

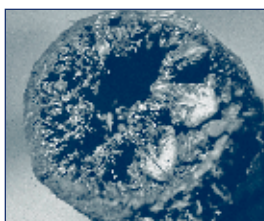
TWINE LINE

2005 WINTER EDITION VOL. 27 / NO. 1

If You Can't Take *the heat*

Research Examines Heat Tolerance in Zebra Mussels

by Jill Jentes Banicki,
Ohio Sea Grant Communications



Since the first ballast water was exchanged in Lake Erie and zebra mussels were released, zebra mussels have impacted their surroundings. From clogging intake pipes to unlocking contaminants from lake sediments, zebra mussels have aggressively dominated species and rapidly changed the dynamics of ecosystems. But as zebra mussels continue to create problems in the Great Lakes, research continues to investigate ways to control them. Could high levels of heat control their numbers? Maybe. The first step to knowing how to control them, however, is by determining what factors make them so dominant in the first place. Those answers, says Miami University's Dr. Curt Elderkin, may lie in their genes.

Over the past five years, Elderkin, along with Drs. James Stoeckel, Paul Klerks, and David Berg have investigated whether a zebra mussel's ability to adapt to high temperature environments may be hereditary. "Zebra mussels have a substantial amount of genetic diversity which could contribute to their rapid spread throughout North America," states Elderkin. The more genetic factors upon which natural selection can act, the higher probability the species can adapt and survive in a new environment.

But to determine whether heat tolerance is a result of "survival of the fittest," the trait must be in zebra mussels' genes, points out Elderkin. The researchers used a full-sib half-sib experimental design that would eliminate variation due to the environment and maternal effects. "By taking out the environmental and maternal factors, we can solely focus on whether a trait (such as heat tolerance) is passed on from one generation to another," says Elderkin. They examined full-sib families, half-sib families (different mother, same father), and their offspring, exposing each to lethal temperatures in order

to determine an individual time-to-death.

What the researchers found surprised them. "We had previously tested a small sample of zebra mussel adults and found there was a genetic component to heat tolerance," explains Elderkin. "This made sense considering how diverse zebra mussels are." Testing a larger population of zebra mussel veligers (larvae), however, they discovered that the heritability of heat tolerance among veligers was extremely low. "Our research found zebra mussels couldn't pass heat tolerance onto their offspring," says Elderkin.

Although their research suggests that heat tolerance may not be genetically determined, Elderkin's previous results using mussels from warmer climates indicated otherwise. "We realized that there was a drastic genetic change in mussels (along the Mississippi River from Minnesota to Baton Rouge) at one particular gene we sampled," states Elderkin. That change correlated to an as-much-as five-degree (Celsius) temperature difference between the zebra mussels living in the North (Great Lakes region) compared to those colonizing in the southern region. "Zebra mussels in the South could withstand higher heat temperatures than those in the North," explains Elderkin.

What could this difference mean? The results of the veliger-heritability study seem to contradict the evidence collected using southern zebra mussel populations. Zebra mussels in the southern regions are either using a heritable genetic component to heat tolerance or they simply adjust with long-term exposure to higher temperatures. "The longer they live, the more tolerant they become to high temperatures," says Elderkin. But to answer any of these questions, more work will be needed. "If using high heat could be a means to control zebra mussels, we needed to first know if zebra mussels could just genetically adjust to it," concludes Elderkin. "Our research, at least for now, indicates that they can't." TL

For more information about this Sea Grant funded research, contact Dr. Elderkin at elderkl@muohio.edu.



INSIDE TWINE LINE

The educational newsletter of Ohio Sea Grant, covering issues, events, and research related to Lake Erie and the Great Lakes

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FOR YOUR INFORMATION

2005 WINTER EDITION

VOL. 27/NO. 1

December Water Levels

Lake Erie's level was stable during December. The mean level was 570.93 feet, which is unchanged from last month's mean level and .10 feet above normal. The December 2004 level was .39 feet higher than the December 2003 level and 1.73 feet above the Low Water Datum elevation reference system.

Kim Awarded John A. Knauss Marine Policy Fellowship

Ohio State University's Gene Kim has been selected as a John A. Knauss Marine Policy Fellow for 2005. A Ph.D candidate in Aquatic Ecotoxicology, Kim will work for the U.S. House of Representatives Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife, and Oceans starting February 1, 2005.



The fellowship, sponsored by the National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant College Program, matches highly qualified graduate students with "hosts" in the legislative branch, executive branch, or appropriate associations/institutions in the Washington, D.C. area for a one-year paid fellowship. Kim is the 17th fellowship winner from the Ohio Sea Grant College Program.

