses from the wintering areas come spring?

Deer will browse on cedar especially during the "pinch-period" of winter. IRENE VANDERMOLEN—c/o LEONARD RUE ENTERPRISES

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NEW WAYS WITH WASTE

"sewerless sanitation," more and more applications of all kinds are appearing in New Jersey.

At the Swiss-owned Firmenich plant in Plainsboro, the magic of chemistry produces an array of flavors and fragrances—industrial products for food processors, pharmaceutical houses, household products, cosmetics. According to Robert Daunois, chief operating officer of the plant, "The wastes are mostly from the production of flavors, since the fragrance division processes leave minimum amounts of wastes. Spraying is done in the daylight hours following a standard application rate of up to two inches a week." Mr. Daunois notes, "We expect the groundwater concentration of nitrogen to go up in late winter and into early spring, then the nitrogen level drops rapidly as we get into spring and the plant uptake and growing process accelerates with the season. It is then that the microbial activity increases."

In Hunterdon County near Whitehouse, Durling Farms, one of the state's largest commercial creameries, treats and discharges dairy wastes high in BOD (biological oxygen demand) pumping them a mile to two spray fields; these soak up wastewaters that otherwise would be discharged to the nearby Rockaway River, a major tributary of the Raritan River. A total of 29 acres are sprayed with 37,000 gallons daily of treated creamery waste flows. Keith Noordzy, plant operator, says that rotating spray heads and frequent field rotations help to overcome puddle problems on spray fields.

In Evesham Township, Burlington County, the Kings Grant housing development—a mix of more than 1000 units of garden apartments, townhouses, and single-family homes—has a raw sewage flow of 150,000 gallons a day. The wasteloads enter flow equalization tanks, are given sophisticated tertiary treatment, chlorinated, and then pumped to a large lagoon system where the wastewaters are percolated through the soil by way of groundwater recharge. Five monitoring wells located near these infiltration-percolation beds are used to check the quality of the water being recharged to the aquifers below.

Art Zoda, DEP engineer who works with the project, explains that the Kings Grant system has avoided disposal of heavy loads of effluent to small streams running through the property where they could be carried into the recreational lake system above Medford Township. "With low flows in these streams," according to Zoda, "further degradation of the Medford lakes would be unavoidable. But with the two 2.5-acre infiltration-percolation lagoons operated alternately every 30 days, Kings Grant came up with a recharge system that proved an acceptable alternate to conventional wastewater treatment methods with a direct discharge to a stream." During winter, final effluent is pumped to nearby cranberry bogs for storage, then pumped back to the infiltration-percolation basins for groundwater recharge, he explains.

Reasonable alternatives also were found for at least two municipalities in the state where discharging to nearby streams was environmentally unacceptable. In East Windsor Township, Mercer County, the local utilities authority was virtually mandated by the N.J. Department of Environmental Protection to install spray irrigation, forbidding it from discharging more than 1.4 million gallons of effluent daily into Upper Millstone River.

Manfred P. Bauer, manager of the East Windsor MUA, notes that the treatment plant produces about 1.7 million gallons of wastewater daily and disperses half a million gallons of that flow through spraying on 80 acres of reed canary grass. The system serves a 16-square-mile service area with 6500 home and business connections. It uses 200 sprinklers from April to October, a period when the river is too low to assimilate a large quantity of wastewater. The rest of the year the plant discharges directly to the river.

Mike Cush and author at spray fields in Morris County.

East Windsor is probably the first municipality in the state to turn to spray irrigation. Today in the suburban-rural township, continuous monitoring goes on through a system of monitor wells and lysimeters which provide data on the reed canary grass and the soils that take up the two inches of wastewater sprayed on each week. The entire spray field also is underlain by a drain system whose discharge is monitored.

Another system went on line this year in Waterford Township in eastern Camden County; this spray irrigation method also was designed to protect a river system. The treatment plant and system, completed in June 1979 handles sewage loads from the smal town (pop. 3000) of Atco, which had previous problems with individual septic tanks. The treated, chlorinated, and lagooned effluent is distributed in spray areas covering 82.5 acres. Each of the 11 spray zones is served by approximately 35 single-nozzle-type sprinklers which operate much like those used on the golf courses.

