Cornell graduate Micah Dean holds a trophy-size brown trout during his days as a Sea Grant scholar on a completed Lake Ontario fisheries study. Photo courtesy of Micah Dean

# Coast

## *Taking Stock of Stocking*

Brown trout. Chinook salmon. Rainbow trout. Coho salmon. These are just a few of the prized sport fish attracting anglers in large numbers to the shores of Lake Ontario. But, a few years ago, survival of these species in the lake concerned a team of NYSG researchers led by Cornell investigator **Patrick Sullivan**. Also interested in the success of these salmonids were Sea Grant scholars such as **Micah Dean** (above) and **Nathan Smith**.

Signs suggest the lake may not be capable of supporting as many trout and salmon as before. This, of course, has created a challenge in maintaining the delicate predator-prey balance, which is sustained naturally as well as through fisheries management efforts such as trout and salmon stocking.

**Dave MacNeill**, NYSG's Great Lakes fisheries specialist (and former Sea Grant scholar), believes the amount of available energy needed to support the fish in the lake's open waters may have been declined through the years. "We could have intentional nutrient reductions that began in the late '70s to thank in part for that," he says. These cutbacks were a result of international legislation mandated at the time to improve the lake's water quality. But they seem not to have helped, as now the exotic zebra mussels may be redirecting some of the available food energy to the lake bottom and out of the loop for fish in the open lake waters.

These long-term ecosystem changes in Lake Ontario have presented managers with new challenges, as maintenance of the lake's number of stocked and wild salmonids is directly linked to the production of their forage base. In the past, stocking levels of Chinook salmon and other predators have therefore been adjusted to account for decreases in alewife populations. To better ensure this balance, scholars like Dean and other members of Sullivan's team tracked the survival of the lake's 5.5 million stocked Chinook salmon and trout. They examined growth factors and relative abundance of wild and hatchery salmon juveniles and described the movement of migrating juveniles through the nearshore area.

# Watch

In the investigation, which called for study sites at the mouth of the Salmon River and Sandy Creek, Dean assisted with data collection and analysis. Among his preliminary conclusions, juvenile Chinook were present in the nearshore area from April through July, with peak abundance in June. Wild Chinook were more plentiful and appeared to remain longer in the nearshore than hatchery Chinook. And they were also found in significant numbers in the lake's nearshore near the mouth of the Salmon River.

Shortly after becoming a Cornell graduate and Thesis Completion Award winner in May 2002, Dean took a job as a research analyst with the Massachusetts Division of Marine Fisheries. "The stipend I received as a Sea Grant scholar allowed me to focus my attention entirely on my thesis, and not be distracted by trying to work at a job and conduct research at the same time. And now, as my career progresses, I see more and more of a value in the knowledge and experience gained during my fellowship."

Sea Grant scholar **Nathan Smith** helped Sullivan and his team in another investigation. In this study of salmon survival and growth, examining the daily growth rings of species' ear bone, or otolith, was key (see illustration). The otolith provides the fish with its balance, similar to the inner ear in humans.

Preliminary analyses based upon otoliths from juvenile salmon collected in 1999 of known origin suggested that a 'natural tag' in the ear bone's chemistry could be used to identify salmon as being wild or hatchery in origin. This identification of origin is useful in understanding the contribution of the different sources to lake-wide production of salmon. It could also help in the understanding of factors affecting survivorship, growth, and age-at-maturity for these fish.