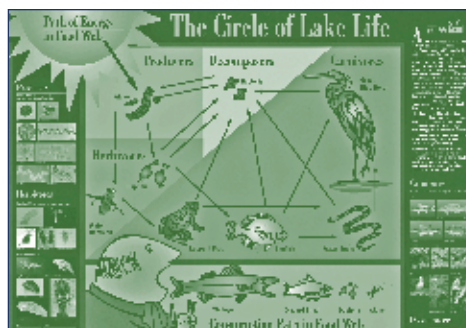
Pledge to Become a Clean Boater On Line

Boaters who want to become an Ohio Clean Boater can now "sign" their pledge on line at www.ohio-cleanboater.osu.edu. With this new feature on the site, boaters can fill out the pledge information on line and receive an Ohio Clean Boater decal for their boat in the mail. Since the program's start in September, over 300 boaters have pledged to become Clean Boaters. For more information about the Ohio Clean Boater Program, contact Leroy Hushak at hushak.1@osu.edu or 614.292.3548.

New Lake Erie Education Poster Series

Ohio Sea Grant College Program has produced a new series of two-sided, full-color educational Lake Erie posters for Great Lakes teachers. The Circle of Lake Life poster outlines the basic concept of the lake food web and the organisms involved. The Lake Erie Dead Zone poster defines lake eutrophication and its causes. Lake Erie Fish explains the three classes of fish and bony fish characteristics, and provides illustrations of the interior and exterior anatomy of the bony fish. Lake Erie's Sport Fish Community can be used as a supplement to Lake Erie Fish to show students all sport fish of Lake Erie. Teachers can download pdf handouts of the fish anatomy diagrams at www.sg.ohio-state.edu/osgrant/education/.

The Circle of Lake Life, Lake Erie Fish, and Lake Erie's Sport Fish Community posters are used for Grades K-12. The Lake Erie Dead Zone poster is for Grades 9-12. All posters address specific grade-level indicators of the Ohio Academic Content Standards for Life Sciences. Double-sided for easy transporting, these posters are free to all with a \$5.00 shipping cost (per set of four posters). To request a set, see publication insert or contact Nancy Cruickshank at cruickshank.3@osu.edu or 614.292.8949. Check or money order please. Supplies are limited.



Twine Line (ISSN 1064-6418) is published four times a year by the Ohio Sea Grant College Program at The Ohio State University, 1314 Kinnear Rd., Columbus, OH 43212-1194. Subscription price is \$10.00 per year (four issues). The opinions expressed are those of the authors only. Please contact the office to obtain permission before reprinting articles or graphics. Ohio Sea Grant is a statewide program that supports greater knowledge and stewardship of Lake Erie and the Great Lakes. It is part of the NOAA Sea Grant College Program (NOAA grant NA16RG2252, project M/P-2), which includes 32 state programs. Support of Ohio Sea Grant is provided by National Sea Grant, the State of Ohio, The Ohio State University, Ohio State University Extension, and participating universities, agencies, and businesses.

TWINELINE

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Some ask **Why?** **OTHERS** *Why* **NOT** ■

by Robin Taylor, Ohio Sea Grant Communications

Eurasian watermilfoil (*Myriophyllum spicatum*) is a submersed plant that is highly invasive, having spread throughout all of North America's temperate zone since its introduction only 60 years ago. So when Eurasian watermilfoil was first documented in Old Woman Creek National Estuarine Research Reserve (OWC) on the eastern edge of Lake Erie's western basin in 1992, researchers and wetland managers took a deep breath...and are still holding it. Despite its notorious invasiveness, the growth of Eurasian watermilfoil in OWC has so far been—zero. It has reappeared many times only to disappear. So report Dr. Robert Whyte of Antioch College and Dr. David Francko of Miami University, who documented the plant's 1992 appearance. Since then, the researchers have systematically sampled the aquatic vegetation from the OWC, time and again rediscovering the plant growing in various sites—one in 1993, 21 in 1995, and two in 1996. Yet time and again the invader has apparently not taken hold. As suits scientific investigation, most researchers ask *why?* But in some cases, researchers can't resist asking *why not?* although such a question is impossible to answer. There may be any number of reasons to explain why something *doesn't* happen, and even finding one reason may not explain them all or even the most important ones.

The *why* of Eurasian watermilfoil's invasiveness is understood from observations of its invasion across the country: it grows quickly, it outcompetes other submersed plant species like itself, and it can grow from stem fragments, which are easily dispersed. Whyte and Francko can only speculate regarding the present *why not* of OWC's invasion, despite the many sites where Eurasian watermilfoil has taken root (only to disappear in subsequent years). The researchers suggest four qualities of OWC that

might have contributed, so far, to protecting it from invasion, not to suggest that future invasion isn't possible.

