

SPRING > SUMMER 2018

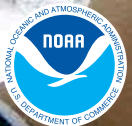
TWINE LINE

Ohio Sea Grant + Stone Laboratory

Making Lake Erie Science Come Alive

*Ohio Sea Grant celebrates
40 years of science,
education and outreach*

page > **18**



LAB NOTES

*Ohio Sea Grant
by the Numbers*

*The Ohio Sea Grant College Program
began in 1978 with \$128,000 in funding.*

> TODAY, THE PROGRAM HAS

23 ENDOWMENTS
VALUED AT } **\$1.6**
MILLION

\$2.9
MILLION PLANNED GIFTS THAT
WILL BENEFIT STUDENTS
IN YEARS TO COME

457
RESEARCH
PROJECTS FUNDED

500 STUDENT
SCIENTISTS
included on research teams

214 LEAD RESEARCHERS
from
32
different
universities

Photo: Jo McCully

> Achievement Highlights

\$1.1
MILLION
IN SCHOLARSHIPS
has been awarded to
Stone Lab students

809
COLLEGE STUDENTS

572
HIGH SCHOOL STUDENTS

\$85
MILLION CLEANUP
project that restored
the Ashtabula River.

Ohio Sea Grant has helped increase sportfishing
profitability by expanding Lake Erie charters from

34 BUSINESSES
IN 1975 } **1,200**
BUSINESSES
IN 1985

NUMBER REACHED THROUGH OUTREACH PROGRAMS:

10 MILLION
PEOPLE

DEPARTMENTS

Research

04 STONE LAB'S WATER QUALITY LAB HELPS KEEP LAKE ERIE ISLAND WATER SAFE

Education

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STORY BY
CHRISTINA
DIERKES

Ohio Sea Grant Celebrates 40 Years
of Science, Education and Outreach



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ABOUT TWINE LINE

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> A current list of Ohio Sea Grant staff and Extension Agents can be found online at ohioseagrant.osu.edu.



Harmful Algal Bloom Interactive Fact Sheet

What are harmful algal blooms? Where do they come from? How safe is Lake Erie water? These are questions everyone who's been affected by algal blooms asks.

A new Ohio Sea Grant online fact sheet answers these and other questions with videos, an interactive "Q&A with Experts" feature and resources to dig deeper.

VIEW FACT SHEET ONLINE

go.osu.edu/facts

Testing, Testing

Stone Lab's Water Quality Lab Helps Keep Lake Erie Island Water Safe

By Christina Dierkes

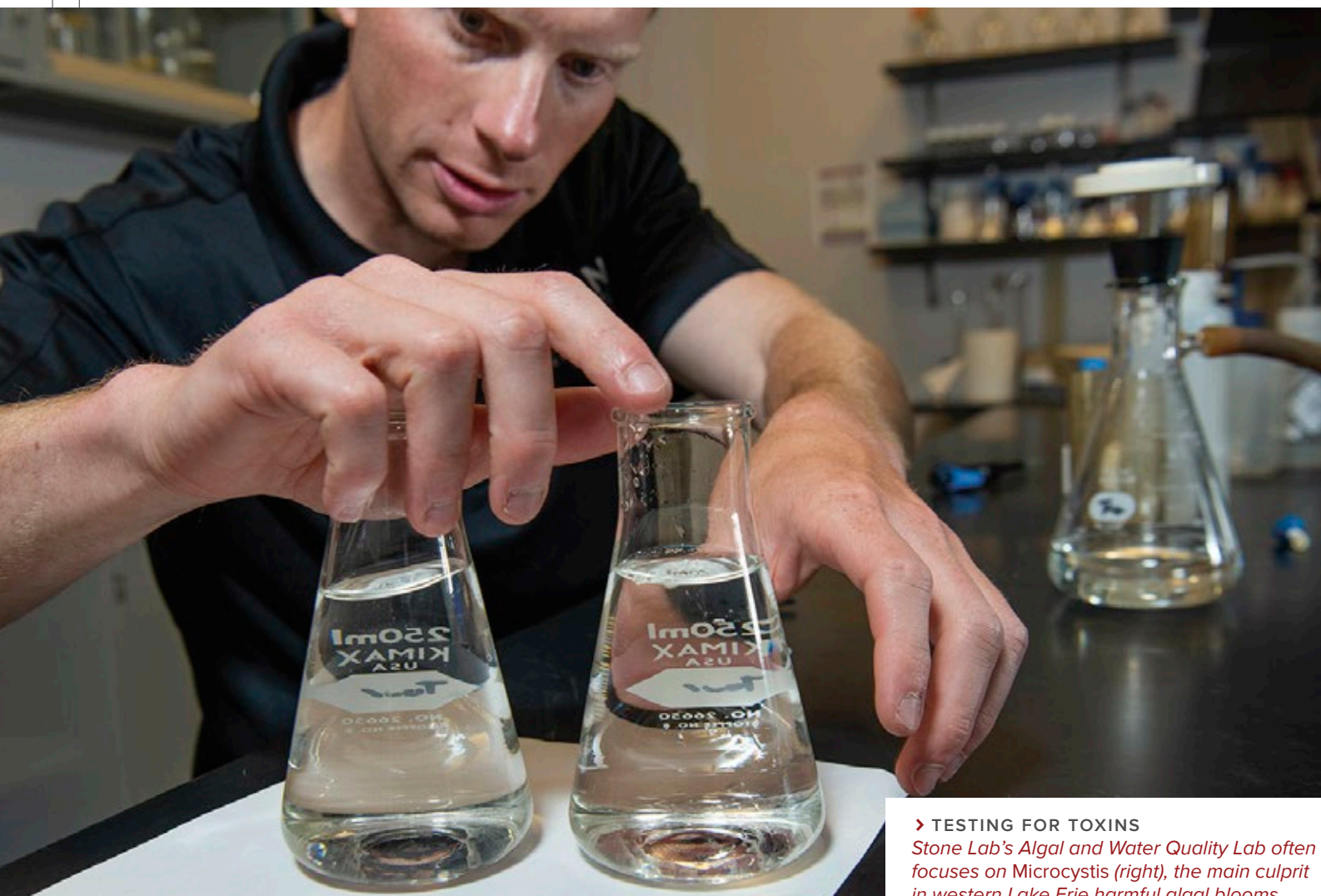
M

ost communities on the Lake Erie shoreline draw at least some of their drinking water from the lake, and for the Lake Erie islands, not doing so would often mean having no easily accessible water at all. So being able to detect any contamination, such as toxins from harmful algal blooms (HABs) that appear in western Lake Erie most summers, is essential to making sure island residents

can be confident that their tap water is safe.