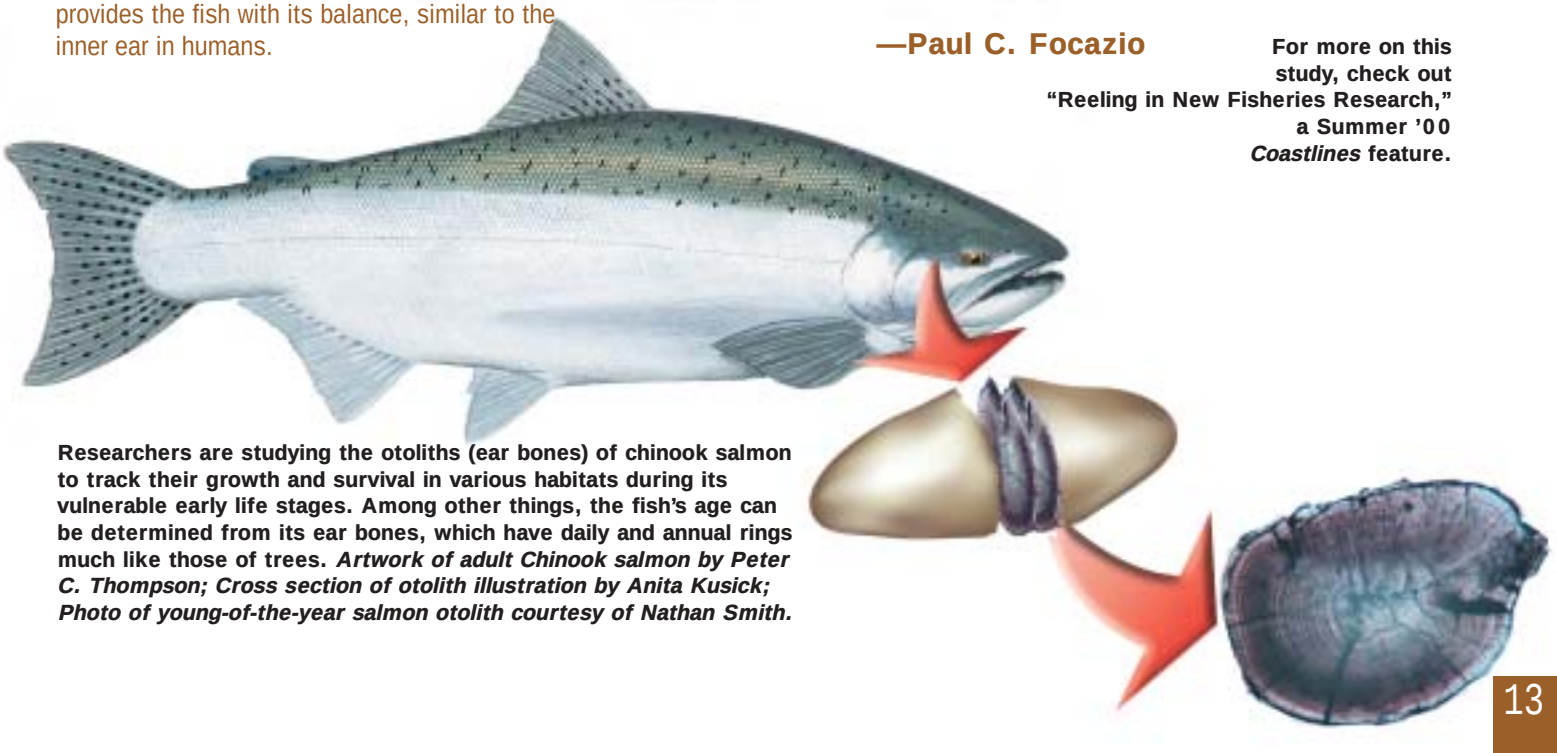
"This research has helped scientists and managers further their understanding of the biology of salmon," says Sullivan. "It has also helped generate substantial data on both stocking rates and angler participation as they relate to fishery productivity for almost a century." Research results and other information on present and future changes in the Lake Ontario ecosystem are available online, at www.dnr.cornell.edu/ext/fish/salmon.htm.

Sullivan says this information helps fisheries managers make informed decisions about the maintenance of a viable fishery. "Predicting the outcome of management decisions on variable ecological systems is difficult, but by using the best available data, scientists can make good approximations."

**—Paul C. Focazio**

> *"Sea Grant provides a valuable source of funding for research in New York's coastal communities and, in my experiences that research is disseminated and utilized by NYSDEC and other managers in the field."*
>
> *—Nathan Smith*
> *Sea Grant Scholar*

**For more on this study, check out "Reeling in New Fisheries Research," a Summer '00 *Coastlines* feature.**



**Researchers are studying the otoliths (ear bones) of chinook salmon to track their growth and survival in various habitats during its vulnerable early life stages. Among other things, the fish's age can be determined from its ear bones, which have daily and annual rings much like those of trees. *Artwork of adult Chinook salmon by Peter C. Thompson; Cross section of otolith illustration by Anita Kusick; Photo of young-of-the-year salmon otolith courtesy of Nathan Smith.***