DECEMBER 1970-JANUARY 1971

THE CONSERVATIONIST

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Ferdinand, The Friendly Bull Moose

Ordinarily visitors to New York State from New Hampshire do not create such a stir, but then they don't usually weigh nearly half a ton, carry a rack of antlers and sport a dewlap that looks like a Vandyke beard. The State's 12th moose visitor since 1936 appeared in Rensselaer County and later in the Chatham area of Columbia County early in October, moving onto a farm containing a herd of goats. Showing no fear of humans, the bull visited area gardens, dined on turnips and trees, quenched his thirst in swimming pools and amazed many area residents.

Docile and almost friendly in manner, the moose may thus be displaying symptoms of a deadly brain worm condition, according to C. W. Severinghaus, supervising wildlife biologist of the Department of Environmental Conservation. Although this condition poses no threat to humans, it inevitably will cause the death of the moose if he remains in the New York or New England area. The worm condition becomes accumulative as he feeds on a range which supports the nematode carried by snails and grubs which are ingested by the moose while eating vege-

Unafraid of man, bull turned aside to avoid trampling photographer.

Brownouts Versus Backbones

There is a great flap about possible electric "brownouts" in New York City. The size of our television pictures will diminish, we must use air conditioners more sparingly, and certain industrial customers may be asked to reduce their electrical demands.

From the headlines, you might think a calamity would result if we missed some of the trash on TV, or had to sweat a little. And there is a series of dire predictions by the electrical industry and planners about the great need for electrical power in ten or twenty years.

To all of which we say, "Take it easy." It would do most of us good to spend an occasional night in darkness. And as for industry, its "furloughs" of workers, and the losses from strikes, far exceed any imaginable loss of production which may be caused by speculative power shortages.

Along with the brownout scares, part of the electrical industry has carried on a campaign to convince us that more and larger nuclear generating plants are the pure answer to future power needs. Indeed, the major manufacturer of nuclear power plants this fall ran a magazine advertisement showing a lighted match with a twirl of smoke coming from it. It then goes on to imply that such a match gives off more pollution than a nuclear power plant. What a sly attempt to deceive the public! Nuclear generating plants give off small, but potent amounts of radioactive gasses and liquids. Such emissions from *one* British seacoast power plant caused embryo fishes in the Irish Sea to develop deformed backbones.

The U. S. Atomic Energy Commission has set questionable top limits on the amounts of such radioactive emissions, and the power industry—seeking to avoid higher costs, and lower dividends—contends that the states cannot impose tougher standards. However, two former Nobel prize winners, Professors Linus Pauling and Joshua Lederberg, and other nuclear and medical experts assert that the A. E. C. radiation ceilings are at least ten times too high for human safety.

With six nuclear power plants planned on Long Island Sound alone, there is certainly need for searching reexamination by this State of the safe levels of radioactive emissions, and deliberate public investigations of the wisdom of issuing particular nuclear building permits.

Let us keep deformed backbones confined to fish.—Editor

THE CONSERVATIONIST

STATE OF NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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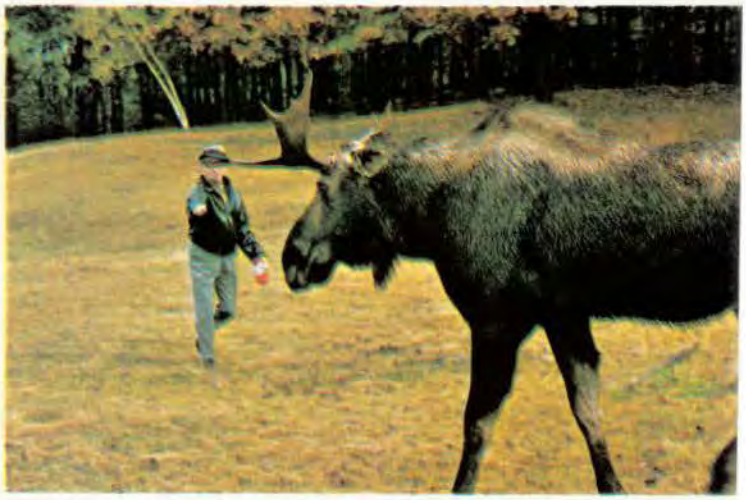
Morning and evening, moose left woods to gambol with herd of goats in farmyard.

Moose had to get down on knees to lick salt set out for goats.



Although interested, moose refused offer of apples.

tation. These nematode worms are common in areas populated by whitetail deer.

Because these nematodes are so common now throughout the New York State deer range, and because they have lethal effect on moose, the Department of Environmental Conservation biologists do not consider the State now suitable for moose, although the nematodes present no threat to our deerherd.

Ferdinand's greatest hazard may come from a hunter, or he may succumb to a four-wheeled animal with horns which is seen in great numbers on the State's highways.

by Alvin S. Fick
Photography by Wayne Trimm

Playtime over, moose heads back to woods to rest and feed during the day.

Governor Announces Strict Controls On Harmful Pesticides

Effective January 1st, Commissioner Diamond Will Ban Ten Pesticides And Set Limitations On Purchase, Sale And Use Of About 60 Others.

GOVERNOR Rockefeller has announced the most stringent controls in the nation for persistent and highly toxic pesticides.

The Governor said that Environmental Conservation Commissioner Henry L. Diamond will ban, effective January 1, 1971, ten pesticides and impose stiff limitations on the purchase, sale and use of about 60 others under provision of the Environmental Conservation Law passed by the 1970 Legislature.

Those banned are DDT, Bandane, BHC, Endrin, Mercury compounds, Selenites and Selenates, Sodium Fluoracetate (1080), Strobane, Toxaphene and DDD,TDE.

Governor Rockefeller said: "These restrictions represent a substantial breakthrough in our battle to save the environment and protect man from unnecessary contamination from poisonous chemicals. We hope that other states and the federal government will follow New York's lead in coming down hard on harmful pesticides."

The list and regulations were developed by the Department of Environmental Conservation after a series of statewide public hearings on pesticides and subsequent consultation with agricultural and environmental leaders across the state.

The Governor said he has directed the Department of Environmental Conservation to work closely with the Department of Agriculture and Markets, the College of Agriculture and the Geneva Experiment Station to review the list of "restricted use" pesticides on a continuing basis. "As new evidence is presented or where less hazardous pesticides are made available additional pesticides will be added. Where use of a pesticide is permitted, there must be clear proof that it will not endanger the environment," Governor Rockefeller said.

Commissioner Diamond said the Department of Environmental Conservation would strictly enforce the rules and regulations and that no pesticides would be permitted to be sold, purchased or possessed if less dangerous alternatives are available.

"We will make every effort to keep the process as simple as possible. Applications for pesticide use will be readily available at Department offices and other outlets. We will provide a speedy response to applicants qualified to use pesticides," the Commissioner said.

Commenting on the ten pesticides for which there is no approved use, Commissioner Diamond said the only exception will be when the Commissioner of Health certifies there is a public health emergency.

Commissioner Diamond said the Department will work with the College of Agriculture, representatives of the chemical industry and commercial pesticide users to develop methods for disposition of existing supplies of pesticides and licensing procedures.

Any person desiring more detailed information on methods and procedures under the new regulation, should address his letter to The New York State Department of Environmental Conservation, "Attention: Pesticides," 50 Wolf Road, Albany, New York 12201.

The list of pesticides affected and the full text of the Order follow:

Pesticide sprayer in orchard

Commissioner's Order

Pursuant to the provisions of Section 15 of the Environmental Conservation Law of the State of New York, I, Henry L. Diamond, Commissioner of Environmental Conservation, do hereby order that Title 1, (Agriculture and Markets) Subchapter D of the Official Compilation of Codes, Rules and Regulations be amended by inserting therein a new part to be known as Part 155, to be effective January 1, 1971 and to read as follows:

RESTRICTED PESTICIDES. Notwithstanding any statement to the contrary, including statements contained on labels or made by manufacturers, any substance or mixture of substances enumerated in this section when used as a pesticide as defined in Agriculture and Markets Law, section 148(1) is declared to be restricted in relation to its purchase, distribution, sale, use and possession.

A. The following may be distributed, sold, purchased, possessed and used only upon issuance of a commercial or purchase permit for any uses listed on the approved label as registered with the New York State Department of Environmental Conservation.

(1) Acrolein, Aqualin [acryaldehyde]—all concentrations.
(2) acrylonitrile—all concentrations.
(3) aldicarb (Temik)—all concentrations.
(4) Antu [alpha naphthyl thiourea]—all concentrations above 29%.
(5) Avitrol—all concentrations.
(6) Azodrin [dimethyl phosphate of 3-hydroxy-N-methyl-cis-crotonamide]—all concentrations.
(7) Bidrin [dimethyl phosphate of 3-hydroxy-N,N-dimethyl-cis-crotonamide]—all concentrations.
(8) Bomyl [dimethyl 3-hydroxyglutaconate dimethyl phosphate]—all concentrations.
(9) carbon disulfide—all concentrations. No permits will be issued for concentrations greater than 90%.
(10) carbofuran (Furadan)—all concentrations.
(11) carbophenothion (Trithion)—all concentrations above 5%.
(12) chloropicrin—all concentrations.
(13) cyanides—calcium and inorganic cyanides, all concentrations; liquid hydrogen cyanide—all concentrations.
(14) cyclohexamide (Actidione)—all concentrations above 1.3%.
(15) Dasanit [O,O-diethyl O-[p-(methylsulfinyl) phenyl] phosphorothioate]—all concentrations.
(16) demeton (Systox)—all concentrations.
(17) dioxathion (Delnav)—all concentrations.
(18) diphacinone [2-diphenylacetyl-1,3-indandione]—all concentrations above 3%.
(19) Di-Syston [O,O-diethyl S-/2-(ethylthio)ethyl/ phosphorodithioate]—all concentrations above 2%.
(20) DNBP or DNOSBP [4,6-dinitro-o-sec-butylphenol and salts]—all concentrations.
(21) DNOC [4,6-dinitro-o-cresol and salts]—all concentrations.
(22) DNOCHP [4,6-dinitro-o-cyclohexylphenol and salts]—all concentrations.
(23) Dyfonate [O-ethyl S-phenyl ethylphosphonodithioate]—all concentrations.
(24) endosulfan (Thiodan)—all concentrations.
(25) EPN [O-ethyl O-p-nitrophenyl phenylphosphonothioate]—all concentrations.

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(26) ethion [bis(O,O-dimethylthionothiophosphoryl)methane] —all concentrations above 2.5%.
(27) Famphur [O,O-dimethyl 2-[p-(dimethylsulfamoyl)phenyl]phosphorothioate]—all concentrations.
(28) fenthion (Baytex)—all concentrations.
(29) Fumarin [3-(alpha-acetonyl-furfuryl)-4-hydroxycoumarin]—all concentrations above 3.0%.
(30) Guthion [O,O-dimethyl S-[4-oxo-1,2,3,-benzotriazin-3 (4-H)-ylmethyl]-phosphorodithioate]—all concentrations.
(31) methomyl (Lannate)—all concentrations.
(32) methyl bromide—all concentrations.
(33) Methyl parathion [O,O-dimethyl O-p-nitrophenyl phosphorothioate]—all concentrations.
(34) nicotine alkaloid—all concentrations.
(35) nicotine salts—all concentrations above 40%.
(36) paraquat—concentrations above 0.2% cation.
(37) parathion—all concentrations.
(38) pentachlorophenol—all concentrations above 5%.
(39) phorate (Thimet)—all concentrations.
(40) Phosdrin [2-carbomethoxy-l-methylvinyl dimethyl phosphate, alpha isomer]—all concentrations.
(41) phosphamidon—all concentrations.
(42) phosphorus (white or yellow)—all concentrations.
(43) Pival [2-pivalyl-1,3-indandione and salts]—all concentrations above 3%.
(44) PMP, Valone [2-isovaleryl-1,3-indandione and salts]—all concentrations above 6%.
(45) Schradan (OMPA)—all concentrations.
(46) strychnine and its salts—all concentrations.
(47) Sulfotepp [O,O,O,O-tetraethyl dithiopyrophosphate]—all concentrations.
(48) Sulfuryl fluoride (Vikane)—all concentrations.
(49) TEPP [tetraethyl-pyrophosphate]—all concentrations.
(50) 2,4,5-T [2,4,5-trichlorophenoxyacetic acid and its esters and salts]—all concentrations.
(51) Vapona (dichlorvos, DDVP) [2,2-dichlorovinyl dimethyl phosphate]—all concentrations above 1%. Resin strips will not require a purchase permit so long as Federal registration is maintained.
(52) Warfarin [3-(alpha-acetonylbenzyl)-4-hydroxycoumarin and its salts]—all concentrations above 3%.
(53) Zectran [4-(dimethylamino)-3,5-xylyl methylcarbamate] —all concentrations.
(54) zinc phosphide—all concentrations above 2%.
(55) Zinophos [O,O-diethyl O-2-pyrazinyl phosphorothioate] —all concentrations.

B. The following may be distributed, sold, purchased, possessed or used only upon issuance of a commercial permit or purchase permit for those purposes listed.

(1) aldrin—allowable for control of termites within structures or beneath the surface of the ground.
(2) arsenic compounds—
  (i) Inorganic insoluble (50% and above as the compound) including calcium arsenate, lead arsenate, magnesium arsenate and Paris green shall be restricted.
  (ii) Inorganic soluble, including arsenic trioxide (above 1.5%), and sodium arsenite (above 2%), and sodium arsenate (above 5%) shall be restricted.
  (iii) Or any use of these compounds which exceeds 4 pounds total per acre of active ingredient shall be restricted.
  (iv) Arsenious oxide may be purchased under permit for formulating baits which shall contain not more than 2.4% of the compounds for commercial areas or 1.5% of the compound for home use to control rodents.
(3) chlordane—allowable for application to soil to control wire worms in potatoes, strawberry root weevil, strawberry root worm, Asiatic garden beetle, Japanese beetle, oriental beetle, European chafer, arborvitae weevil, Japanese weevil, taxus weevil, bulb-flies on narcissus and daffodils, and other larvae, grubs and weevils in commercial sod and nursery stock. Chlordane may be applied also within structures and below the surface of the ground to control ants and termites.
(4) Dicamba (Banvel D)—no restrictions on the substance itself, but mixtures with fertilizers are not permitted.
(5) Dieldrin—allowable for application below the surface of the ground or within structures to control termites, for application to lumber to control the powder post beetle, and for application to seeds to be dispensed in small packages. In accord with regulations of the USDA, dieldrin may be applied to surface soil for shipment of nursery soil and salable sod.
(6) Heptachlor—allowable only for incorporation by the New York State Department of Agriculture and Markets into baits for the alfalfa snout beetle, which may not be distributed at a rate to exceed 2 oz. of active material per acre.
(7) Lindane [gamma isomer of benzene hexachloride]—may be allowed for use on trees and shrubs to control Lepidopterous and Coleopterous borers, long-horned and ambrosia beetles, giant hornets, the white-pine weevil, pine root collar weevil, pales weevil, balsam twig aphids, white-pine aphids, northern pine weevil, and the honey locust pod gall. Overall foliage treatments will not be allowed except for the treatment of the honey locust pod gall. Pastes or ointments containing less than 2.1% of lindane and intended for direct application to wounds in shrubs and trees caused by borers, weevils and other insects may be sold over the counter to the general public without permit. Planter box treatment of bean, cucurbit, corn and pea seeds shall be allowed. Anti-flea collars for pets containing not more than 0.75% of lindane may also be sold over the counter.

C. No permitted uses will be allowed for the following:
(1) Bandane [polychlorodicyclopentadiene]
(2) BHC [benzene hexachloride-mixed isomers]
(3) DDD, TDE [dichloro diphenyl dichloroethane]
(4) DDT [dichloro diphenyl trichloroethane]
(5) Endrin
(6) Mercury Compounds
(7) Selenites and Selenates
(8) Sodium fluoroacetate
(9) Strobane [terpene polychlorinates (65-66%)cl]
(10) Toxaphene

(d) If it is determined by the Commissioner of the New York State Department of Health that an emergency exists affecting the public health the Commissioner of Environmental Conservation may permit the use of any restricted pesticide to cope with the emergency.

Smaller youngsters question their parents.

Dynamics Of The Rogers Conservation Education Center

Older children go off with an instructor.

Here The Director Of The Center Tells How Both Youth And Adults React To The Many Experiences Of A Visit, And How The Staff Puts Together A Varied And Vital Program To Expose The Environment

by John A. Weeks, *Director, Rogers Conservation Education Center, Sherburne*

"THIS is really a swinging place, but there surely are more people here than wildlife." Such a remark might summarize the reactions of a visitor to the Rogers Conservation Education Center some sunny Sunday afternoon.

"My, this is a restful spot! So quiet! I could sit at this window for hours just to watch the birds at the feeder." This might be the remark of a winter visitor or of a participant in the "early morning" watch.

"My kids love this place! We come over every weekend just to feed the ducks and the fish!"

"Your trails are beautiful, but you know, you ought to do something about keeping those Cub Scouts more quiet on the trail. All we saw in over an hour of walking was a cardinal, a red squirrel and a couple of mallards."

This last was the comment of a father from nearby Norwich.

"Oh boy, this place is great! You know what? We got almost close enough to touch a little squirrel." "Yeah, and we saw a cardinal. Boy, was he beautiful! I never saw one before!" "Man, and we saw two beautiful ducks with green heads. When they flew we could see purple on their wings."

This is the joint contribution, delivered in breathless stacatto by the members of a Cub Scout Pack from Syracuse, the same boys whose noisy reactions on the trail had bothered the family from Norwich.

Mixture of Reactions

So one sees, after four years of building and operation and over 250,000 citizens served in some fashion or another, the Rogers Center arouses a mixture of reactions from our central educational aim. We have tried to have something for everyone but this, of course, would not be possible, especially with our limited staff.

Still we take great pride in our accomplishments, especially in that area where we feel our principal effort must always be directed — our formal education program. Close to 50,000 people, preschooler to senior citizen have participated in this many-faceted endeavor.

Best of all programs are the staff-guided outdoor classes. The comments of one third grade class from Deposit will help to show why we feel that the combination of an attractive study area and an expert teacher can produce significant results:

"Dear Mr. Weeks:

"We enjoyed our visit to the Rogers Conservation Education Center yesterday. It is beautiful and we learned many things about conservation of our natural resources. We will try to do our part to use nature's gifts wisely."

A third grade class which had experienced first hand the values of a well-managed environment, was concerned with wise use and had actually talked of doing something about their concern. It is significant that this can be accomplished, simply by capitalizing upon the experiences and knowledge the youngsters bring with them, and directing it toward better understanding of how they relate to the world they live in. The fact that they have shared this experience with someone they soon recognized as an expert and a friend, is also significant.

Many Approaches

The guided tour, while satisfactory for some groups, is only one of a variety of approaches we use. Indoor lectures, outdoor-indoor "collect and study" sessions, independent study programs, an early "morning watch" from the gallery windows and moonlight hikes along the trails have been used to provide the kinds of experiences people want and have promoted the awareness we think they need.

We believe that everyone who visits the Center leaves with a heightened sensitivity to the world he lives in.

It is important to realize that the Center is a seven-day-a-week facility. A typical week day for the Center Director might start with a visit from an Extension Agent to pick up materials for a workshop she is giving that evening. Someone has had to select and assemble the material. At 9:30 o'clock, the president of the local art society comes in for a brief discussion of details for the first exhibit of the spring session. Planning for this event had started the previous fall.

From 10 to 12 o'clock it's a meeting to discuss a Boy Scout leaders' clinic a month hence. This will be a two and one-half day affair using the dormitory. After

Herm Weiskotten impresses with an impromptu lecture.

Father and son learn together.

A humming bird rests in a child's hand.

lunch a group from a charitable foundation in Syracuse visits the area. These people have been requested to provide funding to staff a similar center in Onondaga County. They want to find out what their funds might be buying. In late afternoon it's a deputation from Albany who are interested in roughly the same kind of information. In this group is the inevitable visitor who wonders exactly what we do in winter. Scattered in among all this are administrative problems, telephone calls, requests for speaking engagements, for consultant service and, of course, a request for the identification of a small "kind of grayish bird that sits on a limb and darts out after bugs." That evening it will be a panel discussion on environmental contamination at Colgate University.

There are More Classes

Meanwhile, the educator has had to share his time with four classes, one from Rome, one from Binghamton and two from Norwich. Before their arrival, he was making arrangements for the duplication and assembly of materials for a teachers' workshop, discussing scheduling details with the receptionist and getting prepreparation or self-guiding information packets out to teachers scheduled to visit the area next month. When he gets through with classes, there will be calls from teachers awaiting him and details for the completion of a special exhibit to be ironed out.

To complete the dynamics of the day, the receptionist has had to meet with and orient eight self-guiding groups, serve as hostess to the Director's visitors and answer fifteen 'phone inquiries about visitation and scheduling. Most of these she will be able to handle without recourse to the Director or Educator but a few require special handling and, because a wait is dictated, a bit of diplomacy.

The facilities manager is supervising installation of a heating system in the dormitory, making arrangements for the installation of a new road, parking lot and picnic area in connection with the agricultural exhibit, making sure that the dorm is ready for an overnight group and that schedules for classroom setups are clear to the staff member who doubles as custodian. His day never ends.

Dynamics, indeed! Many people fault us for trying to do too much. They don't know how many groups we've had to turn down — and how much soul searching, patience and diplomacy that required. For the record, in 1969 we had over 100 visiting groups of professionals, 450 school groups, 100 special programs and nearly 15,000 families.

It's for Adults, Too

There is a tendency among people who do not know it well, as yet, to think that the Rogers Center is a superfine place for youngsters, but not so appropriate for adults. Regardless of its origin, however, the notion disappears when one really gets to know the Center. The processes by which our material wealth (food and fiber) and our spiritual wealth (inspiration and recreation) are produced in nature are sophisticated enough to claim the lifelong attention of the most accomplished intellect. To see them revealed in such exquisite fashion as they are at Rogers can be a moving experience.

One of my friends, a professor of English at a local college, expressed it all when he said: "My God, a bird walk is really a spiritual happening, isn't it?" If you are tempted to laugh at this, beware, and beat a path post haste to the nearest mirror, or better still, to the nearest nature center. There is a large measure of intolerance and at least a hint of insensitivity or ignorance in such a reaction. This sense of the wonder of life and the pleasure of sharing our awe might well bear the seeds of our salvation as a society.

At any rate, adults are the heart of our Center program. Their willingness to share their interests and their talents have produced a series of programs, exhibits and workshops which are little short of spectacular. Fine exhibitions designed to explore the influence of nature on the arts have featured some of the best of central New York artists. These exhibits of sculpture, paintings and wood cuts have been our most popular events, drawing thousands, many of whom admitted they had never visited an art gallery, and others, regular gallery goers, who never had and perhaps never would have visited a nature center.