Stone Lab, Ohio Sea Grant's teaching and research facility located on South Bass Island, plays a large role in meeting that need. From research into what turns algal blooms toxic to the nitty-gritty details of weekly water testing for the islands' water treatment facilities, Stone Lab staff serve their island communities in a variety of ways.

In 2014, the Ohio Environmental Protection Agency began recommending that water treatment plants that use surface water as their main source of drinking water test the raw water they take in, as well as the treated water they send out to customers for microcystins, the type of toxin produced by most harmful algal blooms in Lake Erie. That testing became mandatory soon after the Toledo drinking water crisis – the Toledo



› TESTING FOR TOXINS

Stone Lab's Algal and Water Quality Lab often focuses on Microcystis (right), the main culprit in western Lake Erie harmful algal blooms.

Photo: Jo McCully

and Oregon plants had already been performing the tests for a few years, which is how the high toxin levels were detected – and now any plant drawing Lake Erie water tests for algal toxins weekly during the summer and every other week during the winter months.

But in many cases, smaller water treatment plants like those on the Lake Erie islands aren't set up to run the required tests themselves and have to find a lab to provide them with the required information. That's where Stone Lab's Algal and Water Quality Lab

comes in. The lab on South Bass Island, right by downtown Put-in-Bay, offers microcystin testing to anyone who needs it.

Right now the lab does testing for four water treatment plants on South Bass, Middle Bass and Kelleys Island. Research coordinator Dr. Justin Chaffin and his team receive samples for analysis every Monday during the summer, with data sent back to the treatment plants and the Ohio EPA.

The advantage of having samples tested at Stone Lab is that the work is kept right on the islands, instead of having to send the water to a lab on the mainland, such as to Columbus or Toledo.

"Ohio EPA recommended to the Lake Erie islands that they have their water tested, but they didn't have an easy way to get the samples from the islands to the mainland," Chaffin explains. "So Jeff [Reutter, Ohio Sea Grant's former director] suggested we could do it, I agreed, and we've maintained that service ever since."

The main toxins of concern are microcystins, a collection of about 150 types of harmful algal bloom toxins that are all slightly different, but share a common general structure. The test looks for that commonality, measuring the total microcystins produced by a harmful algal bloom. This information is critical to water treatment plant operators who may need to adjust their treatment processes to maintain safe drinking water for area residents.

Because Ohio EPA requires certification for both the labs and the staff performing the microcystin tests, having them done at Stone Lab adds another advantage to larger commercial labs: professional development. Research aides, who are usually recent college graduates, perform the majority of the testing during the summer, from chlorine and pH levels to the enzyme-linked



USING SATELLITES TO TRACK LAKE ERIE HARMFUL ALGAL BLOOMS

Stone Lab's Algal and Water Quality Lab is collaborating with The University of Toledo, Bowling Green State University and NOAA researchers to support the Ohio Environmental Protection Agency (Ohio EPA) in data collection for a potential designation of Lake Erie as impaired. The current impaired status is based on satellite data, which only measures how much cyanobacteria are present in the water, not how toxic a bloom is.

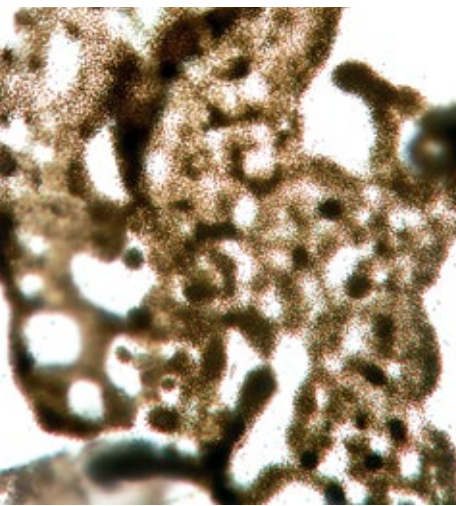
"It's very difficult to judge impairment based on toxin data because blooms and their toxins can be extremely patchy, but satellite data can quantify bloom biomass over the entire lake with one image," said Dr. Justin Chaffin, Stone Lab's research coordinator. "The satellite flies over almost daily, whereas the toxin data is collected less frequently from relatively few locations. So we're going to sample 12 sites once a week, which will add to the data sources from water treatment plants and the Ohio EPA nearshore monitoring program."

Over the two years of the project, that additional data will give agencies and water managers a better idea of algal toxin concentrations in Lake Erie throughout the year.

The project will also help the satellites that monitor algal blooms with quantifying the scum that builds up on the water's surface when there are lots of cyanobacteria – the blue-green algae that make up most harmful algal blooms – in very calm waters. In that situation, the satellites' sensors can get saturated so they no longer register actual algal concentrations beyond a certain level.

"The satellite does a good job from clear water to a little bit green to very green, but then once the cyanobacteria are at the surface and it's just a floating mat, it doesn't know how thick that scum is, whether it's 1 centimeter or 10 centimeters thick," Chaffin explained. "So we're going to try to find that threshold where the satellite saturates, and then if we give that data to the NOAA team that creates the algorithm for analyzing the satellite images, they should be able to figure out how to correct their scum measurement data."

Satellite imagery is routinely used to track harmful algal blooms in Lake Erie, and Stone Lab is participating in a project to make analysis of those images more accurate.