Justification for Waterford's spray-irrigation ground-recharge system is found in the high quality of Mullica River waters. Almost 14,000 acres of Waterford lie within the Wharton State Forest tract and the Mullica watershed. This area drains to the Mullica River, which is designated a "wild and scenic" river, a classification calling for maximum protection of the river's existing high water quality—zero discharge.

If you were to go back to earlier use of spray irrigation in New Jersey, you'd find South Jersey food processors leading the way. A big name among them would be Seabrook Farms, now Seabrook Brothers and Sons, Inc., near Bridgeton. Seabrook still spray-irrigates today, 25 years after installing a system that's now slightly modified. At the big frozen-food operations, the wastewaters flow from the assembly lines (where beans, peas, spinach, and other vegetables are fast-frozen for supermarkets) through a screening step to eliminate pods, seeds, husks, etc.) before entering an open-cut, mile-long canal where further settling of solids takes place. From the canal, the waste flows reach spray irrigation heads carefully placed over 149 acres of nearby wooded lands. The system operates on a four-month season.

South Jersey food processors, operating in a region with large areas available for land disposal, have pioneered the system for 25 or 30 years or more. To name a few still operating: Violet Packing Company of Williamstown; Monroe

Packing of Upper Pittsgrove Township; Tri-County Vegetable Peeling Company of Deerfield; Hunt-Wesson Food Inc. of Bridgeton; Heinz Foods of Salem; Cedarville Packing; United Poultry of Buena; and Vineland Live and Dressed Poultry Company of Pittsgrove.

DEP's Haig Kasabach, Acting Chief, Water Quality and Planning Management, sees a steady growth of spray irrigation applications as the costs of building central sewage systems rise ever higher. "This natural biological system," he says, "has the advantages of low capital and operating costs, and high treatment efficiency. It conserves energy while letting the natural microorganisms in the soil do their work, converting most of the wastes to harmless by-products such as water, carbon dioxide, and nitrogen gas."

For land disposal where feasible, there's no way to go but up. □

Where To Find "Choose and Cut" Christmas Trees in New Jersey—1979

Families interested in buying Christmas trees direct from growers can send a stamped self-addressed envelope to the address listed below.

Ronald J. Sheay, Secretary
New Jersey Christmas Tree Growers' Association
CN028, Trenton, N.J. 08625

Also available is the booklet *Indoor Care of Christmas trees and greens.*

Pocono Environmental Education Workshops Center

The Pocono Environmental Education Center (PEEC) received a grant from the National Science Foundation to help formal and non-formal educators teach middle and junior high school students about nature.

Three information Dissemination for Science Education workshops, December 1979, April and August 1980 are planned. The weekend workshops will focus on outdoor science materials and strategies designed to be experienced by early adolescents.

Workshops objectives are to bridge the gap between education product developers and users, and to enable educators to experience and evaluate outdoor science education materials and strategies.

Participants will be selected from within the New Jersey, New York, Pennsylvania region. Administrators, Supervisors, teachers, outdoor education coordinators, directors and key personnel of residential environmental study centers, small museums, and nature centers are invited to make application to participate in the intensive three-day "learn by doing" workshops.

Outdoor experiences with national curricula such as Outdoor Biology Instructional Strategies (OBIS), Action Socialization Experiences (A.S.E.), Project for an Energy Enriched Curriculum (PEEC) and others are planned. Discussion and evaluation of these national curricula will enable outdoor environmental education practitioners to make informal choices about the programs and materials which best suit their needs.

People interested in the practitioners workshops should contact John J. Padalino, Director PEEC, Box 268, Dingmans Ferry, Pa. 18328—phone (717) 828-2319 and request project brochure and application. In the operation of the project and in selecting individuals for participation in, and administration of the project, Pocono Environmental Education Center will not discriminate against any person on the grounds of race, creed, color, sex, age, or national origin. □

Keystone Junior College—Delaware Water Gap National Recreation Area

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Helicopter Logging

$54,320 or $13.12 per cord of standing cedar, the most valuable single state land timber sale on record.

Following its successful bid in October 1977, Sleeper Creek Corp. began to harvest the Great Swamp trees just as the water table started to rise to normal levels. Using conventional cedar-harvesting techniques, the corporation attempted to construct a "corduroy" logging road system made of tree tops and slab wood; this type of road system enables logging equipment to enter the swamp area and haul the harvested logs to a loading site on higher ground. However, the absence of the spongy layers of peat and moss vegetation consumed by the fire, together with the rising water table, left no suitable base for this type of logging road construction. A full year of attempting to harvest the stand by conventional means, employing a corduroy road system and heavy hauling equipment, proved quite unsuccessful. The operation was failing.