Imagine a group of staid local citizens who had assembled at the amphitheater to enjoy a first rate nature film, flocking around the pre-film campfire to help cook and sample woodchuck drumsticks, snapping turtle steaks or sautéd crayfish tails. If that doesn't tease your imagination, just think of them vying for "seconds."

Adult participation has reached its highpoint in the formation of a Citizen's Advisory Committee to aid the Director in the development and implementation of program. The acquisition of the remarkable George Lesser collection of mounted birds is just one of their singular achievements on behalf of the Center.

Perhaps we could leave the subject of adult participation and of nature centers themselves with the image of senior citizens, not just one group but many. With that special "joie de vivre" possible only to those who have made peace with their declining years, they practically devour the area, poking into every nook and cranny. This demonstrates one of the virtues of the nature center. Its principal products can be consumed with gusto morning, noon and night without materially diminishing its capacity to produce more.

The Rogers Center does not stop at bringing people close to nature. Natural communities, without the influence of man, do not exist around here. The vital natural processes do exist however, and it is our goal to reveal how they work, and how man influences and is, in turn, influenced by them. This achieved, people are always more ready to explore with us what they must do if the nature center experience, not to mention man himself, is to survive.

Speaking for the staff of the Center, and for myself as Director, it seems unnecessary to point out the rewards in our work. There is great satisfaction always in creative activity. There seems to be a persistent notion, however, that these things we do just happen. All too frequently summer visitors, even those from Albany offices of our own Department of Environmental Conservation, say to us: "All this is great, but what in the world do you do in winter?" Sober thought suggests that education programs, exhibitions and public action programs do not come without long preparation.

Workshops take weeks to prepare. Exhibits require days to get ready and slide sets take hours to select and prepare their narration. Anyway, we'll have our share of Scouts, dorm groups, garden clubs and visiting professionals in winter, too.

Nothing could be more satisfying, however, than the kind of response typified by this note from Lisa Watson of Waterville:

"I think the Center give(s) a good example of how beautiful America could look if man could keep America looking like one big Rogers Conservation Center."

That is what we're trying to say to all of you.

A New Environmental Conservation Tool

This Is A Description Of The New Environmental Conservation Commissions And What They Can Do In Your Community

by Charles C. Morrison, Jr., *Director, Office of Community Assistance, N.Y.S. Department of Environmental Conservation*

IT was a hot, humid summer day, but the man standing at his front door was listening attentively. The pert young woman addressing him was saying:

"If you believe, Mr. Jackson, that it's important for the Town of Schodack to have a planned program for preserving open spaces and natural areas, then I'd like to ask you about the Moordener Kill. Our town's new master plan has pinpointed the Kill as an ideal natural recreation area. But it's too polluted to utilize its full potential. As a taxpayer, would you be willing to support efforts to clean up the stream?"

Mr. Jackson was one of 318 persons who answered "yes" to this question. Only 58 said "no." This favorable ratio, better than 5 to 1, was typical of the response to the entire questionnaire, so carefully designed by the new Schodack Town Conservation Council.

The Council was laying a good groundwork. They had conducted the survey in selected areas including one-third of the town's population. The members of the Council felt that they not only had collected valuable "hard data" to present to the Town Board, but also had made a major educational impact on the people who were interviewed. They could move ahead now with specific proposals.

In the Town of Colonie, the bronzed man in the plaid shirt had been hunched over the maps on the table. He now stood up and said to the man next to him: "You know, Cal, if we don't pin these valuable natural areas down through master planning and zoning controls, with some selective acquisition, the same thing is going to happen in this town that has happened in most other places. We are going to wake up one day and find that we are paved wall-to-wall with tacky subdivisions and ugly commercial strips. I know that you are against that kind of progress as much as I am."

The men were both officials of the Town of Colonie. The one who had just spoken was a member of the Town Conservation Council. This conversation was taking place during an informal meeting called to discuss a controversial new conservation zoning provision in the town's zoning ordinance. The big issue was how to implement conservation zoning without precipitating an adverse judicial ruling, if a court test arose.

A New Beginning

These vignettes offer an incisive glance into something that is new in the communities of New York State. The structure and intensity of the drive for environmental quality has been changing ever more rapidly for the past few years in all institutions in our society. But nowhere is this change more profound or likely to have more far-reaching consequences than in local government.

The idea is a simple one. It involves nothing more than putting the legislatures of local governments in common harness with those who have a deep commitment to environmental improvement.

What's new about that, you say. "I've been on my City Council for years. I've been as concerned about the environment as anyone and we haven't exactly been standing still on it."

Well, maybe so. But what's new is that for the first time this partnership between local government and environmental interests is being strengthened and formalized. The resulting agency is an official one that can draw upon the power of local government as well as galvanize and rally citizen action in a way that counts most. The potential for increasing the base of public support for environmental action is enormous.

What's new is that this movement is past the incubation stage. There are a few dozen local agencies for environmental conservation that are on the move in New York. They are spreading. They are active. They are a proven success. They are gaining a feeling of mutual support. And in 1970, for the first time, the State authorized the new Department of Environmental Conservation to develop a highly specific program of technical assistance and direct financial aid for these agencies.

Origins

Did this all come about overnight? Did it happen just in the last few years? The answer to both of these rhetorical questions is "no." We have been building toward this for a long time.

The reports of the Outdoor Recreation Resources Review Commission were a landmark that gave impetus to the movement. An unprecedented flurry of Presidential Messages to Congress on environmental issues marked the decade. The 1965 White House Conference on Natural Beauty, followed by Governor's Conferences in 35 states, was another highwater mark. (Governor Rockefeller called such a conference in New York State in February 1966. It was held in

New York City with more than 1,000 civic and governmental leaders attending to discuss air, land and water quality issues affecting both natural and man-made beauty. A few copies of the summary proceedings and recommendations of the conference are still available from the Department of Environmental Conservation.)

Later, we were presented with the comprehensive environmental quality report, *From Sea to Shining Sea*, of the President's Council on Recreation and Natural Beauty. Now President Nixon's new Council on Environmental Quality has published its first annual report, *Environmental Quality*.

All these major reports contain recommendations for the creation of state and local agencies like environmental conservation commissions.

The Early Years in New York

This story on local environmental agencies is not complete without mention of some of the pioneering efforts in New York State. In the early part of the 1960's, we had a number of agencies created by the legislatures of some of the State's 57 counties (outside of New York City), 62 cities, 931 towns and 556 villages to meet the emerging challenges of environmental quality. By the mid-1960's, they really got rolling.

The Rockland County Natural Beauty Committee, established in 1966, was the first county-level legislatively created organization of its kind in the nation. It works closely with the Rockland Community College, the County Planning Department and particularly with the Cooperative Extension Service, concentrating primarily on open space and recreation projects.

The Oyster Bay Town Beautification Authority, the Broome County Conservation Council, the Scenic Roads Committees, established by county legislatures in about 50 counties—all of these are examples of official local government agencies created to serve the broad purposes of community action for the environment.

The State's Natural Beauty Commission, based in the State Office for Local Government, had a general responsibility for fostering the establishment of local agencies of this kind. The Commission existed from 1966 to 1970. Its functions now have been absorbed in the State's new Department of Environmental Conservation.

State Action and Support

In 1967 the State's present commitment for the establishment of local environmental conservation councils began to emerge. There had been some discussion of the need for such agencies at the Governor's Conference on Natural Beauty in 1966. And in 1967 specific State legislation was approved authorizing towns to create conservation councils. This was installed in the statute books as Section 64-b of the Town Law.

Actually a number of towns on Long Island already had established conservation councils in 1966 and 1967 under their home rule authority. While this State legislation had some promotional effect and indicated State support for creation of these local agencies, it had little statewide effect because it failed to fix a servicing responsibility with any State agency.

As a matter of fact, the conservation council movement would not be as widespread as it is among towns on Long Island and in the lower Hudson Valley area if it were not for the promotional efforts of a few key individuals and the Open Space Institute, a private organization based in New York City. The Institute's field representatives work with private landowners and local officials on open space preservation.

The other shortcomings of Section 64-b of the Town Law were that (a) it did not apply to counties, cities or villages; (b) its language was drawn from Massachusetts legislation conceived many years before and therefore its provisions did not assign up-to-date and comprehensive environmental quality duties to the councils, and (c) its existence without other support services and explanation masked the fact that such local agencies not only could be established by local law under home rule authority, in all types of municipalities, but also that such agencies, being arms of local government, could draw on a wide range of powers, (e. g. acquisition, condemnation, etc.), already assigned to local governments by the State. In other words, Section 64-b unnecessarily portrayed a narrow and not too effectual role for the councils.

Now in 1970 we have a new ball game. The Environmental Conservation Law of 1970, which provides for reorganization of the State's environmental programs and activities and created the Department of Environmental Conservation, assigns to the Commissioner of that Department broad powers to consult, advise and cooperate with local officials and private persons or groups to carry out the purposes of the Act. To implement these purposes with respect to municipal councils for environmental conservation two specific State laws were passed during the 1970 legislative session and signed by Governor Rockefeller on May 18.

Schodack Conservation Advisory Council at work. l. to r., Oscar Rheingold, Mrs. Donald Walsh, Franklin Mutterer, Peter Brown, Mrs. Philip Carabateas, Mrs. Franklin Van De Wal, and Freling Smith.

The first of these is Article 12-f of the General Municipal Law, (Chapter 901 of the Laws of 1970). This abolished Section 64-b of the Town Law, bringing councils created under that law under the provisions of Article 12-f, and gives specific authorization for creation of conservation commissions in cities, towns and villages.

Moreover, and most importantly, this new State law provides that any duly created conservation commission may request the Department of Environmental Conservation to provide assistance along the following lines:

(a) prepare reports outlining objectives, priorities and proposed relationships of the agency to the local legislative body;

(b) prepare descriptions of work to be undertaken, advantageous techniques to be used, and suggested roles for members;

(c) provide research on conservation facts and procedures;

(d) provide, on a consulting basis, technical and research assistance as may be required to assist the agency in carrying out its work and to enable it to offer recommendations to the local legislative body;

(e) describe particular areas of natural resources within the city, town or village, as the case may be, which require particular attention by the local agency.

The Department has been preparing for an accelerating cooperative program with the commissions.

The second State law passed in 1970 pertaining to this area was Article 19 of the Conservation Law (Chapter 902 of the Laws of 1970). This companion Act provides specific authorization for the creation of county (or regional) environmental management councils. These county councils will have an interlocking membership with the city, town and village environmental conservation commissions. According to the Act they are to be assisted by the Department along the same lines as excerpted above from Article 12-f.

However, there is a major difference. The county (or regional) councils will prepare an environmental plan and they will prepare status reports on the environment. The State, in turn, will pay up to half of the operating expenses for these county councils, according to Article 19. Because the Act is so new, State funds for this direct support were not appropriated during fiscal year 1970-1971. Funds are expected to become available as county councils become established.

While the county councils seemingly have duties similar to those of the city, town and village councils within their boundaries, their role is broader from the viewpoint of intra- and inter-county coordination. The relationship will be similar to that between planning boards at these various levels of government.

Establishing A Local Commission

The State already has taken initial action to encourage establishment of these agencies by providing technical assistance information of the kind described under items (a) and (b) above. A 36-page booklet, *Municipal Advisory Councils for Environmental Conservation*, has been prepared by the Office for Local Government in cooperation with the Department of Environmental Conservation.

The booklet contains introductory material describing the purposes and relationships of the councils and it has a good annotated bibliography. However, its main content is two sample local laws which will help local governments expedite the establishment of the commissions and councils.

The first of these sample local laws is for establishment of a city, town or village commission for environmental conservation.[1] The second may be used to establish county environmental management councils.

In addition to the convenience of their availability in ready-to-go legal form, other advantages to the use of these sample laws for establishing the local commissions and councils are:

1. *They assign a most comprehensive set of up-to-date and detailed environmental quality advisory responsibilities to the new agencies.* These model local laws not only are in harmony with the State laws passed during the 1970 legislative session but also contain additional details which are in accord with the ongoing assistance program being developed by the Environmental Conservation Department.

2. *Local laws provide a means for flexible and full use of local home rule powers.* The opportunity to exercise full local powers is not something to be taken lightly in a democracy. Moreover, additional duties for the new agency may be inserted in a local law to meet a unique local need, over and above the provisions contained in the State laws or the sample local laws. Amendments also may be made locally, pursuant to the Municipal Home Rule Law, as a specialized need arises, without the necessity of trying to amend State legislation. The latter step would be most difficult if there was no widespread agreement that such an amendment would fulfill a statewide need.

3. *The adoption of a local law represents the most substantial type of commitment by local government.* All of the provisions and duties are set forth visibly and specifically as part of the entire body of local laws. The local law also must be filed with the Secretary of State. This is the most appropriate procedure for establishing an agency that will be an important and enduring element of local government.

What Does A Council Do?

Environmental problems are so diverse—and often perverse—that a newly formed council or commission may be perplexed about where to start. Because open space in all of its many forms is so vital to community values and so basic to establishment of an ecologically balanced land-man relationship, action on its preservation has been stressed in the basic organizational legislation.

The section on legislative intent in the two sample local laws for creating these agencies gives further direction to this as follows:

"The preservation and improvement of the quality of the natural and man-made environment within the (municipality) in the face of population growth, urbanization and technologic change with their accompanying demands on natural resources, are found to be of increasing and vital importance to the health, welfare and economic well-being of present and future inhabitants and require forthright action by the governing body of the (municipality). It is recognized that the biologic integrity of the natural environment on which man

[1] There is no legal requirement, or advantage or disadvantage, for use of the terms "commission" or "council" when establishing one of these agencies. The authors of the sample local laws feel it is preferable to use "commissions" for the city, town or village agencies so as to avoid confusion with the county environmental management "councils."

is dependent for survival and the natural and functional beauty of our surroundings which condition the quality of our life experience cannot be protected without the full cooperation and participation of all the people of the (municipality) working in partnership with local and state officials and with various public and private institutions, agencies and organizations. Establishment of a commission for conservation of the environment is a necessary step in fostering unified action on environmental problems."

Local conservation commissions often find themselves working closely with planning agencies on development issues. They can lend complementary support, stimulate community action and often they give specialized insights.

Air and water pollution control projects, parks and recreation work, pesticides and chemicals control, refuse disposal, clean-up and litter control campaigns, shade tree planting and replacement, control of visual pollution, landscaping and other types of community improvement projects, erosion control, utilities and highway issues, junk car disposal and related local regulatory problems, control of surface mining and rehabilitation of mined areas, ground water and soils problems relating to percolation and development—all these and more have been subject to action by existing conservation commissions.

Perhaps the best way to understand what commissions do is to take a quick look at three of them—in Pound Ridge, East Hampton and Huntington.

The Pound Ridge Town Conservation Council tells a tale of success. Formed in 1968, they have long since earned the respect of other Town officials. As a result, their advice is being sought on matters such as the environmental impact of proposed new subdivisions, especially with regard to ecological implications. Most recently they have dealt with problems of eutrophication that may be associated with man-made lakes proposed for these developments.

They have conducted a survey of private property to determine its availability as permanent open space, held meetings with landowners on a tax block basis, and worked on prospects for open space easements. Currently, the Council is working with county officials to assess the impact of the use of Sevin in spraying programs. Alternatives are being offered. The drives for paper for recycling, in which they also are engaged, provide a feeling of immediate accomplishment.

The outstanding piece of work by the Pound Ridge Council, according to Chairman Mrs. Gilbert Simpkins, has been the passage of a new water law. This is having widespread consequences. It establishes a Water Control Commission and provides for the regulation of the use of water resources and for regulation of any modifications of water features (streams, wetlands, reservoirs, flood plains, meadows, etc.) Deposition

of debris and wastes in any of these features is prohibited as are excessive thermal discharges. Any developmental projects impinging on water resource features are subject to a permit from the Commission. The great advantage to this power lies not so much in being able to block undesirable projects but in being able to work with developers informally to achieve acceptable solutions before an *impasse* is reached. (This experience is similar to that of the Hudson River Valley Commission in exercising its review authority. Like the HRVC, the Pound Ridge Water Control Commission also is empowered to hold public hearings.)

In East Hampton, Long Island, the Town Conservation Council was successful in obtaining the passage of a wetlands preservation provision as an amendment to the zoning ordinance. Alert to the State's plan to improve the eastward extension of the Sunrise Highway, they are working with the State Transportation Department to skirt rather than splinter ecologically valuable lands which the Council has identified for local acquisition.

They too, have established a reservoir of credibility. This has made them effective in their advice to the Town Planning Board for establishment of 100-foot set-back zones in scenic areas as a buffer against development.

More recently, says Chairman George S. Miller, the Council has been working on a "green belt" along the ocean front and has been successful in placing acquisition proposals on the ballot for referendum. Work also is in progress to effect a study of shallow water currents in Acabonack Harbor. The Council has sought the assistance of the New York Ocean Science Laboratory at Montauk Point for this. It will be the first such study on Long Island.

Not far away, in Huntington, William A. McAneny tells a similar story about his Council—one of those formed under home rule powers before the passage of Town Law Section 64-b in 1967. He, too, rates one of their greatest accomplishments as having achieved a reputation for giving sound advice.

"So often," he says, "a well-intentioned citizen group can't get their good ideas accepted by elected local officials. They don't know how to work with government. I think that we have proven the validity of the conservation council idea. Certainly, this one is getting results."

Mr. McAneny attributes the Huntington Council's success to *tenacity* ("When you have a sound idea you have to keep going back with it. After awhile—often a long while—it gets accepted."); *hard work* ("We meet twice a month, not counting subcommittee meetings."); and relatedly, the *right people*. Two of the council members, both women and one of them a physicist, "work on this almost full-time."

One of the best moves they made, Mr. McAneny feels, was that of taking their own slate of candidates for members to the Town Board when they first requested establishment of the Council. They made sure that they got the "right people" at the start.

In addition to working on open space acquisition, getting parcels on the ballot for referendum, working with the Town Board on the future use of "surplus" town property, taking the initiative in beach erosion control projects, and working closely with the planning board on all of these issues, the Huntington Town Conservation Council has played a major catalytic and coordinating role in getting approval for a new sewage system. It called meetings, talked with homeowners, and "pushed and pulled" in general. Contracts will be awarded soon.

(Concluded in next issue)

General scene where sludge was pumped from bottom of lake.

Barge with pump and tube line to tank car on the shore.

Tank with suction tubes leading down to lake.

Testing Paper

by Mary Sparga

UNPRECEDENTED tests of world-wide significance into the exact composition of paper mill sludge are now being conducted by the New York State Department of Environmental Conservation and the International Paper Company at Ticonderoga on Lake Champlain.

Some 250 cubic yards, out of a 100-year-old accumulation of about a million cubic yards of sludge, were pumped out of Lake Champlain the first week in October. This is the first such action in the United States, so far as is known.

The Department of Environmental Conservation and the International Paper Company are conducting independent tests into the chemical and bacteriological composition of the sludge.

Water samples in the vicinity of the removal area were taken before, during and after the sludge removal. Preliminary tests indicate that sludge removal will have a detrimental effect on the ecology by seriously reducing the oxygen content.

In addition to determining the effect of sludge removal on water quality and finding out the composition of the sludge itself, the concurrent tests are directed to:

1. The possibility of recycling the sludge into a useful and economically feasible product;
2. The best method of handling the problem of 1,000,000 cubic yards of sludge in the lake—i.e., removing to a lagoon and covering as a landfill; leaving in place with a heavy cover to prevent sections of the sludge from breaking away, befouling marinas and boats; or leaving it alone until organic action is completed, since no more sludge will accumulate, because of the pollution control devices International Paper Company is now installing. Their new $76 million plant has $5 million in

Small test can is pulled up from bottom on the barge.

Upper right, water is tested at the scene.

Right, workman pours containers of sludge at tank truck.

Far right, view of new papermill with sludge settling tank in foreground.

mill Sludge

Senior Public Information Specialist

water and air pollution control devices.

Commissioner Henry L. Diamond, Department of Environmental Conservation, has pointed out that the tests now being made are of international significance. Recently the sludge problem of Fuji, Japan, a once delightful tourist attraction, has come to international attention. Fuji's port area has been turned into a stinking cesspool from the wastes of some 150 paper mills, bringing illness to workers and fishermen. The Japanese call the foul brown sludge, "hedoro," combining the words for vomit and muck.

Water from the lagooning of the Lake Champlain sludge was found to have a high biochemical oxygen demand, oxygen uptake rate and nitrogen concentration.

Dwight F. Metzler, deputy commissioner, Department of Environmental Conservation, foresees that the next four years will bring changes in facilities for handling sludge. He predicts that polluters will be under increasing pressure to remove accumulation of sludge from rivers and lakes, even where such accumulations are very old. This will be an expensive program.

The State is determined to find the best solution possible to the problem, which will not degrade the water quality of the lake or create ecological hazards. There is one hopeful note. With adequate waste treatment, these solid accumulations will not increase in the future.

Directors of the testing project at Lake Champlain are Dr. Leo J. Hetling, director of the research unit of the Environmental Conservation Department, and Dr. Glenn A. Nesty, vice president for research of International Paper Company.

More tests will be made after the old mill closes and during summer when oxygen content is critical.

Handling Hot Water, With A Payoff

Our Electrical Needs Are Creating A Two-Headed Monster. One Head Is Thermal Pollution. The Other Is An Amazing Variety Of Ways By Which We Can Turn The Water To Good Uses.

by **Ronald Stewart**, *Atmospheric Sciences Research Center, State University of New York at Albany*

S. P. (John) Mathur, *State Department of Environmental Conservation*

FOR the past forty years the need for electrical power in the United States has been doubling every decade, and it is expected to continue to do so in the foreseeable future. An examination of our present population growth curve will indicate a doubling of the population during a forty year period. These two statistics point out the fact that our demand for electrical power is increasing eight times faster than our population. It is this demand which has created the difficult electrical power situation over the past few years. This same demand in turn has also created the two-headed monster, thermal pollution. Hopefully thermal pollution will soon be considered as a new commodity on the market, usable low-grade heated water.

On September 16-18, 1970 the New York State Department of Environmental Conservation convened a conference entitled *Beneficial Uses of Thermal Discharge* in Albany, New York. This conference was a direct attempt to solve the problem of thermal pollution by productive means rather than by preventive means such as cooling towers. The following comments are a summary of that conference and the philosophy behind the organization of the conference.