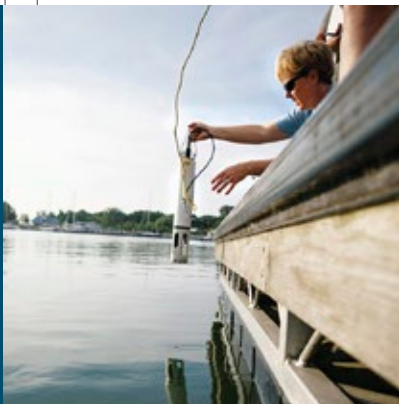


The main toxins of concern are microcystins, a collection of about 150 types of harmful algal bloom toxins that are all slightly different, but share a common general structure.



“Ohio EPA recommended to the Lake Erie islands that they have their water tested... and we’ve maintained that service ever since.”

DR. JUSTIN CHAFFIN




COLLECTING WATER SAMPLES

Charter fishing boat captains collect water samples for Stone Lab and educate anglers about Lake Erie water quality. Since the program started in 2013, there have been:


12 FISHING
BOAT
CAPTAINS


542
water samples
collected to date


1,553
ANGLERS EDUCATED ABOUT
LAKE ERIE ALGAL BLOOMS

RESEARCH ROUNDUP



immunosorbent assay (ELISA) test that detects any microcystins in the water samples. That training and certification always looks good on a resume when they apply for other research lab positions in the future.

Chaffin, partnering with scientists from LimnoTech, Bowling Green State University, Michigan Technological University, The University of Toledo, Wayne State University and the University of Michigan, also leads a three-year National Oceanic and Atmospheric Administration (NOAA) project funded last year that studies what causes Lake Erie algal blooms to become toxic. Right now, the size of a harmful algal bloom and the toxin levels it produces don't seem to be connected, with some small blooms being highly toxic while larger blooms don't produce much toxin at all.

"While forecasting harmful algal bloom size is reasonably accurate right now and real-time sensors in the lake provide the location of the bloom, we still have fundamental questions about what controls when blooms become toxic, and how to predict that toxicity," said Chaffin. "The goal of our project is to include toxins in the annual HABs

› ELISA TRAINING

Research aides at Stone Lab perform much of the water quality testing during the summer months, adding important professional development opportunities and an Ohio EPA certification to their resumes.

forecast and the biweekly HABs bulletin NOAA puts out for Lake Erie, predicting both algal biomass and toxicity in time and space."

Those predictions in turn can give water managers advanced warning of an incoming toxic bloom, allowing them to adjust treatment processes accordingly without potential interruptions to safe water service for Lake Erie residents. And in the end, that's really the goal for Stone Lab and Ohio Sea Grant – making sure Lake Erie communities are thriving and well-prepared for any water quality issues that may come their way. ●

LEARN MORE



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LARGEST GROUP OF KNAUSS FELLOWSHIP FINALISTS SENT TO WASHINGTON, D.C.

Ohio Sea Grant is proud to announce that five Ohio finalists have been selected as part of the 40th class of the prestigious John A. Knauss Marine Policy Fellowship, a year-long program that places highly qualified graduate students in host offices in the legislative and executive branches of U.S. government. The group represents the largest number of Ohio finalists selected in one year since the program began in 1979.

The five graduate students join a group of 69 finalists recommended to the National Sea Grant office from 30 Sea Grant programs across the country. Finalists will meet in Washington, D.C. in November 2018 for placement interviews with potential host offices, which can include executive branch appointments in offices like NOAA, the Department of the Interior and the National Science Foundation, as well as legislative placements on Senate and House committees and in legislative offices.



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Wright State University



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› AMARA HUDDLESTON
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› AUDREY MARAN
Department of
Biological Sciences
Bowling Green State University



A Living Laboratory

Gibraltar Island Fosters Lifelong Commitments to Lake Erie Science

By Christina Dierkes

Lake Erie plays a big part in the lives of Ohio residents, from providing drinking water and seafood to creating memories of family vacations and weekend fishing trips. But for some, it can be difficult to see that connection without an experience that draws a specific link between the lake and their personal life.

Stone Lab, Ohio Sea Grant's research, outreach and education facility on Gibraltar Island, aims to make that link more explicit through educational opportunities like field trips, college courses, research experiences and professional development workshops for fifth graders through adults. While the formats vary widely, Stone Lab education has one guiding principle: making sure a trip to the lab is a hands-on experience that leaves visitors with an appreciation for Lake Erie and the impact it has on their surroundings.

"We also tied different subject areas together, so it wasn't just science," Conry said. "It tied into reading and writing because students were doing research online, creating a PowerPoint presentation, really thinking about the entire process, so it was a multi-subject approach. And that's what allowed us to continue it throughout the year."

The field trip at the end of the school year also expanded the students' understanding of what they had learned by showing them how their knowledge applied to the larger Lake Erie ecosystem and the researchers who work in it. Measuring wind speed and wave height, collecting and dissecting fish and identifying microscopic organisms in water samples they had collected all tied back to what the students had learned throughout the year.

"The field trip really took a lot of knowledge that they learned in the classroom and allowed them to apply that in a real-world scenario," Conry explained. "And because we had spent the time talking about it throughout the year, they were knowledgeable, and for them to take what they learned in the classroom and use those skills in the real world, that was a great connection for them to see."

Stone Lab's summer college courses continue the tradition of hands-on education by immersing students in Lake Erie science, often quite literally. All classes include at least some field trips, where students go out in the field to collect samples and experience the ecosystems they're studying first-hand.

"Stone Lab courses take all the components of being a working scientist and put them together into a one-, four- or six-week course," said Dr. Christopher Winslow, Ohio Sea Grant and Stone Lab's director. "We want our students to not only gain the knowledge they expect from the course they're taking, but also to see how that knowledge applies to real-world ecosystems like the Lake Erie islands."



CONNECTING STUDENTS WITH SCIENCE

"A lot of times teachers are trying to find that real-world connection and I feel like Stone Lab really offers that," said Jackie Conry, who teaches science, technology, engineering and math (STEM) classes at St. Mary Catholic School in Vermilion. Her fifth-graders not only participated in Stone Lab's Lake Erie Science Field Trip Program, but also spent the school year leading up to their visit collecting weekly water samples from the Vermilion River and Lake Erie near their school. The samples were analyzed by Dr. Justin Chaffin, Stone Lab's research coordinator, and then students from kindergarten through fifth grade used the data in their classes.

