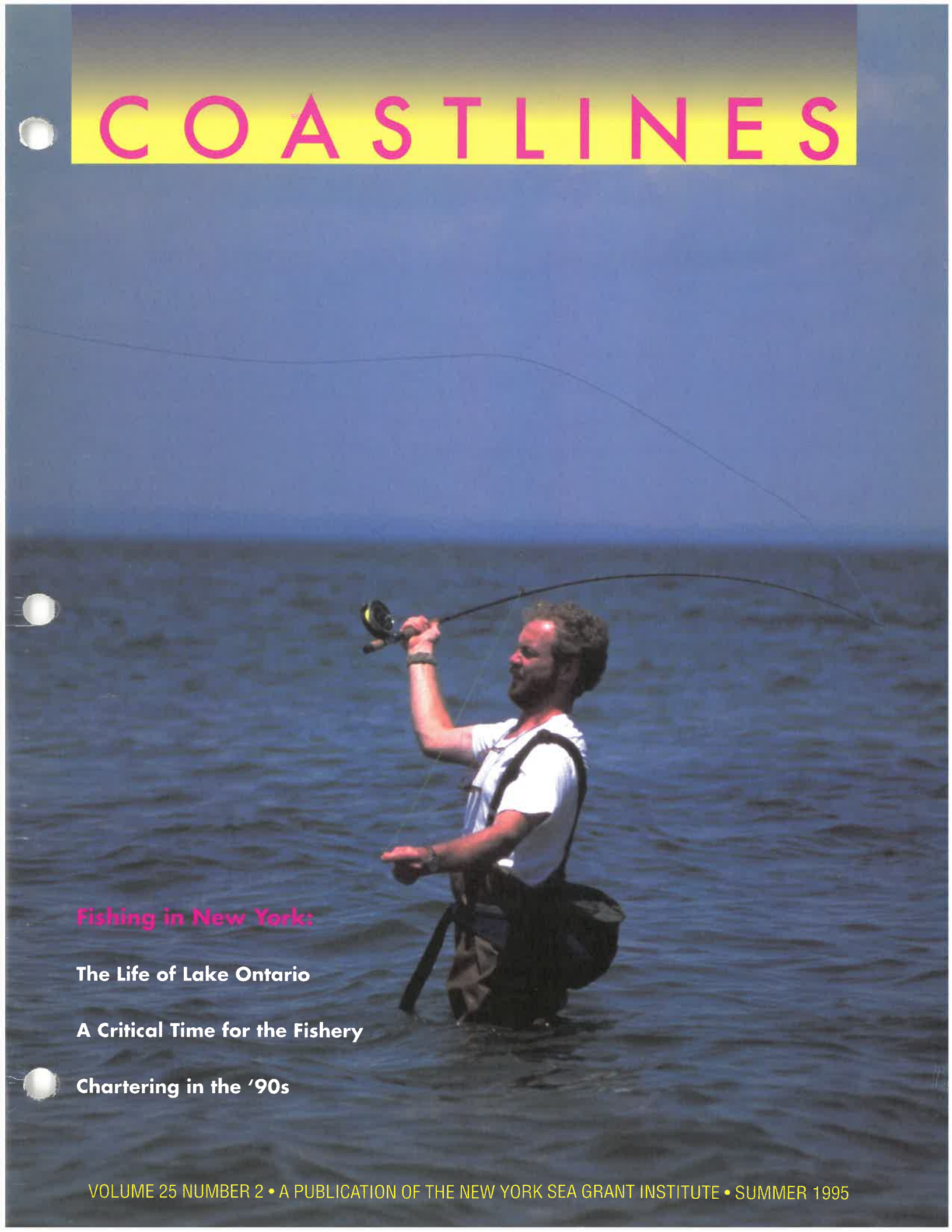
COASTLINES



Fishing in New York:

The Life of Lake Ontario

A Critical Time for the Fishery

Chartering in the '90s

VOLUME 25 NUMBER 2 • A PUBLICATION OF THE NEW YORK SEA GRANT INSTITUTE • SUMMER 1995

COASTLINES

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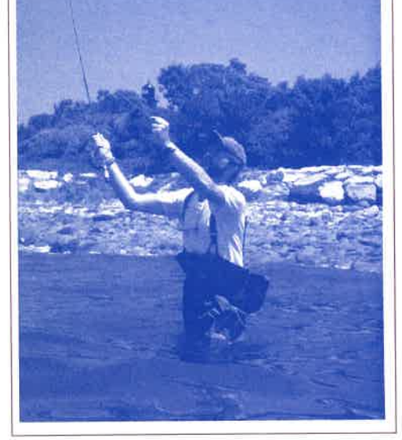
Cover Photo: Flyfishing in Long Island Sound by David Hutchins

Note from the Director:

Whether it's flyfishing in Long Island Sound, casting off Montauk Point into the Atlantic Ocean or from a charterboat in Lake Ontario, thousands of anglers flock to New York's coastline each year to experience the thrill of fishing. While Lake Ontario is the smallest of the Great Lakes, it has gained an international reputation for its chinook and coho salmon, steelhead, rainbow and brown trout. Downstate, recreational anglers caught and released more than 5 million bluefish, striped bass, weakfish, summer flounder, scup and tautog from the Hudson River to Montauk in 1994. But New York's dynamic sportfishery is also a fragile one. Millions of salmon and trout are stocked into Lake Ontario each year, but an unstable ecosystem which may not be able to sustain such large numbers of predators, now jeopardizes the fishery. In Long Island waters, anglers who once reminisced about reeling in "the big one," now share concern about the decline in fish stocks since almost every species has been overfished, some nearly to the point of extinction.

The summer issue of COASTLINES focuses on New York's recreational fishery and what anglers, charterboat captains, fishery managers and scientists are doing to help sustain it. The quest to understand how the fisheries of Lake Ontario and Long Island work and how to preserve them has driven these groups, often with divergent opinions, together in recent years. New York Sea Grant has played a critical role in trying to understand these complex ecosystems through scientific research and providing this vital information to the various stakeholders.



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The Life of Lake Ontario: WHERE RECREATION AND SCIENCE MEET

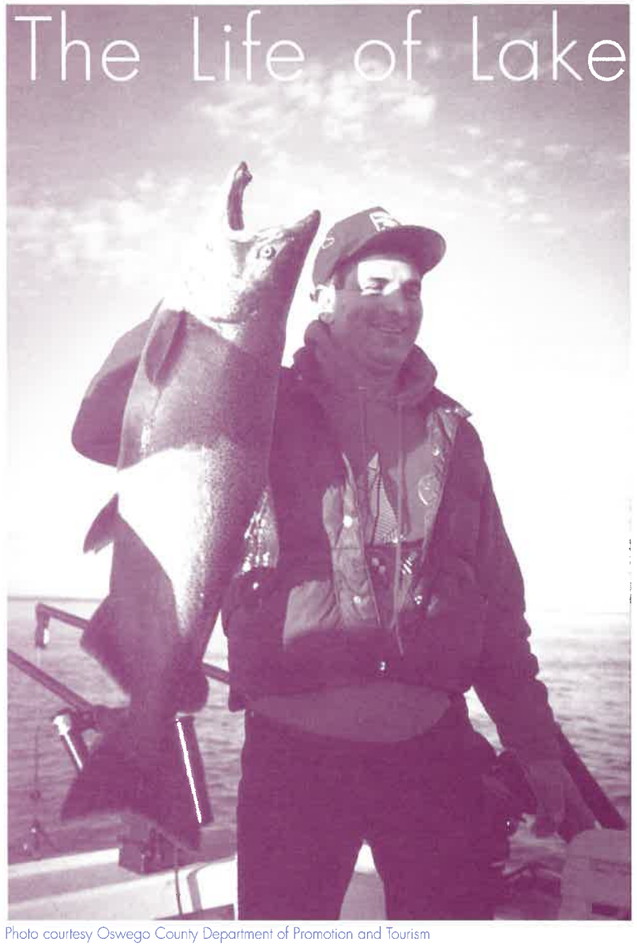


Photo courtesy Oswego County Department of Promotion and Tourism

by Julie Zeidner

Avid fishermen like Ed Sander think of Lake Ontario as the most dynamic freshwater system on earth when it comes to chinook and coho salmon, steelhead, rainbow and brown trout.

"I got bit by the bug," said Sander, recalling the first time that he went out fishing on a charterboat on Lake Ontario more than ten years ago. Today, Sander owns his own boat and is the president of the Trout and Salmon Anglers Club in Rochester, New York. Sander is not the only one enthusiastic about Lake Ontario fishing.

While Lake Ontario is the smallest of the Great Lakes, it lays claim to one of the most productive freshwater recreational fisheries in the world. Each year thousands of anglers come to recreate on the banks of tributaries like the Deer River or on boats to experience the abundance, trophy-sizes and diversity of Lake Ontario fish. Some of these anglers have set world records in recent years: a 40-lb. chinook or king salmon, the largest caught in the Great Lakes, and more recently, a 33-lb. coho, a world record.

Such great fishing has attracted big business – an estimated $100 million – to Lake Ontario. Service groups ranging from large charterboat and hotel companies to mom-and-pop bait and tackle shops and inns have cropped up along the shores of New York and Ontario to cater to Great Lakes enthusiasts.

The dynamic sportfishery is also a fragile one. Hatcheries run by federal and state agencies in the United States and Canada keep the fishery alive by stocking millions of salmon and trout into Lake Ontario, but an unstable ecosystem that may not be able to sustain such large numbers of predators threatens to dampen the sportfishery. For those that depend on Lake Ontario for profit and pleasure, such an event would harm an important sector of the regional economy and dull the spirits of diehard anglers.

How Lake Ontario came to boast of prized fish like chinook salmon (native to the Pacific Northwest), and how to sustain this artificially-stocked ecosystem while also restoring native species like lake trout, is a complex story that captivates a wide range of people from anglers and charterboat captains to scientists and fisheries managers. The quest to understand how the fishery works and how to preserve it has driven these groups, with often divergent opinions, together in recent years. For more than a decade, New York Sea Grant has played a vital role in trying to understand the complex ecosystem through scientific research and provide this information to the various stakeholders on Lake Ontario.