One quality is that the plant might be susceptible to Lake Erie's freezing temperatures, which the plant experiences during natural winter drawdown of the already shallow (less-than-one-meter) estuary. In that same vein, plants and their root crowns near the shore may be sheared off by ice movement.

Second is that although Eurasian watermilfoil appears to find safe harbor and has taken root in the quiet waters created by stands of American water lotus (*Nelumbo lutea*), the researchers

have also reported that American water lotus may produce an allelopathic agent, a chemical that organisms can produce in different forms to kill or stunt their rivals. In this particular case, the agent would be a sort of natural herbicide to reduce rivals that compete for resources, such as space, nutrients, or light.

Third, Whyte and Francko suggest that OWC's turbidity might hinder Eurasian watermilfoil's growth. The estuary is shallow and its sediments are primarily silts and clays, which are easily stirred. The resulting turbidity is such that limited light, the researchers say, may play an important role not only

WATERMILFOIL PG. 5 ►



Gene Wright



2004 Program Summary

Jeffrey M. Reutter, Ph.D., Director

Ohio Sea Grant and
Stone Laboratory



The past year has been productive for Ohio Sea Grant and Stone Laboratory. We were successful in supporting almost 100 students with scholarships, internships, fellowships, and jobs. Our research is helping us understand the causes of the dead zone in Lake Erie; reduce the cost to clean up contaminated sediment; create vaccines for diseases in fish; develop low-cost processes to treat agricultural runoff using wetlands; and much more (see the results of all of our research projects on our web site at www.sg.ohio-state.edu). We have continued to partner with agencies to increase Lake Erie tourism; have created Clean Marinas and Clean Boater Programs for Ohio; and brought in over \$8 million of economic development into the Cleveland area with over 70 jobs. The following is a list of accomplishments for the program in 2004.

Enrollment at Stone Laboratory

- During the summer of 2004, a total of 154 students from 15 colleges and universities and 45 high schools took college courses at Stone Laboratory. Since 2000, students from 48 colleges and universities and 140 high schools have taken courses at the Lab.
- With the Friends of Stone Laboratory (FOSL), Sea Grant awarded 36 student scholarships totaling \$14,254 in 2004. Included in this total are six scholarships awarded by FOSL to outstanding high school students at State Science Day sponsored by the Ohio Academy of Science.



Outreach at Stone Laboratory

- Stone Lab's Science Workshop and Conference Programs attracted 145 groups and 5,379 participants from grades four through adults in 2004.

Supporting Diversity

- The Young Scholars Program and Columbus Public Schools' I Know I Can Program are designed to sup-



port participation of minority and low income students in college. Nine high school students from the Young Scholars Program and three from the I Know I Can Program enrolled in Stone Lab classes in 2004.

Research

- During 2004, 19 investigators and 47 students and technicians from 12 agencies and institutions worked on 19 projects at Stone Laboratory.
- Ohio Sea Grant supported 35 large, competitively funded projects, including 14 new projects. Sea Grant also supported 23 development fund projects, including 14 new projects. Researchers came from 10 universities.
- Sea Grant scientists produced 92 publications, made 115 scientific presentations, and supported 51 students on their projects.

Communications

- Ohio Sea Grant Communications received two national Communications awards for the 2004 Stone Lab Promotional Campaign and *Twine Line's* eight-part research series.
- Sea Grant's web site had over 1.1 million hits from over 60,000 individual visitors in 2004.

- Communications launched the new Stone Lab web site in late 2004. New additions include easier navigation, database-driven news and event calendar, a program photo gallery, electronic fundraising capability (with OSU e-giving services), and quicker application downloads.
- Communications partnered with Ohio's Division of Travel & Tourism to publicize the Stone Laboratory Science Workshop Program as an Ohio tourism destination.
- Communications produced 72 different publications during 2003-04 that were distributed to over 125,000 people.

Creation of New Endowments

- Shirley Bowser issued a 2-for-1 challenge for the Dunlap Education, Outreach and Development Fund. In 2004, FOSL members were successful in raising the \$25,000 maximum for her challenge (including a \$10,000 gift from the Leigh Perkins Charitable Lead Trust) to which she matched another \$50,000.
- A \$25,000 scholarship endowment from Sally and Jackson Smith was also completed and approved in 2004.

Knauss Fellowships

- Felix Martinez, a Ph.D. candidate in The Ohio State University Department of Evolution, Ecology, and Organismal Biology (EEOB), began his Knauss Fellowship year in Washington in February 2003. LeAnn Southward, having just completed her M.S. degree in the same department, was selected as a fellow beginning in February 2004 and worked in the U.S. State Department. Gene Kim, who is completing a Ph.D. in EEOB, began his fellowship year in February 2005 in the Science Committee of the U.S. House of Representatives.