› HANDS-ON LEARNING

Lake Erie Science Field Trips bring science to life for students in grades 5-12.



“The field trip really took a lot of knowledge that they learned in the classroom and allowed them to apply that in a real-world scenario.”

JACKIE CONRY



**HELP FUND EDUCATION
AT STONE LAB**

Donate today to help fund future
Stone Lab education efforts:

ohioseagrant.osu.edu/giving



“Seeing working scientists doing what they love and making a difference inspired me to chase the same dream.”

KELSEY REIDER

RESEARCH EXPERIENCES

Exceptional college students who want to get a closer look at how scientific research is done can also apply for Stone Lab’s Research Experience for Undergraduates (REU) Scholarship Program, which gives them a chance to work with professional scientists on a research project of their choosing. REU students present their findings in person and via a live webinar at the end of the term and may go on to author papers or present posters at scientific conferences.

“We’ve had 139 students go through the REU program since it started in 2005, and of those students, 32 gave conference presentations and eleven authored or co-authored peer-reviewed journal articles,” said Chaffin, who coordinates the REU program. Some of the students are also able to extend their research

experience into some additional weeks of paid work, continuing to collect and analyze samples or performing experiments to expand their data sets during the rest of the summer.

Donors fund most of the REU program, covering tuition and room and meals for the students, many of whom couldn’t have had the experience without financial support. And for at least some of them, that summer research project started off a lifelong dedication to scientific research.

“That Stone Lab REU scholarship is immensely valuable to students like me – a first-generation college student without the means to pay for a Stone Lab education on my own,” said Kelsey Reider, a 2005 REU student who is now working on her PhD in ecology at Florida International University in Miami. She credits seeing working scientists doing what they love and making a difference – in this case, working with Stone Lab’s Dr. Kristin Stanford on the Lake Erie Watersnake recovery plan that removed the snakes from the threatened species list – with inspiring her to chase that same dream.

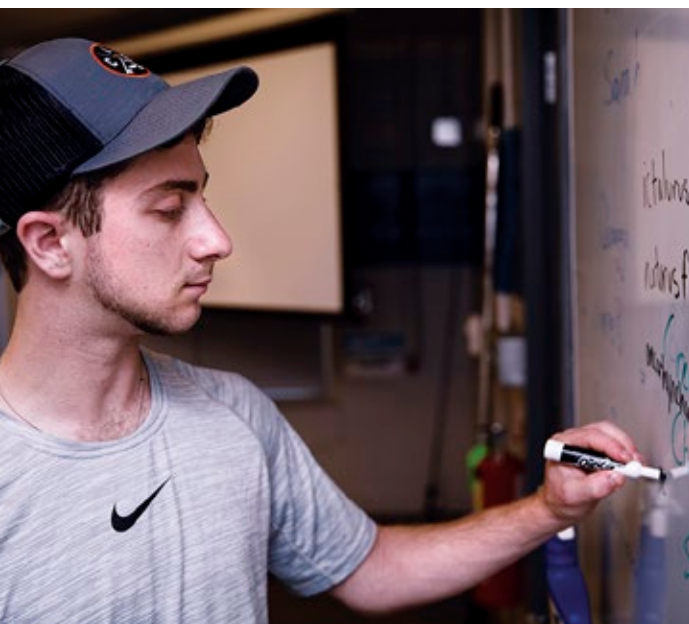
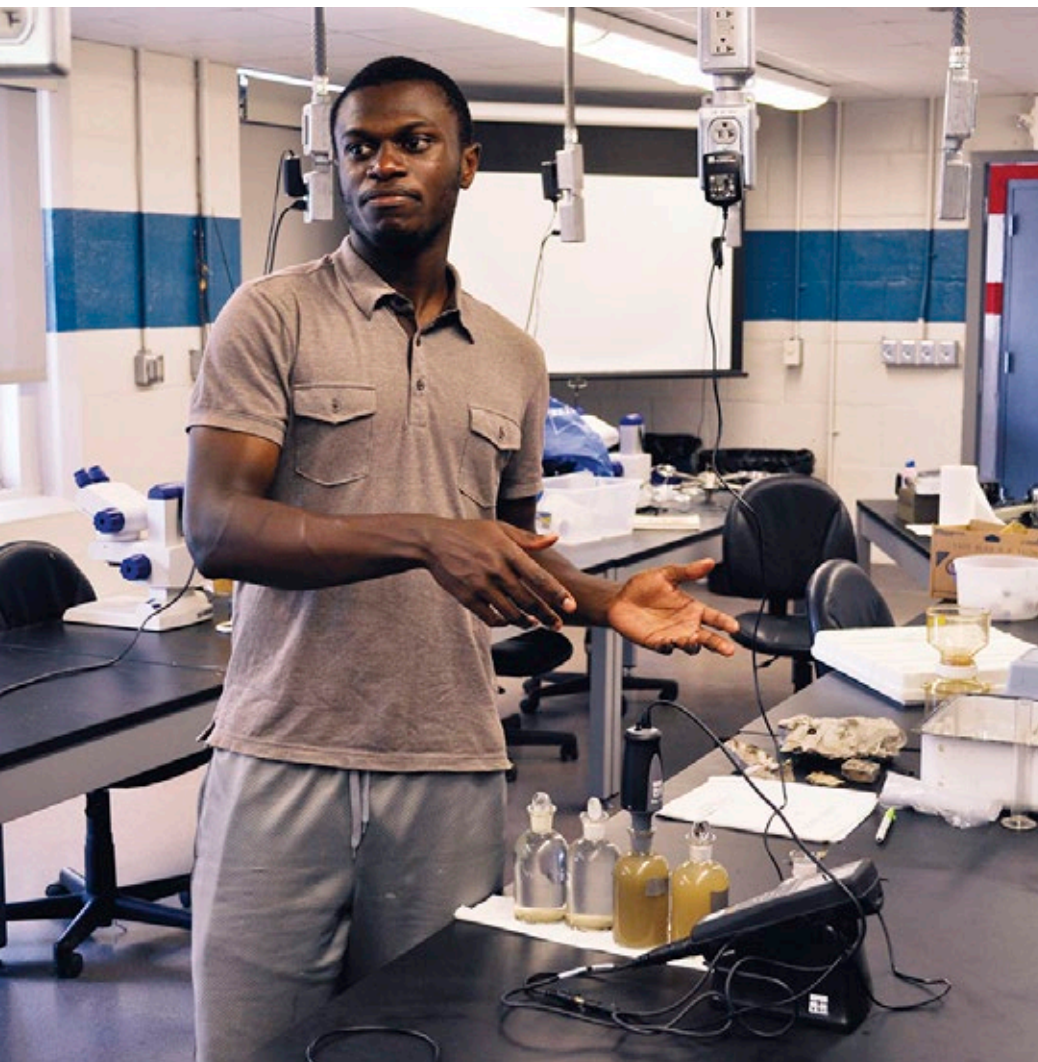
TEACHING TEACHERS