What the past may reveal about the future

The Great Lakes came into being10,000 years ago when the last glacial retreat left in its wake inland seas, which are known as Lakes Superior, Michigan, Huron, Erie, and Ontario. The landscape of rolling hills, evergreens, and fertile land, as well as a spokeswheel of streams and rivers surrounding the lakes originally provided ideal spawning habitat for diverse fish including lake trout, burbot, large and smallmouth bass and walleye. Each year, huge runs of Atlantic salmon that spawned in northern Atlantic tributaries migrated to the ocean and the Great Lakes.

Fishing has always been a way of life on the Great Lakes. Generations of Native Americans fished the Great Lakes in a time when the Atlantic salmon were numerous enough to catch by spear. When their land was ceded to immigrant settlers, the immigrants also fished. Commerical fishing operations soon established a dominant presence throughout the region.

For centuries such an abundant resource appeared inexhaustable, but massive development of the region had a destructive impact on the Great Lakes. Fish spawning habitats were clogged or destroyed by erosion and silt when trees were clear-cut for timber and land cleared for farms. Mining tailings, untreated sewage, agricultural and industrial waste, polluted tributaries, and development of power plants and dams further encroached on fish habitat and made it difficult for them to spawn, and big boats and canals created channels for exotic species to enter the Great Lakes.

As the fishery began to deteriorate in the 19th century, early biologists took an increasing interest. It became evident that certain fish species were thriving and others were perishing. When the forage fish alewife was introduced from the Hudson River through the barge system into the Great Lakes in the 1860s, lake herring populations collapsed. The Atlantic salmon disappeared from the Great Lakes altogether in the late 1800s, due to deforestration and barriers that obstructed spawning migration. Despite these losses, fishermen annually pulled 120 million lbs. of fish including lake trout and whitefish from the Great Lakes during this period. So important was the Great Lakes supply of fish to the country, that fishermen there were exempt from military service in World War II. The use of sophisticated technology including gill nets improved their yield, but there weren't as many fish to catch.

The parasitic predator sea lamprey was introduced to the Great Lakes from the Welland Canal, which bypassed Niagara Falls. The lake trout gradually fell victim and its population had crashed in most of the Great Lakes by the early 1950s. In 1955, the Convention on the Great Lakes Fishery was convened by the U.S. and Canadian governments, and the Great Lakes Fisheries Commission was formed. One of the Commission's top priorites was the control of the lamprey. Scientists tested 6,000 substances until a chemical, TFM, was discovered that is used to the present day to destroy lamprey larvae. Another goal for fisheries managers was the restoration of the native lake trout to historic levels.

Despite these efforts, the Great Lakes continued to have serious problems, and some still persist. The dumping of toxic contaminants into the lakes caused the closing of parts of Lake Ontario for fishing in the 1970s, and fish consumption advisories were issued. Pollution and heavy algal blooms killed large predators in the lake, and their prey, alewife and smelt, exploded in numbers. Massive numbers of alewifes vulnerable to cold temperatures washed up onto the shores in winter, which created a big stench.

A renewed effort to improve water quality under the Clean Water Act was made by the governments of Canada and the U.S. in 1972 with the development of the Great Lakes Water Quality Agreement. Aggressive federal programs were also initiated to control sea lamprey and rehabilitate lake trout. Major hatchery supported fisheries for Pacific salmon and lake trout were developed to control populations of alewife and smelt. The fishery was on the rebound. Significant signs of progress in Lake Ontario were observed by the end of the 1980s as water quality improved and toxic contaminants in fish decreased.

A Lake Ontario sportfishery is born, but can it survive?

The surprise result of initial water quality improvements was the birth of a salmon and trout sportfishery on Lake Ontario that developed a world-class reputation in a matter of two decades. In winter and summer runs, anglers have stood in streams so full of chinook, the salmon would bump into them. In a six-month period during 1994, there were more than 126,000 private boat trips, 14,400 charterboat trips, and 173,300 trout and salmon caught from Lake Ontario in New York waters alone, according to the New York State Department of Environmental Conservation (DEC).

While anglers may have been catching trophy-sized fish during this period, scientists like New York Sea Grant-funded researcher Don Stewart were documenting changes in the Lake Ontario ecosystem that concerned fisheries managers. Using bioacoustic sonar devices to measure the total biomass of prey in Lake Ontario, his studies between 1987–92 showed that alewife and smelt were decreasing in size and number, and the alewife that were surviving were in poor condition. The abundance of stocked sportfish had led to intense pressure on alewife and smelt populations, especially the larger individuals. The sportfishery was poised to collapse.

With Lake Ontario's sportfishery potentially jeopardized, the Lake Ontario Committee co-chaired by Stewart and comprised of representatives from the DEC and Ontario Ministry of Natural Resources (OMNR) was formed to review existing data on the status of Lake Ontario's food chain and make recommendations to fisheries management.

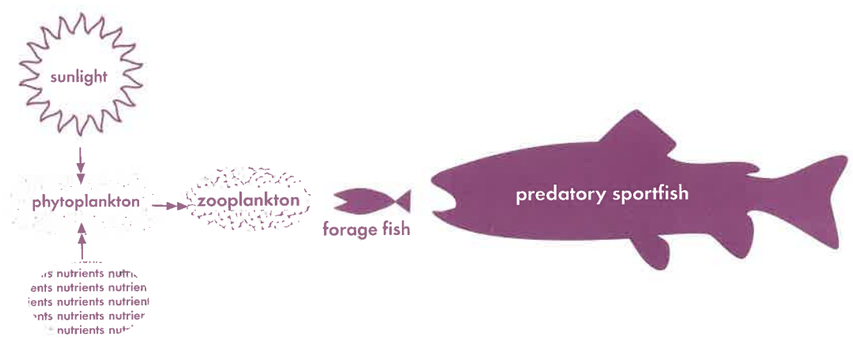
A healthy ecosystem depends on a food chain that has an equal balance of supply and demand. Lake Ontario's food chain is based on microscopic plants called phytoplankton, which require nutrients, like phosphorous, and sunlight to grow. Farther up the food chain are microscopic animals, zooplankton, which feed upon the plants, and small forage fish like alewife and smelt that feed upon the zooplankton. Highest in the food chain are the large predators like salmon and trout that feed upon the small fish. All parts of the food chain are interdependent, and problems with any of the components can have undesirable consequences for the whole delicately-balanced system.

Ironically, successful ecosystem restoration efforts led to some declines in the productivity of the sportfishery. Phosphorous, a nutrient from phosphorous-based detergents in sewage effluent, had declined by 25 percent in the lake during the 1980s. Also having an impact on water clarity were millions of zebra mussels, an exotic invader introduced from ballast water into Lake St. Clair that rapidly colonized throughout the Great Lakes. Capable of filtering large quantities of plankton from the water, scientists believe zebra mussels may be another problematic competitor in the ecosystem.

With less nutrients for phytoplankton and zooplankton, the forage fish were exhibiting classic stress signs. A bad winter could reduce the alewife population even further. If predatory pressure continued, the committee warned that trout and salmon were likely to suffer a significant decline as well.

Fish stocking in Lake Ontario that had reached a peak in 1988 to eight million individuals was reduced substantially in 1993 and 1994 in response to these concerns. In New-York, DEC stocking of the trophy-species chinook, which accounts for most of the predator demand, was reduced from 2.8 million to 1 million, and lake trout was reduced from 1 million to 500,000. The stocking of other sportfish less dependent on diets of alewife and smelt stayed about the same: 500,000 steelhead, 425,000 brown trout, 250,000 coho, 200,000 Atlantic salmon and 100,000 rainbow trout.

"Our message to the fishermen is that the DEC has done what we thought we could do in order to protect the type of fishery that they told us was important in terms of species diversity and the availability of trophy opportunities," said Robert Lange, Great Lakes supervisor for the DEC Bureau of Fisheries in Albany. "We tried to point out that if we waited till there was a problem with trout and salmon, it would be far too late to do anything about it. These things don't happen instantaneously. You may see a trend on one trophic level, but several years may pass before you see a ripple effect on the next trophic level up."



When fishery managers moved to protect the fishery by reducing the stocking of salmon and trout in Lake Ontario, the angling community was caught off guard.

"It was tough to tell many people that there was a problem back then, when all people saw were tons of fish," said Sander, noting the initial outrage of some members of the angling community to fishery management decisions that might reduce their success. "But today people are observing smaller fish, an indication that there have been changes in Lake Ontario's nutrient levels."

To keep up with the scientific information driving fishery management decisions, many members of the angling community have developed an extensive knowledge of the ecology of Lake Ontario from its food chain to the life history of its salmonids. Fisheries specialists like Dave MacNeill of New York Sea Grant have taken a leadership role in providing the latest university-based research to these stakeholders. Through a Sea Grant newsletter *Charterlines* and annual "State of the Lake" workshops, MacNeill brings recreational anglers up-to-date on the latest fisheries information. MacNeill and Sea Grant Extension Specialist Diane Kuehn held a special charterboat workshop this spring to help charterboat captains, confronted by a changing sportfishery, adapt to the new economy by developing diversified businesses (See Coastwatch, p 20).

Fall fishing along the Oswego River. Photo by P. MacNeill

Lake Ontario's forage base has been a continued outreach focus for MacNeill. In presentations he makes before angling clubs, he cautions anglers not get too "self-satisfied."

"This is a world-class fishery," MacNeill tells them. "But rapid changes in the system are posing some obvious challenges for biologists and anglers alike for both the short and long-term."

The challenge for scientists trying to understand Lake Ontario is that they don't know precisely how it originally behaved, or how it will fare in its current state with stocked-predators and a myriad of exotic species interrupting the natural ecosystem.

"Lake Ontario is like a giant aquarium, an experiment," said MacNeill, "When fisheries managers first began stocking coho and chinook into Lake Ontario the goal was to restore ecosystem stability by controlling alewife and smelt populations, and not necessarily to create a sport-fishery. But there wasn't enough information to determine how many fish to stock."

