

# Botulism Update



**Lake Erie near Erie, Pennsylvania in Spring 2004, where fewer botulism die-offs of fish and waterfowl have been reported.**

*There is good news and bad news regarding botulism die-offs in the lower Great Lakes. The good news is that there were fewer die-offs of fish and waterfowl in the summer and fall of 2003 in Lake Erie. The bad news is that there has been an increase of die-offs in Lake Ontario. This leaves scientists wondering if Lake Ontario will see the same ecological impacts of botulism that has been witnessed in Lake Erie over the past five years.*

Botulism is a disease caused by exposure to the toxin produced by the bacterium

*Clostridium botulinum*. Botulism has been recognized as a major cause of mortality in migratory birds since the 1900s. Although type C has caused the die-off of thousands of waterfowl (especially ducks) across the western United States, type E has been somewhat restricted to fish-eating birds in the Great Lakes. Type E toxin has also been known to affect fish and the toxin is suspected in recent fish die-offs in the lower Great Lakes.

In order to bring researchers, agency staff members and concerned stakeholders together to exchange data and ideas, New York Sea Grant again joined forces with Pennsylvania and Ohio Sea Grant to hold a binational workshop on the botulism issue. The fourth annual workshop on botulism was held on Thursday, March 25, 2004, at the Stull Nature Center in Erie, Pennsylvania.

Approximately 40 participants gathered to hear reports from New York, Ohio, Pennsylvania, and Ontario. The reports from the various state and provincial agencies provided information on the fish and waterfowl die-offs from 2003.

**Ken Roblee** of the New York Department of Environmental Conservation reported that waterfowl die-offs decreased from over 17,000 in 2002 to approximately 3000 in 2003. Roblee, a wildlife biologist, also reported that 22 dead lake sturgeon were collected along the Niagara County shoreline of Lake Ontario, a significant mortality for these threatened fish. These mortalities concern biologists because the Niagara River is an established spawning area

**NYSG's Helen Domske and Pennsylvania Sea Grant's Eric Obert coordinated this year's botulism workshop. All photos by Lane Smith**



for lake sturgeon and these slow-reproducing fish could be impacted by the loss of reproductive-age fish.

Following the reports on bird and fish die-offs, participants heard from researchers representing Cornell University, Penn State University, Wadsworth Center – New York State Department of Health and the University of Guelph – Health Canada. The research at Cornell and the Wadsworth Center are efforts that were funded through New York Sea Grant.

The NYSG funded research at Cornell is being carried out by **Dr. Paul Bowser** and **Dr. Rod Getchell**. Through this work, the Cornell team has developed a faster, safer and more affordable way to detect botulism using a molecular assay to screen samples. Their new research will also focus on testing sediments, quagga mussels and other invertebrates in the future (see sidebar). This will help to evaluate the hypothesis that botulism is being moved from the sediments up into the food chain by filter-feeding quagga mussels.

As a true binational effort, participants heard from researchers in Ontario. **Dr. Rich Moccia**, **Dr. Ian Barker** and graduate student, **Adam Yule**, from the University at Guelph, presented their findings on interspecies toxicity of Type E botulism in fish. This research demonstrated that fish such as round gobies, walleye, yellow perch and rainbow trout show different sensitivities to the botulism toxin. Not only was there a difference in mortality for different species of fish, some species like the round goby seemed to show pigment changes and others like trout showed marked behavioral changes. These changes in behaviors, such as erratic swimming or “breaching” (where the fish swims head-first upwards in water), may actually help to “lure” bird predators to the affected fish. This may increase the likelihood for fish-eating birds to prey on fish that contain the toxin, resulting in illness or death for birds like loons and mergansers.

Results of the workshop evaluation indicated that 98% of the participants will share the information and data from this workshop with others. Participants have shared information from previous workshops with colleagues, students, administrators, general public, media, sportfishing groups and the Commissioners from the International Joint Commission. **Helen Domske**, Senior Extension Specialist for NYSG,

has herself made several presentations on the botulism outbreaks to angling and environmental groups, such as the Audubon Society.

When asked if they plan to take some action as a result of the information learned at this year’s workshop, nearly all of the participants indicated that they would. These actions ranged from initiating research projects, working on bird or fish surveys, making observations, collecting samples, and writing articles, to making oral and written briefings for agency colleagues.

Conference organizers were pleased by the positive responses concerning interest in the continuation of annual workshops. Participants overwhelmingly indicated that there is a need to keep the flow of information and data ongoing. Along those lines, proceedings are being developed from the workshop and that information will be placed on the NYSG web page.

— **Helen Domske**



**Rod Getchell of Cornell University and Katherine Alben of the University at Albany at the botulism workshop. Each has begun newly-funded NYSG botulism research projects (see sidebar).**

## NY Sea Grant’s Commitment to Botulism Research

Two new projects that began this spring further NYSG’s involvement in Great Lakes botulism research. Cornell University researchers Paul Bowser and Rod Getchell are looking at food web relationships involved with the spread of botulinum toxin. Field observations suggest that quagga mussels and maybe other benthic organisms may become infected by the presence of vegetative cells of type E Clostridium botulinum bacteria in the sediment immediately beneath or within the mussel beds. Fish species that feed on infected mussels—round gobies and drum— then contribute to the movement of type E toxin up the food chain to fish-eating birds. Bowser and Getchell plan to document the role of organisms at different trophic levels in the movement of the toxin through the food chain.

University at Albany’s Katherine Alben and SUNY Fredonia’s Alicia Perez-Fuentetaja are working on another aspect of the food chain transfer of botulism toxin. They seek to determine the dietary pathways leading to type E botulism in fish and birds using the presence of algal carotenoids in tissues of food organisms as tracers. The use of carotenoids would provide an abundant, easy-to-work with tracer that could provide information on the trophic pathways that the botulism toxin follows in the food chain. Results from both projects will provide information on an important dimension relating to the botulism die-offs of birds and fish in the Great Lakes

— **Lane Smith**