College classes aren’t the last chance people get to study at Stone Lab though. Sometimes, the best way to spread a love of science and nature is by bringing together a group of dedicated teachers, showing them all the cool science they can do in their own classrooms, and then sending them back out into the world to inspire the next generation.

Teacher professional development at Stone Lab does just that: three-day to one-week courses in geology, environmental education and educational technology provide educators with background and tools to take Lake Erie science back to their classrooms or informal education settings, and spending time with others who are excited about science education can have a huge impact on motivation and inspire participants to try some new things with their students.



Photo: Jo McCully




> REU SCHOLARS

REU students receive full scholarships to Stone Lab, and many have gone on to positions in academic research and natural resources management.

Stone Lab has awarded

1,381
SCHOLARSHIPS

totalling more than

\$1 
MILLION

Since 2005, there have been

 **139**

REU STUDENTS WHO HAVE
RECEIVED SCHOLARSHIPS
TOTALING \$482,000

EXPLORE

*Lake Erie
Educational
Opportunities*



1

OHIO MARINE DEBRIS PSA CHALLENGE

GRADES
9-12

With a need to educate about marine debris in Lake Erie, Ohio Sea Grant partnered with Congresswoman Marcy Kaptur for the third annual Ohio Marine Debris PSA Challenge, which is open to 9-12 grade students in Ohio's Lake Erie coastal communities. Students complete lessons and create a public service announcement to help raise awareness of marine debris.

FIND OUT
MORE ONLINE

> go.osu.edu/marinedebris



2

CURRICULUM SHINES LIGHT ON SOLAR TECHNOLOGY

GRADES
9-12

Ohio Sea Grant and Stone Lab offer a number of free curricula for teachers and other educators. Most recently published was the Solar Technology Curriculum, a set of four hands-on lessons that lets students examine how solar energy works. Lesson development was funded by an OSU CARES grant from OSU Extension.

INFORMATION
+ DOWNLOADS

> go.osu.edu/SolarLessons



► **BRINGING SCIENCE TO LIFE**
Teacher courses and workshops help educators teach science that's hands-on, energizing and relevant to their students.

"It was just an amazing week with amazing teachers," North Olmsted Middle School math teacher Shari Insley said of the week-long Water & Wildlife Training for Educators class she took at Stone Lab. "As soon as I got home, I thought, 'How can I use this in the classroom to make the students' education more meaningful and more real?'"

It turned out that connections made on Gibraltar Island helped Insley do just that. Together with Cleveland Metroparks naturalist Mark Warman, her lab partner during the course, she developed activities that allowed her students to monitor water quality in the Rocky River throughout the year.

"The students felt like real scientists, getting to use scientific equipment and apply what we'd been learning," Insley said. "I am hoping that they can see the real-world application for math in different professions and that you need math to understand science. I'm hoping they are exposed to a variety of jobs that they never thought they could do."

For those already working as real-life scientists (or getting ready to do so), Stone Lab also offers professional development workshops on algal identification, fish sampling and preventing the spread of aquatic invasive species. These workshops teach new agency personnel needed skills for fisheries work and water quality protection, and address current problems like harmful algal blooms (HABs) in Lake Erie by helping water treatment plant operators to identify HABs and remove any toxins from the water going through their facilities.

"A week after one of the workshops in 2014, one of the participants worked with Dr. Chaffin and correctly identified a harmful algal bloom in the reservoir at the Norwalk water plant and averted what could have been a serious problem," said Dr. Jeff Reutter, Ohio Sea Grant's former director. "Our hope is that other workshop students will be able to do the same for their facilities should the need arise."



“The students felt like real scientists, getting to use scientific equipment and apply what we’d been learning.”

SHARI INSLEY

The fisheries workshops are just as relevant to making sure Lake Erie's fisheries are healthy and thriving. Students get hands-on experience deploying sampling equipment like nets and electrofishing gear, and work closely with actual agency staff while learning how to catch fish and collect real-world data used to manage fisheries in most of the Great Lakes.

"These are professional-type experiences that college students don't get from the classroom," said Eugene Braig, program director of aquatic ecosystems extension in The Ohio State University's School of Environment and Natural Resources, who teaches Fish-Sampling Techniques along with scientists from the Ohio Department of Natural Resources and the Ohio Environmental Protection Agency. "The workshop was very deliberately developed to provide students with marketable skills so they would be much more competitive for those entry level positions as technicians and interns."

And once they've been to Stone Lab, most people tend to not only come back, but will also tell others about the experience, sowing the seeds for the next crop of field trip kids, college students and professionals who gain a new appreciation of Lake Erie and its importance to their world. ●



Lake Erie Science Field
Trip program has:

8,000

ANNUAL PARTICIPANTS



Total participants:

282K
SINCE 1973

STAY UP TO DATE



Keep up with Stone Lab events and education opportunities. Subscribe to the Ohio Sea Grant eNewsletter:

ohioseagrant.osu.edu/news/subscribe



Cleaner Is Better

Ohio Clean Marinas Program Promotes Environmental Responsibility

By Christina Dierkes

Summer's here and the time is right... for boating on the lake! Or just about any other body of water in the state of Ohio. More than half a million boats were registered here in 2017, and all that traffic can leave a mark on Lake Erie, the Ohio River and other rivers and lakes throughout the state. To keep the environment safe and healthy for the future, a new program supporting marinas and boaters in good decision-making came to be in 2003.