The future of Lake Ontario's sportfishery remains in flux. It is too soon to tell whether stocking reductions of salmon and trout will allow forage fish populations to stabilize, or whether zebra mussels will further reduce the productivity of the whole ecosystem. Alewife may have been further stressed by one of the coldest winters on record in 1994. Yet, other species appear to have benefitted from the reduction in phosphorous levels and other ecosystem improvements. There is a resurgence of native species, like the lake whitefish, that were almost extinct. Other native species like burbot, lake herring, and lake trout may also be on the mend.

"Lake Ontario is a giant aquarium - an experiment..."

Where there is hope

A restored and sustainable Lake Ontario fishery has been the primary goal of fisheries biologists and managers. Recent Sea Grant research directed toward the natural productivity of hatchery-reared salmon and trout, as well as native lake trout, has provided valuable information needed to sustain the recreational fishery.

For ages, salmon and trout in the Pacific northwest have used their unusual homing instinct to make a journey from freshwater streams where they live as juveniles to the ocean where they spend their adult life and then back to the very streams where they were born to spawn and die.

When Pacific salmon were first stocked into Lake Ontario, fishery managers assumed that these non-native fish would not be able to carry out their full life cycle and reproduce naturally in such a dramatically different environment. But in the mid-1980s, researchers found juvenile smolts (migrating trout and salmon between one and three years old) in streams feeding Lake Ontario, and began to consider whether conditions in these tributaries could support natural reproduction of these exotic sportfish.

New York Sea Grant-sponsored research has shown that these sportfish populations have begun to take on a life of their own in Lake Ontario. Up to 30 percent of the trout and salmon in Lake Ontario may be of wild origin, reproduced naturally, according to Dr. Neil Ringler of the State University of New York's College of Environmental Science and Forestry.

In a series of New York Sea Grant-funded projects, Ringler and his graduate student Jonathan Kennen used specially designed traps to capture juvenile smolts in four Lake Ontario tributaries during the spring. Their goal was to estimate the number of naturally-produced smolts in Lake Ontario found in each stream during the previous spawning run in autumn.

Ringler discovered significant numbers of wild chinook salmon in Little Sandy and Skinner Creeks, and Trout and Orwell Brooks, favorite spots for fishermen. He estimated that during the 1988 to 1991 trapping season, there were as many as 63,194 chinook smolts leaving these creeks. This number coupled with the more than 30 tributaries on the eastern shore of Ontario could contribute as many 400,000 wild trout and salmon annually to the fishery, Ringler estimated.

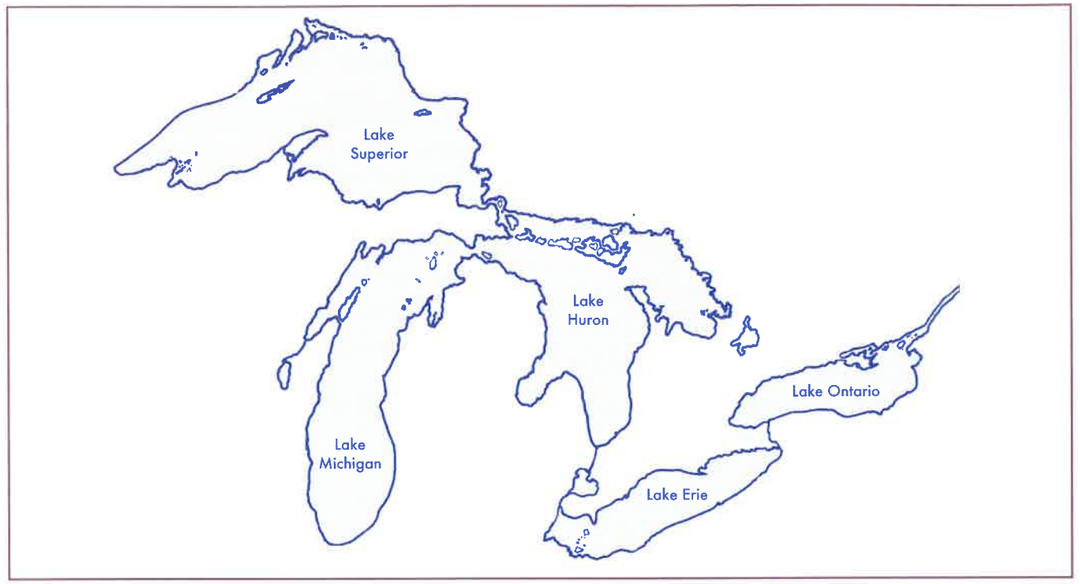
Extension Specialist Dave MacNeill. Photo by P. MacNeill.

The results of Ringler's study may have important implications for fisheries managers in determining the number of hatchery-produced trout and salmon to release into Lake Ontario. With a wild salmon population estimated at 30 percent, hatchery managers might be able to reduce their annual output without hurting the sportfishery, Ringler said.

Lake Trout Restoration

Once the dominant cold water predators of Lake Ontario along with Atlantic salmon and burbot, lake trout became extinct in Lake Ontario by the 1950s.

An intensive federal initiative was launched by the U.S. Fish and Wildlife Service to restore lake trout through stocking, but the effort failed largely due to a combination of excessive predation by sea lamprey, overfishing and habitat degradation. The lake trout's ecological and socioeconomic importance in the Great Lakes made it a

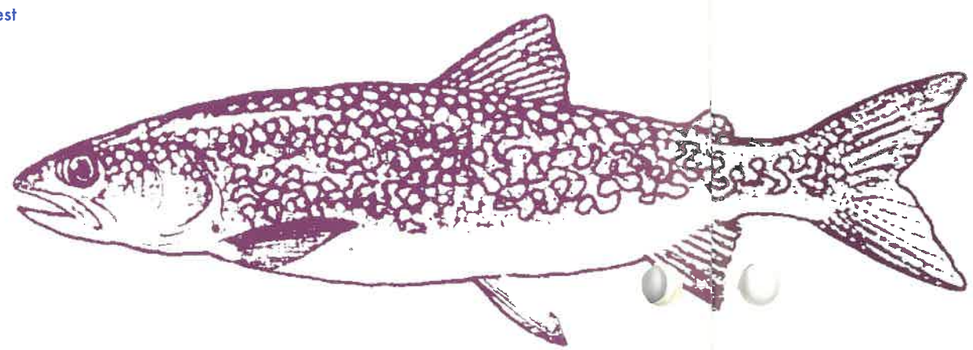


top priority for restoration by federal agencies, and in the early 1970s a renewed effort to restore lake trout in Lake Ontario began with the use of lampricide in tributaries, and the release of hatchery-origin lake trout into the wild.

The lake trout occupies the deep waters of lakes in the northern region of North America. Unlike most other members of the trout and salmon family that spawn in tributaries, the lake trout lay their eggs on rocky reefs or shoals along Lake Ontario's shoreline, and can take more than five years to reach maturity. Since the native strain of lake trout had disappeared from Lake Ontario, lake trout from elsewhere had to be found. Nine different strains of lake trout were stocked in Lake Ontario from 1973 to 1991 in an effort to find the genetic strains that were best suited to Lake Ontario's habitat. While some of these strains reached adulthood in the lake and returned to the reefs to spawn, none of their offspring have survived to adulthood.

In New York Sea Grant-funded studies, Dr. Charles Krueger, a fisheries biologist in Cornell University's Department of Natural Resources, has made a series of discoveries to help fisheries managers improve lake trout reproductive success in Lake Ontario. His recent research has shown that lake trout fry are vulnerable to predation by alewife, dramatically reducing the odds that lake trout can survive to adulthood in Lake Ontario. This finding supported the decision by fisheries managers to hold lake trout in captivity for a year before releasing them into Lake Ontario to increase their chances of survival, Lange said.

Krueger also argued that by stocking a variety of genetic strains into Lake Ontario, lake trout strains with higher reproductive success would breed with lake trout strains of lower reproductive success, weakening the genetic fitness of potentially better strains. He recommended that fisheries managers collect the eggs of hatchery-origin lake trout that had reached maturity in Lake Ontario and spawned successfully in the lake for future propogation of the species. These trout would represent the fish that have "the appropriate genetic characteristics for survival in Lake Ontario," Krueger said.



In a Sea Grant study with Dr. Peter Grewe of Cornell University and J. Ellen Marsden of the Illinois Natural History Survey, Krueger analyzed the genetic DNA structure of different strains of lake trout at Stony Island Reef and Yorkshire Island reefs in Lake Ontario between 1986 and 1990. The researchers found that of the various strains of wild fry captured, 60 to 85 percent were of the Seneca strain, despite the fact that only six percent of the total fish of this type were actually stocked into the eastern basin of Lake Ontario.

To monitor how hatchery-reared lake trout perform in the wild, a thin sliver of coded wire tag is put in their nose cartiladge and their adipose fin is clipped. Yearly assessments of stocked lake trout yearling and older fish taken by the DEC and the National Biological Service (NBS) confirmed Krueger's observation that the Seneca strain, which originated in New York's Finger Lakes, may be the best performer in Lake Ontario. Further evidence that the Seneca strain is ideal for stocking in Lake Ontario will be examined by Krueger in the near future in order to verifiy whether naturally-produced lake trout that have survived to the yearling stage in Lake Ontario are also of the Seneca strain.

"Krueger's research helped us understand that the Seneca strain is probably the most suitable for restoring a self-sustaining population of lake trout in Lake Ontario," Lange said. "Fish of this parentage are coming back to these spawning areas and carrying out the life cycle by reproducing."

As a result of this research, fisheries managers have emphasized the Seneca strain in hatcheries, and discontinued the use of some other strains altogether, Lange said.