The use of the thermal discharge may be divided into two categories: (1) direct use of the discharge by an agency independent of the utility or (2) an integrated coupling of the power plant to a closed-cycle operation which continually uses the same water and returns it to the utility.

Fish Growth Rate Accelerated

Under category one it appears as if both agriculture and mariculture could use the heated discharge directly. In Britain, research has been carried out for over seven years on the feasibility and cost of raising plaice, Dover sole and other marine foods in tanks, cages and fish farms. At the Hunterston Nuclear Power Station on the west coast of Scotland one of the experiments carried out by the White Fish Authority included using the heated discharge from the power plant. It had been noted in previous experiments at Port Erin that the fish growth rate had increased in the warmer water. The results at Hunterston proved that sole could be raised from the egg to one-half pound in less than two years. Similar growth in nature would require four years. This is simply due to the fact that the rate of growth decreases in the winter when the water is cold. If the water is warmed (as it is in a steam-electric generating station) then the growth may continue during most of the year. Thus, the fish reach market size more quickly and an economic gain is evident. It should be realized that these experiments were designed to improve the productivity of fish in Britain and the resultant application to solving the problem of thermal discharges is a most welcome happy event. This experience also pointed up the possibility that future fish culture will include hybrids which are adapted to the warmer waters and provide a more efficient food conversion ratio. In terms of world population needs the ability to provide a highly acceptable protein will become a tremendous asset. This has led the White Fish Authority to consider expanding their experimentation to include crustacea (such as lobster, shrimp and crabs) and/or mollusc farming (such as oysters).

Extensive experience on shrimp, yellowtail, halibut, eel, whitefish, and other marine foods being raised in the thermal discharge is evident from the Japanese mariculture. Japan is the world's largest fishing nation and today 6% of the total catch (equivalent to 15% of the total dollar value) is in mariculture. Mariculture is carried out at over a dozen power plants along the coast of Japan. The fish are raised in ponds, cages and areas created by dikes. The shrimp are raised inside in structures which appear to be greenhouses. The heated water is sprayed over the surface of the water containing the marine life and this acts as a spray pond used for power plant cooling as well as increasing the yield.

Iceland Using Geothermal Water

In Iceland vast quantities of geothermal waters are available under the surface of the ground. These can be tapped as wells with the discharged steam and/or water being transported to nearby towns. The use of the geothermal energy has more than doubled during the last decade. There are nine fish farming stations in Iceland and they produce about 300,000 smolts (young salmon) per year. Several of these farms use

White Fish Authority uses heated water from Hunterston Power Station in Scotland to speed growth of sole.

geothermal water to maintain optimum temperatures in the fish ponds to stimulate growth. In this way the smolt reach release size in eight months rather than two years under natural conditions. They are then released inside the fish farm to migrate to the sea and to rivers in Iceland.

The United States has just begun to use thermal discharge for fish culture. The Catfish Farmers of America have a wealth of information on controlled fish growth and suggest that under optimum conditions a catfish farmer could expect to produce as much as two thousand pounds of fish per acre in eight to nine months. Fifteen hundred to eighteen hundred pounds would be considered a good average. However, these figures are for still ponds. If instead we introduce the fish into the discharge canal (or other moving water) of a power plant, the yield improves. Between 25,000 and 50,000 fingerlings could be stocked per acre. Experiments of this nature have begun in Texas, Mississippi and at one TVA site. However, summer temperatures may prove to be a problem for the catfish and some other species may be considered eventually.

Agricultural uses of thermal discharge are evident at a variety of sites and in a variety of methods. This is of importance as it is necessary that methods to use the discharge be available in many climates.

"Spray-conditioning" of orchards and fields is being carried out in the Willamette Valley in Oregon. In this case Weyerhauser Pulp & Paper provides the heated water. The water is piped to the fields and is then sprayed into the air. By the time the water reaches the ground it has returned to the surrounding temperature. This system has several purposes: (1) it irrigates crops when needed, (2) it allows the fertilizer and pesticides to be spread under a controlled system, (3) it may be used to warm the soil in spring and delay the frost in the fall, and (4) when the temperature rises too high during the summer heating period, the heated water is sprayed into the air. Due to the evaporation which takes place the air temperature is actually reduced by heated water and the crops are not damaged. Although this system is operational, funds have not been available to study all the reasons as to why it works so well or if other problems are being created by the amount of leaching, etc. However, the first year yields are impressive and if these continue it is obvious that there will be a great demand for the available heated water. Even now in the Willamette Valley there is more demand for the heated water than can be provided under the present system.

Potent Agricultural Application

Direct warming of the soil by placing pipes underground was considered as a portion of a heat dissipation scheme at Oregon State University. Electric heating cables were used to simulate the pipe in this experiment. Extensive data were taken on the soil temperature at various depths to aid in optimizing the system. The results of the field experiments showed that the yields in the heated plots were from 34% (corn) to 66% (soybeans) greater than in the control plots. To overcome drying of the soil due to the extra heating a semi-porous pipe has been suggested. Whenever underground irrigation is needed the pressure in the system could be increased to force water through the walls of the pipe to the root area. The economic analysis presented was most encouraging and is best represented by the fact that two crops were harvested in one season rather than one crop. This doubled the yield per acre, a most impressive fact when the economics of these plans to alleviate thermal pollution involve some capital outlay for the initial piping, etc.

The Office of Recovery, Recycling and Reuse in the New York State Department of Environmental Conservation has announced the first grant which stresses the beneficial uses of thermal discharge from an electricity generating plant. The Niagara Mohawk Power Corporation and the Department of Environmental Conservation have jointly funded a demonstration and research project which will be carried out by personnel of the Atmospheric Sciences Research Center, State University of New York at Albany. The thermal discharge will be used for climate control in a small structure with experimentation on soil heating, evaporative cooling and space heating. This project is designed to provide data on the possibilities and limitations on the use of the thermal discharge under varying climatological conditions.—EDITOR

In Iceland, greenhouses cover thirty acres of land. About 70% of the area is used for tomatoes, lettuce and other vegetables while 30% is used to raise flowers such as roses, carnations, and tulips. These greenhouses are heated by the geothermal water. If a similar scheme was constructed using the thermal discharge from a 1000 MW nuclear plant several hundred acres of greenhouses could be heated. With the advent of plastic greenhouses the total cost per year of erecting and maintaining greenhouses will decrease. These greenhouses will also provide a year-round source of fresh foods.

Growing Crops Under Cover

One of the more unusual demonstration projects involves the air-inflated plastic greenhouses in Puerto Penasco, a small shrimping village on the Gulf of California. The waste heat from a diesel generator is used to desalt the sea water. However, as this is a coastal desert area the evaporation would be too high for irrigation so greenhouses have been erected. The atmosphere of the greenhouse is enriched with carbon dioxide from the generator to further stimulate growth. The result is a high humidity enriched atmosphere which aids in the production of fine crops. During the winter months the water vapor in the greenhouses condenses on the walls and ceiling to provide up to 1,500 gallons per day, far exceeding the amount of water needed for the plants. In the summer this amount decreases but if the winter excess was stored a year-round supply would be available for irrigation. At present 160 varieties of 18 different vegetables and fruits have been grown in these unusual greenhouses. All the crops have matured earlier than outdoor crops or crops in standard greenhouses. The yields have also been greater than expected with normal growth. Cucumber and lettuce production has been at least six times more than the production expected in open fields.

Further use of the thermal discharge in agriculture presents the need to move away from direct use toward more interdependent systems. By taking steam from the utility turbines at a higher temperature (which slightly reduces the amount of electricity generated) we may create a system with several hundred acres of greenhouses, enclosed cattle and chicken pens and a food processing plant. Or, if the discharge is still used directly, then during the normally colder months some form of extra heating must be available. With the electric power source nearby this is readily available. During the colder periods of the night (4-7 a.m.) the power demand is lower as thermostats are turned down for the night and industry has yet to begin the day's operation. Thus a balance of using electric heat during a period of normally lower demand insures better efficiency at a lower cost.

Based on the Fort St. Vrain (330 MW) power plant statistics it would be possible to use a greenhouse with evaporative pads to cool the thermal discharge and return the water back to the power plant 13°F cooler than the existing cooling towers. This in turn improves the efficiency of the whole system. The economic analysis presented may be highlighted by two figures: (1) if the greenhouse operator receives the heated water free, he saves $2,000-5,000 per year per acre on his heating bill, and (2) the utility (based on Fort St. Vrain) will save a quarter of a million dollars per year by not constructing cooling towers or having to maintain them. Such economics, which also turn a pollutant into a usable commodity, must be considered by industry.

Urban And Industrial

The next series of beneficial uses of thermal discharge depends upon the second category stated early in this article. This series develops the concept of urban and industrial uses. At this point the utility becomes an integral part of

This little girl examines vigorous growth of pole beans which have been stimulated by effluent water in Willamette Valley.

Foreign contributors to the conference, l. to r.: Matthias Matthiason, Reykjavic, Iceland; I. D. Richardson, London; and Won T. Yang, Miami, Florida, and Japan.

the plan. First consider home heating. We can pipe hot water to a nearby city ten to fifteen miles away. Here the Icelandic experience with geothermal water is of great assistance. A central heating source such as a nuclear power plant providing each home with heat (and possibly air conditioning) allows: (1) no individual furnaces in each home, therefore (2) more room in the house, (3) less air pollution, (4) less fire danger, (5) lower building costs, and (6) no chimneys needed. At present the city at Farsta near Stockholm, Sweden has such a system coupled with a nuclear plant. There are many other centralized heating systems available for study, however, which are coupled with fossil-fueled power plants.

In Iceland 40% of the population receives their home heating from centralized geothermal sources. The cost ($1 per million BTU) is very good for individual use. However, major users such as industry pay much less ($0.15 per million BTU). Other users include the Diatomic Earth Plant which produces 24,000 tons per year of dry diatomite. (This plant is owned jointly by the Icelandic Government and Johns Manville Corporation, USA.) The diatomite is brought up from the bottom of Lake Myratn in Northern Iceland and then dried. Using the geothermal steam for drying the cost is $3.3 per ton whereas it would cost $12 per ton if fuel were used. The diatomite is then sold for filtration and clarification of wines and beer in Europe.

Future prospects for using the geothermal steam include the production of chemicals from brine and sea water. An experiment on drying seaweed for export has been carried out on the west coast of Iceland. Preliminary plans call for a plant drying 3,600 tons per year with a drying cost of $3.40 per ton.

The Nuplex Approach

The concept of a nuclear complex, or nuplex as it is sometimes called, involves a series of options as to how the heat is used. Most of the ideas are not new, they have been carried out individually in many parts of the world, but putting the concepts together often creates other unforeseen problems. The nuplex would normally center on one nuclear and one fossil-fueled power plant or two nuclear plants. In this way the reliability of the system is greatly enhanced. Several industries may operate within the nuplex just as they would normally do in any city. The thermal discharge would be used to heat the greenhouses with any residual heat being used for fish ponds and/or accelerated waste treatment. (As biological activity increases with temperature, controlled heating of sewage tends to accelerate the treatment.) Studies have also been carried out on the raising of algae on the effluent from sewage treatment plants. This algae becomes food for the fish population and provides an economical means of operating the fish ponds. Within this same nuplex a freeze-drying plant treats most of the crops and fish. The single greatest cost in freeze-drying is the production of the steam used in the processing. In the nuplex this steam could easily be available in other than peak load hours. Vegetables and fish are 70-75% water by weight. During the freeze-drying this water is distilled off and condenses again to become available as another product. In this way a ton of fish releases more than 1,400 pounds (about 200 gallons) of distilled water. The freeze-dried product requires less space for shipping and no refrigeration for storage.

A completely different approach has been suggested incorporating canals and streams as well as constructing connecting canals. This is based on a long-range inter-regional water supply. These canals would provide for the cooling of thermal discharges by natural means. However, the evaporative losses would have to be accepted and the canals could not meet thermal pollution criteria. The heat would keep the canal open year-round and would transfer water from the Pacific Northwest to the Southwest. On the way approximately 30,000 MW could be generated with the possibility of additional hydro-electric generation.

Many other suggestions have come forth for consideration although they have not been attempted to date. It has been suggested that a series of power plants along the St. Lawrence Seaway would keep the Seaway free of ice during the wintertime. This would allow shipping to move year round. The possibility of increased fogging and icing during this period raises a question as to whether or not this is feasible. Other schemes have included weather modification on a large scale. A 1000 MW plant releases sufficient heat to evaporate fog over the runways of an airfield. Distribution of the heat is costly, however, for a part-time problem. It would take a coupled system which provides for desalting most of the time and the heat released to the de-fogging system when necessary.

Industrial Attitudes Important

Although some suggestions for the use of the thermal discharge seem to be rather long range it should be realized that the growth of electric power generation and its concomitant thermal discharge presents a considerable problem

Two interested participants: Robert Hall, editor of the Warrensburg-Lake George News, and Mrs. Henry Diamond.

for any utility interested in protecting the environment. For instance, if we consider only large power plants (500 MW or larger) then our capacity in New York State is expected to grow from approximately 14,500 MW in 1970 to 40,500 MW in 1990. (One megawatt (MW) is equal to a thousand kilowatts or one million watts. Compare this to the light bulb in your own home. One MW is equivalent to ten thousand of the one hundred watt bulbs commonly used in the home.) Cooling of this power generation will take about 0.8 gallons of water per kilowatt per minute, or about 11,600,000 gallons of water per minute are being heated up in New York State in 1970. It seems foolish to waste this vast quantity of low-grade thermal discharge if we can find reasonable uses for it. There are, of course, many problems to be considered. At present very few species of fish are suited to the summertime temperatures discharged from power plants. The relationship between temperature, food utilization and growth for each species must be understood for proper economic analysis of fish farming. The organic wastes of fish farming must be treated less they contribute to a pollution problem. It is possible that they could be returned to the algae ponds in a nuplex. More experimentation and pilot plant studies of greenhouse heating by the discharge are also necessary, especially in colder climates.

In too many cases the organizations which create some form of pollution are reluctant to get involved in the expense of alleviating the pollution. Thermal discharge is simply heated water and as cooling towers, cooling ponds, etc. are expensive it behooves the power generating industry to encourage uses of the discharge.

This may provide them with large financial savings simply by not building cooling devices.

Commissioner Diamond views the theme of the conference.

(NOTE: The full proceedings of the Conference on Beneficial Uses of Thermal Discharge are available for $10. Write: S. P. Mathur, Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12201.)

Papers presented at the conference and their authors were as follows:

"Trends of Power Generation and Expected Heat Discharges," by Dale Brown, General Electric Co., Schenectady, N. Y.

"Use of Waste Heat in Aquaculture in Scotland," by I. D. Richardson, White Fish Authority, London, England.

"Mariculture in Japan Using Heated Effluent," by Won T. Yang, University of Miami, Florida.

"Catfish Farming—A Beneficial Use of Waste Heat," by Charles W. Pickering, Catfish Farmers of America, Laurd, Mississippi.

"Biological Limitations on the Use of Waste Heat," by Charles C. Coutant, Oak Ridge National Laboratory, Oak Ridge, Tenn.

"Utilization of Thermal Water in the Willamette Valley," by Herman H. Miller, Jr., Vitro Corporation of America, Portland, Oregon.

"Use of Waste Heat in Agriculture," Larry Boersma, Oregon State University, Corvallis, Oregon.

"Waste Heat Use in a Controlled Environment (Greenhouse)," by Carl N. Hodges and Carle O. Hodge, University of Arizona, Tucson.

"An Independent View of Use of Thermal Power Station Cooling Water to Supplement into Regional Water Supply," by Robert T. Jaske and C. J. Touhill, Battelle Northwest, Richland, Washington.

"Beneficial Uses of Heat in Iceland," by Matthias Matthiason, Reykjavik, Iceland.

"Agro-Industrial and Urban Uses of Waste Heat," Sam E. Beall, Oak Ridge National Laboratory, Oak Ridge, Tenn.

"Combination Urban-Power Systems Utilizing Waste Heat," by John A. Nutant, Westinghouse Electric Corporation, Pittsburgh, Penn.

"Status of the Art," by Ronald Garton, Federal Water Quality Administration, Corvallis, Oregon.

New York's Snow Patrol

Conservation Officers And Forest Rangers Have Tripled Their Coverage Of The North Country With A Fleet Of Snowmobiles

by Louis R. Fendrick, *Conservation Officer*

For decades the job of patrolling the Adirondack Forest Preserve and State lands in winter has been an arduous one for New York State Conservation Officers and Rangers. Much of the patrol had to be done on snowshoes, and that can be hard and slow work.

But this past winter the patrol has been easier and far more effective. The reason: The Department has gotten into full swing with a joint enforcement program using a fleet of 43 snowmobiles which has vastly expanded the effectiveness of both Conservation Officers and Rangers.

In a job that requires constant surveillance of the back country, officers long ago learned to rely on snowshoes to get them into areas where the snow is deep. Today, the snowmobile enables them to more than triple the territory covered with minimum physical exertion.

One of the big problems in deer country is the winter pack of dogs that harass the deer population, killing many and causing an undue amount of complaints to the various Regional Offices. Perhaps there is no one single complaint from the public that causes more concern in the winter than dogs killing deer.

Protecting Deer

One of the tasks of the Conservation Officer is to hunt down these dog packs and kill the dogs whenever and wherever the problem exists.

In the past this has been perhaps one of the most strenuous duties of the Officers in the field. It meant a concentrated patrol, and most of this patrol required footwork on snowshoes. It is not unusual that most of the trouble arises when the snow is deep and the top is encrusted with ice.

Two Conservation Officers on patrol use a radiotelephone to direct a Department plane to their vicinity.

Under such conditions deer find it hard to travel. During this time of the year when their physical condition is at low ebb, due to scarcity of food and yarding conditions, deer are easy prey to prowling dog packs. The dogs can travel on top of the drifts without breaking through, whereas the deer cuts through the crust and makes slow progress.

With the snowmobile, Officers gain clear advantages on the running dogs. They now can travel on top of the drifts at a far greater speed and cover much more of a troubled area. When a man afoot is spotted by the dogs, they take

off and keep well out of rifle range. With the snowmobile, men can get in closer to the pack and often discard the rifle to use a 12-gauge automatic shotgun loaded with 00 buckshot.

The time element is so vitally important in getting into position to establish some control on the dog pack. Those of us who work in the field are well aware of established runs that deer will use in their effort to evade the chasing dogs. A travelling herd will cross at a point miles away but with the snowmobile it takes only minutes to beat the herd to the spot and be on hand when the dogs come through.

Control Of Dogs

Over the years there has been no better means of control of marauding dogs. Use of the snowmobile has become one of the most effective means of reducing the deer-killing dog packs.

Whereas much of the actual shooting is done from the machine, a word of caution is advisable at this point. The New York State Conservation Law prohibits the carrying of a shotgun or rifle loaded in either the chamber or the magazine, in or on a vehicle. The snowmobile is classified as a vehicle. This law exempts Officers in the performance of their duties. But it is a violation of law in New York State for others to carry loaded shotguns or rifles on a snowmobile.

(All snowmobilers are advised to know the laws of all states in which they might have occasion to carry or use firearms in connection with snow machine use.)

As a law enforcement tool the snowmobile fits admirably into the course of a general conservation patrol. Used as well by the public, the seasoned trapper now can extend his range well into the back fur country. This means patrols now have to extend their range as well and keep a close tab on those who would break the law.

It is not uncommon for an Officer to follow the same snow tracks made by a trapper tending his trapline. Often a two-way radio set-up is used between a patrol car and the Officer on the snowmobile. This enables more efficient use of both vehicles to accomplish the job.

The machines also are used on the frozen lakes of the North Country as a quick means of checking ice-fishermen. The scattered tip-ups on many of the larger lakes required a time-consuming check on foot patrol.

Game Management Work

Also, game management work done by the Officers entails many hours in the back country. A wild turkey census, before use of the machine, was a back-breaking job that required great physical stamina and endurance. Today, the snowmobile makes the job a pleasant one and possibly presents a more accurate survey with better coverage.

Similarly, in areas where deer have yarded to the extent that food scarcity is a problem and there is a possibility of deer starving, Officers have a much better chance to work with game biologists to slash-cut wooded areas to obtain better browsing conditions to carry the deer over the critical period. In a 4- to 6,000-acre wooded mountain area the snowmobile is the best answer for getting such a job done.

Used in conjunction with a trailer hitched to the patrol car, the machine has unlimited possibilities in patrol work. The back country now is open more than ever before. An Officer often will travel with his car as far back as he possibly can, then resort to snowmobile travel to get him to a problem spot in record time.

In live-trapping snowshoe rabbits for stocking purposes, the machine is most adaptable. It enables the Officer to set up his live-traps in a wide range in a comparatively short time. It also affords him the luxury of checking his traps quickly and transporting the live animals in a manner that is much more efficient and pleasant.

Predator control also is made much easier by use of the snowmobile. Shooting a running fox from one of these machines gives one the feeling of being on a Maryland fox hunt. You almost expect a frenzied yell of "tally ho!" You really have to watch this fellow though, or you could wind up in a high jump into a ravine. For some unknown reason the fox isn't too afraid of the cruising snowmobile and I have seen times when it was quite obvious he wanted to race the machine.

When real rough weather hits the snow country, many of the back roads become impassable and a great majority remain unplowed until spring. Officers are well acquainted with residents and it is not unusual for some of these people to live way back in the snowed-in area.

More often than not, the Conservation Officer on such a beat now makes these places a regular stop for a cup of coffee and to check up on the old gent to see how he's making out. It gives some of these old-timers a sense of security, when they hear the motor noise of the snowmobile coming up the trail. In many cases the Officer doubles in brass as a mailman and a grocery delivery boy for an ailing woodsman who just won't give up the comfort of his isolated cabin.

Old logging roads become byways to the snowmobile and soon the snow-packed trails become arterials for entrance into the hard-to-get places. An interesting observation is that game soon begin to follow the same tracks, making game trails!

Much has been said about the snowmobile being a winter plaything for those who have the money to own one. This may be true in some instances but the practical application of the machine in snow country is hard to measure. Believe me, it's here to stay.

Recently, in sugar bush country, I ran into a new use for the machine. Where the old-time farmer or backwoodsman used a team of horses and sleigh to get the sap to the sugar house, I found a modern operator who uses a snowmobile with a tank built onto the toboggan trailer. I had quite a talk with this fellow who figured his biggest saving was in reduced collection time with use of the machine.

To quote this fellow's opinion, as we parted he jokingly yelled at me, "How sweet it is."

Somehow I had the idea that he really was right. I know my job is a lot easier with this new equipment and I could understand his feelings, for the snowmobile really is a sweet piece of machinery.