Outreach

- We were fortunate to receive a Fisheries Extension grant in a national competition held by the NOAA Sea Grant College Program. This award allowed us to hire Kelly Riesen as our newest extension person. As our Fisheries Extension Coordinator, Kelly is housed within the Lake Erie Nature and Science Center in Bay Village.

New Programs

- Ohio Sea Grant along with Lake Erie Marine Trades Association and Ohio Department of Natural Resources launched the Ohio Clean Marinas and Clean Boater Programs in September 2004. There are currently 15 Ohio marinas and over 300 Ohio boaters who have taken the Clean Marinas and Boater Pledges.

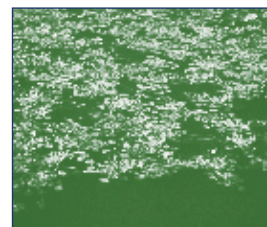
Clearly our biggest concern is state funding. Although private donations to the programs have been significant, they have not offset losses in funding from the State of Ohio—we must work harder. Our state line item has fallen steadily from a high of \$301,475 in 1998 to the proposed level of \$231,925 in 2006 and 2007. Simply to have kept up with inflation we would need an annual budget of \$395,000. We have been able to generate over \$50 of economic benefit per state dollar invested in the program, and we are a matching program that gets \$2 from the U.S. government for every state dollar invested in the program. This program, Lake Erie, and our science education activities are good investments for the State of Ohio. Unfortunately, our private sector donations have not been able to keep up with these losses. **TL**

► WATERMILFOIL from PG. 3

in limiting the growth of Eurasian watermilfoil but also that of other plants.

Fourth, the estuary is protected from Lake Erie to its north by a barrier beach. This last form of protection makes sense when you know that Whyte and Francko's vegetation surveys so far show Eurasian watermilfoil entering the estuary only from the North, by way of Lake Erie waves that carry the plant and plant fragments. Still, this barrier is often open to lake waters, allowing plants and fragments to flow in. It may, in fact, even help direct the flow of the plants into the estuary. That these plants have yet to establish and create new populations indicates that, more than the barrier beach, some other quality of the estuary seems to protect it.

To suggest that OWC may somehow now be protected from Eurasian watermilfoil is in no way to imply that it is out of harm's way. In fact, the estuary's resistance to invasion may be a simple



matter of numbers—not enough plants and plant fragments have yet been introduced in the estuary at one time to establish a stable population. Little can be known about the evolution of an invasion, such as how many times or in what critical numbers invasive species must be exposed to a new environment to take hold. That's because we usually aren't aware of an invasion until the invasive species shows itself, often in explosive numbers. Or, in the very rare case of OWC, we encounter an invader when it makes first contact because the area is already being so carefully monitored and surveyed for what is already there, in a healthy state. This is what makes the continued surveillance of OWC so valuable—researchers may be observing the introduction of an invasive species at its very beginnings. They may be observing the many false starts that invasive species undergo before they are able to establish new populations. Eurasian watermilfoil may continue to fizzle in OWC. It may, on the other hand, one season take hold and explode, and unless someone's there to see it, we'll have a much harder time understanding why. **TL**

For more information about this Ohio Sea Grant funded research, contact Dr. Whyte at rswwhyte@antioch-college.edu or Dr. Francko at franckda@muohio.edu.

Whyte, Robert S. and David A. Francko. 2001. Dynamics of a pioneer population of eurasian watermilfoil (*Myriophyllum spicatum* L.) in a shallow Lake Erie wetland, *Journal of Aquatic Plant Management*. 39: 136-139.

From OHSU-RS-270. This work has been supported in part by grants R/ER-32 and R/ER-46 from the Ohio Sea Grant Program.

Teaching the Nature of Science

by Kelly Riesen, Ohio Sea Grant Extension



As Ohio Sea Grant's new Fisheries Extension Coordinator, I would like to tell you a little about the Lake Erie Nature and Science Center (LENSC), where I work. Ohio Sea Grant has collaborated with LENSNC in the past to hold educational seminars and meetings. With the event of my hire as Fisheries Extension Coordinator, Ohio Sea Grant and the Lake Erie Nature and Science Center have committed to becoming long-term partners in educating the public about Lake Erie and its fisheries.