Fisheries managers are optimistic that they will begin to see adult fish of wild origin in Lake Ontario within six years, Lange said. Prior to 1994, they had only recovered two yearling lake trout that were of natural origin. By the end of last year, they had recovered six yearlings and two, two-year-old lake trout. This may not sound like a significant number of fish, but it demonstrates that for the first time since lake trout were stocked in Lake Ontario two decades ago, they are finally surviving the fry stage and may soon complete the entire life cycle without human intervention.

What's in store for the future

"Mother nature continues to throw a few curve balls," said MacNeill, contemplating the future of the Lake Ontario sportfishery. Despite warnings that the forage base might collapse after the severe winter in 1994, Lake Ontario's alewife population managed to survive.

"What the scientists have learned is that there are major information barriers that still have to be overcome," MacNeill said. "Over the years, there may have been a natural selection process for a more thermally tolerant and stable alewife population. This is just such a gigantic ecosystem. There's a lot of information known, but if you get a few answers, you often raise another ten questions."

The perception that the long-term sustainability of the Lake Ontario sportfishery is at risk is now widely-accepted. Trout and salmon are beginning to show the first signs of reduced growth confirming scientific hypotheses that the forage base may not be able to support the large number of artificially-stocked predators. Hatchery diseases also threaten the Great Lakes sportfishery. Whirling disease, a fish parasite endemic to Europe, has been introduced into hatcheries in the western U.S. threatening to wipe out entire hatchery populations of rainbow trout. New York fishery managers have restricted the stocking of rainbow trout into Lake Ontario from the Caledonia hatchery in

New York where the whirling disease contaminated the water supply. While the effect of whirling disease in wild populations of rainbow trout is unknown, fishery managers are seriously concerned about the major impact it could have on fish highly susceptible to disease in crowded hatchery conditions.

The research of Dr. Paul Bowser, a researcher in Cornell University's Department of Avian and Aquatic Animal Medicine, could lead to better detection and prevention of other fish diseases in hatcheries. Bowser, a Sea Grant-funded researcher, has discovered two new antibacterial compounds, which are pending approval by the Food and Drug Administration, for use in rainbow trout hatcheries. Bowser has also found a technique that could lead to a detection method for the EEVD virus, which can cause serious mortalities in fingerling and yearling lake trout, threatening to stop all federal and state efforts for lake

Photo by Bill Huff, Jr., Wayne County Department of Promotion and Tourism

trout restoration in the Great Lakes. The EEVD virus has already afflicted lake trout hatcheries in Michigan, but has not yet shown up in the hatcheries that stock Lake Ontario.

Zebra mussels are the "wild-card" that may ultimately determine the future of Lake Ontario's sportfishery, researchers say. Zebra mussels are shunting nutrients in the water column to the lake bottom. While the diets of other bottom-dwelling native species like lake trout, walleye and yellow perch may be enhanced by the presence of zebra mussels, the exotic pest may be causing a general reduction in the overall availability of nutrients for forage fish, which salmon and trout depend on. Zebra mussels also infest Lake Ontario reefs where lake trout spawn, which may harm lake trout reproductive success, Krueger warned.

Lake Ontario's stakeholders are monitoring its future with excitement and trepidation.

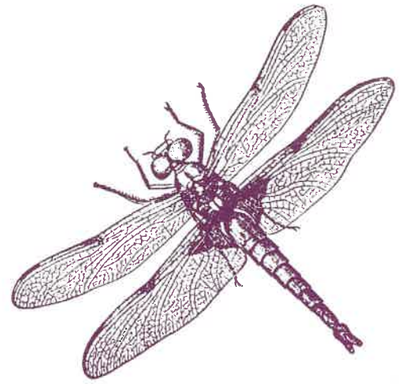
For serious anglers who describe the exhilaration of getting a 30-lb. chinook to bite and its struggle to escape as it strips line off the reel while shooting through the water like a torpedo, Lake Ontario would never be the same without this trophy fish. Yet fishery managers and biologists assert that the long-term sustainability of the Lake Ontario ecosystem depends in part on the restoration of native species, and difficult choices may have to be made about how many and what kinds of sportfish to stock in the future.

Yellow perch may not represent the challenge of salmon to anglers, but this native fish is accessible to anglers from the shoreline, and should be restored, Krueger advised. Steelhead is another popular sportfish which outcompetes Atlantic salmon in the wild, and any effort to restore native populations of Atlantic salmon in the future might require stocking reductions in steelhead, Lange said.

"The biological history of Lake Ontario is currently being rewritten, " said MacNeill. "This is probably the most exciting time to be alive if you are a fisheries biologist because of the tremendous changes in the lake ecosystem, but a frustrating time if you are a charterboat captain wondering about the future of the sportfishery. It's also frustating for anglers and other members of Lake Ontario's business community. They ask are we going to lose the fishery? Are we going to stay in business? Anglers are concerned about anything that would jeopardize their recent successes, and they want to make sure that they have the resource for posterity."

Trent Schneider contributed to this article.

New York Sea Grant Publications



What's it? Alewife or Blueback Herring?

David MacNeill

Alewife and blueback herring are closely-related members of the herring family whose marine populations overlap over most of their range on the Atlantic coast of North America. This field guide helps distinguish between these two species in terms of their appearance, ecology, environmental preferences, and habits. Three-panel brochure. Free.

Interpretive Recommendations for the Eastern Lake Ontario Sand Dune and Wetland Area

Gillian E. Earnest

This publication provides recommendations to park managers on how to educate and inform visitors about the Lake Ontario sand dunes and wetland area by indicating accessible areas, and promoting nondestructive use of the delicate habitat.

Information about how to develop interpretative trail signs, kiosks, and guidebooks at four New York state-owned eastern Lake Ontario sand dune properties are included in this publication prepared by New York Sea Grant Extension Scholar Gillian Earnest, in cooperation with Sea Grant Extension Specialist Diane Kuehn and The Ontario Dune Coalition. 32 pages (plus figures and tables). $1.00.

Municipal Nonpoint Source Pollution Guidebook

J. Pultz and R. Williams

This guidebook was developed by New York Sea Grant Extension, the Wayne County Water Quality Coordinating Committee and the Wayne County Soil and Water Conservation District to assist local government in the prevention of water resources deterioration through nonpoint source pollution management. 45 pages. $2.50.

The Ontario Dune Coalition 10th Anniversary Report

Dave White, editor

The Ontario Dune Coalition (TODC) is an alliance of private property owners' associations, not for profit organizations, local governments, and state agencies, all of which have an interest in the Eastern Lake Ontario dune system. The report explains what the TODC is, who its members are and the various projects and programs they have undertaken. 4 pages. Free.

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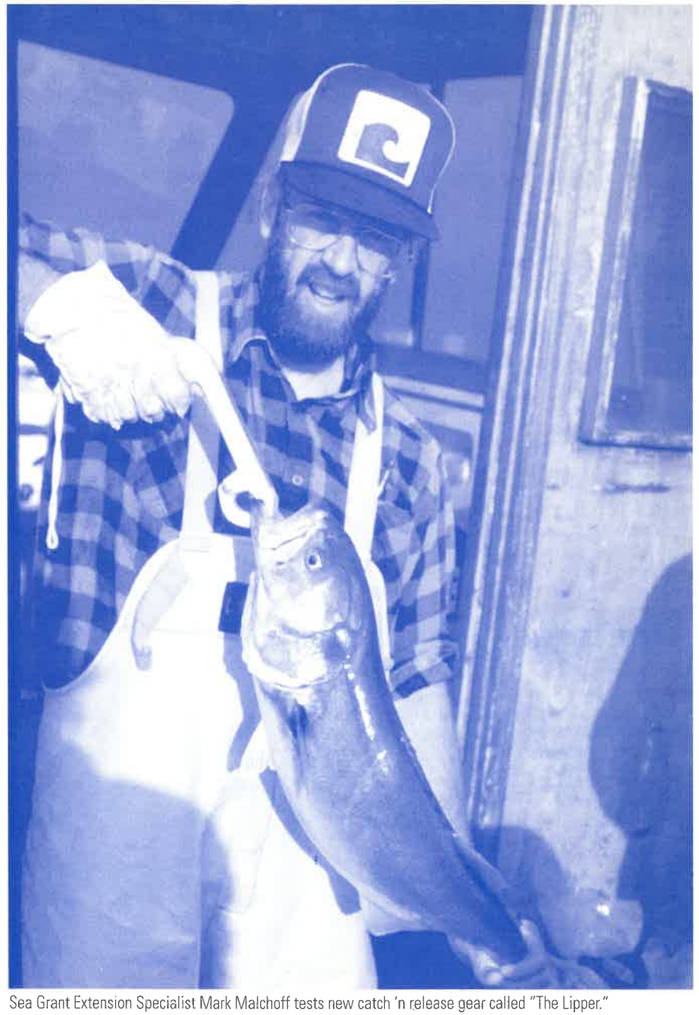
A Critical Time for the Marine Recreational Fishery



Sea Grant Extension Specialist Mark Malchoff tests new catch 'n release gear called "The Lipper."

by Judith N. Hogan

When fishermen stop by their favorite tackle shop or meet up at fishing piers and on charter boats across Long Island and in New York Harbor, greetings are usually followed by discussions about what fish are biting, who caught what and where, and what kind of bait and lure was used.

Decades ago, the conversations would probably have been enhanced with thrilling tales of reeling in "the big one," or boasting about the hundreds of fish caught in a day's fun. Anglers today are more likely reminiscing about those days, sharing information about the latest fishing regulations and concern about the decline in fish stocks.

There isn't any mystery about what's causing the decline of the recreational fishery. Nearly everyone, from anglers to members of the scientific community, agree that overfishing is the major culprit. The question, they ask, is what can be done to reverse the tide and restore the fishery to a healthy and thriving existence.

Surveying The Fishery Scene

Dating back to the Magnuson Fishery Conservation and Management Act of 1976, size limits have been placed on certain species to preserve stocks, and during the past 20 years catch limits and seasonal closures have been enacted as one species after another started to show signs of decline.