Aside from getting the job done, the snowmobile adds fringe benefits. There is a definite thrill in operating the machine. It makes fun out of what used to be a laborious task. You also can enjoy the breath-taking wonders of nature you've somehow missed before.

A routine patrol on top of the snow is an adventure in itself. You get to know parts of your assigned territory you never knew existed. The day-to-day drama of wildlife facing the winter snow drifts is more easily understood by continual study of tracks . . . their story in the snow.

Conservation Officers are finding the snowmobile the real answer to their winter work. It's snow patrol with a snowmobile.

LAKE ERIE
Alive But Changing

The Eleventh Largest Lake In The World Has Been Called "Dead," "Dying," "Hopeless." Here Is A Dispassionate Analysis Of Its Present Condition And What Ails It.

Dr. Dean E. Arnold, *Assistant Research Limnologist, Great Lakes Research Division, The University of Michigan*

THE idea has become popular that "Lake Erie is dead." In a real sense, this is far from the truth. By any common measurement there is more life going on in Lake Erie now than there has ever been in the past.

What has "died" is the community structure that existed in "the good old days." It consisted largely of organisms which we have been conditioned to consider desirable, but which have been replaced by others more adapted to the present conditions.

In recent years, interest in the pollution and degradation of natural waters has become widespread and fashionable among both scientific and popular writers. In such writings, it is common to apply the label of "eutrophication" to the deterioration process, whatever its cause and means. To the limnologist (one who studies fresh waters and their ecology), "eutrophication" refers only to an increase in nutrient content, not to aging of lakes in general, nor to most types of pollution. For examples of eutrophy, one usually turns to small, shallow, weed-choked lakes and ponds, and it is indeed in such environments that the typical conditions are most easily seen. On the other hand, large lakes are the classic examples of oligotrophy, or low nutrient conditions. It has been widely held that the vast dilution factor characteristic of the largest lakes would prevent any clear indication of eutrophy in them. Recent studies, however, have forced a reconsideration of this idea. Perhaps the best-documented case is that of Lake Erie, the eleventh largest lake in the world in surface area. From the human viewpoint, this lake is rapidly deteriorating, not only by becoming more eutrophic, but in other ways to be discussed in this article.

Contribution Number 131 of the Great Lakes Research Division, University of Michigan, Ann Arbor.

An earlier report on Lake Erie by the same author was published in the *New York Fish and Game Journal*, Vol. 16, No. 1 (January, 1969), under the title "The Ecological Decline of Lake Erie."

In the following sections, we will look at the various components of the Lake Erie system and examine how and why they are changing.

Geologic and Physical Changes

Early Lake Erie was formed about 12,400 years ago. Its level was about 98 feet below the present, but rose rapidly when the area around its outlet at Buffalo was uplifted following the retreat of the last glacier. The present level of about 570 feet above the sea was attained 9,000 to 10,000 years ago, and has changed little since. The hard rock at Niagara Falls controls the level of the lake by preventing vertical erosion of the outlet, acting as a natural weir. However, the falls are being eroded away horizontally and thus are moving upstream. It is estimated that this horizontal erosion will intersect the eastern basin of the lake in approximately 25,000 years at the present rate. The lake will then empty, leaving little more than a marshy stream. By that time, however, other processes now becoming apparent

LAKE ERI

PROBLEMS O

Bosmina

Cyclops

Daphnia

Midge larvae

Hexagenia (Mayfly)

Fingernail Clam

INTENSIVE FARMING

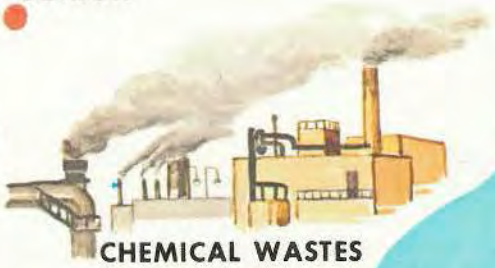
Turbidity, erosion, plant nutrients, pesticides

HEAVY INDUSTRY

Turbidity, toxic wastes, heat

DETROIT

LA



CHEMICAL WASTES

Persistent and toxic chemicals, oxygen demand, discoloration

Smelt

Carp

Pike

Catfish

CLEVELAND

MUNICIPAL WASTES

Plant nutrients, turbidity, health problems

POWER PLA

Heat, radioactiv

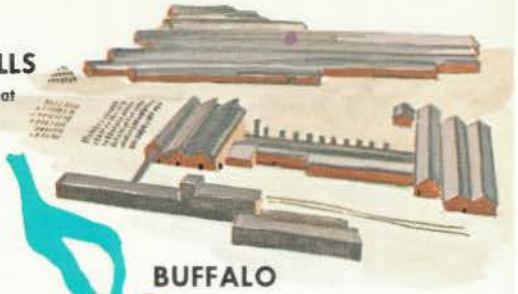
GROWING POPULATION

Increased wastes, increased demand for activities causing other problems

F A CHANGING ECOLOGY

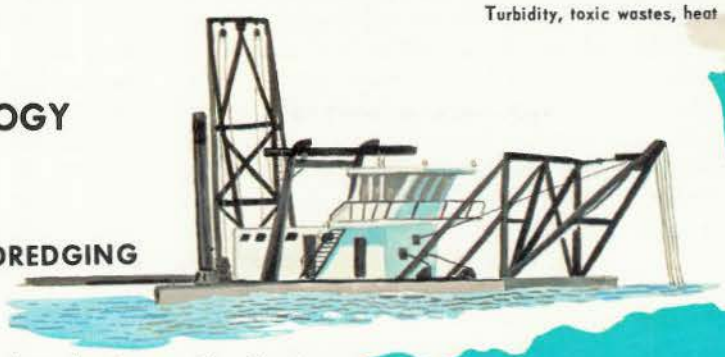
STEEL MILLS

Turbidity, toxic wastes, heat



BUFFALO

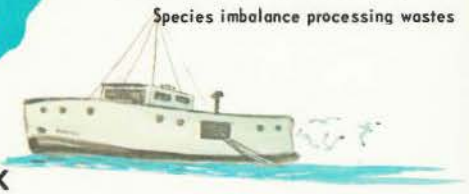
DREDGING



Oxygen demand, turbidity, release of noxious materials and nutrients

COMMERCIAL FISHING

Species imbalance processing wastes



Carp

Carp

200 ft

100 ft

erch

DUNKIRK

POWER PLANTS

Heat, radioactivity

KE ERIE

ERIE

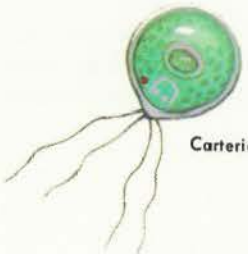
Carp

SHORE EROSION

Turbidity, silting of spawning areas, land loss

Asterionella

Tabellaria

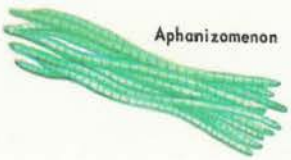


Carteria

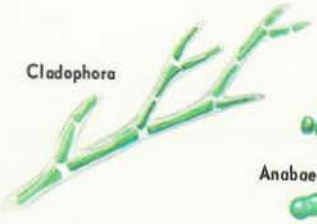
Fragilaria

Microcystis

Melosira



Aphanizomenon



Cladophora

Oscillatoria

Anabaena

TS

will have destroyed the lake for human enjoyment, unless they are checked.

At present, the lake consists of three basins (western, central, and eastern) that become less productive and deeper from west to east. The central basin is generally considered as the area between a line connecting Point Pelee and Sandusky (Ohio), and a line extending from the base of Long Point (Ontario) to Presque Isle (near Erie, Pa.). The western basin includes the island area and is nowhere deeper than 60 feet. It is almost always completely mixed by the wind, and is the most productive of the three basins. The central basin has a maximum depth of slightly less than 100 feet and exhibits summer stratification, as does the eastern basin, which has a maximum depth of 210 feet. The mean depth of the lake as a whole is less than 92 feet. Average depths of the other Great Lakes are much greater, particularly in proportion to their areas.

The chief process in the aging of a lake is filling with sediments. This is a serious problem in Lake Erie despite its large volume. All of the large tributaries and most of the incoming solid material enter the lake in the western basin, tending to decrease further its already shallow depth by adding sediments. Although the Detroit River (outlet of the upper lakes) contributes 90% of the inflow (194 million cubic feet per second), the Maumee River contributes most of the silt load and nutrients. This is largely due to the draining of the Great Black Swamp in the late 19th century, which created extensive rich but easily-eroded farmlands. Most of the northern and some southern shores consist of high clay cliffs subject to wave erosion which contributes large amounts of sediments to all three basins. The shore of the lake is sinking at the rate of about 3 feet per 300 years due to shifting of the earth's crust, and this increases erosion and sedimentation. In addition to man's acceleration of sedimentation through cultivation and abuse of the land, he has built harbor jetties and erosion control structures all along the shore. These seem to have increased the total shore erosion and silt load. There seem to be no published estimates of the rate of filling of the lake with sediments.

Sediment Load Heavy

The sediment load is reflected in light penetration readings. In the Maumee River, Secchi disc readings average less than 3 feet. In the open water of the western basin this increases to 6 feet due to mixing with the relatively clear water of the Detroit River and water from the central basin which enters through the Bass Island passages. (Except for temporary seiche effects, there is a clockwise circulation of the waters of the western basin and all of the outflow is through the Pelee Passage along the north shore. The average turnover time for western basin water is two months.) By the time the water reaches the eastern basin, its transparency has increased greatly, so Secchi disc readings are 13 to 25 feet. The latter readings are characteristic of the other Great Lakes; only western Lake Erie is not relatively clear. There have been no significant changes in transparency since the 1920's, but an overall average increase of 50% in turbidity occurs from summer to early winter each year.

There has been a gradual warming of both the lake and the climate of the surrounding area. The increase in average lake temperature has amounted to about 2°F since 1920, and there have been several open winters recently. This is not necessarily a symptom of eutrophication, but contributes to it by accelerating biological processes and to some extent by making the habitat less favorable for some species and more favorable for others.

Pollution

Pollution, in the broad sense, is responsible for most of the changes in the chemistry of Lake Erie. Three kinds of pollution may be considered important to the lake: (1) silt, as already mentioned, which changes the character of the bottom and reduces light penetration; (2) domestic sewage, which adds nutrients, lowers dissolved oxygen, and causes health problems; and (3) industrial wastes, which may do all of the foregoing as well as cause injury or death to living organisms. Serious pollution enters the lake from the lower Detroit River, the western shores, along the south shore and at the eastern end. Vessels on the lake and dredging operations also contribute significant amounts of pollution.

Most of the effects of domestic sewage are seen in the western basin. This area is particularly susceptible to pollution for three reasons: (1) the large industrial communities on the Maumee, Raisin, and Detroit Rivers; (2) its shallowness and consequent small water volume; and (3) its semi-isolation caused by two peninsulas and numerous islands which tend to prevent free outflow of water to the rest of the lake. Each day, the American shore discharges 70 million pounds of waste solids plus 504,000 pounds of dissolved phosphate and nitrogen into the Detroit River. On the Canadian side, much of Windsor's sewage has been dumped into the river without chemical treatment. The same is true for the wastes of over 13,000 persons on the Michigan shore alone. The population in this area is increasing at the rate of 26 percent per decade, and the bacterial load at the outlet of the Detroit River has increased more than threefold since 1913. Maximum coliform counts in the area now reach 500 per milliliter, whereas in 1913 they were approximately 2 per milliliter. In all, the Detroit River receives 1.6 billion gallons of waste per day.

Apparently there has been little if any increase in bacterial load in the central and eastern basins, except along populated shores. In a 1929 report on an early eastern basin survey, A. M. Zillig wrote: "The presence of *B. coli* in such small numbers, the repeated absence of this species and other gas-forming organisms in some parts of the lake, and the low bacterial counts at all stations, tend to eliminate pollution as a factor affecting fish in the open waters of Lake Erie." Recent open-water samples in the eastern and central basins have shown similar results.

Little detailed documentation is available for the industrial waste discharges into Lake Erie, but they are known to be of increasingly large magnitude, and are probably responsible for many of the increases in dissolved ionic material in the lake. A significant amount of these wastes is in the form of airborne particles from smokestacks and trash burning which settle on the lake. Nitrogen in particular seems to be added in this way.

Mercury Complicates Pollution

Recently, two particular industrial wastes, mercury and heat, have been much in the news. It appears clear that waste mercury has been discharged for some years by at least two chemical plants upstream from Lake Erie on the St. Clair and Detroit Rivers. It is estimated that over 365,000 pounds of mercury have been released there since 1950. Being a very insidious substance in the environment, it has spread throughout the food chain of Lake St.

Clair and at least the western basin of Lake Erie. Among other things, this has caused serious restrictions on both commercial and sport fishing, since mercury is a powerful nerve poison. Yellow perch from western Lake Erie have shown mercury concentrations averaging 0.39 parts per million, with lower concentrations to the east. The current Federal limit is 0.5 parts per million. Although the discharges have for the most part been stopped, it is nearly certain that it will be many years before the mercury concentration in the ecosystem drops to levels of no concern. (See "Mercury—Major New Environmental Problem," THE CONSERVATIONIST, August-September 1970.)

Waste heat, or "thermal pollution," has as yet received little attention in Lake Erie. The major and most common source of thermal pollution is electric power plants. There are several of these along Lake Erie's shores, but until recently none have been large enough to cause a serious problem. There are two larger plants at the western end of the lake which have recently begun operation, and studies are underway to determine their effects. One of these is coal-fueled, the other nuclear. A third large new plant, nuclear-fueled, to be built at Locust Point between Toledo and Sandusky will include cooling towers to prevent damage to the delicate ecology of the western basin by its heated discharge. As more and larger power plants are built in the future, thermal pollution may become a more serious problem in Lake Erie. (See "Thermal Pollution of Cayuga Lake by a Proposed Power Plant," THE CONSERVATIONIST, August-September 1968.)

Another problem connected with the growing number of new electric power plants, most of which are nuclear-powered, is radioactivity. Contrary to popular belief, nuclear power plants do intentionally release small but significant amounts of radioactive waste to both the water and the air. These releases are closely controlled according to governmental regulations, but the possibility of accidental larger releases, although small, does exist. There is currently a controversy regarding whether the government limits are sufficiently enforced. Even at low levels, it is likely that some of the radioactive materials released to lakes by nuclear power plants will be concentrated in the food chain in the same way that has been demonstrated for mercury and pesticides. Some research in this problem is being done, but more is needed.

With the large areas of agricultural land bordering Lake Erie, pesticide runoff would be an expected problem. So far, however, there have been no well-publicized discoveries of high pesticide levels in fish from Lake Erie as has happened in Lake Michigan and elsewhere. As persistent pesticides are now being withdrawn from use, it is not likely that this will grow in importance in Lake Erie.

Chemical Changes

Except for the two constituents (silicon and iron) known to be involved in the mineral nutrition of at least some of the phytoplankton, all the chemical constituents of Lake Erie have increased during the past century. A. M. Beeton has summarized the changes in the major ions since 1906 as follows:

Calcium from 31.0 to 36.7 parts per million

Magnesium from 7.6 to 10.2 parts per million

Sodium + Potassium from 6.5 to 9.4 parts per million

Sulphate from 13.0 to 23.0 parts per million

Chloride from 8.7 to 26.0 parts per million

Silicon from 5.9 to 1.6 parts per million

Total solids from 133 to 183 parts per million

(Not all the values are from the same location, but the differences are minor compared to the total change in concentration.) Jacob Verduin has listed the following additional changes between 1950 and 1961 for the western basin only:

pH from less than 8.7 to 9.2

Carbon dioxide change per day at surface from 32 to 70 micromoles per liter

Nitrate in Maumee Bay from 1400 to 2200 micrograms per liter

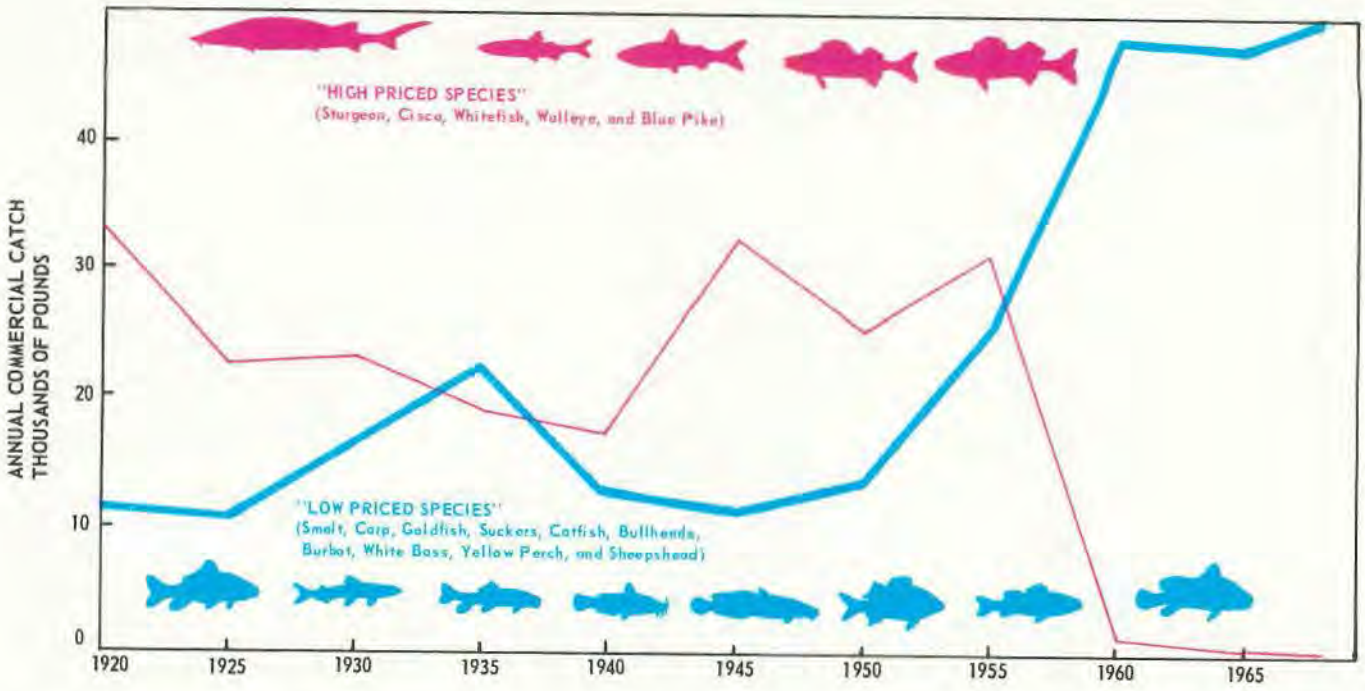
Phosphate in Maumee Bay from 105 to 450 micrograms per liter

More recent studies by R. R. Weiler and V. K. Chawla of Canada's Centre for Inland Waters show that these trends of increasing inorganic ions still continue. That the same is true of the major plant nutrients is shown by the accompanying table of data collected by the U. S. Federal Water Quality Administration.

There is some controversy about both the causes and effects of these changes. Beeton stated that they are probably of no consequence to the biota and that they must be due to materials in the inflowing water. H. C. Curl calculated that the Maumee River alone carried in over 125 metric tons of phosphates per year; these act as fertilizer for phytoplankton. Verduin pointed out that since the Federal price-support program limits acreage tilled but not production per acre, farmers in the Maumee basin have been applying large amounts of fertilizer, causing increases in nitrates in the runoff to Lake Erie (he gave collateral evidence for this by the increase in the number and prosperity of fertilizer dealers in Bowling Green, Ohio, in the last 15 years). G. G. Harlow found that in the Michigan area of the lake, municipal wastes contributed 90% of the nutrients, with land drainage a minor factor. On the other hand, J. R. Kramer stated that much of the increased concentration of soluble salts in the lake appears to be due to loss of water through evaporation (a component of natural lake aging).

Source: U.S. Federal Water Quality Administration

Water characteristic	Years	Average concentration
Soluble phosphorus	1963-4	0.011 milligrams per liter
	1967-8	0.018 milligrams per liter
Organic nitrogen	1963-4	0.25 milligrams per liter
	1967-8	0.33 milligrams per liter
Sediment characteristic	**Years**	**Average concentration**
Total phosphorus	1963-4	0.62 milligrams per gram
	1967-8	0.86 milligrams per gram
Ammonia nitrogen	1963-4	0.12 milligrams per gram
	1967-8	0.30 milligrams per gram



Assuming all concentration of salts to be attributable to evaporation, he derived an evaporation rate of 2.3 x 10^{-6} centimeters per second, well within the range of other reported results. C. R. Ownbey and D. A. Kee reported that the Detroit and Grand Rivers together contributed 90% of Lake Erie's chloride input. It seems that the true cause of the chemical changes must involve both evaporation and inflow, and that they must have some effect on the phytoplankton if not on other biota.

Dissolved Oxygen

Perhaps the most serious environmental change in Lake Erie has been in the dissolved oxygen levels at the bottom. Regardless of the *average* dissolved oxygen concentration in a body of water, a single instance of anaerobic conditions or levels below the lethal limit will kill all the benthic organisms and have many far-reaching consequences, lasting until new populations have been established by immigration. Such conditions are usually associated with thermal stratification over a bottom high in organic matter. The three basins of Lake Erie differ in these respects. The western basin is high in organic matter but is too shallow to stratify, the eastern basin stratifies but is low (although increasing) in organic matter, while the central basin stratifies and has accumulated sufficient organic matter to cause oxygen depletion to become the usual summer condition in recent years.

Low levels of dissolved oxygen have been observed in the central basin several times since 1930 and might have been more commonly detected with better sampling and analysis. Depletion has become gradually more extensive over the past three decades. At present over 70% of the central basin (more than 1,600 square miles) has less than 1 part per million dissolved oxygen at the bottom from mid-July through September. The oxygen demand of the water in the hypolimnion is not great enough to cause this depletion, but the sediments themselves have a high chemical oxygen demand. N. A. Thomas calculated the oxygen deficit rate for the central basin by determining the difference in dissolved oxygen in the hypolimnion on two dates at least a month apart. The 1929 rate was 0.0065 milligrams per cubic centimeter per day. In 1959 and 1960 rates were 0.03 and 0.037 milligrams per cubic centimeter per day respectively. This indicates an increase of 5.7 times in productivity, which uses over 70% of the hypolimnial oxygen by late August. The limiting rate for aerobic conditions to be maintained is only slightly higher, at 0.04 milligrams per cubic centimeter per day.