The Ohio Clean Marinas Program is a proactive partnership between Ohio Sea Grant, the Ohio Department of Natural Resources (ODNR) and the Lake Erie Marine Trades Association (LEMTA) designed to encourage marinas and boaters to use simple solutions to keep Ohio's waterways clean. The program, along with a companion Clean Boater program, promotes environmental stewardship and assists in protecting clean water and fresh air for future boaters.

"From the beginning, it was essential to everyone to have stakeholders from the university, the agencies and industry in the room," said Sarah Orlando, Ohio Clean Marinas Program manager. "Each came from a different background and a different perspective on what they wanted the Clean Marinas program to be, and it helped to create the program that we ultimately have today."

“It was essential to everyone to have stakeholders from the university, the agencies and industry in the room. ... It helped to create the program that we ultimately have today.”

SARAH ORLANDO

CLEAN MARINAS: ESSENTIAL PARTNERSHIPS

Clean Marina certification is a five-step process and most marinas complete it in three months to a year, depending on how many best management practices they need to implement.

"We're here to help, and we work with the marina throughout the process," said Orlando. "We also know that these are businesses, so if there's a management change or a delay, we work with them to still get them certified, ideally within a year."

Because environmental conservation and ecotourism

have become more prominent in people's minds, the program also helps marina owners attract new business by certifying them as Clean Marinas. A Clean Marina is an environmentally responsible marina, and for many Lake Erie and Ohio boaters, protecting the environment where they enjoy the water is an important concern.

Spitzer Lakeside Marina in Lorain, Ohio was one of the very first marinas to join the program in 2006 and continues to be an active participant. General Manager Matt Edwards took a little while to warm up to the idea when his staff first worked on the certification, but he quickly came around once he realized just how beneficial the program could be to the marina.

The marina just recertified as a Clean Marina for another year, and Edwards expects the partnership with the Ohio Clean Marinas Program to continue in the future. "We've certainly been on board and enjoyed the program and everything Sarah and her staff have been able to put together over the years."

Partners were essential to the Clean Marinas Program from the very beginning, starting with a meeting between Ohio Sea Grant, ODNR and LEMTA at the Lake Erie Nature and Science Center in Cleveland in late 2002. "Greg Nageotte from ODNR and I had been working on this concept since the summer of 2002," remembers Dr. Jeff Reutter, Ohio Sea Grant's director at the time. "The Ohio Department of Natural Resources was looking for actions they could take in the coastal zone to reduce pollution going into Lake Erie."

The few examples of existing Clean Marinas programs were run by state agencies, industry groups or Sea Grant programs, so with that in mind, "We were very pleased to be asked to lead the program, but it was really a partnership between ODNR, LEMTA and us, and that partnership continues to this day" Reutter added. Much of the initial program funding came from ODNR, NOAA and LEMTA, with matching support from The Ohio State University and Ohio Sea Grant.

OHIO CLEAN MARINAS
AS OF 2017



78
CERTIFIED

ANCHOR 497

BEST MANAGEMENT
PRACTICES IMPLEMENTED

by 47 marinas including invasive species prevention, recycling and using native plants in landscaping.

The partnership with ODNR broadened in 2015, when two additional staff members were hired to expand the certification program from the Lake Erie watershed to the entire state. Heather Sheets and Jenny Roar joined the Clean Marinas Program through the ODNR Division of Parks and Watercraft, and enable the program to be all-inclusive: open to marinas along Lake Erie, on inland waterways and along the Ohio River.

A Clean Marinas advisory board also maintains the involvement of agency partners in the program and expands it to a number of different agencies such as the Ohio Department of Health and the state fire marshal's office. Having that regular involvement not only makes sure that the team keeps ahead of any changes in regulations, but also brings in different viewpoints on what marinas can do to go above and beyond those rules.

"We've also always had marina owners on our advisory board, and that's essential because we have a sounding board to the realities of what we're asking when we come up with a new best management practice," said Orlando. "We have the folks at the table who are actually going to be implementing these practices, and they can tell us what's not quite going to work or bring in new ideas and challenges we haven't even thought of."



CLEAN BOATERS:
PROTECTING WATERWAYS

In addition to marinas and the boaters that dock there, the Clean Marinas team also wanted to target boaters that may rent boats or keep smaller vessels like kayaks at home. The Ohio Clean Boater Program, started in 2006, encourages the hundreds of thousands of boaters across Ohio to do their part in protecting the waterways they use for recreation.

"The program highlights key practices that boaters should be implementing," said Orlando. "They're simple and easy to understand, but every boater who is doing them can make a big impact." Examples include minimizing gasoline spills while fueling their boat, recycling or at least avoiding littering during boat trips, and practicing "clean, drain, dry," a technique that helps boaters avoid the spread of invasive species from one body of water to another.



1 LEARN ABOUT
THE PROGRAM

At informational workshops held throughout the state, the Clean Marinas team provides a checklist for certification.

2 TAKE THE CLEAN
MARINA PLEDGE

Marina owners can take a pledge to become a Clean Marina, giving them access to the Clean Marinas team's expertise and assistance.

3 ASSESS
THE MARINA

Marina owners complete a self-evaluation of what they must achieve to become a certified clean marina.

4 CERTIFY
THE MARINA

Once the marina is ready, Clean Marinas staff conduct a site visit and certify that the checklist has been successfully completed.

5 CONTINUE THE
COMMITMENT

The certified Clean Marina verifies their commitment through an annual letter and a five-year recertification process.

LEARN MORE

ohiocleanmarinas@osu.edu
419.609.4130



“Any boater can participate in the Ohio Clean Boater program, whether they’re at a certified Clean Marina or not,” Orlando continued. “No matter where you are in the state of Ohio, if you’re on the water somewhere, there are things you can do to help, and we want to recognize and support those who pay attention to simple things they can do to keep our water clean and safe.”

But really, the cost savings aren’t what the Ohio Clean Marinas Program is about. “At the end of the day, the marinas aren’t going to save a ton of money by being a certified Clean Marina, or by shrink-wrap recycling, and they know that,” said Orlando. “They’re participating because they know it’s the right thing. They know they’re a business that relies on clean water to thrive, and they are participating in the active protection of that water resource, which ultimately helps their business in the long term.”