The Magnuson Act was established to insure sound conservation and management measures for both domestic and foreign fisheries. It provides exclusive rights for the United States to manage fisheries within a zone of three to 200 miles offshore and limits foreign fleet harvesting. It also prompted a massive buildup of the U.S. commercial fishing industry. Eight regional fishery management councils were established to oversee overfishing problems, monitor fish abundance and carry out provisions of the act.

While primary responsibility for marine fish management in New York lies within the New York State Department of Environmental Conservation's (NYSDEC) Division of Marine Resources, New York is also one of six states represented by the Mid-Atlantic Fishery Management Council (MAFMC). The 19-member council is composed of the regional director of the National Marine Fisheries Service (NMFS), a fisheries official from each state, and 12 public members, of which one must be from each state involved. These public citizens are nominated by the governor of their state. A permanent staff, a scientific and statistical committee and an advisory panel support and advise the council. New York also falls under the review of the Atlantic States Marine Fisheries Commission (ASMFC), an interstate agency responsible for coordinating the management within the 0–3 mile zone along the entire Atlantic coast. Since several species travel along the coast, management decisions are often the result of joint review by the two groups.

"Prior to the Magnuson Act, there was only the International Commission for Northwest Atlantic Fisheries (ICNAF) and the ASMFC, which met once a year to discuss domestic fishery issues," recalled John Mason, who worked for the MAFMC in its early years before heading to the NYSDEC as a Marine Resource Specialist in the Division of Marine Resources. "Not much can be done in one annual meeting. The Magnuson Act provided the opportunity for state directors to sit down each month and talk. It set fishery management light years ahead," he said.

In the past 20 years, size, bag and seasonal limits have been placed on most every species, except for whiting and blowfish. But fishing mortality rates are generally above desirable levels and some species, such as the weakfish, have become so scarce they are no longer targeted by some in the fishing industries.

In 1981, anglers caught and kept nearly 280,000 weakfish in New York waters. Last year the number sharply dropped to under 2,000. The first state-mandated regulation on weakfish was a 12-inch size limit, enacted in 1976, and since then limits have been increased several times. But it clearly is a case of "not enough soon enough," say fishery experts.

"We erred on the side of the fisherman, and we should have erred on the side of fish," said Mason, reflecting on the initial fishery restrictions. "We were trying not to hurt any industries — whether recreational or commercial — and it's a juggling act. Now it's time for everyone to make the sacrifice so the fisheries can be saved."

That sacrifice will likely involve much more stringent limits or moratoriums on species that have almost disappeared. "We've gotten to the point where we have depleted the stock to such a low level that every fish counts," said Mason.

A Critical Time...

The Numbers

When fishermen and charter boat captains share stories about the "good old days," they tell tales of catching so many fish that their arms ached at the end of the day. They describe filling bucket after bucket and passing the prizes to neighbors, family and friends. At that time there were many more fish and it didn't bother anyone to throw back the few short ones. Today, not only are fishermen dealing with size, possession and seasonal restrictions, there's the strong possibility that they might not even be able to catch the limit.

The fishery decline is clearly reported in surveys conducted by the National Marine Fisheries Service (NMFS). The federal agency surveys anglers in every state on what they caught, where they caught it, and whether they kept it or released the fish. New York surveys are taken every two months from March to December, encompassing fishing locations from the Hudson River to Montauk Point, Long Island. The Marine Recreational Fisheries Statistic Surveys (MRFSS), initiated in 1979, include catch resulting from shoreline fishing, private boats, charter boat landings, as well as catch and release tallies by anglers.

According to MRFSS surveys, porgies (also known as scup) have dropped fast in numbers, from a little more than 5 million caught and kept in 1981 to approximately 1 million in 1994. The decline has prompted fishery management councils to recommend first-ever size limits on the species, and public hearings on proposed regulations were held this summer. Legislation on size limits has been approved by the New York State Legislature and are pending the governor's consent.

The survey numbers also prove something most recreational fishermen already know — the striped bass are back. Overfishing and recruitment failures starting in the late 1970s resulted in a severely depleted East coast stock by 1985. A subsequent stock recovery, stemming from a no-catch moratorium, is being touted as the biggest success story marine fishery managers have on record. From a reported 23,000 landed and kept by anglers in 1981, nearly 85,000 were caught and kept in New York last year, according to MRFSS statistics.

"Striped bass is a great success story. It proves that fishery management and users can help rebuild a stock," explained Chet Zawacki, the NYSDEC's Chief of the Bureau of Finfish and Crustaceans. "Rebuilding these fisheries is not going to happen overnight, just as they weren't overfished overnight. And once a fishery has recovered, you need a management plan to manage in an adaptive mode."

As of this summer, limits on striped bass were a one-per-day possession limit, a 36-inch size limit, and a May-to-December fishing season. The revitalization has been so great that the ASMFC has recommended liberalizing minimum size and bag limits over much of this species' East coast range, and in fact, New York limits may have changed by the publication of this article.

One very popular fish with recreational anglers, the summer flounder (fluke), is a success story in the making, according to fishery experts. Caught and kept numbers have taken drastic turns in the past four years jumping from about 1.7 million in 1981 to approximately 3 million in 1984 and then crashing at roughly 300,000 in 1989, according to MRFSS surveys. But last year's caught and kept tally of nearly 2 million has fishery managers feeling confident that the species is on the rebound.

"This is a sign that the summer flounder plan is starting to work and we have a framework for recovery of this species," said Zawacki.

But the recovery hasn't been substantial enough for the MAFMC, which has considered amending the fluke plan to reduce the current daily possession limit of six fish to two or three. After review and public hearings, the council recommended keeping the current bag limit and extending the management plan's rebuilding strategy past its original completion date. Possible economic hardship to the charter boat industry was cited as one reason, according to council members.

Photo by Ian Stupakoff

While fluke may be on the rebound, the numbers tell a sad story when it comes to one of most popular species on Long Island. Long loved by recreational fisherman due to its great abundance in past years and respected as a champion battler, bluefish has steadily declined in the past decade. More than 4 million bluefish were caught and kept by anglers in 1981, but only 1.5 million were caught and kept in 1994.

Considered primarily a recreational fish, the abundance of bluefish in the early 1980s drew the attention of commercial interests and, in response, fishery managers instituted a 20 percent cap on the commercial harvest, reserving 80 percent for recreational anglers with a 10-fish-per-day bag limit. While the commercial fishery didn't catch on as expected, probably due to the species' perishability and limited seasonal availability, the stock decline has prompted further regulatory review. A size limit proposal is among several options currently under consideration as fishery managers amend the bluefish management plan which was established in 1989. The MAFMC held a series of public meetings last winter which were the first step in the long process of developing a set of preferred management alternatives. The initiatives are now on hold for further review.

Sea Grant Provides Needed Research

It was the bluefish's popularity with anglers and a lack of information about its early life stages that caught a researcher's attention in 1985, and has resulted in 10 years of scientific study.

With the support of New York Sea Grant, Drs. David Conover and Robert Cowen, both of the Marine Science Research Center at the State University of New York at Stony Brook, have both studied the timing of recruitment of young bluefish into New York waters and the possibility that bluefish spawn twice a year on, or near the edge, of the continental shelf. Working jointly on some projects, and independently on others, the researchers are providing needed information on early life mortality factors and the effect of larval transportation on stock recruitment.

A Critical Time...

While Cowen and Conover cite overfishing as a top reason for the fishery's decline, they both emphasize that a complete understanding of the species' biological background could prove useful in future management decisions. New York Sea Grant has funded six bluefish projects. The researchers have also received support from the DEC's Division of Marine Resources. The current Sea Grant-funded project targets the effect of bluefish predation on the striped bass population in the Hudson River. Initial findings indicate that in some years, a large percentage of the mortality of young striped bass can be attributed to bluefish.

"An important factor in all fishery management is to maintain the habitat quality at the same time of reducing fishing. Overfishing is only part of the equation, habitat suitability and those influences affecting it must be also be considered and managed," said Professor Conover, who currently serves on the MAFMC's Scientific and Statistical Committee and previously served on the Stock Assessment Review Committee of NMFS.

New York Sea Grant is also supporting several other projects involving fishery issues. One relates to the growth rate of larval striped bass and understanding the mechanisms supporting striped bass recruitment. Another focuses on the stock structure of the Atlantic and Gulf sturgeon whose populations have been severely depleted throughout their distribution. Scientists have identified stocking assessments as a chief research need in formulating management plans to restore these fisheries to harvestable levels.

The Importance Of Catch & Release

Since the first day a fisherman took the hook from a fish's mouth and dropped the fish back into the water, recreational anglers have been involved in catch-and-release. With the adoption of more stringent minimum size limits and bag limits for a number of marine species, catch-and-release fishing has become a much more common practice among fishermen who have learned the technique.

More than 5 million fish (specifically bluefish, striped bass, weakfish, summer flounder, scup and tautog) were caught in 1994, and released in New York by recreational fishermen, according to 1994 MRFSS estimates. While sportfishing groups and fishery managers boast that catch-and-release has "caught" on with anglers, the fate of the released fish was relatively unknown.

Prior to 1992, estimates of catch-and-release mortality rates for a number of marine species were largely unavailable. A number of recent investigations have confirmed that mortality is probably quite low in northeast striped bass, bluefish, porgy and black seabass recreational fisheries.

Photo courtesy Oswego County Department of Promotion and Tourism

One project, conducted by New York Sea Grant Extension Specialist Mark Malchoff and funded by a grant from the NMFS Saltonstall-Kennedy Program, found that overall catch-and-release mortality was approximately 5 percent for striped bass, 10 percent for bluefish and 10 percent for scup. Similar estimates for these species were found in studies at the University of Rhode Island and the Massachusetts Division of Marine Fisheries. The recent project, "Effect of Catch and Release Angling on Important Northeast Marine Fishes: Mortality Factors and Applications to Recreational Fisheries," was completed this past spring.

"Given the degree of overfishing, managers must continue to address the problem of fishing mortality," explained Malchoff, who specializes in fishery biology and marine recreation industry development. "On the recreational side you can continue to impose limits, and in doing so it's going to force people to throw back a lot of fish alive. That's useful if a large percentage of those fish live. Up until recently not a lot was known about the fate of those fish."