When I was hired in July, I had only been to LENSNC one or two times. Aesthetically, the nature center has a fantastic set-up: 22,500 square feet of science-based learning space. There are live animal exhibits ranging from native animals, such as the white-tailed deer in the outdoor wildlife gardens, to the exotic ocean reef fish in the indoor aquarium exhibits. The nature center also boasts one of only two planetariums in Ohio and the only wildlife rehabilitation unit in Cuyahoga County. Those are only the things that are visible while strolling around LENSNC.

Dig a little deeper and you will find that this nature center and its employees are dedicated to developing understanding and appreciation for the relationships between people and nature through quality experiences and educational programming. The center has amazing education and outreach programs. There are programs for preschool children, children in grades K-12, adults, teachers, boy and girl scouts, families, and more. However, even though the nature center has the name "Lake Erie" in its title, there was no resident Lake Erie expert at LENSNC. There was also not much in-depth programming regarding fishing and Lake Erie ecology. That is where Ohio Sea Grant and the Fisheries Extension Coordinator come in.

Because Lake Erie and its fisheries are extremely valuable resources for all Ohioans, an Ohio Sea Grant proposal received federal funding to hire a Fisheries Extension Program Coordinator. The position title is a mouthful, but the purpose for which I was hired is straightforward: the fisheries extension coordinator is to collaborate with local, state, and

federal agencies and other organizations to develop and deliver educational and technical information about Lake Erie and fishing to the public. Not only will I be delivering programs at LENSNC, I will also create programming for all of Ohio's coastal counties.

Currently there are several programs that are being scheduled for winter and spring at LENSNC. A women's steelhead fishing clinic is scheduled for February 18 and 19. In this program, women can expect to learn basic fishing techniques for both spin fishing and fly fishing for steelhead trout in northeast Ohio. It has been my experience that certain groups are not targeted very well for education or training in areas such as camping, hunting, and fishing. It can be very intimidating for a woman to go out and try to learn these skills when the fields are mostly dominated by men. These fishing programs should encourage more participation by women by providing an un-intimidating atmosphere in which to learn.

Youth programming is also of critical importance to my duties as fisheries extension coordinator. A Lake Erie aquatic science program for ages 14-16 is scheduled for May 21. In this half-day program, students will get hands-on experience in biological sampling techniques for lakes and aquatic ecosystems. We will spend time in the classroom, but the majority of the learning will be done while we seine for fish, and collect aquatic macroinvertebrates and plankton samples. In addition to aquatic science learning, there will be basic fishing programs for families and young children this summer. In today's world, families often don't spend enough time together. These programs are meant to start family traditions of fishing and fun outdoor activities.

The programs mentioned above are all to be held at LENSNC. Currently, there are plans underway to branch out educational programming to all of Lake Erie's coastal counties. **TL**

If you would like to plan a visit to the Lake Erie Nature and Science Center, please call 440.871.2900. If you have questions or suggestions for Kelly Riesen, please contact her at 440.808.5627 or riesen.4@osu.edu.





Habitattitude™

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PIJAC • U.S. FISH & WILDLIFE SERVICE • SEA GRANT

New National Program to Prevent Spread of Aquatic Invasive Species

A new program launched in September wants you to think twice before dropping little Oscar the Goldfish into your local stream. Led by NOAA's Sea Grant Program, the U.S. Fish and Wildlife Service, and the Pet Industry Joint Advisory Council, Habitattitude™ is a new national public education program that encourages aquarium owners and water gardeners to help avoid introductions of non-native aquatic plant and fish by adopting preventative measures.

"While most invasive species come into the country as hitchhikers through commercial trade, some aquarium owners and water gardeners have unknowingly complicated the challenge invasive species pose for conserving America's wildlife and landscapes," said U.S. Fish and Wildlife Service Director Steve Williams. "Habitattitude™ will give them the knowledge they need to help them prevent invasive species introductions and conserve the natural world they appreciate so much."

Initiated as a cooperative effort among the pet and water garden industries, academia, and the government, the program specifically promotes aquarium owners and water gardeners to follow simple measures when faced with an unwanted aquatic plant or fish.

For more information about the program, contact Frank Lichtkoppler at 440.350.2267 or Lichtkoppler.1@osu.edu.

The program asks that you:

- Contact a retailer for proper handling advice or for possible returns.
- Give/trade with another aquarist, pond owner or water gardener.
- Donate to a local aquarium society, school, or aquatic business.
- Seal aquatic plants in plastic bags and dispose of in the trash.
- Contact a veterinarian or pet retailer for guidance on humane disposal of animals.