To continue recruiting marinas to the program – and to keep things interesting for the marinas that



have been around for a while – the Clean Marinas team is developing a new tiered certification system that will recognize marinas going above and beyond the baseline requirements and giving currently certified marinas new goals to work toward. Two additional tiers beyond the basic certification will incorporate new science on best management practices, as well as ideas that wouldn’t be a new clean marina’s initial focus, but make good add-ons once those initial steps are completed.

“Some examples of the things we’re thinking about are a greater emphasis on native plants, for

example,” said Orlando. “So we really want to make sure the marinas are doing landscaping that involves native vegetation, stabilizing the shoreline but encouraging what we call a living or natural shoreline that helps with erosion control but also creates habitat for wildlife and makes it a more natural and more of a clean marina-type environment.”

With updates like these, and frequent exchange of ideas with Clean Marinas programs in other Great Lakes states, the Ohio Clean Marinas team continues to keep Lake Erie clean and healthy, one marina and one boater at a time. ●

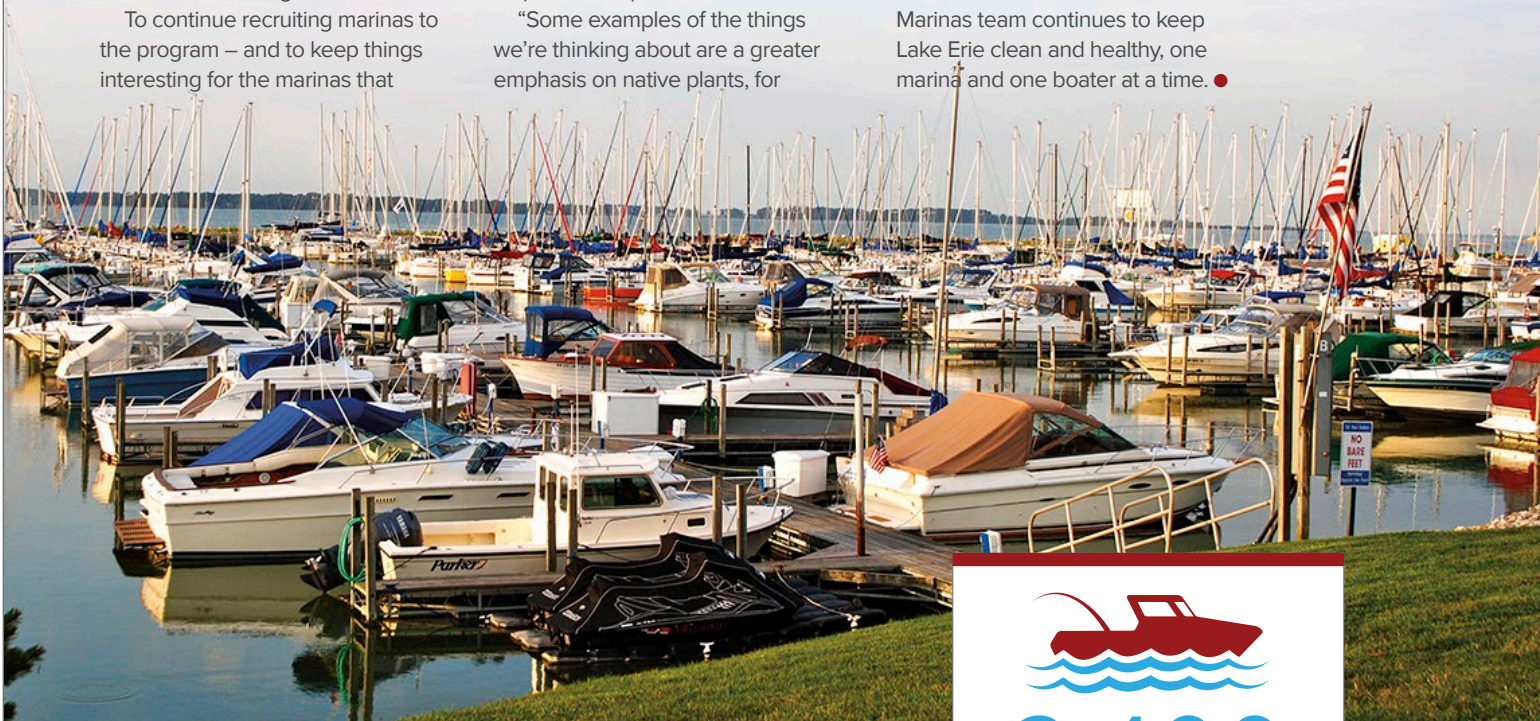
RECYCLING PROGRAM

An additional environmental protection effort that came out of the Clean Marinas Program is the Shrink-Wrap Recycling Program, which also began in 2006. Its overall goal is to keep the plastic shrink-wrap used to protect boats during the winter out of landfills, where it takes up space and breaks apart very slowly, if at all. Until 2012, the program partnered with Mondo Polymer Technologies in Marietta, who would pick up shrink-wrap from marinas and turn them into guard rail blocks for highway construction. Since the program’s inception, 2.29 million pounds of shrink-wrap have been recycled in Ohio, with much of that plastic turned into 332,000 guard rail blocks stretching along 415 miles of highway.



INTERESTED IN RECYCLING?

Marinas who are interested in recycling their boaters’ shrink-wrap can contact the Ohio Clean Marinas team to find a recycling partner that works best for their needs.



The Ohio Clean Marinas Program is a partnership between Ohio Sea Grant and the Ohio Department of Natural Resources, which started in 2005, to recognize marinas that choose to adopt best management practices to improve the environmental, educational and economic aspects of their operations. Financial assistance for the program is provided by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Ohio Coastal Management Program, administered by the ODNR Office of Coastal Management. Additional funding is provided by the ODNR Division of Parks and Watercraft and Ohio Sea Grant.

2,400
OHIO CLEAN BOATERS

ohioseagrant.osu.edu/clean



“Ours is always the most recent, especially when Sue comes to collect sea lamprey. Now on the way to @OhioStateFair.”