In order to increase the survival of released fish, fishermen should understand some general rules concerning physiology. Relative to terrestrial animals, most fish live in a cold, oxygen-poor environment. Since most fish can't control their internal body temperatures, which often determine metabolic rates, they have a harder time than humans and other animals in dealing with blood chemistry waste products. One consequence is that lactic acid produced by muscular exertion is broken down relatively slowly in fish. Therefore, subjecting a fish to a prolonged struggle may diminish a fish's chance for survival once released, said Malchoff. Anglers should also realize that dissolved oxygen levels are inversely related to water temperatures. Since fish require oxygen to break down lactic acid, they are likely to be more stressed by catch-and-release in August versus October.

"It used to be more sporting to use light tackle so that you would have a bigger fight with the fish. But it may be more sporting to use heavier tackle so you can get the fish in quicker, minimizing the production of lactic acid," advised Malchoff.

Anglers should also insure that the fish is not out of the water longer than absolutely necessary, and minimize the removal of scales and slime that help protect a fish by keeping hands moist or using wet cotton gloves.

The results of Malchoff's study have been made available to more than 250 leaders of the marine sportfishing community, providing an increased understanding of how to conserve important natural resources by minimizing fishing mortality in sport-caught fish. Malchoff also presented the project results at a catch-and-release workshop sponsored by the Mid- Atlantic Sea Grant Marine Advisory Program this past May. Further research could provide needed information on gear and handling factors suspected of influencing fishing mortality, Malchoff said.

When discussing the decline of the recreational fishery, he quickly points out that much of what is labeled 'overfishing' is actually being driven by the development of new fish finding technology.

Decades ago anglers would stumble across a concentration of fish and then rely on triangulation (using a visual marker on the shore) or compass bearings and time to find that lucky spot again. But the advent of Long Range Aid Navigation (LORAN), the Global Positioning System (GPS), VHF radios, remote sensing and echo-sounding have greatly simplified the task of finding fish .

For the past seven years, Malchoff has worked to open lines of communication between recreational fishermen and related industry groups through dissemination of regulatory information and educational programs. He updates the charter boat

industry through a newsletter, the *Commercial Vessel Passenger News*, and also assists sportfishing organizations on public survey questionnaires relating to attitudes about fishery conservation practices. His efforts concerning catch-and-release are praised by both industry members and regulatory officials.

"Part of the fishery solution is educating the user, the fishermen, about the regulations and the state of the fisheries," said Zawacki. "You also have to continually educate them about catch-and-release, both the techniques and the importance. We have to make sure these fish survive and get back in the water. That is why Mark's work is so valuable."

Industry Actions

At Chet Wilcox's shop in Moriches, Long Island, Wilcox observes how increased public outreach efforts are helping change the overall attitude of the recreational fisherman.

"The biggest change with the angler is the fishing attitude, and it is one of the best things that has happened. It used to be that fishermen wanted to catch as many as they could. Now people get booed if they haven't released the proper fish. Everyone has come to realize that it isn't too bad to put fish back in order to keep the fishery alive," said Wilcox, who's been in the tackle business for 25 years.

The store owner also praises the dozens of sportfishing clubs for the "proactive and responsible" attitude on catch-and-release. He cites a recent poll which indicates that 85 percent of anglers in New York favor a one-per-day limit on striped bass and were opposed to increasing the bag limit.

"I remember going into Moriches Bay, dropping a hook and catching fish left and right. Now it's a little tougher because the fish just aren't there like they used to be," said Wilcox, adding that while overfishing may be the main problem it isn't the only one affecting the recreational fishing industry. Restricted beach access and the increase of commercial interests concerning winter flounder, are other important issues.

Other industry-related concerns include proposals to ban lead in fishing line sinkers, limit the bluefish snapper catch, and institute a saltwater license. These issues prompted the establishment of the Fish and Tackle Trade Association on Long Island, a watch-dog industry group with nearly 50 members.

Who's Fishing

Since recreational fishermen aren't registered, and their numbers appear to fluctuate parallel to the abundance of fish, it is hard to characterize this large and diverse group. More women are now active in recreational fishing, and overall, fishing groups are much more organized than in past years, said George Scocca, publisher of the *Nor'East Salt Water,* a weekly fishing newspaper.

"There is still the guy who goes out once a year to fish, and there are those who fish on a regular basis. But in both groups, there's a segment which doesn't want to hear about any problems or get active in the fishery management arena," said Scocca. "Then you have the very active sportfishermen and the clubs who serve on advisory committees and attend every fishery management hearing."

There were 860,000 recreational anglers in 1984 and that number dropped to 420,000 in 1993, according to a *Nor'East Salt Water* study.

Competing interests and a lack of free time were the top two reasons anglers cited for not fishing, according to a survey conducted in the mid-1980s by Dr. James Kahn of the State University of New York at Binghamton. The New York Sea Grant-funded report, *The Economic Value of Long Island Saltwater Recreational Fishing,* indicates that fishing activity levels may also be constrained due to a loss of access to areas and water quality concerns.

Unfortunately not much has changed since the Kahn study, say industry leaders. An overall decline in the local economy and the substantial drop-off in young anglers has also had a cumulative impact on many of the small businesses in the industry, said Charter Boat Captain Anthony DiLernia.

Photo courtesy of Cornell University

"All you see are jet skis and water tubes..."

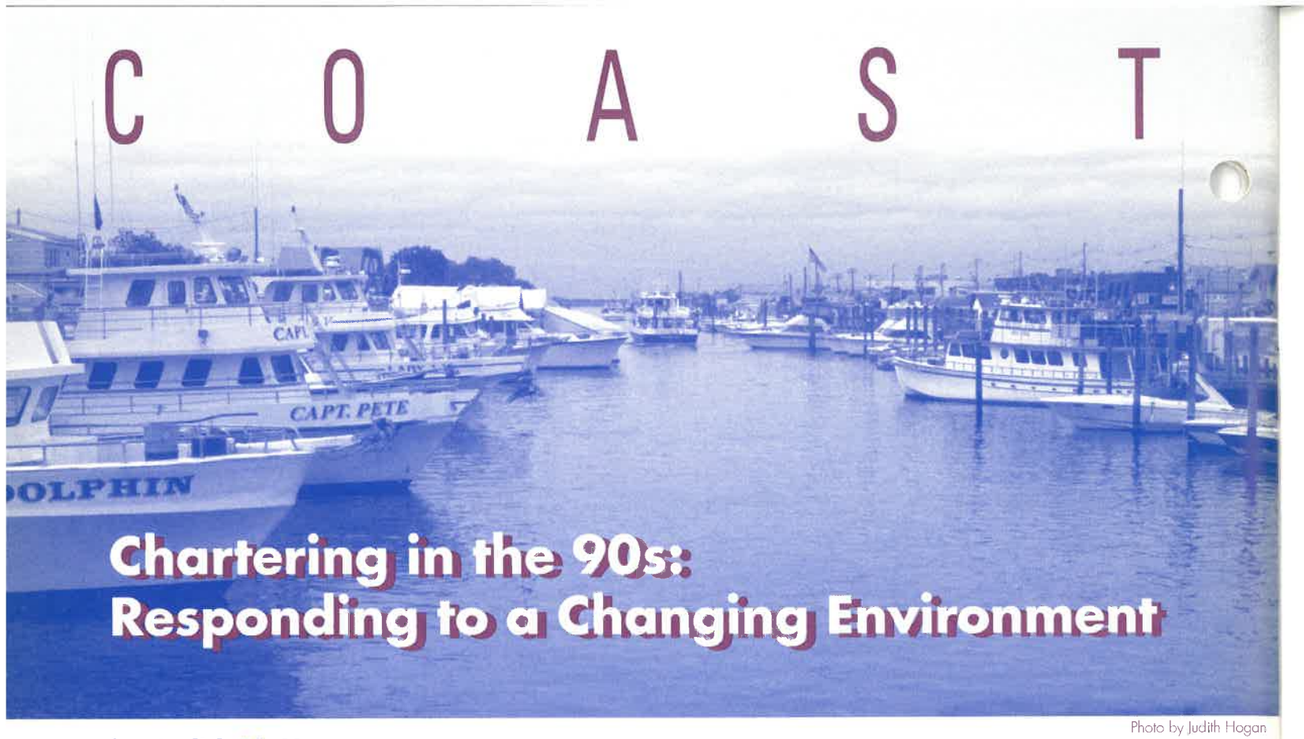
"Just look at the docks and on the boats. You don't see kids fishing as much anymore. You don't see fishing poles, you see jet skis and water tubes. We have to get the young kids back into fishing," said DiLernia, who has been operating charter vessels for 15 years and teaches courses on navigation and vessel operations at Kingsboro Community College. DiLernia serves as vice chairman of MAFMC and is chairman of the council's information and education committee.

Efforts to entice young enthusiasts is not new for The Fisherman, a weekly newspaper serving the northeast area. The publication's successful "Send A Kid Fishing" program, now in its 13th year, sent 1,000 children fishing last year through the support of advertisers and donations. Participating charter boats reduce fares to make it possible for a greater number of children to fish. For many of those children it's the only opportunity they've had to fish off a boat. Most charter boat operators now also offer discounts for youngsters and family package deals to entice young anglers.

While industry marketing programs will help draw customers, DiLernia believes that the most important ingredient to the recreational industry's survival is the fishery's survival.

His statements are echoed by John Mason, who's kept a close eye on the recreational fishery and its many changes during the past 15 years.

"I hope everyone has learned by now that the ocean is not an inexhaustible resource. We all have to compromise and work together to solve the problems we're facing today," he said.



Chartering in the 90s: Responding to a Changing Environment

Photo by Judith Hogan

by Judith N. Hogan

• New York's charter fishing industry dates back to the 1880s when waves of immigrants flowed into the city. Party boats in Sheepshead Bay provided a needed venue for those without transportation, or much money, to fish for a meal and have some fun at the same time. Over the century, as the population increased and extended to the outer boroughs, Long Island, and to the upstate lakes and rivers, charter fishing has remained an important segment of the recreational fishing arena and one now facing a myriad of challenges.