Oxygen depletion in the western basin occurs only when thermal stratification is set up by long, warm, windless periods. Bottom productivity is so high, however, that in 1966 only five days of stratification were required for the dissolved oxygen to drop below 3 parts per million, whereas 28 days were required in 1953. The results of such an occurrence are discussed below in relation to invertebrates.

Phytoplankton and Other Algae

It is difficult to draw conclusions regarding changes in the algal flora of Lake Erie because of insufficient studies and a large amount of seasonal variation. However, the total abundance of phytoplankton has increased almost threefold, and some shifts in dominant species have been documented. P. R. Burkholder found "clean-water" diatoms, especially *Tabellaria* and *Asterionella*, abundant in samples taken in 1928. D. C. Chandler found that diatoms composed 98% of the spring pulse and 77% of the winter pulse in 1939–40. C. C. Davis found diatoms still dominant in all seasons in 1950–51, but by 1956–57 his collections showed green algae clearly dominating the autumn phytoplankton. Even within the diatom group, changes have occurred. Jacob Verduin listed the dominant western basin diatoms before 1950 as *Asterionella formosa, Tabellaria fenestrata,* and *Melosira ambigua;* by 1960–61 these had been replaced by *Fragilaria capucina, Coscinodiscus radiatus,* and *Melosira binderama.* Davis observed a similar shift in the central basin on the basis of records from the Cleveland water intake. Analysis of these records from 1919 to 1963 showed that there had been a consistent increase in the average quantity of phytoplankton. The vernal

and autumnal phytoplankton maxima had consistently become more intensive and had lasted longer. The periods of minimum phytoplankton in winter and summer had become shorter and less well marked, until the winter minimum failed to develop at all in some of the latest years. Davis also observed that blue-green and green algae had partially displaced the diatoms in autumnal pulses, and V. L. Casper observed a bloom of blue-greens covering 800 square miles of the western basin for two days in September, 1964. This bloom was composed of *Anacystis, Oscillatoria, Carteria, Aphanizomenon,* and *Anabaena.* It is generally agreed that these genera are good indicators of eutrophy, and they are now among the dominants in Lake Erie.

Attached and floating algae (mostly filamentous) have also increased. Since the early 1930's complaints have grown of decomposing, malodorous accumulations of *Cladophora* along the shoreline, particularly around the Bass Islands and the eastern basin. It has now become a major problem.

Zooplankton

The zooplankton of Lake Erie has been only sparsely studied, but some changes can be seen. C. B. Wilson in 1928 found cladocerans much more abundant than copepods, with *Daphnia pulex* and *Epischura lacustris* the dominant species of the two groups. A. S. Bradshaw has presented evidence from collections at ten-year intervals (1939–49–59) for a large increase in cladocerans and a slight increase in copepods over the 20-year period. C. C. Davis in 1966 stated that *Daphnia retrocurva* was now the dominant cladoceran, and that the copepod *Diaptomus siciloides,* characteristically an inhabitant of shallow eutrophic waters, had appeared.

Benthic Invertebrates

The changes in benthic populations in the western and central basins revolve around the naiad of the mayfly *Hexagenia limbata,* a clean-water inhabitant which until 1953 was the dominant benthic organism. S. Wright and W. Tidd found 283 *Hexagenia* per square meter in 1929, and 510 per square meter in 1930. Evidently little change occurred over the next two decades. D. C. Chandler found 493 per square meter in 1942 and 351 per square meter in 1943. In 1951–52, K. G. Wood found 235 per square meter in collections taken through the ice. On September 1–4, 1953, N. W. Britt observed an unusual thermal stratification due to hot, calm weather in the western basin and found oxygen concentrations as low as 0.70 parts per million near the bottom. Bottom samples collected on September 5 had an average of 465 *Hexagenia* per square meter, all of which were dead. Later in September and again in November, the average number of living nymphs was only 44 per square meter. Examination of the stomach contents of silver chubs, which are important predators on mayfly nymphs, showed a great reduction in the use of *Hexagenia* in September and November 1953 as compared to the same period in 1952. Britt predicted that this short period of stratification would have long-lasting effects on the economy of the western basin; a prediction which has been upheld by later events.

In 1954, Britt discovered that a high level of repopulation had occurred, with an average of 827.5 *Hexagenia* per square meter at the same stations he had sampled in 1953. These were all juveniles, probably the product of resistant eggs that had survived the low oxygen of 1953. Unfortunately this abundance did not last. In 1957 A. M. Beeton found only 39 per square meter, and in 1961 J. F. Carr and J. K. Hiltunen found fewer than 1 per square meter, a decrease of 99% since 1930. In both the western and central basins, the plague of adult mayflies that was characteristic in summer around the lights of south shore cities has been absent since 1953. Caddisflies, also formerly abundant, had decreased to less than 1 per square meter by 1957.

As might be expected, other organisms, more tolerant of adverse conditions, appeared to occupy the niche left by the mayflies and caddisflies. Oligochaete worms (mostly Tubificidae or "sludgeworms"), which had occurred at a density of about 12 per square meter in 1929, had already increased to 551 per square meter by 1957 and averaged over 2,000 per square meter in 1961 in the western basin, with individual collections ranging up to 39,164 per square meter. This group also increased in the central basin, although all organisms except nematodes have decreased greatly there in the last few years due to the anaerobic conditions. Chironomid (midge) larvae increased from 56 per square meter in 1930 to 119 per square meter in 1951–52, 299 per square meter in 1957, and 355 per square meter in 1961. In addition, fingernail clams (Sphaeriidae), sewage fungus (Sporophilus), and sulfur bacteria have increased or appeared recently in the central basin. In 1965, Carr and Hiltunen have summarized the changes in the western basin in the last 31 years as follows: A 9-fold increase in Oligochaeta, 4-fold increase in Chironomidae, 2-fold increase in Sphaeriidae, 6-fold increase in Gastropoda (snails), 400-fold decrease in *Hexagenia,* and an increase in the area of heavy pollution from 102 square miles to 394 square miles. Obviously, not all of these changes are the result of the catastrophic oxygen depletion of 1953, but such conditions certainly accelerated the process. C. C. Davis has stated that similar changes in fauna, although less extreme in numbers, have occurred in the central basin. Little is known of the extent of change in the eastern basin benthos.

Fisheries

Nearly all the available data on changes in the fish fauna of Lake Erie stem from the commercial catch. Naturally, such data may not show important changes in species which are not commercially sought, but such information has been gathered on those which are. Five main hypotheses to explain the decline and extinction of the most valuable Lake Erie species have been proposed and advocated by various schools of thought: (1) high temperature, (2) oxygen depletion in the central basin, (3) overfishing, (4) pollution and (5) new predators or competitors. All of these are interrelated and probably mutually responsible in various degrees. The most desirable species have, in succession, undergone rapid population declines from which they have not permanently recovered. Since the proposed causes for these crashes are in most cases similar, it may be simplest to examine the history of each population and then the controversy over causes.

The first species to decline was the lake herring or cisco *(Coregonus artedi),* which began to be exploited in the 1880's, fluctuated, exhibited a large yield in 1923 and 1924, suddenly collapsed in 1925, stayed minimal for twenty years, exhibited a large yield in 1945 and 1946, and again crashed, staying minimal to the present. This collapse, being the first of lakewide importance, stimulated much concern among fishermen and public officials,

who were inclined to suspect pollution and other factors, rather than overfishing, as the cause. Three studies were initiated: one by C. J. Fish, one by John Van Oosten, and one by S. Wright and W. Tidd. The first two came to the conclusion that overfishing was at fault, and all three agreed that pollution was not the cause. Van Oosten determined that most of the ciscoes present in 1923 and 1924 were concentrated in a small area of the central basin, probably because of adverse conditions elsewhere, and thus were easily "cleaned out" by the fishermen, accounting for the heavy yield followed by collapse.

The whitefish *(Coregonus clupeaformis)* fishery in the western basin greatly decreased about 1890 and practically vanished about 1920. It remained productive in the rest of the lake until about 1954. The sauger *(Stizostedion canadense)* fishery, which was generally a secondary one, declined about 1946.

The populations of walleye *(Stizostedion vitreum vitreum)* and the so-called "blue pike" *(Stizostedion vitreum glaucum)* seem to have some inverse co relation in abundance. The blue pike seem to have been restricted to the colder waters of the lake and were probably placed at some disadvantage as these waters became smaller and less habitable. After exhibiting several large fluctuations, the catch declined from 18,800,000 pounds in 1956 to about 500 pounds in 1958 and later years. Reflecting this decline, the growth rate of the remaining blue pike increased eightfold between 1951 and 1959, but the few blue pike caught in 1963 were mostly over ten years old, inspiring little hope for recovery of the population.

The walleye fishery showed an upward trend in production from 1929 to 1956 (300,600 pounds to 15,652,650 pounds) but declined rapidly after 1960, producing only 716,500 pounds in 1965, and now is fluctuating. The growth rate of the remaining population has increased markedly since its collapse, as has that of the blue pike.

Another species which has disappeared from the commercial catch is the lake sturgeon *(Acipenser fulvescens)*. These were mostly removed at an early date because of their ability to wreck fish nets, and were destroyed or used as fuel or fertilizer until their value as food was realized, by which time, however, their numbers were severely reduced.

Less-desirable Species Increase

As the commercially important species have declined, other, less-desirable species have increased. The exotics such as gizzard shad *(Dorosoma cepedianum)*, alewife *(Alosa pseudoharengus)*, white bass *(Roccus chrysops)*, and smelt *(Osmerus mordax)* have become common, and native "rough fish", such as carp *(Cyprinus carpio)* and sheepshead or freshwater drum *(Aplodinotus grunniens)* have increased their numbers and percentage of the catch. (See "Lake Erie Ice Fishing," THE CONSERVATIONIST, February-March 1961.) The yellow perch *(Perca flavescens)* has to a large extent replaced the higher valued species in the fishery, but its lower unit price causes the net income to be much lower than previously, and thus the number of fishermen has decreased.

The total catch of all species in Lake Erie has remained remarkably high for many years because of the replacement of high-priced stocks with rough fish as the former have declined. It was 57,980,980 pounds per year about 1925; over 25,066,300 pounds per year about 1944; and 50,044,420 pounds per year recently. The fishery industry, however, has been hard hit by the species change because of its ultraconservative attitudes, especially its reluctance to develop uses and markets for the newly-abundant but unexploited species, and by the hodgepodge of regulations imposed by two federal and five state and provincial governments which have so far been unable to agree on uniform policies. (See "Fishery Picture Changing in Lake Erie," THE CONSERVATIONIST, October-November 1967; and "Our Stake in the Great Lakes Fisheries," December-January 1961-62.)

The opinions as to the cause of the decline of major species have been centered around two camps, that of John Van Oosten and that of T. H. Langlois. Van Oosten held that overfishing in the biological sense (i.e., to the point where the stocks could not easily regain their former abundance) had definitely occurred in the case of the cisco and was a more likely explanation for the decline of the other species than the environmental factors blamed by the Langlois group. In this, Van Oosten has been supported to some extent by others. H. A. Regier and others, in a recent extensive review, concluded that overfishing and poor management were largely responsible for the decline of the walleye population in the western end of the lake. Van Oosten and his followers do not deride the importance of environmental factors, but seem to view them as setting the stage for overfishing. He also mentioned disease, parasites, and competition as possible negative factors. Regier earlier pointed out that the more limiting the Lake Erie environment is, the more readily overfishing can occur.

Langlois and his supporters have held that environmental factors, particularly turbidity, related siltation on spawning and nursery ("key") areas, and temperature, are the controlling influence on the level of fish abundance in the lake and act essentially independently of fishing pressure. They also believe that stocking has been largely useless for the same reason. Recently G. H. Lawler has concluded that temperature, in the form of the general warming trend, is largely responsible for the decline of the whitefish population, which is at the southern limits of its range in Lake Erie.

Future Prospects

It is generally agreed that the hope for salvation of the fisheries and ecology of Lake Erie lies either in a return of the high-priced species through rehabilitation of the environment coupled with stocking, an increase in demand or price for the remaining species, or introduction of new, desirable exotics. Rehabilitation of the environment seems almost impossible but is being attempted by some government agencies, on a small scale. Most of this effort is directed toward better sewage treatment.

Langlois has proposed several remedial actions for the lake environment, all within the realm of feasibilty from an engineering standpoint if not from a practical one. (Many already-completed government resource-management projects seem to have this type of feasibility.) These include: (1) transferring sludge from shoal areas to low shorelines to lower the oxygen demand of the bottom and provide spawning beds; (2) aeration of the bottom waters by compressed-air hoses; (3) opening of the pre-glacial outlet of the lake west of the Welland Canal and installation of gates to permit periodic drawdown for aerating the bottom, controlling floods, and facilitating levee construction; (4) a levee across the island region to carry

(Continued on page 36)

Teacher Tips:

Lake Erie: Alive But Changing

by John A. Weeks, *Director, Rogers Conservation Education Center, Sherburne*

Suggestions For Class Use

DR. Dean E. Arnold's article outlining the influences of population and increasing technology on an extremely large body of water provides timely and compelling challenges to the teacher:

1. How can the specific information and the gist of the article serve to prepare me to teach better about the implications of environmental contamination?
2. How can I, using the center spread picture as an interest center, interpret its meaning to those too young or too uninformed to make an effective reading of the article?
3. How can I provide opportunities for elucidation and enrichment to those who can read it with understanding?
4. What are the "teachable ideas" of the article, and how can they be augmented or at least be rendered more real for my students?

Perhaps, the first stumbling block for both readers and teachers will prove to be the "Limnological" vocabulary. Even though this is kept to a minimum in the article, there are still at least two dozen words whose specific meaning it would be well to check. A partial glossary is appended to this teacher tip article.

I always favor outlining the main points of each article, because it tends to force the reader to understand and interrelate the major ideas. It should also serve to indicate areas of existing curriculum where the ideas can be introduced most profitably.

Next, apply yourself to developing units based upon those ideas in the article which are the most teachable ones for you. Give careful considerations to ways in which you can enrich the units with local projects and lab type experiences in which the students may get "their hands wet" and perhaps even "dirty." For instance, how many schools are making any study of local bodies of water—lakes, rivers, ponds or brooks—to consider the basic values to the community and to consider whether or not the uses made of these valuable resource areas are beneficial or abusive. Almost any community has at least one body of water which is being degraded by combined community actions. Study of these areas can only benefit the community.

The article indicates two ways of categorizing pollutants, one according to source, and another according to the nature of their action. In the latter category would be physical or mechanical contaminants such as silt, biotic contaminants such as coliform bacteria and chemical contaminants such as mercury or phosphates. A study of the nature of the pollution situation in your community might be most instructive.

Getting back to Lake Erie as an example of a contaminated body of water, the following outline might be helpful:

1. *Historic*
   Natural and Ecologic History
   How was it formed, and how has it changed since formation.
   Human
   How was it settled and what did it contribute to developing America.
2. *Characteristics of Lakes*
   a. Physical—Combinations of surface area, depth, inflow and exposure to wind and other climatic factors influence water temperature, subsurface movement, surface movement, stratification and plant and animal distribution. These factors can be measured in local streams and ponds. Stream tables, basins or bowls can be helpful in teaching about water movement in bodies of water.
   b. Chemical—Water chemistry is more difficult and exacting but varieties of colorimetric or titration kits are available which can be used by Junior High or High School groups. (Refer to science supply house catalogs). Hydrogen ion concentration (pH) can be measured by using inexpensive Hydrion Papers.
   c. Biotic—Some of the ways in which the physical nature of the lake and its environs influences plant and animal distribution are indicated in the centerspread article. Studies of plants and animals in local streams, ponds and lakes can reveal much about their trophic levels. Consultation with science or biology teachers can provide valuable assistance and equipment for the elementary teacher. Large or small aquaria can also be used to study the characteristics of aquatic communities, or of individual plants or animals.

The following bibliography will provide sources for assistance with techniques:

Smith, Robert Leo 1966
Ecology and Field Biology
Harper & Row New York
Needham, J. G. and
P. R. Needham 1962
A Guide to the Study of Fresh Water Biology
Holden-Day San Francisco

(Continued on page 36)

Small Game Take Down Last Year[1]

Bad Weather Blamed For Reduced Harvest In 7 Out Of 10 Categories. Waterfowlers Do Well.

by H. F. Maguire, *Principal Statistics Clerk*

THERE is no question about it, your modern hunter is going soft. The weather was bad during much of the 1969–70 small game season, and as a result, more than one-third of those who bought licenses, did not use them.

A heavy early season snowfall was general throughout the state on October 21 and 22, and this was followed by an abnormal cold wave on the 23rd and 24th.

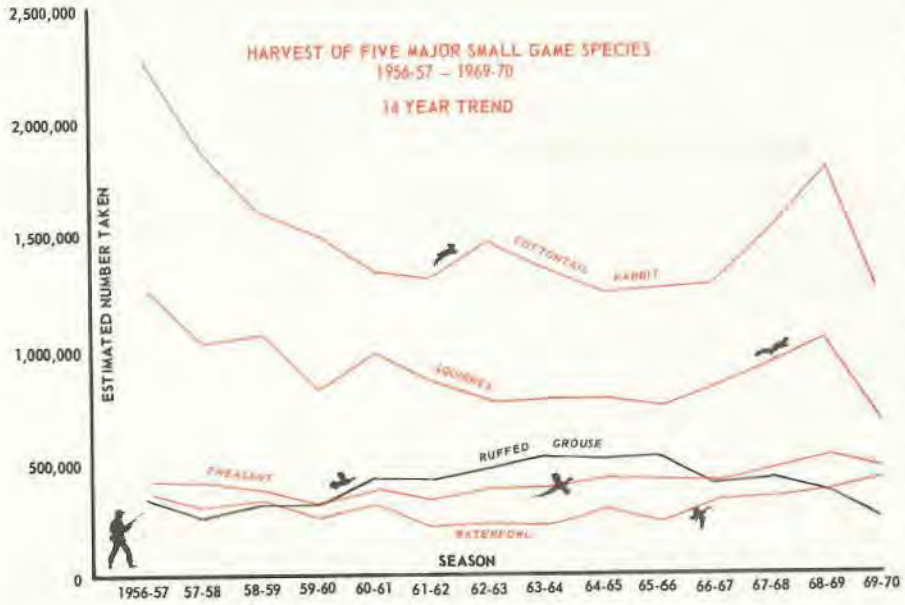
The cold wave produced maximum temperatures that were 23 to 25 degrees colder than seasonal normals. Albany had a low of 16°F on the 24th, the coldest October temperature in 31 years. The Weather Bureau records showed a minimum of 17°F at Patchogue on the 24th to be the coldest October temperature of record on Long Island. In the Adirondacks a low of 14°F was reported at Gabriels, a drop to 16°F at Addison in Steuben County and a 17°F at Liberty in Sullivan County on the same day demonstrated that the cold wave was statewide.

As a consequence, the number of hunters afield, the number of days spent

[1] A contribution of Federal Aid to Wildlife Project W-90-R-15, Job I-1.

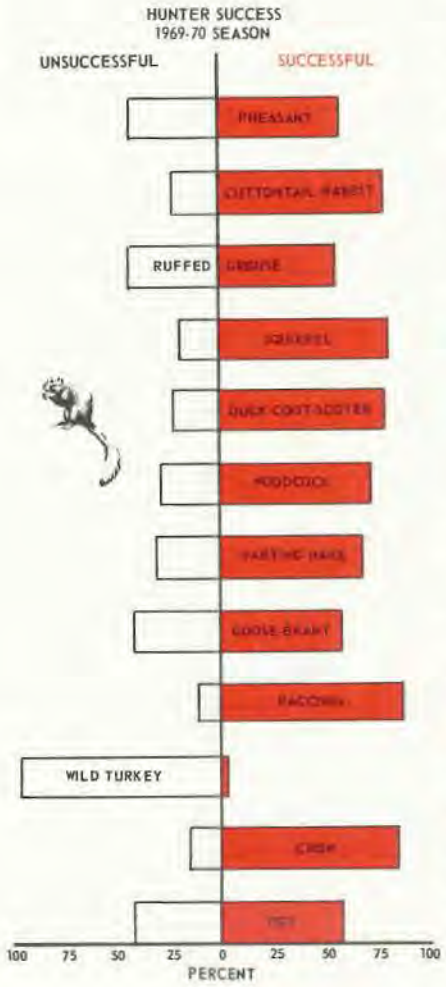
SURVEY COMPARISON, 1969-70 WITH 1968-69 SEASON

SPECIES	1969-70			1968-69			Take Per Day		Mean Take	
	Number of hunters	Days afield	Number taken	Number of hunters	Days afield	Number taken	1969-70	1968-69	1969-70	1968-69
Pheasant	236,731	1,059,025	467,257	272,371	1,220,029	521,389	.441	.427	1.97	1.91
Percent change	−13.1	−13.2	−10.4				+3.3		+3.1	
Cottontail Rabbit	218,833	1,618,009	1,219,212	266,894	2,259,428	1,764,181	.754	.781	5.57	6.61
Percent change	−18.0	−28.4	−30.9				−3.5		−15.7	
Ruffed Grouse	160,068	901,612	283,176	180,400	1,098,603	379,758	.314	.346	1.77	2.11
Percent change	−11.3	−17.9	−25.4				−9.2		−16.1	
Squirrel	136,562	742,230	623,894	166,034	984,066	1,020,047	.841	1.037	4.57	6.14
Percent change	−17.8	−24.6	−38.8				−18.9		−25.6	
Duck-Coot-Scoter	67,625	422,721	374,933	66,287	385,859	325,179	.887	.843	5.54	4.91
Percent change	+2.0	+9.6	+15.3				+5.2		+12.8	
Woodcock	59,839	266,949	158,397	50,020	223,663	138,252	.593	.618	2.65	2.76
Percent change	+19.6	+19.4	+14.6				−4.0		−4.0	
Varying Hare	32,843	144,407	94,830	48,806	259,841	158,293	.657	.609	2.89	3.24
Percent change	−32.7	−44.4	−40.1				+7.9		−10.8	
Goose-Brant	31,620	169,971	62,703	36,638	181,187	49,823	.369	.275	1.98	1.36
Percent change	−13.7	−6.2	+25.9				+34.2		+45.6	
Raccoon	28,130	197,117	216,268	35,358	279,817	268,074	1.097	.958	7.69	7.58
Percent change	−20.4	−29.6	−19.3				+14.5		+1.5	
Turkey	26,421	66,564	849	29,063	75,144	1,145	.013	.015	0.03	0.04
Percent change	−9.1	−11.4	−25.9				−13.3		−25.0	
Crow	43,731	233,479	275,212	Not sampled			1.179	-	6.29	-
Fox	37,616	228,915	43,999	Not sampled			.192	-	1.17	-



afield and the harvests for most species declined.