A new web site, www.habitattitude.net, will also help consumers to learn more about responsible behaviors and how to prevent the spread of potential aquatic nuisance species. The site includes information on federal and state laws and statutes that regulate aquatic organisms, recommended alternatives to releasing plants and animals, instructions on how individuals and clubs can get involved, and detailed information on some of the more problematic aquarium and water garden species that have created problems with our native aquatic systems. "This program doesn't just point out a problem, but offers positive actions that anyone can do to help become part of the solution," emphasized Frank Lichtkoppler, Habitattitude™ program team member and Extension Specialist, Ohio Sea Grant. TL

LEWS just LOVE Gobies!

by Kristin Stanford, Stone Laboratory



It may not be news that the round goby (*Neogobius melanostomus*) is an abundant and destructive invasive species that has spread through the western basin of Lake Erie. However, did you know that our federally threatened and state endangered LEWS or Lake Erie water snake (*Nerodia sipedon insularum*) has taken advantage of the prevalence of these troublesome little fish and is consuming them at surprisingly high levels? In fact, snakes are eating so many goby, that goby now constitute the majority of the snake's diet!

Water snakes haven't always had the goby to gorge on. Historically, water snakes have fed on native

fishes (e.g., catfishes, logperch (*Percina caprodes*), and spottail shiner (*Notropis hudsonius*)) and amphibians (e.g., mudpuppy (*Necturus maculosus*)) (Fig.1). Round goby first appeared in diet samples of the snakes soon after the goby's invasion in 1995 and has between 1996 and 1998 constituted about 24 percent of the samples recovered by Dr. Richard King of Northern Illinois University and his graduate students. More recently, a new examination in 2003 and 2004 showed that round goby now constitute 92 percent of the

snake's diet. Additionally, native fish consumption by water snakes was reduced to less than 2 percent of the prey samples recovered. Interestingly, this diet shift has occurred in less than two water snake generations (less than 6 years) and is seen in all size classes of snakes, from juveniles to adults.

Often, introduced species such as the round goby have negative impacts on the native species and communities that they invade (see Sept/Oct 2000 issue of *Twine Line*). Surprisingly, however, the recent shift in diet from native fishes to round goby by the water snakes seems to be having beneficial effects for snake populations. Since the shift, water snakes have been able to grow faster and attain larger body sizes. By growing faster, water snakes can outgrow potential predators (e.g., shorebirds) more rapidly, reach sexual maturity faster, and produce larger litters of offspring. Since these factors can also positively effect important population regulating mechanisms (e.g., survival and reproduction), the invasive round goby may be indirectly contributing to the recovery of this federally listed species. Researchers believe this is one of the very few cases where a harmful and usually devastating invasive is resulting in positive effects for a native and threatened species. **TL**

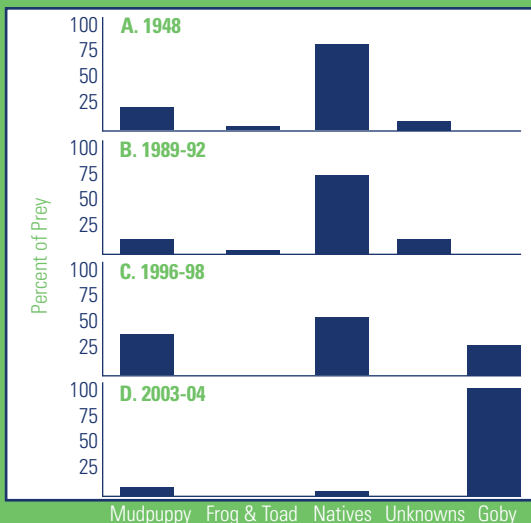


Figure 1. Frequency histograms showing change in Lake Erie water snake diet composition before (A, B) and after (C, D) the round goby invasion. Data in A are based on an unspecified number of prey recovered from 23 individual snakes collected on Pelee Island (Hamilton 1951). Data in B, C, and D are based on 45, 46, and 322 prey recovered from 31, 45, and 299 individual snakes, respectively. Histograms represent percent by number of snakes (A) or by number of prey (B, C, D).

Research at Stone Lab

by Matt Thomas, Stone Laboratory

I am often asked to speak about the research activity that goes on every year at Stone Laboratory. Our research program is a growing and successful part of Stone Lab's education, outreach, and research philosophy.

Depending on your background, you might think of research at Stone Laboratory as taking place inside the "Research Building" on South Bass Island and nowhere else. Scientists in white lab coats and walls of aquaria filled with hundreds of exotic fish might come to mind. While this is true for some projects, most of them take place far away from Gibraltar Island. Established scientists and graduate students alike take full advantage of our location in the western basin of Lake Erie to get the hands-on or a "hands-wet" experience.