• Overfishing of most species, a downturn in the regional economy, increasing regulatory mandates and seafood consumption advisories are the top problems confronting New York charter fishing owners and operators, whether their boats are harbored on Lake Ontario or docked in Montauk, Long Island. To assist this industry New York Sea Grant specialists have played an active role in helping to develop cohesive industry organizations on both Lake Ontario and Long Island, providing dissemination of information and creating an open dialogue between the industry sector and various regulatory agencies.

• The charter fishing industry offers a wide variety of different vessels and fishing experiences. Party boats, also called head boats or open boats, are sportfishing boats open to the public that leave and return to a dock at scheduled times. These boats are 40 to 135 feet in size, inspected by the Coast Guard, and usually carry 35 or more passengers per trip. Space is allocated on a first-come, first-serve basis.

These types of boats are also called "T-boats" referring to the subchapter of federal regulations governing their design and operation. Charter boats are similar in size to party boats and are also subject to Coast Guard inspection, along with a Coast Guard-licensed captain.

• Depending on the length of the trip and the species targeted, charter trips can range in cost from $35 per person on a charter to $450 for a six -pack trip. The six-pack rates are somewhat lower on the eastern end of Lake Ontario for warm-water species, between $300 to $350. Operating costs, including fuel, are primarily responsible for the cost difference between the two areas.,

• On Long Island, there are an estimated 250 to 300 charter fishing boats working out of eight major fishing ports, providing over 600,000 passenger trips a year. These charters are catching less fish, carrying less passengers and watching their expenses increase as revenues decrease, explained New York Sea Grant Specialist Mark Malchoff. The industry is still rebounding from misconceptions about contaminated seafood and floating debris which caused a panic among marine district users in the mid 1980s, says Anthony DiLernia, a long-time charter captain and industry activist.

• Charter boat owners are responding to the loss of customer base in different ways. Party boats now offer a half-day trip option which has provided the most significant result — more passengers. Half-day trips cost less and offer greater flexibility to people who have less time for recreation and less money than they did a decade ago. Some charters are also offering their vessels for evening cruise trips to offset the cost of operating their boat and keep the price of party fishing affordable. Most charter boats also offer discounts for young children.

• "There aren't many diversification options for Long Island charter boats, such as whale watching. Many of these boats are locked into fishing, and we must promote the fishing experience itself," says Malchoff, a specialist in marine recreation industry development and a fishery biologist.

• When the Coast Guard released its proposed new Small Passenger Vessel Rules last year, involving revised vessel equipment mandates and operating procedures, it was acknowledged that the regulation would have an immediate impact on T-boats. To facilitate accurate understanding of the proposed rules Malchoff produced a fact sheet highlighting the changes. He also organized a meeting attended by Coast Guard staff, which provided an opportunity for charter owners and operators to review the major rule changes. Such forums have helped preempt a disruption in the industry when the new rules take effect next year. Since angler expenditures associated with the Long Island charter boat industry were estimated as high as $71 million in 1989, protecting the industry is all the more critical.

• To provide the sportfishing industry with up-to-date fisheries management news and small business information, Malchoff initiated the *Commercial Vessel Passenger News* in 1989. The Long Island Commercial Passenger Fishing Vessel Association (LICPFVA) was formed the same year to present a unified industry stance on evolving management measures. Malchoff also serves on the East End Charter Boats Committee and helped design a new brochure focusing on charter boat fishing.

• In the Great Lakes area, charter operators are dealing with similar challenges. While Lake Ontario is one of the most productive freshwater recreational fisheries in the world, an unstable forage base and some hatchery diseases are now jeopardizing the fishery (see related article, p. 2). There is widespread recognition among stakeholders, including charter boat owners, that the long-term sustainability of the sportfishery is at risk, said New York Sea Grant Extension Specialist Dave MacNeill.

• The Great Lakes charter industry (incorporating all seven state's businesses) experienced substantial growth in the past 20 years. In 1975, there were several hundred boats for hire, of which 33 were NewYork-based operations. By 1988, there were over 3,000 charter vessels, including 450 were New York businesses. The growth rate of New York's industry continued until 1990 with 563 New York charters on Lake Ontario, Lake Erie, St. Lawrence and Niagara Rivers. As of 1994 there were 400 charter businesses operating, a 29 percent drop from 1990, according to a study recently completed by New York Sea Grant Specialist Diane Kuehn.

• Kuehn's study, conducted with the assistance of Dr. Chad Dawson of the New York College of Environmental Science and Forestry, also reflects a 44 percent decrease in New York income for charterboats in the past four years — from $9.9 million in 1990 to $5.5 million in 1994.

• As fishery managers reduce the number of stocked sportfish in Lake Ontario, and impose other restrictions on the recreational fishery, Sea Grant specialists are continuing a long-standing effort to aid the sportfishery stakeholders. Specialists helped establish the first charter boat group, the Lake Ontario Charter Boat Association, nearly 15 years ago. The 120-member organization is the largest of seven different associations that form the New York State Charter Sportfishing Council (the smallest has only 13 members). Established 10 years ago, the council helps disseminate industry-related information and coordinates activities among the various associations.

• In 1984, Sea Grant specialists initiated a quarterly publication, *Charterlines*, to provide information on industry-related issues to charter skippers, fishery managers, researchers and educators. A 1993 series of special issues on the charter fishing industry offered technical and regulatory information to more than 600 skippers. Supported by a wide variety of industry and community associations, *Charterlines* is written and edited by MacNeill, whose expertise encompasses sportfishery development and fishery biology. MacNeill also organized six annual "State of the Lake" seminars that provided recreational anglers with the latest university-based fisheries information.

• This past spring, charterboat owners and operators discussed how to increase customer base by developing diversified businesses (i.e. historic tours in cooperation with other coastal businesses) at a workshop organized by MacNeill and Kuehn. The effort was so well received it may become an annual or biannual event.

• "Sea Grant works to be proactive with the issues facing the charter businesses," explained MacNeill. "We try to anticipate any possible problems before they actually become a problem."

CURRENTS

Release Coatings Show Promise against Fouling Organisms

Sea Grant researchers are developing new non-polluting coatings that should help in the battle against zebra mussels and other fouling organisms. Concern about exposure of marine organisms to toxic non-fouling paint, as well as potential human health implications of application, maintenance, and disposal of toxic coatings has sparked interest in new types of defense against fouling.

Robert Baier, director of the Industry/University Center for Biosurfaces, has been looking into the interface between living and non-living matter, and developing improved surface coatings that mimic nature's mechanisms for combatting attachment. Initially focusing on zebra mussel adhesion to hard surfaces, molecular-level investigation by Baier's research team has shown that most biological adhesion follows surprisingly similar modes of action. As such, a properly designed surface should perform equally well against most organisms, from zebra mussels to barnacles. While these non-polluting coatings do not directly prevent attachment, they allow for easy removal of fouling that does occur. Several industry collaborators have begun to manufacture coatings based on this work and hundreds of jobs are being created as production units go on line.

New York's Seafood Council and Sea Grant Continue Seafood Marketing Program

In recognition of the importance of seafood and the seafood industry to the economy and culture of New York state, New York's Seafood Council has received funding support from the state legislature that will enable it to continue its successful seafood marketing and promotion efforts in 1995-96.

For the past four years, New York's Seafood Council and Sea Grant have teamed up to increase the public's awareness, understanding and appreciation of local seafood products and the state's seafood industry. This collaboration will continue in 1995-96.

Activities planned for the coming year include continuing the "Hidden Treasures" campaign to increase consumer's awareness of local fish like mackerel, cape shark, herring, sea robin and skate that are both plentiful and a good value because of their current low demand. The Council's successful "Long Island Fresh" program designed to help consumers identify when local seafood products are abundant and affordable will also continue. New marketing initiatives are expected to focus on how easy and quick it is to prepare seafood and its great taste. Consumer education efforts will also be conducted, and the Council will continue to work with the media, government, and the seafood industry to address industry issues.

Bluefish Impacts on Commercially Valuable Fishes Modeled

Studies of the feeding impacts of bluefish indicate that they may consume more squid, butterfish, and menhaden along the U.S. Atlantic coast than landed by the commercial fishery for those species. Bluefish possess an early life history strategy that gives them a distinct survival advantage — they grow fast enough to prey on fish of other species that are approximately their own age. This ability, combined with one of the highest consumption and digestion rates of any temperate fish (an individual bluefish eats hundreds of other fish each season), means that bluefish have the potential to do substantial damage to prey fish stocks.

Dr. David Conover, a researcher at the Marine Sciences Research Center at the State University of New York at Stony Brook, is conducting a Sea Grant study to measure just how much impact bluefish will have on other species. Estimates of bluefish growth rate and efficiency, diet information over broad temporal and spatial scales, and densities of bluefish and their prey, enabled Conover and his graduate student Jeff Buckel to model these effects. The researchers believe this study will illustrate the need for a multispecies approach to management of bluefish and their prey species.

Students Plunge into Great Lakes Summit

A student delegation formed at the Great Lakes Student Summit this June will deliver concerns and ideas of Great Lakes youth to the International Joint Commission during its biennial meeting this Sept. in Duluth, Minn. More than 250 students and their teachers from western New York and Canada tackled environmental problems and solutions during the three-day summit in Buffalo. Students from grades 5-12 experienced the history and importance of the region while touring Niagara Falls, Love Canal, the Power Vista and Occidental Chemical.

Organizers hope networking among students and teachers at the summit will stimulate enhanced learning activities related to the Great Lakes. By sharing classroom projects, they also learned about aquatic science and the Great Lakes watershed, zebra mussels and pollution. Dr. Donald Birdd of Buffalo State College wore a globe to make students aware of their responsibility to the water planet. New York Sea Grant Extension Specialists Helen Domske and Jennifer Pultz provided workshops on Great Lakes exotic species and water quality. Other workshops focused on biological monitoring, geological information systems, and Great Lakes fish and wildlife.