November was marked by a period of stormy weather from the first to the fifteenth, heavy snows occurred on the 5th and 6th, and damaging winds swept western, central and northern New York on the 19th and 20th. December was cold and heavy snowfalls occurred throughout the month. Bad weather continued into January 1970, and the New York State College of Agriculture at Cornell University reported January as "one of the coldest months ever recorded in the Empire State."



Nevertheless, the season started auspiciously; the number of small game licenses issued through early October showed promise of heavy hunting pressure during most of the season. Licenses issued for the first five months of the license year totalled 546,818, or about 3,000 over the number issued during the first 6 months of the previous season. Few licenses are issued during the sixth month of the license year and this month, March, was not sampled in our current survey because of delays in receiving license stubs.

We mailed 24,121 questionnaires in our major sample. Of these, 405 were undeliverable and 23,716 were presumed to be delivered. Cooperating licensees returned 18,592 questionnaires for a 78.4 percent response. The rate of response was satisfactory but some of the information we collected was disturbing. We learned that 36 percent of the responders had not used their licenses: this is the highest rate of nonuse since we started collecting information from small game license holders in 1956. Compared to the previous season there were fewer hunters afield for 8 of the 10 game species sampled; only duck and woodcock hunters were out in greater numbers. See the accompanying Table 1.

Number of pieces of game taken dropped for 7 of the 10 species. Take as well as numbers afield increased for duck and woodcock hunters and goose hunters increased their take by over 25 percent.

The woodcock season was the best since survey data was obtained in the 1961-62 season, and may place New York State in or near the forefront for this species in the United States.

Notable drops in hunters, days afield and take occurred in the rest of the species sampled. Even crow hunting, last sampled two years ago, and fox hunting, last sampled three years ago, showed marked drops from their latest figures.

The game species, pheasant, cottontail rabbit, ruffed grouse, squirrel, varying hare, turkey and raccoon showed drops in take ranging from 10.4 percent for pheasant to 40.1 percent for varying hare.

Turkey hunters have been adversely affected for the second successive season. The number of turkey hunters, their days afield and their take have dropped substantially this season. About 98 percent of turkey hunting and 99 percent of the take are from the western region—and this section was subjected to unpleasant weather for most of the turkey season. The gross drop in hunters in the west and in Delaware County was 9 percent below the 1968 season and 23 percent below the 1967 season. The drop in days afield for the corresponding years was 11 percent and 20 percent. For take, the decline was 26 percent and 57 percent respectively, a very drastic fall in a two-year period. The number of turkey hunters out statewide during the 1969 season was 26,421. Days afield totaled 66,564 and the take 849.

Take Per Day

The most encouraging information to be gleaned from Table 1 is found in the Take Per Day column. This factor seems to be a fairly reliable index of species population abundance and changes, except for waterfowl, since it expresses the success for an average day's effort, whereas the season's bag will vary according to the number of days expended in hunting a particular species. No drastic drops occurred except for squirrel, and hunting this species would be particularly difficult through heavy snow.

The BACK of the BOOK

Thoughts on a Plastic Tree

I think that I shall never see
A place to store our Christmas tree,
A tree that robs me of elation
(Where fit it in for hibernation?)
A vinyl tree for the Christmas season
Can offer not one valid reason
To be around the house at all
In spring or summer or in fall.
A tree that may at those times wear
My patience thin—for it's still there!
Phonies are bought by fools like me,
But only God should make a tree.

Marcelene Bell

Cornell conservation forum

Speakers at the Conservation Leaders' Forum at Cornell University Oct. 8 unanimously called for a massive, sustained attack to clean up air, water, land, and other environmental resources on the basis of clear-cut national policies and goals.

They emphasized the importance of educating the young to be guardians of clean environment in the future through positive action programs to combat the man-made environmental ills.

Sponsored by the N.Y. State College of Agriculture at Cornell, the forum hit hard on the theme, "Positive Approaches to Environmental Quality."

Speakers were Henry L. Diamond, commissioner, New York State Department of Environmental Conservation; Ned D. Bayley, director, science and education, U.S. Department of Agriculture; Prof. Charles C. Russell, College of Agriculture; Thomas L. Kimball, executive director, National Wildlife Federation; and Prof. Philip H. Lewis, director of the Environmental Awareness Center, University of Wisconsin.

Diamond stressed the need for governments to work with citizen groups, university communities and young people, saying that "environment is too important to be left to the bureaucrats."

Earth Day triggered an explosion of enthusiastic involvement that conservationists must use and channel before it wanes, said Diamond. He added that decisions must be made now that will affect the future of the environment.

Diamond cited a study of eutrophication at Lake Canadarago in Otsego County as an example of cooperation among the State's Department of Environmental Conservation, experts in the community, and researchers from the College; and he stressed that the department will continue to use expert skills from any source to solve environmental problems.

Textbook: "Outdoor Recreation"

"Outdoor recreation, as treated by this textbook, is that wholesome recreation that is done without the confines of a building. It covers a broad field of topics from a backyard barbecue to a Boy Scout jamboree. But whatever its form, it is part of an entity known as recreation and this word must be explained before such terms as outdoor recreation, forest recreation and water-oriented recreation can be understood."

This quote from "Forest Recreation" by Robert W. Douglass, Assistant Professor of Forestry, Pennsylvania State University, is fully explored in this excellent textbook.

This book will serve as an excellent reference for anyone interested in the field of forest recreation and may be obtained from the Pergamon Press, Maxwell House, Fairview Park, Elmsford, N. Y. 10523.

Centennial meeting

The one hundredth anniversary of the American Fisheries Society was held September 13-16 in New York City, where it was founded December 20, 1870. In attendance were 750 members and guests.

The American Fisheries Society is the oldest professional body in North America dealing with a particular aspect of natural resource conservation. Joining with the Society for its centennial celebration were the International Association of Game, Fish and Conservation Commissioners and the Natural Resources Council of America.

Roy I. Jackson, Assistant Director General of the Food and Agriculture Organization of the United Nations, Rome, Italy, gave the keynote address, "Fisheries and Famine." He described the efforts being made throughout the world to raise nutritional standards, especially in the developing nations, by increasing the productions of seafood by improved commercial fishing.

Policies in international fishery control were examined together with a critical evaluation of international fishery commissions. Thirty technical papers dealt with current problems of freshwater and marine fisheries. The subjects ranged from insecticide residues in farm ponds to shrimp aquaculture in salt-marsh impoundments, from economic goals in fisheries management to the role of American marine fisheries in feeding the world. Unless otherwise distributed, all papers will be published in the *Transactions of the American Fisheries Society*, the quarterly professional journal.

The Society's 1971 annual meeting will be held in Salt Lake City, Utah, September 15-18.

37th Annual convention of the Conservation Council

The presentations of awards for outstanding work in conservation highlighted the annual meeting of the New York State Conservation Council at Monticello in September.

The awards were as follows:

Governor's Award, New York State Conservationist of the Year, Jerry Weisner of Granville; Wildlife Conservationist, Robert F. Perry, Regional Supervisor of Fish and Wildlife, Department of Environmental Conservation, of Avon; Soil Conservationist, Dr. Paul J. Zwerman, Professor of Soil Conservation, Cornell University, Ithaca; Water Conservationist, Edward H. Meiser, Inspector, U. S. Army Corps of Engineers, Elnora; Conservation Educator, Victor A. Fitchlee of Gasport; Youth Conservationist, Roy Harold Henzler of Cheektowaga; Legislative Conservationist, Assemblyman Edwyn E. Mason of Hobart; Conservation Communicationist, David Starr, Managing Editor, The Long Island Press, Jamaica; and Conservation Organization, Turnpike Rod and Gun Club, Inc. Altamont.

On the first day of the conference, after the reading of extensive reports of committees, the afternoon was featured by an address by Commissioner of Environmental Conservation, Henry L. Diamond, in which he reviewed some of the work he has been doing since the creation of the new Department on July 1. He reiterated his disfavor for the establishment of a national park in the Adirondacks and pledged that he would defend the heritage of the New York Forest Preserve. He said, in part:

"I know that there was some concern originally that this big new Department would override the traditional importance of fish and wildlife activities. I find that the reverse is true.

"The more sophisticated our environmental aspirations become the more important we find our fish and wildlife resources as an index of environmental quality. Fish and wildlife are highly sensitive to environmental change.

"They serve as a barometer of the quality of man's environment."

Following his address, the Commissioner answered a wide range of questions from the audience. The following day, the Council was entertained by visits and addresses by Governor Nelson A. Rockefeller and by Arthur Goldberg, who opposed the Governor for election.

Officers and directors were elected as follows:

President, James Mullarkey, Carmel; legislative vice president, Lorell E. Cook of Troy; vice presidents, Stephen Gehring of LeRoy, Arthur Wager of Hyde Park, Wilfred Knapp of Dundee, and William Matott of Voorheesville; recording secretary, John M. Demers of Troy; corresponding secretary, Lyle A. Findlay of Kenmore; treasurer, Ernest Billquist of Jamestown; financial secretary, Robert Pohlman of Rockville Centre; national representative, W. Kendall Jenkins of Wyoming; assistant national representative, William Hilts of Sanborn; chaplain, Father Peter Ward of Mineville.

Directors: Donald Van Liere, Wolcott, Karl Karlnoskie of Hornell, Dr. Paul Cramer of Syracuse, John Szijarto of Lowville, Edmund Morette of Ticonderoga, William Black of Long Lake, Roger Cole of White Plains, Lawrence Morocco of Staten Island, and Chrissy Wilson of Stoteville.

Directors at large: Martin Turner of Eden, Herman Forster of Wellsville, Lou Lafforthun of Schenectady, Carl Crary of Liberty, Philip Dustin of Salem, and Kermit Cantwell of Hobart.

Donates papers

Edward W. Littlefield, former Assistant Commissioner for Lands and Forests who retired in May of 1962, has donated an important collection of reports, papers and documents covering the Adirondack Preserve and forestry in the Adirondacks to the State University College of Forestry at Syracuse University.

Obsolete product

Spruce gum, once collected as a commercial product from the red spruce of the Adirondacks, is no longer of appreciable commercial value in modern society. However, it's available up in Maine.

Appalachian Trail guidebooks

New editions of two popular guidebooks have been published by the Potomac Appalachian Trail Club of Washington, D. C. PATC, a non-profit organization which maintains some 350 miles of trails in nearby mountains, has released the Seventh Editions of *Guide to the Appalachian Trail from the Susquehanna River to the Shenandoah National Park,* and *Guide to the Appalachian Trail and Side Trails in the Shenandoah National Park.*

The Appalachian Trail extends 2,000 miles along mountain ridges from Maine to Georgia, and is maintained by some 60 groups that comprise the Appalachian Trail Conference. The trail system in this area was begun by PATC in 1927, and much of it is still maintained by that organization. The new guidebooks provide detailed descriptions of the famed footpath from the Trail's Susquehanna River crossing at Duncannon, Pennsylvania, to Rockfish Gap near Waynesboro, Virginia. Side trails accessible from the A. T. are also covered.

The Guides are available for $3.50 postpaid at PATC, 1718 N. Street, N. W., Washington, D. C. 20036. The Club's offices are staffed by volunteer workers weekday evenings from 7 to 10 p.m., and are open to the public.

Union crusades for conservation

All members of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers (AFL-CIO-CLC) have been asked by their President-Secretary Joseph P. Tonelli to "join with me in a great crusade to stop all forms of pollution and to work to preserve and enhance the quality of human life."

His announcement to the membership that spans both the United States and Canada, launched the Union's inauguration of its new general workshop on "Man and his Environment."

For more than a year, the Union's Canadian Division has been surveying both the industry and Federal and Provincial statutes and regulations and their maintenance. A similar project has been underway in the United States since early summer.

Among other items the official position paper recommends the establishment of pollution control committees in all local unions; the gathering of factual material on a local level and forwarding same to the Union's Research and Education Department in Fort Edward, New York. In addition, it asks the local union committees to seek membership on all local environmental, anti-pollution and conservation committees; undertake intensive public information campaigns to win support of other sectors of the community as well as to lend leadership, support or both to encourage communities to install proper sewage processing facilities.

In his enthusiastic introduction to a class of more than 250 local union leaders from four Midwestern-Lake States, Tonelli added, "this may prove to be an historic first, for to the best of our knowledge, we are the first union in the United States and Canada to offer a course of study to our local union leadership on environmental problems."

Early pollution?

In the drinking well
  Which the plumber built her,
Aunt Eliza fell —
  We must buy a filter.

— HARRY GRAHAM

Lake Erie

(Continued from page 30)

a highway and permit drainage of the western basin for agricultural use, with only the ship channels maintained; and (5) alternate boat routes through channels dug north of the lake. D. V. Anderson has proposed a scheme for recirculating water from Lake Ontario to Georgian Bay and back through Lakes Huron and Erie for reuse in various ways. The potential effects of this and other schemes on the ecology of the lake are difficult to predict, but it is relatively certain that if changes of some sort are not made in man's use and misuse of the Lake Erie resource, he will lose it entirely. The most important change he must make, of course, is to end the growth of his own numbers; without this step, any other action will eventually prove useless.

Snapping turtle

The fisherman dunking worms in a weedy pond for panfish will often see the dark nose of a snapping turtle poke above the surface of the water for a few moments as it catches its breath and views the world topside. Refreshed and reassured, he may again settle to the bottom and wriggle down into the mud where he will wait for his supper to come by.

The snapper is admirably adapted for life in the muck of a swamp or weedy pond. Its rough, dark carapace (or back) is inevitably covered with algae, and the skin of its legs is covered with wrinkles, warts, and little horny scales, so that it blends perfectly with the marsh bottom. Many forms of wildlife fade into the background except for a give-away dark eye. Not the snapper, for his little eye is covered with a camouflage pattern of little spots like extra pupils, so that even it is obscured.

Unlike the other native turtles, the snapper can't pull its head, legs and tail into its shell. When it draws its relatively long neck in so that only its head still sticks out, the heavy skin of its neck forms thick folds around its head, showing the inspiration for the name "turtleneck sweater." On its underside, the shell is small, leaving its legs very exposed and apparently vulnerable.

The business end of the snapper more than makes up for the apparent vulnerability. From its withdrawn position, the head can be projected forward or sideward with lightning-like speed. The striking range of a 20-pound turtle would cover a bushel basket. A 12-inch turtle in good condition is capable of amputating a man's finger as though it had been hit by a butcher's knife.—PAUL M. KELSEY, *Regional Conservation Educator*

Teacher Tips:

(Continued from page 31)

GLOSSARY

Biota—n. Combined plants and animals
Biotic—adj. Living
Ecosystem—n. The biotic community and its non-living environment
Plankton—n. Floating or drifting aquatic community (plant and animal)
Phytoplankton—n. Plants of the plankton community
Diatoms—n. Minute phytoplankton
Cladocerans—n. *Copepods* n. small crustaceans found in plankton
Nutrients—n. Organic or inorganic "food" substances
Trophic—adj. Nutrient or food (levels)
Eutrophic—adj. High in nutrients
Oligatrophic—adj. Low in nutrients
Aerobic—adj. Requiring or having available oxygen
Anaerobic—adj. Not requiring or without available oxygen
Aerate—v. Add air, specifically oxygen
Thermal Stratification—Layering within a body of air or water according to temperature
Sedimentation—n. Deposition of insoluble materials
Vernal—adj. Relating to spring
Autumnal—adj. Relating to autumn
Pollution—n. Organic or inorganic substances which limit for man the use or quality of air or water (etc.)

Conservation award

Prof. Harry A. Kerr, Soil Conservationist at the N. Y. State College of Agriculture, Cornell University, is the recipient of this year's Man of the Year Award of the New York Soil and Water Conservation Districts Association, Inc.

This group is an action agency which works to establish environmental resources on private and public lands. This includes planting trees, building wildlife preserves and draining and reclaiming land.

Prof. Kerr was honored at this meeting for "his contributions to the development of conservation districts within the state since the early 1940's." He has encouraged the growth of about 80 percent of the county conservation districts.

Kerr, who is a native of Cattaraugus County and a resident of Newfield, is executive secretary to Gov. Rockefeller's State Soil and Water Conservation Committee. As secretary of this committee, he has served as an advisory member to several legislative committees and commissions in the field of natural resource conservation and management.

New location

General Dynamics, Inc. has been awarded a $98,799 research contract to study the feasibility of siting nuclear power plants on the ocean floor. The concept is based on the fact that the cold ocean waters can more readily absorb the large quantities of waste heat from power plants than can inland bodies of water. The study will evaluate at least three sites: one in northerly waters, one in temperate zones and a third in semi-tropical waters.

Governor's Book

Our Environment Can *Be Saved.* Nelson A. Rockefeller. 176-pages. Doubleday and Company, Inc. Hard cover: $5.95; paperback: $2.50.

This is the best description I have read of the condition of our environment and what the New York State Government has done and will be doing to correct it. It is outstanding on two fronts: first, the amount of facts which are crammed into the entire text, and secondly, the variety of remedial programs that Governor Rockefeller has initiated and is carrying on so energetically.

The author begins as follows:

"The purpose of this book is to offer a practical man's guide to saving our environment, based on experience rather than theory.

"It is dedicated to the proposition that we *can* halt our downhill run toward ecological suicide—and even start climbing back up the slope."

The book opens by the author quoting his father, John D. Rockefeller, Jr., about the father's love of nature. The son relates some of the many philanthropic programs that his father initiated in order to restate his own personal commitment. The father wrote about one park,

"It was such a beautiful place, and I wanted to have it opened up so people would see it."

From there on, the Governor first goes into a recent history of the efforts of concerned people throughout the country to unite and form effective forces to reform our environment. He makes it clear that he believes the task can be done only by a unified effort of all segments of society.

In a chapter entitled, "Cleaning up the Atmosphere," the Governor names names and describes the dirty situation which he encountered in a helicopter survey of the capital district. He recalls that as early as 1962, he signed into law a requirement that would diminish the amounts of pollutants discharged by automobiles in New York State and he continues to tick off the progress in curbing polluters of the atmosphere.

Rockefeller's chapter on, "Noise: The Quiet Issue," is probably the best and most concise treatment of this subject that I know of and is particularly readable. He tells what a decibel is and gives surprising examples of the noise ratings of many of the activities that we take for granted in our modern life. Interestingly, he relates that the Port of New York Authority envisions the early construction of two more runways at Kennedy International Airport on landfill to be dropped in nearby sections of Jamaica Bay. He mentions that the ecological effects of this are also being studied.

The Governor strikes his most serious tone when he writes about, "Power for the People." By this phrase, he means electric power and he makes it very plain—with annotations—that he is deadly serious in his concern about the likelihood of increasing power shortages and the adverse effect this would have upon the economy of the State. He details struggles which have gone on and are continuing when conservationists clash with public utilities over the construction of electric power plants and the problem of thermal pollution.

The author speaks affectionately of his brother Laurance and relates their interests in parks to a teenage tour of national parks with his father and another older brother. From this early recollection, he traces his concern for guarding and enlarging open space.

Probably the most enthusiastic chapter in the book is on the arts and the quality of life. There is no question that the Governor here wrote much of the material personally and he takes delight in telling of the surprise and sometimes the horrified reaction of legislators to the pieces of modern art which he brought into and displayed in the executive mansion. He also takes great satisfaction in telling of how he won support for the State Council on the Arts and how it is bringing a richer environment to the people.

Finally, the Governor makes a plea for support of the new Department of Environmental Conservation and even goes so far as to give a checklist of practical items which people can do in order to personally help the environment.

Finally, in the appendices there are lists of the addresses of Federal, State and private organizations in the environmental field and some useful books and other publications about the environment.—J. E. Gavagan

Acreage under FPA

During the past 22 years, New York's private woodland owners have received free technical assistance from the State Department of Environmental Conservation and planted, thinned or selectively harvested nearly 500,000 acres under the Forest Practice Act program.

N. Y. S. Big Game Measurers

For a great number of years there has been a critical shortage of Boone & Crockett Club Recorders of North American Big Game in New York State; and, there still is. This scarcity has led to irritations and hardships for the people who wanted to have their game trophies measured as they often had to travel long distances to existing recorders. To alleviate the problems of inconvenience and frustration, the Division of Conservation Education has set up its own Official New York State Big Game Recorders on a regional basis. They will use the B & C Club scoring system in their work.

These men are not replacements for Boone & Crockett Officials and serve the Environmental Conservation Department's needs only. They will measure and record big game heads in their regions and will advise sportsmen whether their trophies qualify for the B & C Club records. If they do, the sportsmen will have to have their trophies scored officially by a B & C official. Our men cannot do it unless they happen to be B & C officials too. B & C officials are marked with an asterisk in the list below.

THE CONSERVATIONIST magazine will print periodic articles on the "Ten Best Deer Heads" in future issues. Sportsmen must bring their trophies to the following men (after they have allowed their trophies to dry for 60 days) for official measurement.

Region 1—Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Seneca, Wayne, Wyoming and Yates Counties: *Robert Estes, 90 Maxwell Station Road, Caledonia, N. Y. 14423; *Wesley Lulg, 3188 Raymond Avenue, Sanborn, N. Y. 14132.

Region 2—Allegany, Cattaraugus, Chautauqua, Chemung, Schuyler and Steuben: Victor Sawkins, Cassadaga, N. Y. 14718; Kenneth Dunbar, Bolivar, N. Y. 14715.

Region 3—Broome, Cayuga, Chenango, Cortland, Madison, Onondaga, Tioga and Tompkins: Jack Hardendorf, Apulia Station, N. Y. 13020.

Region 4—Herkimer, Jefferson, Lewis, Oneida, Oswego and St. Lawrence: *Collins Kellogg, 294 N. State St., Lowville, N. Y. 13367.

Region 5—Clinton, Essex and Franklin: Jack I. Taylor, 168 Lake Flower Avenue, Saranac Lake, N. Y. 12983.

Region 6—Fulton, Hamilton, Saratoga, Warren and Washington: Gary Parsons, Jim Harnish, Jack Harnish, NYSECD, Hudson St., Warrensburg, N. Y. 12885; *George Lesser, 310 West State St., Johnstown, N. Y. 12095.

Region 7—Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie: Gustav Linhart, Vernon Bailey, NYSECD, Route 10, Stamford, N. Y. 12167.

Region 8—Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester: Celik Brothers, Rt. 22, Patterson, N. Y. 12563; *Steve Horn, Jonas Bros. Studio, White Plains, N. Y. 10601.

Region 9—Bronx, Kings, Nassau, New York, Queens, Richmond and Suffolk: Walter Oelschlager, 96 Kime Avenue, North Babylon, N. Y. 11703.