In the 1920s, Julius Stone had the foresight to realize that the best way to study Lake Erie was to have a base for study right in the middle of the Lake. Gibraltar Island was a great place to start. Purchased in 1925, Ohio State was able to expand its "North-Coast Campus" from South Bass Island to include the 6.5-acre island and all of its buildings, including the Jay Cooke Mansion. The island, nestled next to Peach Point and protected from storms, is within just a few hundred feet from some of the deepest waters in the western basin as well as being near unique wetlands and Ohio's last surviving alvar habitat (vegetatively sparse, naturally open areas of thin soil overlying flat limestone or dolostone. This concentration of so many differing habitats just begs for scientific study. In some

respects, this brings a wider and more interesting group of researchers together.

The past year was one of Stone Lab's busiest on recent record with 14 major projects and over 30 technicians and student research assistants. The year was also a year of changes. This marked the first full field season for our newest research vessel, the *Erie Monitor*. This 25-foot, all-aluminum dive boat was designed and constructed with funds appropriated from Senator Michael DeWine's office. It has proven to be just the right size for over half of last season's research projects. It is ideal for projects that need to span large distances or sample in shallow areas of the lake. For example, Stone Lab's monitoring of the dead zone phenomenon requires scientists to travel large distances over the water in the same day. This faster boat enables them to dive at six stations spanning over 30 miles. It also provides a means of quick transport from island to island.

With the increase in water clarity through the 1990s, much of our research is able to take place underwater. The use of scuba diving as a research tool has been increasing since the costs for equipment and the availability of training has become more attainable. Divers can now record what they see either on a dive slate or with a camera. In previous years, all of the 1970s for example, seeing through the water in some places would have been impossible. Stone Lab now averages 300 research dives per season. These dives mainly take place near the islands but extend all the way to the shores of Avon Point. Diving

has been used as a research tool at Stone Laboratory since the technology became available.



This photo shows surface supplied diving off the Gibraltar docks, circa 1949.

The guidance and hard work of the Friends of Stone Laboratory further contributes to the Lab's success. The Friends still receive support from the Stone family. An impressive research endowment was set up in honor of Kate Stone in 2002. It is still in the early stages and has only begun to be utilized. With several other existing research endowments, it generates \$30,000 per year for the support of research activity. Among other things, this has also allowed us to host a visiting scientist for up to two weeks. William Edwards, currently teaching at Niagara University, was the first recipient of this "mini-sabbatical."

Research topics addressed at Stone Lab are diverse, covering all aspects of Lake Erie and its watershed. From insect populations to sediment transport, it's a growing and valuable part of the whole Stone Lab experience. **TL**

FRIENDS OF STONE LABORATORY

Dear friends,

I have always believed that when one door or window shuts, another one opens. Ten years ago the door of my daughter's life closed, but a window of opportunity opened. My daughter Kelly had studied at Stone Lab and loved her experience with the program. It was a high point of her life. At that time, the decision to start a scholarship in her name at Stone Lab was an easy and meaningful one to us. Over the past ten years, our contributions to her scholarship have been matched by generous donations from the Friends of Stone Lab. In 2004 the scholarship became an endowment. This lasting tribute to our daughter will live on well into the future. My thanks go out to all of the FOSL members and especially to the past FOSL Presidents and Board members who felt Kelly's scholarship was a worthy project to undertake. The benefit of this accomplishment will affect many young enthusiastic lives that care about the Great Lakes and the ecosystem surrounding them.

Last year in recognition of the efforts of FOSL, my husband and I challenged other donors, like ourselves, to help FOSL in their quest to raise \$25,000 for the Dunlap Foundation matching fund campaign. Our latest donation was put toward the Dunlap Fund and I had asked for your support in doing the same. Every dollar donated to the Dunlap endowment fund before the end of June 2005 was matched 2 for 1! I am proud to report that your generous donations have realized our goal early. Congratulations on a job well done.

All of our donors are valued and appreciated. Every contribution to FOSL is used directly for equipment, education, and outreach. Sometimes it is difficult to see the results of all the good your donations do, but be assured Stone Laboratory is one program that spends your dollars wisely.

Sincerely,

Charlene Prochazka
FOSL President

cpro@eriecoast.com

New Stone Lab Web Site

Ohio Sea Grant has launched its new Stone Lab web site to start the new Summer College Program campaign, incorporating new, youthful graphic elements for the current Stone Lab promotional campaign. Besides easier navigation, new features include database-driven news and event calendar, a program photo gallery, electronic fundraising capability, and quicker downloads. Potential Stone Lab students can download applications more quickly and icons better direct students to syllabi, course calendars, and FOSL activities. Donors can now financially support Stone Lab programs through a new web site link with Ohio State's Office of Development. The site allows donors to electronically direct contributions to their choice of specific Stone Lab endowments.

