

## Botulism Primer

Avian botulism is a disease caused by *Clostridium botulinum*. Type C botulism has caused the die-off of thousands of waterfowl across the western United States. Type E botulism has been somewhat restricted to fish-eating birds in the Great Lakes. The neurotoxins produced by the bacteria cause effected birds to show signs of weakness, dizziness, inability to fly, muscular paralysis, and respiratory distress. Some infected birds drown. Great Lakes species most affected by the disease include loons, grebes, and gulls. Type E botulism has also been documented in recent mortalities in Lake Erie fishes, including alewives and round gobies.

Human botulism is typically caused by eating improperly canned or stored foods and normally involves type A or B botulism toxin. The toxin in food is killed by cooking and smoking fish and waterfowl at temperatures high enough to destroy the toxin produced by the botulism bacteria.

Anyone finding a diseased or dead fish or bird should call a fish or wildlife management agency. For more information, see: [www.seagrantsunysb.edu/botulism](http://www.seagrantsunysb.edu/botulism)

Photo by David Jude



NYSDEC's Ward Stone believes the round goby plays a key role in the transfer of botulism.

# Botulism Workshop Sets Research Agenda for 2002-03

*Disease-Fish-Bird Connections, Lake Levels, Water Temperatures*

## Why have increasing numbers of birds and fish been dying along Lake Erie?

More than 100 interested people gathered to discuss that question at the second Botulism in Lake Erie/ Binational Workshop, held in Buffalo in February. The workshop, was sponsored by New York State Assemblyman Richard Smith, New York Sea Grant, Pennsylvania Sea Grant, Ohio Sea Grant and the Great Lakes Program at the University of Buffalo. The focus of the workshop was twofold: 1) to present an historical perspective on the birds and fish known to have died from Type E botulism along Lake Erie's American and Canadian shores since 1998, and 2) to develop a research agenda to answer the lingering question of why these deaths are occurring and the implications related to broad ecological and human health issues.

"We must move quickly to determine and pinpoint the problem," **Assemblyman Smith** said. "Sea Grant with its federal network that crosses state lines can pull all the information together and use sound scientific data to inform the general public. Lake Erie is a sparkling jewel and a regional asset with sports fishing opportunities that are the greatest in the world. The lake must be constantly monitored for future generations so they can enjoy the benefits of fresh and clean water."

"New York Sea Grant is pleased to play an instrumental role with Pennsylvania Sea Grant in bringing together the stakeholders interested in how botulism affects the Great Lakes system," said New York Sea Grant Director **Jack Mattice**.

Photo by Dale Baker



**Eric Obert, Pennsylvania Sea Grant and Helen Domske, NY Sea Grant organized the Botulism Workshop.**

"The work we have done with the brown tide, lobster and hard clam research projects establishes a model for researchers to follow in dealing with botulism."

With funding support from Congressional and state legislators, brown tide, lobster and hard clam projects are helping to uncover the science behind the water-based ecological changes affecting New York State's seafood industry.

The botulism research agenda established for 2002-2003 at the Buffalo workshop includes investigating:

- 1) the links between round gobies and quagga mussels and botulism-infected fish,
- 2) how low water levels and warmer lake temperatures affect the activation and transfer of botulism, and
- 3) how botulism relates to broader ecological and human health concerns.

To develop an agenda for the research needed to identify the source of and possible corrective strategies for dealing with botulism outbreaks, highly-respected scientists and researchers from the U.S. and Canada presented

data on the recent outbreaks of botulism along Lake Erie. According to NYSDEC bird mortality survey in 2000, the predicted mortality of merganser ducks was close to 2,500 while a Canadian Wildlife Service report of 1999 estimated 5,400 merganser deaths along the Canadian shore. To a lesser degree several other species of birds have been affected including loons, grebes, ducks, and gulls. Multiple fish species and mudpuppies (aquatic salamanders) have also died of the disease.

Researchers considering the historical connections to the disease are looking at data on a mid-1980s outbreak of botulism in Lake Michigan. That outbreak appears to have been an isolated incident. Ohio agencies are just beginning to see evidence of botulism-related bird and fish deaths along Ohio's stretch of Lake Erie.

Areas of study that Lake Erie researchers would like to pursue include how anaerobic conditions, lake levels, and water temperatures affect the development of botulism and what role is played by the exotic species introduced to the lakes through the ballast of commercial freighters.

**Ward Stone**, NYSDEC's senior wildlife pathologist, told conference attendees at the February Sea Grant conference that he has identified the type E botulism bacteria in several species of dead birds, including a bald eagle, collected along Lake Erie. He believes

the round goby, an exotic species of fish often consumed by several species of birds, plays a key role in the transfer of the disease. Although type E botulism has not been identified as a problem in Lake Ontario, Stone will be examining several dead lake sturgeon found along that Great Lakes' shoreline.

Among those attending the botulism conference were representatives of New York, Pennsylvania, and Ohio Sea Grants, the NYSDEC, the Pennsylvania Game Commission, the PA Fish and Boat Commission, the National Water Research Institute, Environment Canada and Health Canada. Private stakeholders represented fishing, sports and conservation organizations, including the New York Walleye Association, the Niagara River Musky Association, and the Erie County Federation of Sportsmens Clubs.

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Prepared from material supplied by  
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Photos by Ellen George

**NYS Assemblyman Richard Smith** (front row, far right) helped sponsor the well attended Botulism Workshop.



**Dr. Rod Getchell** of Cornell University at podium.



**Gordon Fraser, Director of the Great Lakes Center, Buffalo State College and Dale Baker, Program Leader and Associate Director of New York Sea Grant.**

## Cutting Edge Research Begins

**Drs. Paul Bowser and Rod Getchell** with the Department of Microbiology and Immunology at the College of Veterinary Medicine at Cornell University are working on a New York Sea Grant-funded research project to study the prevalence of the botulism bacteria, *Clostridium botulinum*, in fish in the lower Great Lakes.

The primary objective of the project is to determine the level and extent of *C. botulinum*, in healthy, moribund, and dead fish in areas of confirmed botulism outbreaks and in unaffected areas in Lake Erie and Lake Ontario. Answers will be sought to the questions:

- Are bacteria more likely to be present in healthy, moribund or dead fish?
- Is one species of fish more likely to carry the bacteria?
- Does the toxin form in fish prior to or after death?
- Are fish carrying the bacteria associated with waterfowl death events?

The researchers are working with the New York State Department of Environmental Conservation to collect fish, primarily carp and round gobies, for examination from both lakes. Tests will assess the cause of death as well as other pathogens present in the fish. Sampling will also take place during active outbreaks of botulism in waterfowl. Gene-testing diagnostics will be used to test fish with positive samples sent to the Veterinary Diagnostic Laboratory at the University of Pennsylvania's New Bolton Center for additional testing. (See also page 5, column 2.)