The Great Lakes Student Summit was sponsored by the Erie County Environmental Education Institute and the County of Erie, in cooperation with East Aurora and Buffalo Schools, and the Friends of the Buffalo River. Assistance was provided by New York Sea Grant, the Great Lakes Program at the University of Buffalo, New York Power Authority, Environment Canada, and other environmental groups, industries and governmental agencies.

For further information about this or next year's summit, contact: Great Lakes Student Summit, P.O. Box 56, Erie County Environmental Education Institute, Buffalo, NY 14205-0056, or phone (716)858.8846 or e-mail: DJNewt@aol.com.

Zebra Mussels May Pave the Way for their Cousins, the Quagga Mussel

Researchers from Cornell University have found evidence that once zebra mussels colonize an area, they appear to be slowly displaced by their relative, the quagga mussel.

Dr. Ed Mills, a researcher at Cornell's Shackelton Point Biological Field Station, received funding from New York Sea Grant to investigate this related mussel. In addition to finding positive genetic identification that the quagga mussel is *Driessena bugensis* from the Ukraine, Mills characterized the environmental tolerances of this new invader.

A review of findings from the Ukraine (the only other place where quagga mussels have been found), led Mills to hypothesize that quaggas operate at a lower energetic level or are more efficient at converting food to energy, allowing them to dominate an area once zebra mussels have depleted available food. Food limited conditions seem to favor the quagga mussels.

Further work looking into the energetics of these species is needed. To support his hypothesis, Mills plans to compare benthic samples from 1992 to samples collected this spring to see if zebra to quagga ratios have changed during this time frame.

Geographic Information System Maps Resources of Long Island Sound

Resource managers will soon have access to a powerful tool for surveying water quality and the living resources of Long Island Sound.

A new Geographic Information System (GIS), depicting the natural resources of Long Island Sound from its shellfish beds and beaches to the commercial activities around the Sound that could affect the health of the ecosystem, has been under development by the Long Island Sound Study this past year.

The GIS database includes a base map covering the Long Island Sound Study area, which runs from the southern tip of Manhattan to where the Long Island Sound meets the ocean. The base map identifies watershed areas in New York and Connecticut that drain to Long Island Sound, including streams, lakes and wetlands. It also highlights roads, political boundaries, and coastal landmarks. Additional database information includes shellfish habitats and harvest rates, and sediments.

Plans are underway to house the GIS at the Connecticut Department of Environmental Protection's Long Island Sound Resource Center. Resource managers and other interested parties will soon be able to request GIS maps of Long Island Sound or request new maps be developed for planning purposes.

Resource Management Focus of Native American Conference

Aquaculture and educational opportunities were on the agenda during the eighth annual Northeast Region Native American Fish & Wildlife Society Conference in August hosted by Cornell University and cosponsored by the Native American Indian Nations of New York. This year's theme was Natural Resource Management: "*A Sharing of Tradition and Modern Day Perspectives.*"

New York Sea Grant Extension Specialist Dave Greene, who has been working with Native American populations in New York, co-chaired the conference, which drew participants from Maine, Connecticut, Massachusetts, New York and Rhode Island. Dr. Joseph Buttner, a New York Sea Grant-supported researcher who has worked with the Akwesasne along the St. Lawrence River for several years, headed a panel on aquaculture.

Faith McGruther, Executive Director of the Chippewa/Ottawa Treaty Fishery Management Authority, talked about her organization, which covers parts of Lakes Superior, Huron and Michigan.

Other issues at the conference included cormorants, sturgeon restoration, and estimating fish harvests.

Studies Reveal Atmosphere as Source of Contaminants

Pollution management programs in the metropolitan area should consider the atmosphere a major source of contaminants to nearshore environments, according to investigators at the Marine Sciences Research Center at the State University of New York at Stony Brook

With funding through New York Sea Grant, researchers Kirk Cochran, Bruce Brownawell, and David Hirschberg measured atmospheric inputs of contaminants such as metals, PCBs, petroleum derivatives, and pesticides in tidal marshes in the western Long Island Sound area, and compared them to those measured in less urbanized areas. Their findings indicate that there are both local and regional gradients in the levels of contaminants deposited, with less severe gradients of contaminants at locations away from urban New York. In addition to direct deposition from the atmosphere at marsh sites, Cochran explains that airborne contaminants settling on land surfaces, roadways, and rooftops are often collected and carried by rainwater into storm drain systems that release the runoff into nearby marshes. The researchers also were able to determine the chronology of contamination from sediment cores taken from the marshes. For example, the highest levels of PCBs were found in layers of marsh sediment that corresponds to a period between 1968 and 1983. This research has helped emphasize the importance of atmospheric deposition, and has led to management recommendations regarding this pollution pathway in the Long Island Sound Study's management plan.

Hotline in the Hudson Lets Drivers Dial into Their Favorite Watershed

On county and town roads throughout Dutchess County in the Hudson River Valley, motorists are responding to "watershed hotline" signs next to lakes, streams or rivers adjacent to the roadway.

Motorists who dial 677–LAKE will receive a message asking them to leave their name and address and the name of the watershed that they are interested in receiving information on. A brochure containing information about the activities on land that affect the health of either Wappingers or Fishkill Creeks or the Hudson or Tenmile River watersheds will be sent to them.

The Dutchess County Environmental Management Council (EMC), with funding from New York Sea Grant, initiated the watershed education project last year.

Eighty signs throughout the region have generated dozens of calls about the watershed, and other environmental issues.

"We receive all types of calls, including alerts about illegal dumping and requests for information on subjects ranging from composting to pesticides," said Barbara Kendall, EMC executive director, noting that the majority of calls are related to watershed issues, an indication that people are interested in the watershed.

COASTLINES

Bringing Science to the Shore

Photo by R.G. Rowland

The coastal environment plays a critical role in the lives of New Yorkers. More than 14.5 million residents — 85 percent of New York's population — reside along 3,200 miles of widely varied coastline in the state.

For almost 25 years, COASTLINES' aim has been to raise interest in the value of New York's coastal resources and enterprises, and the need for sound science in the formulation of environmental policy.

Last year, the New York Sea Grant Institute redesigned its newsletter in an effort to appeal to more of New York's diverse coastal users. COASTLINES' reports on timely university-based research that has led to the development of new marine and Great Lakes technologies, products and information. Some of the issues that we've covered include New York's commercial fishery, long-term ecosystem sustainability, brown tide research, and new marine products.

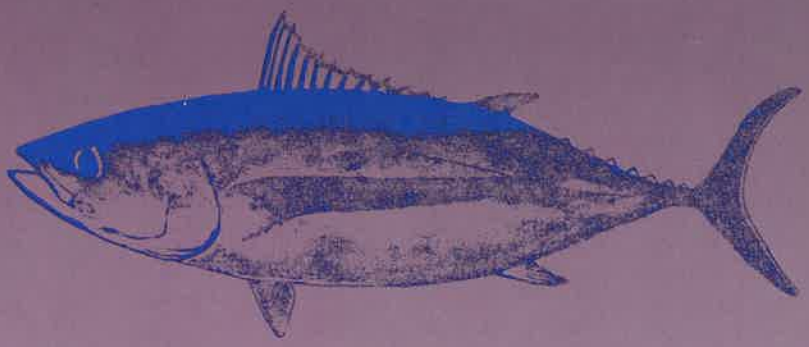
By informing the public about issues and opportunities related to New York's coastal resources, New York Sea Grant hopes to expand the public's understanding and appreciation of our marine and Great Lakes environments. To ensure COASTLINES reaches the broadest audience possible, we offer a free subscription.

We'd like to know what you think of our new format, so let us hear from you!

COASTLINES

To subscribe write: New York Sea Grant Institute, 115 Nassau Hall, SUNY at Stony Brook, Stony Brook, NY 11794-5001

Seafood Corner



Grilled Albacore

(Courtesy of Great Circle Fisheries, E. Hampton & Montauk)

Albacore tuna *(Thunnus alalunga)* is one of the smaller members of the tuna family found throughout the world as well as in ocean waters off the northeastern United States. Easily distinguished from other tuna by their long, saberlike pectoral fins, albacore range in size from 10 to 60 pounds.

While the popularity of fresh tuna has increased dramatically over the past decade, most consumer's only experience with albacore has been with the canned product. Albacore, considered the premium canned tuna, is the only species that can legally be labelled "white meat tuna" in the U.S. This "white knight in shining armor" is a perfect substitute for chicken and veal.

Most tuna fishermen in the northeast direct their effort towards the large red meat tuna like bluefin and bigeye, highly prized in the Japanese sashimi market. However, longline fishermen also catch quantities of albacore at its peak in New York during September and October.

Albacore, which varies in color from pink to white, has a firm, yet flaky texture with a full meaty flavor characteristic of all cooked tuna.

Nutritional Information (for 3 ounces grilled albacore tuna only)*	
Calories:	115
Protein:	25 grams
Total Fat:	1.0 grams
Calories from Fat:	8 percent
Saturated Fat:	0.3 grams
Cholesterol:	48 milligrams
Sodium:	39 milligrams

4 8-oz tuna steaks (3/4" to 1" thick)

Marinade:
1/2 cup lite soy sauce (reduced sodium)
1/2 cup lemon juice or any combination of citrus juices
1/8 cup rice vinegar
2 tablespoons light brown sugar

Stir marinade ingredients together in a pot and bring to simmer, allow to cool. Marinate the tuna in the refrigerator for several hours before cooking. Preheat grill to medium-high heat. When grill is hot, place tuna steaks on grill and turn after 4-5 minutes, or as soon as the sides of the steak turn opaque.

Cook on the second side for 2-3 minutes or until fish feels flaky when pressed with a fork. Serve with wedges of lemon or lime.

Note: Yellowfin or other tuna can be used as a substitute for albacore. Tuna should be cooked rare to medium, or the meat will taste dry. A good rule of thumb is to never cook longer than 10 minutes per inch of thickness.

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