"One way or another," relates Paul Harmonson, President of Sleeper Creek Corp., "those trees had to come out." So after a long and frustrating year, the corporation decided to attempt the first operation of its kind in New Jersey—helicopter logging. The thought of using a helicopter was not a new one to Mr. Harmonson. He started considering the idea the day he began running into harvesting problems in the stand. However, the high cost of logging by helicopter demanded that all other harvesting methods be attempted first. Atlantic White Cedar is one of New Jersey's most valuable timber species. The standing dead cedar trees were beginning to show the initial signs of deterioration and would rapidly get worse. In addition, large acreages of the forest were beginning to blow down as a result of the loss of root support. Time had become precious.

Beacon Helicopter Services of Lumberton, New Jersey, was approached with the idea of logging this particular sale. Pilots Rich Misturak and John D'Innocozi became interested in the idea and agreed to undertake the project of getting the trees from the swamp to higher ground. Flying a helicopter is an exhausting job requiring a pilot's full attention both physically and mentally. "These machines just don't fly by themselves, like an airplane can," says John D'Innocozi; "then just try to add on the logging aspect and it can get very busy." As a result, Rich and John began flying in shifts. The Hiller U H 12 D being used had proven itself considerably more capable then its appearance would suggest. The high cost of helicopter logging also demands that the maximum weight or logs be transported during each trip to the staging area. A safety weight gauge was installed on the helicopter to ensure that the load would be kept under the 1200-lb. limit. Depending on size, one to three tree-length logs were removed each trip, enabling the operation to remove 50 or more cords per day.

The logging operation begins as an area of the stand is prepared by the tree cutters (fellers) felling the trees and removing the limbs. Care must be taken that the trees are felled in a uniform direction to facilitate removal by the helicopter crew; a "pick-up-stick" tree-felling pattern would prove disastrous to the helicopter operation. When the tree fellers move on to a new area of the stand, the helicopter and its ground crew move in for the harvest. Steel choker cables are wrapped around a log or group of logs in preparation for the helicopter's pickup and the helicopter hovers above, the choker crew attaches the electronic catch on the helicopter's cable to the choker around the waiting logs. As the ground crew shifts to a safe distance, the pilot slowly lifts the load, carefully measuring its weight. Once off the ground, the helicopter begins its quarter-mile run to the staging area drop zone. Coming in at treetop level, the logs are positioned over the drop zone and electronically released. The helicopter then throttles back toward the pickup area, where the ground crew is finishing the choker preparations for the next load.

Efficiency and safety are the prime concerns of the logging operation and for these reasons the helicopter crew and the rest of the logging crew work in separate areas of the cedar stand. Tree fellers work in one area while the helicopter works in another, and the staging crew works on one day's harvest while the helicopter's drop zone remains empty of personnel. Advance planning is therefore the prime prerequisite for the operation to run smoothly.

The use of a helicopter in a logging operation where ground personnel are near the flight path has its potential hazards. When several logs are bundled together and the helicopter begins to lift them, the choker crew must be especially wary. Occasionally, surrounding logs will shift and endanger the person standing on top. Very often, limbs (both small and large) are carried aloft only to come crashing down below the helicopter's transport path. The staging area crew operates in the previous day's helicopter drop zone, working on the tree-length logs deposited there. They buck the logs to length, sort them into piles, and load the trucks for delivery to the sawmill. In this fashion, the logs continue to flow out of the swamp and into Mount Holly Forest Products of Mount Holly, New Jersey, where this sawmill processes the salvaged logs into useful products. Here the logs will be sawn into cedar siding, fencing, blueberry flats, dimension stock, and many other products valued at more than $1,200,000. Helicopter logging has made this particular harvest possible and has converted this potentially "lost" forest resource into a stream of useful products for the forest products industry and consumers alike. □

FRONT COVER

Deer portrait—Photographed by Harry Grosch.

INSIDE BACK COVER

Black-Capped Chickadee—Illustration by Carol Decker (See article on page 2).

BACK COVER

Sunrise at the Brigantine Wildlife Refuge—Photographed by Mark Warner.

New Jersey State Library

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