Archers interested in having big game heads scored should contact Lew Dupaulis, Cazenovia, N. Y. 13035; Wayne Trimm, N. Y. S. Env. Cons. Dept., 50 Wolf Road, Albany, N. Y. 12201; Robert Estes, 90 Maxwell Sta. Rd., Caledonia, N. Y. 14423. These men are the official Pope and Young Bowhunter scorers.—NICK DRAHOS

Protein source

The Food and Drug Administration has approved the use of herring and menhaden in producing fish protein concentrate (FPC), based on data supplied by the Bureau of Commercial Fisheries. Previously, only hake and "hake-like fishes" had been approved.

This approval broadens the resource base for production of FPC. The value of recovered oil from these additional species of fish will reduce costs of producing FPC, a virtually odorless, tasteless light tan powder made from whole fish. It contains over 75 percent animal protein and several nutritionally beneficial minerals.

In addition to helping provide a better balanced diet for the undernourished, worldwide use of FPC offers an opportunity for profitable utilization of large quantities of fish off the U. S. coasts which now are not being used for market.

Pollution solution?

Can it be that the automotive industry is overlooking a possible answer to the exhaust emission problem? Recently while crossing the Department's parking lot this writer saw a neatly painted sign on the rear of an elderly auto which was obviously a veteran of the highway wars.

The legend read: "Please don't blow your horn. I'm pedaling as fast as I can."

Engineers, pick up your slide rules! —A. F.

William C. Maynock

Area conservationists and sportsmen in Region 8 were saddened to learn of the passing of William C. Maynock. A conservation foreman who worked in Region 8 out of the New Paltz Office, Bill was born on February 19, 1908 and was raised in the Hancock area. He joined the wildlife rabies control unit of the Department as a trapper in 1947, and was one of the outstanding fox trappers in New York State during the period when he worked for that program.

In 1961 he transferred from the wildlife rabies control program to the Regional Office of Fish and Wildlife in Poughkeepsie. In 1967 he was promoted to Conservation Foreman and did an outstanding job until the time of his death.

Tainted Air

Every day, you breathe in about 16,000 quarts of air. Almost none of it is free of taint. Much of the air that enters your lungs and provides oxygen to your bloodstream is loaded with foreign substances that are harmful to your health. Almost everywhere in New York State, but especially in cities and suburbs, your daily intake of air includes many small particles—some too tiny to be seen—of carbon black, fly ash, soot, metal dust, silica and other organic and nonorganic matter. You also breathe in, day after day, numerous liquid droplets of chemical contaminants, and many different gases. Some of these pollutants are irritants; some are actually poisons. The air you breathe may contain sulfur dioxide and sulfuric acids, carbon monoxide, ozone, nitrogen dioxide, various hydrocarbons, and a myriad of still unidentified compounds of such dangerous chemicals.

Worthwhile reading

Endangered Rare and Uncommon Wildflowers and *Protecting Endangered Wildlife* are 20-page booklets containing photos, artwork and descriptions of endangered wildflowers, wildlife and their habitat published by the U. S. Forest Service. Checklists and pre-addressed cards are enclosed to encourage the reader to report sightings of the rare species. For copies of these two publications, write: U. S. Forest Service, 1720 Peachtree Road, N. W., Atlanta, Georgia 30309. A wilderness publication, *Search for Solitude*, is available for 65 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Prolific musk ox

The major herd of wild musk ox in the United States is being threatened by its own increase in numbers. Musk ox were native to the Arctic Slope of Alaska until 1850 when the last known animals disappeared from the vicinity of Barrow. In 1935-36, 34 musk ox were obtained from Greenland and relocated on Nunivak Island, Alaska. The herd grew over the years and now numbers about 750.

Although there is extensive summer range for musk ox on Nunivak, severe winter conditions of heavy snowfall and ice glaze restrict forage availability to a relatively small area of sand dunes and cliff type habitat where high winds act to reduce snow depth.

Excessive numbers of musk ox are deteriorating the beach grasses which are a main winter food supply. Destruction of this grass reportedly would create a severe erosion problem which could take hundreds of years to rectify.

Reproduction within the herd has dropped. This fact plus habitat destruction led biologists to conclude that the present herd of 750 is in excess of range capacity and in critical danger of unnecessary losses in bad winters.

The Nunivak herd is being used to restock other areas. Those removed, however, are mainly females because musk ox are polygamous and a new herd requires only a limited number of bulls. Also, capture and transportation of the animals are very expensive which is another reason why surplus bulls accumulate.

Managers are recommending that the herd be reduced to a more secure winter level of 500 or less even though there is considerable opposition to a harvest of musk ox on Nunivak and sympathy for widespread domestication. Conservationists, however, view a harvest as essential under present circumstances and the extensive domestication of a wildlife species as unwise.

Salt-water engine

Most inventions are the result of the need to solve specific problems, but Prof. Martin Sussman of Tufts University has pulled a switch by inventing a turbine engine fueled by salt-water.

His next step is to find a use for the engine. The turbine consists of two cone-shaped cylinders that rotate in a salt-water tank. The cylinders are wrapped with a fiber called collagen, which is made from animal tendons and has the ability to shrink and expand repeatedly when exposed to certain salt solutions and then fresh-water. In salt-water, the collagen develops a tension that rotates the two cylinders and powers the turbine. The Professor's working model develops about one-tenth of a watt of power. He feels, however, that models generating more electricity can be built.

Name change

The Federal Water Pollution Control Administration is now the Federal Water Quality Administration, a change of name brought about by the enactment of the Water Quality Improvement Act of 1970.

The name change reflects the growing emphasis being given to protecting the quality of the nation's waterways before they become polluted or from additional pollution.

National parks visits

The National Park Service reports some 163,990,000 visits to its natural recreational and historical areas in 1969, an increase of 8.7 per cent over 1968, and a new record high. Oddly enough, eight of the ten most used areas of the National Park Service are east of the Mississippi River.

Ski-center rates

There is no increase in the price of lift tickets this season at the three major State-operated ski areas.

Following, is a breakdown of the rate structure for State-operated ski centers:

Adult season tickets, honored at Belleayre, Gore and Whiteface mountains, will cost $125 after December 15, but if purchased before that date, the price is $110.

Intermediate and Junior season tickets cost $100 and $80 after December 15, or $85 and $65 before that date. Intermediate tickets are sold to skiers in the 16 to 17 year old age bracket, while Juniors are 15 and under. Maximum rate for a family is $300 after December 15, and $275 before.

The basic adult all-lift day rate is $7 on weekends and holidays and $5 on weekdays. Holiday and weekend all-lift afternoon tickets for adults are $5 while the same tickets on weekdays are $3.50.

All-lift Junior tickets are $4.50 on weekends and holidays for a full day, or $3.50 for a half day. On weekdays, these rates drop to $4 and $3.

Tickets for use of lifts on the lower mountain area are available at Whiteface and Gore. These, which entitle the holder to use the J-bar, T-bar and novice chairlifts at each facility, are priced on weekends and holidays at $5 for adults and $3 for Juniors per full day, dropping to $3.50 and $2 for the afternoon. On weekdays, these tickets are priced at $4 and $3 for full-day use, or $3 and $2 for a half day.

A five-day ticket, good for all lifts Monday through Friday is priced at $20. This ticket does not include lessons.

Previous "Learn to Ski Week" rates which include use of all lifts and daily class lessons, remain at $25 for Belleayre and Gore and at $26.50 for Whiteface. Both rates apply Monday through Friday. Whiteface offers an additional seven-day "Learn to Ski" package at $36.50.

Complete information on use of State-operated ski areas can be obtained at the ski areas or by writing to: Department of Environmental Conservation, Division of Lands and Forests, Bureau of Forest Recreation, Albany, N. Y. 12201.

Destructive porkies

A porcupine can destroy two trees in a single night and has been known to cause damage ranging from $10 to $100 per acre. Porkies feed largely on conifer bark and when they girdle a tree it dies.

New edition of "Murray's Adventures"

Adventures in the Wilderness. By William H. H. Murray; edited by William K. Verner; introduction and notes by Warder H. Cadbury. 327 pages. Illustrations, including folded map in pocket. Published by The Adirondack Museum/Syracuse University Press, Box 8, University Station, Syracuse, N. Y. 13210. Price $10.50.

Collectors of Adirondackana and those who love New York State's mountain wilderness will welcome this reprint of Reverend Murray's controversial book which was first published in 1869. Murray's glowing description of the region, combined with folklore, travel tips and humor, enticed a flood of tourists from America's growing cities.

The results, especially in the case of those travelers who merely skimmed the book, were something less than completely satisfactory. A rainy summer added to the discomfort of many, helping to precipitate spirited dispute about the author, his book and the Adirondacks themselves. Murray published a vigorous answer to his detractors in the New York Daily Tribune on October 23, 1869. The Adirondack Museum edition of the woodsy classic includes this defense in a 95-page appendix, thus inviting the reader to consider questions which still have relevance today.

In substantial green binding, the book is enhanced by reproductions of sporting advertisements of the era, and several cartoon commentaries on the wilderness rush taken from publications of the day. The combination of nostalgia with modern day pertinence should appeal to a wide audience.

If you are looking for a gift for the outdoorsman, *Adventures in the Wilderness* is one you can be quite sure will not be exchanged after Christmas.—A. F.

Environment builders

Many Canadian landowners with Ducks Unlimited support have for the past 33 years been creating a better quality environment as well as providing a home for numerous types of wildlife.

The 900-plus projects built by Ducks Unlimited construction crews on land made available by Canadian landowners have kept over a million acres of wetlands in their natural state. Ducks Unlimited's main interest, of course, is to provide good habitat for waterfowl. The greatest benefit in creating a marsh is that another area is saved from destruction and preserved as a clean area.

It is nice to know that an organization comprised of U. S. and Canadian private citizens has been at work creating quality environment for man and ducks.

Record brook trout

A 54-year-old world record for brook trout was broken recently when Frederic Shaw of Westwood, Mass., landed a 15-pound 2-ounce trophy fish in Labrador. Harvard Museum of Comparative Zoology identified the prize as a true brook trout.

The brookie measured 32½ inches long and 18 inches at the girth.

Ranger receives $1,500 award

District Ranger Philip J. Carter, Stamford, received top award of $1,500 recently in the State Employee Suggestion Program. Because a forest fire simulator made available to the State by the United States Forest Service can be used for only one month, Carter suggested that New York build its own simulator.

Following discussion with the Superintendent of Fire Control, he sketched the simulator and submitted a list of materials needed for its construction—on his own time.

The device simulates fire conditions and is a valuable forest fire control training tool. Not only is Ranger Carter $1,500 richer, but the State's savings are approximately $15,000.

Rock festivals restricted

Sponsors of mass gatherings similar to last year's Woodstock rock festival are required to obtain temporary residence permits from city or county health departments or District State Health Department authorities under a law signed by Governor Rockefeller.

The law defines such a mass gathering as one likely to attract 5,000 or more people and to continue 24 or more hours. To implement the new law, the State Public Health Council has adopted Sanitary Code amendments which will have the force of law when filed by the State Health Commissioner with the Secretary of State. The statute and sanitary code amendments are designed to protect the public health.

New image

The men in green are now driving cars of green.

New York State's Conservation Officers—the men who enforce the Fish and Game Laws—have broken with the tradition of unmarked black patrol cars.

It is hoped that the added visibility will increase the conservation officer's effectiveness and provide the public with easier access to services.

About 50 of the new green and white patrol cars are in service around the State. They are equipped with siren, dome light and two-way radio equipment. They bear the State seal on both front doors and the label "Conservation Officer" across the rear of the car.

The remaining 185 unmarked cars will gradually be replaced by the new cars over the next three or four years.

Water resources study

The eleventh meeting of the North Atlantic Regional Water Resources Coordinating Committee was held at Lake Luzerne, N. Y., on September 17 and 18. The joint session, involving the Coordinating Committee and the Board of Consultants, heard a report on the status of plan formulation by the Corps of Engineers, together with evaluation of various facets of the program by federal and state representatives.

The study is a coordinated approach by the committee to solution of water and environmental problems of the northeastern section of the nation, representing 13 states, the District of Columbia, seven federal agencies and the Delaware River Basin and New England River Basin Commissions. It deals with the needs of the entire North Atlantic region, treating each water basin thereunder separately.

When completed, it is expected the framework plan will serve as a guide to individual states, and will fill the middle ground between what is technically valid and what is politically expedient. As conclusion of the study draws near, State involvement becomes increasingly important. Final version of the report is scheduled for April 1971.

The NAR Study is under executive management of the Corps of Engineers, North Atlantic Division, for the Coordinating Committee.

As designated by Governor Rockefeller, F. W. Montanari, Director of Water Resources, and N. C. Barbarorossa, Assistant Director of Water Resources, serve respectively as New York State representative and alternate on the Coordinating Committee for the NAR study. —A. F.

Americans to eat more fish

The civilian population of the United States will eat about 1.23 billion pounds of fresh and frozen fish products in 1970, the Department of the Interior's Bureau of Commercial Fisheries has estimated.

One-quarter of the 1.23 billion pounds will come from groundfish species such as cod, haddock, hake, flounder, Boston bluefish (pollock) and ocean perch.

Studies indicate that U.S. landings of cod, ocean perch and bluefish will probably be greater than a year ago, while haddock landings are expected to drop to a record low, the decline probably offsetting any gains made in other groundfish.

Pipeline to good fishing

Under the best of conditions, fish stocking can be hard work. When the banks of the stream to be stocked are high and steep, and this is coupled with a background of 76 birthdays, the stocker thinks about giving up his avocation. In the case of Percy Caster of Lacona, 40 years of fish stocking with an area sportsmen's club did not come to an end with the loss of some spring from his legs.

A nimble and inventive state of mind came to the fore. Mr. Caster obtained some pipe from a local farmer, after checking with the Department Regional Fisheries Manager, Leigh M. Blake, and installed a one-way "fish pipe" to the Mad River. The fish receive a watery ride down 45 feet of pipe, then drop another 25 feet into the river.

Whenever feasible, Department personnel prefer to spread fish along a stream for better distribution, with less chance for concentrations in a few holes. In the case of Mad River's septuagenarian, the funnel and pipe innovation is understandable.

Mr. Caster's fishermen colleagues who enjoy angling in the waters of Mad River can be grateful that his advanced years rest lightly on his shoulders. He is proof that age is just a state of mind.—A. F.

One Explanation

It seems that two ice fishermen were having no luck when one of them spotted an ice shanty being towed past theirs. He remarked that that was what they should be doing — trolling.

Christmas gift ideas

Population, Resources, Environment: Issues in Human Ecology. By Paul R. and Anne H. Ehrlich. 383 pages. Illustrated with graphs, maps, tables and diagrams. Published by W. H. Freeman and Company, 660 Market Street, San Francisco, California 94104; 1970. Price $8.95.

This book is very good reading and reference for anyone interested in environmental quality. Chapter one effectively sets the course by stating in adequate detail, exactly what the problems are thought to be. The remainder of the book discusses those problems and offers conclusions and recommendations for solutions.

Game Cookery. By E. N. and Edith Sturdivant. 166 pages. Illustrated by line drawings. Published by E. P. Dutton and Company, Inc., 201 Park Avenue South, New York, New York 10003; 1969. Price $4.50.

To make a hunting or fishing trip more successful, the Sturdivants' cookbook gives tips on preparing meat from field to table. If the family chef is in the habit of hiding when her "Dan'l Boone" brings in the game or fish, he can take over himself with some simple, sure-fire recipes, made easier by the inclusion of directions for side dishes, including old favorites like dumplings, buttermilk hot cakes and hush puppies.

American Hawking. By Hans J. Peeters and E. W. Jameson, Jr. 145 pages. Illustrated with color plates and line drawings. Published by the authors. 814 J Street, Davis, California 95616; 1970. Price $25.00.

This lavish volume is a vivid historical and how-to-do-it account of the art, science and tradition of hunting to the birds of prey. Emphasis is directed to the sport as practiced in the United States. With reference to the precarious state of some U. S. raptors, a conservationst flavor runs throughout the book with detail given to species selection, feeding and care.

Extinct species

Although there are more deer in the United States now than when the Pilgrims landed, not all species have fared so well. In fact, since that time 33 species of birds, nine species of mammals and six species of fish have become extinct. At least 78 other species are classified as "endangered."

LETTERS
To The Editor

Traveling bear

Dear Sir: Recently, a 200-pound black bear tangled with an automobile on Rte. 17 just outside of Horseheads, New York and four miles west of Elmira, New York.

Although I have seen your statistics of bear sightings in counties east and west of Chemung, this is the first instance I have noted in or near this area except in southern parts of Tioga and Bradford counties, thirty to forty miles south of here.

Judging by its weight, I assume it was a young bear and probably migrated north from Pennsylvania.

Inasmuch as bear have not been seen in these parts in fifty years or more, I would appreciate your comments as to origin.

H. T. VanBrunt, Horseheads

• *Pennsylvania would be our guess, also. —Editor*

Pesticide perils

Dear Sir: *Distant early warnings on killing the birds and bees with DDT:* This article was written with the help of Mr. George North of the Hamilton Naturalist Club. Read on and weep! New York reports of heavy mortality of birds, fish, frogs, crabs and other marine and fresh water life, allegedly as a result of insecticide dust and sprays, have led the National Audubon Society to investigate the situation. John H. Baker, President, said today. His statement follows.

"Far too little attention has been paid to repeated warnings by the U. S. Fish and Wildlife Service and the Department of Agriculture on the danger of employing certain new insecticides in heavy concentrated outdoor areas." These insecticides include DDT, DDD, TEPP and chlorinated camphene.

These toxic agents in heavy application not only kill birds and fish, but lead to heavy destruction of bees and other insects valued by farmers and fruit growers. This problem concerns human welfare as well as wildlife.

As little as ½ pound of DDT to the acre of water was employed, the poison being fatal to aquatic life in much lower concentrations than to land animals. The peril of the new insecticides to land is low. The perils of the new insecticides to birds lies in the fact that these organic poisons act slowly. *"Slow action fatal to birds."* Adult birds might fly many miles before they are caught by the convulsions of death, from flying over a sprayed area. This has proven itself when birds of many areas subjected to repeated heavy spraying have died off. *I am concerned!!!*

Thank you.

Gary Waxman, Hamilton, Ontario

• *See the articles in this and the last issue restricting pesticides.—Editor*

Objects to motor boats

Dear Sir: We enjoyed our week at Forked Lake Campsite very much. Any chance that this lake could be restricted to non-motor boats, which is the only suggested improvement in the interest of reducing air, water and noise pollution in at least one small area?

Raymond S. Trayer, Hershey, Pennsylvania

• *Such action could only be taken by the local government, and then probably there could be a restriction on horsepower only. —Editor*

Lightweight backpacking

Dear Sir: The article on backpacking in the June/July issue of THE CONSERVATIONIST was very helpful. I especially liked the advice on cover three about drilling holes in the handle of your messkit spoon to lighten the weight in your pack.

I couldn't wait to get home and try drilling holes in my spoon after reading the article. Unfortunately, the only scale I have around the house is not sensitive enough to record the weight reduction.

Please tell me where I can get the kind of supersensitive scale you guys in the Conservation Department must use. Also, could you send this information as soon as possible, as I want to try drilling the keys on my key ring.

Perhaps you could experiment further and get Wayne Trimm to find out how many holes you can drill in your belt-buckle before your pants fall down.

John D. Hirsch, Albany

• *Sorry about the pants. A true outdoorsman wears suspenders.—Editor*

Foiling jays

Dear Sir: You might tell Mrs. F. Ralph Drehnier of Savona, whose letter about her voracious jay you published in your August/September issue, that small-mesh poultry netting wrapped around her feeding station will keep the jays out and let the little birds in.

The jays will get along well enough on the seeds dropped under the feeding station by the small birds.

Donald F. Southgate, Phelps

Marking quadrangles

Dear Sir: I would like to mark my geological survey quadrangles with the locations of State land, within the blue lines of the Catskill and Adirondack State Parks.

I know that A. T. Shorey once offered such a service privately but, since his retirement, I know of no other such service.

Did someone take this over, do you know? If so, please send me the address. If not, do you know of any way I can accomplish this job myself?

I look forward to your reply and, as always, I must compliment you on a magnificent job with THE CONSERVATIONIST. I have been a subscriber since Vol. 1, No. 1 and my library of CONSERVATIONISTS is a highly prized possession.

Harry Lewis, Emerson, New Jersey

• *I know of no such service, but you might do it yourself with the Environmental Conservation Department's Adirondack and Catskill Land Maps.*

Compiled by personnel of the Division of Lands and Forests, the Adirondack Land Map is printed in four 19" x 55" folding sections. The map features Forest Preserve lands, Adirondack Park Boundary, county and town lines, fire towers, names and locations of cities, villages, mountains, lakes, ponds, streams, roads, railroads, land patent and tract boundaries, etc. Forest Preserve lands are shown on the map in pink with the Adirondack Park Boundary marked in dark blue.

A unique system of grid lines and number and letter coordinates, keyed to a marginal index, provides a quick reference to U. S. Geological Survey map sheets.

Individual copies of the map may be purchased for $6.00. It must be sold complete and cannot be sold in sections. *Orders accompanied by check or money order payable to the New York State Environmental Conservation Department, should be addressed to: New York State Environmental Conservation Department, Division of Conservation Education, Albany, New York 12201.*

Also compiled by personnel of the Division of Lands and Forests, the Catskill Land Map, scaled one inch to two miles, is printed in three 15½" x 46" folding sections (making a complete map 46½" x 46") featuring Forest Preserve lands, Catskill Park boundary, county and town lines, fire town boundaries, names and locations of cities, villages, mountains, lakes, ponds, streams, roads, railroads, fire towers, and land patent and tract boundaries. Forest Preserve lands are shown on the map in red with the Catskill Park boundary marked in dark blue. Water areas appear in lighter blue. State lands other than Forest Preserve are indicated by red cross hatching.

While the land map is printed and periodically revised primarily for Department use in administering the state-owned lands in the Forest Preserve, provision is made for its sale. Individual copies may be purchased for $4.50. Order in the same manner as the Adirondack Land Map.—Editor

Wants books published

Dear Sir: It breaks my heart! I am moving from Rochester, New York to Copake, New York to a smaller house and due to room and weight, I had to dispose of all my back copies of THE CONSERVATIONIST.

The two magazines I enjoy most are THE CONSERVATIONIST and the *National Geographic.*

I think THE CONSERVATIONIST is a superb magazine with outstanding articles and pictures. Have you ever thought of doing what the *National Geographic* does? They print books which are a group of related subjects in past issues of the *National Geographic.* For example, "This England," "Greece and Rome," and many more. This way you can buy and keep in book form articles that interest you. You have had so many good articles on birds, fish, wildflowers, etc., that are written and illustrated in a superior fashion to anything I have seen at bookstores.