New features later this year will include a student discussion board and a photo gallery of each course. To visit the site, go to www.stonelab.ohio-state.edu.

The Dunlap Challenge Met

During the fall of 2003, Shirley Dunlap Bowser, a former member of the Ohio State University Board of Trustees, created the John H. Dunlap, Jr. Fund for Outreach, Education, and Development at Stone Laboratory with a \$50,000 gift from the Kellogg Foundation. In April 2004 she challenged the Friends of Stone Laboratory (FOSL), with support from the Kellogg Foundation, that she would donate another \$50,000 if FOSL could raise \$25,000. With a final gift of \$10,000 from the Leigh Perkins Charitable Lead Trust, FOSL reached their goal by December 31. These tremendous gifts to the Laboratory will help to support our college courses (since 1990 our students have come from 93 colleges and universities and 326 high schools), our Science Workshop Program for grades 4 through adults, and our fund raising efforts for education and outreach. Thank you, Shirley and Cliff Bowser, the Kellogg Foundation, the Leigh Perkins Charitable Lead Trust, and our many contributors from the Friends of Stone Lab and Ohio Sea Grant.



A Workshop Report

Each year, more than 5,000 students participate in the spring and fall workshops held at Stone Laboratory. Catering primarily to grades 4-12, these one-or two-day workshops give students the opportunity to get a firsthand introduction to field biology and the ecology of Lake Erie.

We are always thrilled when schools send us a scrapbook of their experience at Stone Lab. Elyria schools recently brought one of their classes up to the Lab for a workshop and documented their adventures on the following web link: www.elyriaschools.k12.oh.us/gate/stone_lab.htm.

The Friends of Stone Laboratory (FOSL) began in 1981 as a support group to "bring Stone Laboratory into the 21st century with the best possible facilities, equipment, and professors, and make this an unequaled learning experience available to all outstanding students." Members of the Friends provide a way for former students to support the facility by raising awareness and funds for scholarships, research, and equipment.

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FOSL

Dates to Remember

Spring Work Weekend at Stone Lab
April 16-17, 2005 (Volunteers wanted)
Contact Stone Lab office for details

OAS State Science Day—*May 7, 2005*

Stone Lab Open House/FOSL Annual Mtg.
September 10-11, 2005

Buckeye Island Hop—*October 1-2, 2005*

It Really Happened

by Carlos Fetterolf

The very cold winter of 1963-64 was still gripping Lake Erie into the early springtime. Windswept snow was scudding across lake ice. Lake Erie had frozen over early and stayed frozen late. Those of us planning the 12th Annual Meeting of the Midwest Benthological Society (later changed to North American Benthological Society) at Stone Laboratory were concerned. We imagined that delegates to the meeting would either have to fly to the islands on the Ford Tri-motor or slip-slide over on the ice. Luckily, the weather and the ice broke just in the nick of time. The 60 or so delegates to the meeting crossed by ferry on April Fools' Day, but the joke was yet to come.



We all squeezed into the Park Hotel for the welcoming extravaganza: wine, beer, cheese, and things salty. On a frosty morning, we gathered in small groups for the launch ride across the wind-swept harbor to Gibraltar, the "Rock." We clambered up to a conference room filled with bookcases, a few chairs, and plenty of cold air. The inside and outside temperatures were essentially the same, in the low 40s. Only then did we discover that there was no heating

system for the room and there had never been one! Nothing was in readiness for our arrival.

We huddled in our winter coats, dourly awaiting something, but what? Suddenly someone made an announcement that the Put-in-Bay Town Hall would be able to accommodate us. Feeling (and acting) like refugees, we were launched back to town and hastened to the heated Town Hall.

Being observant scientists, we quickly realized that the meeting room in the hall was L-shaped. Due to the shape of the room, not everyone in attendance would be able to see the projection screen or the speakers. However, at that point, it was unimportant. We were at least warm.

The meeting finally started a couple of hours late. We all cut our talks short, which was deemed a blessing by most attendees. However, one further April Fools' surprise was yet to reveal itself. When the island school let out, we discovered that the town basketball court was in the room directly overhead! What seemed like armies of players were racing back and forth overhead. This added much emphasis to the presentations going on below. While this may not have been the most successfully executed meeting at Stone Laboratory, it was certainly one of the most memorable. **TL**

Editor's Note: *The history of Stone Lab is full of remarkable and memorable stories. They often get told and re-told at each gathering of FOSL. We would love for you to share your memorable stories with us, as Carlos has done. Please jot down those anecdotes and send them to me in care of the Stone Lab office, or via e-mail to mrh@smoc.cmhmetro.net. Thanks, Mike*



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