Howard Baumann, Copake

• *Consideration has been given to the publication in book form of material from* THE CONSERVATIONIST. *Thus far, we have not been able to unravel all the intricacies involved, such as handling financial aspects, and staff and time to select, edit and prepare the material. We have also discussed the feasibility of calendars, daybooks and a cumulative index of the magazine's first 25 years.—A. S. Fick, Assistant Editor*

Girls forecast weather

Dear Sir: Thank you very much for sending the reprints of the weather article in the December/January-1969-70 issue of THE CONSERVATIONIST. We had enough to place one in each unit for study and reference. The week of our camp-in Day Camp was very fruitful. The girls set up a weather forecasting station making their barometer, weather vane, wind velocity gauge, rain gauge and sun dial. They listened to the radio and TV weather forecasts and then compared them with the readings of their own instruments.

The units were composed of 10-12 girls, 7-14 years old. Each had a name relating to weather, i.e., sun, sky, snow, rain and lightning. They learned poems, songs and stories, which they dramatized. All had something to do with weather.

Thank you again for helping us have a successful camp-in.

Martha B. Kunkel,
Director Assoc. No. 5 Camp-In
Mohawk Pathways Girl Scout Council

Milk snake?

Dear Sir: Enclosed are a few pictures my husband took of a snake he killed on our property at Saratoga Lake in the month of July.

We have never seen a snake like this. Some people seem to think it resembles a spotted adder.

Could you please tell us what kind of snake it is?

Mrs. Jean Dora, Saratoga Springs

• *Looks like an eastern milk snake to me. —Editor*

Mallard duckling disaster

Dear Sir: My ten year old son is a member of the Junior Duck Club at our local elementary school and we incubated 36 duck eggs this spring. We were fortunate enough to have 18 survive out of the 29 that hatched.

My husband put up a chain link fence run for them, together with small chicken mesh wire around the bottom so they could not slip thru.

They had been out-of-doors for one and one-half weeks, even survived a terrible thunder and rainstorm. Then, on Monday morning, July 22, when my son went out at 7:30 a.m. to water and feed the little mallard ducklings, he found 12 lying dead in the run. Some had their heads torn off, and many were in several pieces.

We first considered an owl, as we live in the country and have heard owls, but when our neighbor boy set traps for us Monday night, we found a young skunk in the larger trap on Tuesday morning.

What do you think it could have been, either one, or both?

We gave the final five survivors to our Senior Duck Club member to keep for us as we were afraid of losing them, also.

Thank you for taking your time to read of our dilemma and hope that you can help us solve our problem and doubts.

Mrs. Fred McKinley, Canandaigua

• *The owl would be a strong candidate; the skunk less so, depending on the vulnerability of your fence. Other possible culprits: weasel, rat or raccoon. If you try raising ducks again, it would be advisable to screen the top of your run to keep out avian predators.—A. S. Fick, Assistant Editor*

The cost of hunting

Dear Sir: I have just read James Salvator's sports column about New York raising their non-resident hunting fees to "$35.00" and said we are just a bunch of suckers and will pay.

You know what I think! You are a bunch of blood suckers, as far as I am concerned.

I have just been made president of our New York State hunting club. I didn't want the job in the first place. We had 16 members, but because of rising costs, are down to 12. Now, I don't know what will happen. I am 63 and still love to hunt and fish and believe in conservation and I am receiving a social security check of $103.00 a month, so you see where I stand. So, here goes one subscriber, a fishing license, which I very seldom used year after year, and maybe the hunting club and the non-resident hunter you people don't want in the first place.

Jacob Kuyper, Totowa Boro, New Jersey

• *We are in sympathy with your dilemma. In all fairness, however, it should be pointed out that New York State is far from the most expensive place for non-residents to hunt. Here are some typical non-resident fees charged by other states for the same privileges accorded by New York's $35.00 charge: Michigan $55.20, Minnesota $76.25, Arkansas $50, Vermont $44.00, Utah $70, Oklahoma $40, North Dakota $101.50. If you take advantage of all the permits offered out-of-staters visiting New Mexico, be prepared to part with $263.25, plus $2.00 for your deer tags. There are states whose fees are lower than ours, but our point is that New York's are in line and, in fact, a bargain if you consider the excellent hunting offered. Incidentally,* THE CONSERVATIONIST *is still only $2.00. We hope you will reconsider and stay with us as a subscriber.—A. S. Fick, Assistant Editor*

Boat site trash problem

Dear Sir: On September 20th, my husband and I went to launch our boat at the State owned site at Horicon. The parking area there was a disgrace. The trash cans (all four of them) were filled to overflowing and refuse was strewn on the ground; some of which was a box of steel bands, used around wooden crates; some sewing remnants and the usual number of beer containers. Since there are no picnic facilities there, I am sure this mess was not done by the boaters, especially after seeing a car drive in, deposit his box of trash and go on out across the bridge. It appears to me that some people are saving money by letting the State area collect their garbage.

The launch site is an excellent place for anyone who wants to use his boat on Schroon Lake.

It is too bad that there are those who have to spoil the looks of everything.

Mrs. Ernest D. Fullock, Duanesburg

Well known campers

Dear Sir: Your article in the August/September 1970 issue, page 30, about John Burroughs, brings to mind my early childhood, between 1913 and 1917.

My father, Burton H. Loucks, who then was Attorney-General, concerned with conducting law suits against "squatters" on state lands in the Adirondacks, took our family to the Cedar River Hotel, two miles west of Indian Lake Village on Route 30 for the summer.

In 1917, although I was in Oneida, New York, the family was at the hotel, so I got the story from them.

One day a Simplex car—aluminum body and chain drive—and a White truck, stopped at the hotel and asked Frank Wood, the owner, for permission to camp on adjacent grounds. Mr. Wood refused, saying no camping was permitted.

Mr. Frank Babcock, who owned the small cottage just north of where the route makes a sharp turn toward Blue Mountain, recognized the party as consisting of Thomas Edison, Harvey Firestone and John Burroughs. He told them he had a small fish pond at the turn in the road (I helped build it the year before) and they were welcome to camp there.

The party was on the way to Blue Mountain Lake to inspect the old Prospect House electric light system before the hotel was torn down. I was told that this was the first publicly lighted building and that explains their interest.

Their camp consisted of individual tents, platforms, folding beds with mattresses, blankets, sheets, pillow cases and even electric lights. They also had their own chef.

Henry Ford, who had been with the party, had left them at North Creek because of illness, I believe.

John Burroughs walked over to the hotel and my mother, Josephine, had several chats with him. One remark he made to her was, "this is no way to camp. All I need is a frying pan and a blanket."

The picture of a single person is John Burroughs sitting on the steps of the Cedar River Hotel.

The group picture showing their camp near Mr. Babcock's pond shows, left to right—

1. My father—Burton H. Loucks
2. Harvey Firestone
3. Thomas Edison
4. John Burroughs
5. Frank Babcock
6. Man in background unknown to me.

These two pictures were taken by my brother, Francis.

Mr. Babcock, who was from Buffalo, told my father he had lost two fortunes trying to manufacture the Babcock carriage and later an electric automobile.

I greatly regretted I was not at Cedar River that year.

Burton H. Loucks, Jr.
Winter Garden, Florida

Labor rebuttal

Dear Sir: We take issue with remarks you made in an editorial which appeared in the August/September, 1970 edition of THE CONSERVATIONIST. You ask, "where is organized labor in the protection of the environment" and suggest that it has done practically nothing up to now to promote a state of urgency or to influence industry "to make more strenuous efforts to prevent pollution and promote improved products."

We address our remarks to rebuttal to what appears to be unfounded statements made by you. Organized labor's concern for its environment dates back to the 1870's when, according to "Man and His Environment," an AFL-CIO publication, labor actively and consistently supported the family-operated farm that eventually became a keystone of the nation's land policy. The AFL-CIO through the intervening years up to the present day, has constantly battled against pressures of powerful farm corporations in California and Arizona to weaken the 160 acre restriction provisions of the Federal Reclamation Law.

Indeed, organized labor for many years has been a champion of conservation and anti-pollution measures. "Man and Earth," another labor publication, points out that "labor federations and individual unions have long employed specialists who have devoted themselves to environmental problems, sometimes as part of labor's concern with health conditions in the shop, but as often with its concern for the broader problems of ecology."

Labor has traditionally supported every piece of legislation designed to better our environment. The AFL-CIO has issued many proclamations and policy statements on conservation, air and water pollution. Resolutions have been adopted at the National and State AFL-CIO conventions strongly urging the enactment of effective legislation to deal with the problems of our environment.

Contrary to what you said, the vast majority of international unions *are* educating their members through informative articles, photos, talks, etc., alerting them to the inherent dangers of continual pollution of our environment.

So, you see, Mr. Gavagan, labor is keenly aware of its stake in protecting the environment, not only for its 20,000,000 members as you stated, but for the more than 200,000,000 people who inhabit our country.

We conclude by saying, labor sees very little merit in your suggestion that such goals can be achieved through negotiations with the management of corporations. Such agreements or understandings, other than those pertaining to environmental conditions in the shops, would be ineffectual and unenforceable. The enactment of effective governmental laws, both on the national and state levels, will only bring about the desired results; therefore, labor will continue to concentrate its efforts in that direction.

We sincerely hope that you will find space in THE CONSERVATIONIST to print our reply to your editorial. We believe that you owe it to your subscribers (many of them members of organized labor) to let them know labor's side of the story.

Joseph Mangino, Business Agent
Local 301, IUE, AFL-CIO, Schenectady

Paging Ohio

Dear Sir: I am a subscriber to your magazine and am most impressed. I realize the climatic conditions are not too much different in Ohio, but would like to send my brother, in Cincinnati, Ohio, a subscription to a similar magazine. Do you know if Ohio has a magazine equal in quality to your magazine?

Thank you for your interest in my inquiry.

Mrs. Otto E. Raynor, Eastport

• *Suggest* Wonderful World of Ohio, *21 West Broad Street, Columbus, Ohio 43215. —Editor*

Protecting birds of prey

Dear Sir: I have just received your June/July issue, and was very happy to see page 17 "Birds of Prey Protection." We need this type of exposure to remind careless hunters of the importance of our predatory birds. But, to my knowledge, the people who read your magazine are fully aware of this problem. It is the average hunter that must be reminded of the problem.

Would it be possible for the Conservation Department to print copies of page 17 so that they may be distributed to people like myself who would be happy to display the copies at such places as sporting goods stores, gunshops, and shooting ranges.

I am sure people all over the State who read your publication would be willing to help.

Thank you.

Peter J. Doyle, Bethpage

• *Shortly after publication of the "Don't Shoot!" page arrangements were made for reprinting for distribution similar to your suggestion. Copies should be available soon. —Assistant Editor*

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A turtle named Jonah?

Dear Sir: I read with interest your Letters to the Editor Department in each issue. The field experiences of the writers are very often educational as well as interesting.

This has prompted me to write you of an experience I had this past summer while frog hunting.

I caught a frog, perhaps eight to ten inches long. Upon dressing the frog out, I found that it had swallowed a baby snapping turtle (length of 1¼ inches). The turtle appeared to be dead, but upon placing it in water, it came to life. To date, it is still doing well.

In the past, I've found various creatures in frogs' stomachs, such as mice and crawfish, but the snapping turtle was a first for me.

I'm 15 years old, and attend Ichabod Crane Central School in Valatie, New York, where I am preparing for a career in conservation work.

Lee Shannon, Stuyvesant Falls

Hawk—or pigeon?

Dear Sir: Noting under "Letters to the Editor," in the June/July issue of THE CONSERVATIONIST, a question from Roy Tracey concerning a "hawk" visiting a bird feeder, I felt that I should add a comment.

The description of the bird certainly fits a common coloration pattern of the domestic pigeon. Mistaking the bird for a hawk is not as unlikely as would at first appear. A condition known as "hawk beak" to pigeon fanciers sometimes occurs, in which case the upper mandible curves downward and is lengthened producing a hawk-like bill. This may be due to uneven wear, and/or mutation, and I have observed about a dozen such birds out of several thousand domestic pigeons.

My second and third comments refer to the answers given to L. C. Luick of Canandaigua concerning "upward-looking grackles" and "the cardinal flying at windows."

When grackles look at objects in the sky, their head is tilted to one side—sort of the opposite of the way a robin looks at a worm. Pointing the bill upwards is, along with tail and wing spreading, part of their courting display, and several males may assume this pose when surrounding a female.

Cardinals have long been known for their tendency to fight imaginary rivals caused by their reflection in windows, mirrors, and auto hubcaps. This is supposedly a territorial defense procedure, and explains why the bird exhibits continual interest and aggression.

J. H. Czech, Asst. Curator of Natural Science
Rochester Museum and Science Center, Rochester

Wants art portfolio

Dear Sirs: This early subscription idea is great. It is one more thing we can get out of the way before the busy holiday season starts.

I have another idea I would like to submit. I am fond of the Hudson River school of painting but those in our magazine I hate to remove because I will ruin my magazines. How about putting together a portfolio of these prints so that we might purchase them. I like to have my cake and eat it, too.

Thanks again.

Geraldine La Barbera, Mount Morris

• *We would like to be able to supply reproductions of much of the art used in the magazine, but it is impossible for several reasons. First, all of the art is borrowed and we do not have the reproduction rights. Second, the bookkeeping and mailing would overwhelm our already strained circulation staff. However, the Adirondack Museum at Blue Mountain Lake does sell reproductions of many of its paintings which it has loaned the magazine.—Editor*

Unfortunate deer

Dear Sir: I thought perhaps my fellow readers might be interested in the enclosed photograph; one more example of how man can unwittingly destroy his fellow creatures. The deer in the photograph was found floating dead in a local reservoir, firmly enmeshed in the steel folding chair. My guess is that it had become entangled while foraging in some local dump and wedged the chair so tightly that it could not extricate itself.

It does not seem as though the presence of the chair itself would have been sufficient to kill the animal. One guess might be that the deer ventured out on the ice or into the lake in order to escape some pursuit (perhaps dogs).

Milton Kramer, New York

First Cover (Winter Solitude), Robert W. Rehbaum
Second Cover (Tufted Titmouse), Alice Porter
Third Cover (Personal Environmental Measures), Wayne Trimm
Fourth Cover (Tree Sparrow and Junco), Nick Drahos

Lauds Chautauqua region

Dear Sir: I enjoy THE NEW YORK STATE CONSERVATIONIST very much, as I worked for Roy Norton at the Beaver Point Muskellunge hatchery, also at Pendergast Point propagating the famous musky, and what a lake Chautauqua always was and still is for the propagation of the musky. I worked with Cecil Heacox when he was a new biologist fresh from school. He was a very good man and proved his worth all the way. Bill Bentley is a friend of mine, also.

One thing I would like to suggest that you write more in regard to the wonderful biological set up of Chautauqua Lake, as a musky and smallmouth bass body of water. I operated a resort at Bemus Point catering to fishermen for 30 years and ran a guiding service for musky and bass fishermen. You write up the Adirondacks and the Catskill regions real often, but I feel there is quite a bit of fishing lore in the Chautauqua region. I am not real critical of your paper management, but I do feel that there should be more mention in the magazine of Chautauqua Lake, the Cassadaga Lakes, 15 miles to the north, and Finley Lake, 20 miles to the southwest. Keep up the good work, it's a fine magazine.

Dick Arnold, Jensen Beach, Florida

Picture Credits

First cover, Robert W. Rehbaum; second cover, Alice M. Porter; pages 1, 2, 3, 13, 24, 25, 28, 31, 34, 42, 46, third cover, Wayne Trimm; page 5, Eric V. Johnson; page 7, John Weeks; page 8, Weeks, Nick Drahos; pages 11, 19, 20, 35, Peter Scofield; pages 14, 15, Walter Fogg; page 17, Ronald Stewart; page 18, Robert Lindsay & Associates; pages 21, 36, 40, fourth cover, Drahos; page 33, Roy Irving; page 37, Cornell University; page 39, Ed Kenney; page 41, Dave Morrow; page 44, Francis Loucks; page 47, Milton Kramer.

Wants hunting information

Dear Sir: I am a constant reader of your magazine and like it very much. I thought the magazine would report all game laws-small and big game. I couldn't wait to receive the August/September issue to find out when you could apply for an extra deer permit. I had to refer to the local newspaper to find out when you could apply. I was a little disappointed not finding anything about it in the magazine, referring to last year.

Walter M. Judge, Rosedale

• *Final determination of deer permit regulations is made too late for inclusion in the magazine. The publishing schedule forces us to work well in advance.—Editor*

Women in conservation

Dear Sir: I would like to suggest that a way be found to place a copy of Dr. Anne LaBastille's article, "Conservation Careers for Women," in every high school library in the State.

Fay McChesney, Hornell

What You Can Do About Environment

(Continued from page 48)

Do your part to keep the air clean. Keep your car's engine well tuned. Don't let your engine idle needlessly. Don't drive short distances when you could walk, and do ride a bicycle if your health permits. Once again, you will be helping yourself two ways—reducing air contamination, and gaining healthful exercise.

Recently a small boy, playing on the sidewalk when his mother came home from work, retreated up the steps when she approached. The mother stopped a moment to look at an old house next door which lay in a heap of rubble, the first day's work of a demolition crew making way for urban renewal. "Ma," the boy said, "you can ask the baby-sitter. I didn't do it."

But, when it comes to the destruction of a healthy, attractive environment, you and I *are* doing it. And, we better mend our ways.

What You Can Do About The Environment

by A. S. Fick, *Assistant Editor*

THE deterioration of our environment is a problem created by people and, ultimately, it is the result of actions and decisions made on an individual level. So, too, much of the damage can be prevented by individual action.

The question, "What can I do about the environment?" has so many specific answers that we can only touch briefly on some of them here. Perhaps the most important decision you can make is one of attitude. Don't just stand around and wring your hands. What you do individually is part of the overall environmental picture. Your example can influence many people to similar concern for the quality of life.

Become active by joining groups in your community involved in the environmental movement. If your town does not have a Conservation Advisory Commission, obtain permission from your local government to form one. Get your neighbors, including young people, involved. It is rewarding as well as conducive to larger accomplishment to work with like-minded people who share your enthusiasm.

Your group—and you personally—can support office seekers who have a sincere desire to seek beneficial environmental legislation. Campaign for them; suggest specific regulations you would like to see adopted, and mention action areas where you would like to have your tax money spent. Write to your State Assemblyman and Senator, talk to your alderman and supervisor, buttonhole the mayor. Inform them of your active, serious concern for environment. Let them know that you are vitally interested, not because it is the popular "in" thing today, but because the quality of life and survival itself are at stake.

There are many things you can do at home which will give you a strong feeling of participation. Gear your living to recycling. Box or tie old paper, even scraps, cereal boxes and other paper containers. Give this material to local paper drives, or take it to the waste reclamation dealer in your area. Constructing a simple home paper baler will make this chore more convenient.

Help reduce solid wastes by purchasing beverages in returnable containers. You will find they are cheaper this way. Aluminum cans are a salvageable item. The Reynolds Metal Company has set up a pilot center in Los Angeles that pays 10 cents for every pound of used aluminum. The company has plans to open 16 centers across the country. Other metal containers should be crushed to reduce their bulk. If you wish to refine your solid waste disposal methods further, there is a compacter available in many stores for household use. Reduce your consumption of products packaged in plastic or other non-biodegradable materials. You can do your shopping with a basket or mesh bag, eliminating the need for paper bags and cartons. This is a two-pronged attack: it reduces the consumption of a natural resource and mitigates the disposal problem. A concerted effort in this direction will lower costs by elimination of needless packaging. Europeans and Orientals have shopped this way for centuries, and still do.

Don't burn anything. Make a compost heap for your leaves, weeds, kitchen scraps, lawn clippings and other organic material. If your house is on a small lot you can compost successfully in a barrel. If this is done properly, there will be no offensive odors. Maintaining a proper mix of refuse, soil and moisture, coupled with periodic turning of the pile, will keep your compost temperatures at a high, active level. A working compost pile cycles in a relatively short time, providing excellent natural material for your garden. Feeding garbage to colonies of earthworms kept in pits results in a near perfect fertilizer when combined with other organic materials.

If you are unable to construct a compost pile you can spade kitchen scraps into your garden, burying them six to eight inches deep. Leaves can be spaded in by digging a trench about eight inches deep, piling the soil to one side and covering the leaves with soil from the next row. You will be able to garden in the area next season. Weeds, clippings and similar material can be used as mulch, then spaded or tilled into the soil at the conclusion of the growing season.

Until such time as phosphate regulating standards have been legislated, or technology devises means of removing them from sewage, voluntarily reduce or stop using detergents containing phosphates, or use those with low phosphate content. Phosphate laden discharges into streams and lakes cause algal growth which consumes oxygen. The result is a dead, polluted body of water unfit for consumption, and unable to sustain aquatic life.

Avoid the use of pesticides and herbicides. One of the major keys to natural control of disease and pests in garden or lawn is a healthy, strong plant. The rich, organic material from your compost pile is your best ally in strengthening your plants so they can resist infestation.

If you have a brush problem, you will find there are several mulchers for homeowners on the market which will handle brush as well as weeds, grass and leaves. Prices range from $125 to $175, no more than a good lawnmower costs, and the returns are every bit as beneficial.

With simple hand tools, you can construct a mulcher using a rotary mower for power and shredding. Again, the benefits are two-fold: you solve a waste problem, and your compost will give you the envied "green thumb" of the successful gardener. Additionally, your need for commercial fertilizers will be diminished, reducing pollution potential to the water table streams and springs.

If your property borders a stream, you can lessen runoff by planting trees which will hold the soil.

To conserve water, fix leaking faucets, and lower the float level in the toilet tank (10 flushings at ½-gallon per flushing multiplied by one million people equals five million gallons of water saved). Don't let the hose run while you soap your car; bathe in a reasonable amount of water, not a full tub; don't let the water run continuously when showering. Don't let water run to cool it. Fill a container and store it in the refrigerator.

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SPREAD THE WORD – GET INVOLVED

CONTACT LOCAL INDUSTRY

WRITE LETTERS

GET INTO POLITICS

BOX OR BALE PAPER FOR SALVAGE

CRUSH CANS

DON'T BURN ORGANIC MATERIAL – COMPOST IT

BARREL COMPOSTER FOR SMALL LOT OWNERS

CEMENT BLOCK COMPOSTER

KEEP COMPOST WET AND TURN IT REGULARLY

RIDE A BIKE INSTEAD OF DRIVING

SHREDDING MATERIAL SPEEDS DECOMPOSITION