KEVIN KEELER
@GR8LAKESWETLAB



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RYAN
MACRAILD

“I took a group of 7/8 grade students to an overnighter and learned so much more about Lake Erie than I could have imagined! It makes me appreciate what a beautiful resource we have and more aware of the care it needs to keep it safe for further generations.”



FIND OUT MORE ABOUT THE REU PROGRAM
ohioseagrant.osu.edu/research/reu

“I am grateful to Ohio Sea Grant, Stone Lab, and OSU for the amazing opportunities, education, and experience you’ve given to my son. He participated two summers as a student and this summer is completing his REU. Thank you!”

SHERI SAXON FRIED



“Stone Lab means a great deal for me. To start I did part of my master’s program there. I wrote curriculum for Ohio Sea Grant under Vic [Mayer] and Rosanne [Fortner]. As I was teaching science at the middle school level, a group of teachers conducted a summer program in science for students entering middle school. Then in the fall, we took these students to Stone Lab as a follow-up where they monitored the lake and more. Wonderful program.”

LYNDA ARMSTRONG FLOEHR

1978



2018

Working to Make

LAKE ERIE SCIENCE

Come Alive

OHIO SEA GRANT CELEBRATES
40 YEARS OF SCIENCE,
EDUCATION AND OUTREACH

BY CHRISTINA DIERKES



WATCH VIDEOS ABOUT THESE AND OTHER
OHIO SEA GRANT ACCOMPLISHMENTS AT

youtube.com/ohioseagrant

IT'S BEEN 40 YEARS since The Ohio State University's Center for Lake Erie Area Research (CLEAR) was first recognized as Ohio's home for the National Sea Grant College Program, whose dedication to supporting the practical use and conservation of coastal, marine and Great Lakes resources to create a sustainable economy and environment has helped coastal and Great Lakes communities for over 50 years.

The Ohio Sea Grant College Program was established in 1978, with \$128,000 worth of funding that had to cover all aspects of what a Sea Grant Program was supposed to do.

"The National Sea Grant College Program, when they funded us, called us a coherent program because we had everything that a Sea Grant Program was supposed to have, the three pieces of research, education and outreach as well as an overall communications component," remembered Dr. Jeff Reutter, who had been with the program from the beginning until his retirement in 2017.

That initial funding covered the establishment of a Marine Advisory Service (today's Extension program), along with one research project on creating a market for freshwater drum for commercial fishermen and an education effort that would lead to the development of Great Lakes curriculum lessons still inspiring educators today.

Today, Ohio Sea Grant manages a multi-million-dollar research program, with funding from the National Oceanic and Atmospheric Administration (NOAA), the State of Ohio, The Ohio State University and funders ranging from private foundations to the Ohio Department of Higher Education. The team oversees operations and education opportunities at Stone Lab, the program's research, education and outreach facility on Gibraltar Island, just off Put-in-Bay on Lake Erie's South Bass Island, and five Extension educators along the coastline bring Lake Erie knowledge directly to the communities most affected by it.

Over the past 40 years, Ohio Sea Grant has accomplished a number of milestones, all of them important to making Ohio a thriving place to call home. We highlight some of the most impactful projects and research findings.

➤ STONE LABORATORY

Stone Lab, located on a Lake Erie island, is the perfect base for research, teaching and outreach.



“The National Sea Grant College Program, when they funded us, called us a coherent program because we had everything that a Sea Grant Program was supposed to have.”

DR. JEFF REUTTER



A River Burns in Cleveland

It's a story everyone who spends time in Cleveland hears eventually: in 1969, the Cuyahoga River caught on fire. It wasn't the first time the extremely polluted river had burned, but increased media attention and a shift in public sentiment towards environmental protection meant it was the last.

The Cuyahoga River fire inspired legislation like the Clean Water Act and the creation of the Environmental Protection Agency (EPA), and raised awareness about the health of Lake Erie and its tributaries to the point where establishing Ohio's Sea Grant program became a no-brainer.

Over the next 16 years, newly created national, state and local efforts to clean up the lake went so well that Lake Erie's reputation quickly changed from North America's Dead Sea to the Walleye Capital of the World. By 1985, the lake had recovered so much that two graduate students who were studying under Ohio Sea Grant's education coordinator Dr. Rosanne Fortner wrote to Dr. Seuss to ask him to update his book *The Lorax*. The line they objected to read "*They'll walk on their fins and get woefully weary / In search of some water that isn't so smeary. / I hear things are just as bad up in Lake Erie.*"

Seuss sent an apology to the students, and promised to update the line in future editions of the book. "I should no longer be saying bad things about a body of water that is now, due to great civic and scientific effort, the happy home of smiling fish," Seuss wrote in his response. "Unfortunately, the purification of texts, like that of lakes, cannot be accomplished overnight. The objectionable line will be removed from future editions."

Today, work to restore the Cuyahoga River continues under the 1987 Great Lakes Water Quality Agreement and the U.S. Clean Water Act. The agreement declared the 43 dirtiest rivers and harbors in the Great Lakes watershed as Areas of Concern (AOCs) and put processes in place to address the specific issues affecting each river. Ohio Sea Grant Extension agent Dr. Scott Hardy chairs the public outreach subcommittee of the Cuyahoga River Area of Concern Advisory Committee, which recently had cause to celebrate.

"There were ten total beneficial use impairments (BULs) when the river was first designated as an AOC,



and of those ten, we've just in the past few months had two delisted," Hardy said. "Those two are degradation of aesthetics and restrictions on recreation and public access, and they were officially removed from the list in late 2017. We're also hoping to get restrictions on fish consumption removed in the next few months."

Hardy continues to work with the Cuyahoga River AOC Advisory Committee, a collaboration with a number of other local and regional agencies and non-profit organizations, on removal of the remaining eight BULs. Their goal is to have the river completely delisted as an Area of Concern by the end of 2025.



Read more about Ohio Sea Grant research issues at ohioseagrant.osu.edu/research/issues.



From 1969 to 1985, newly created national, state and local efforts to clean up the lake went so well that Lake Erie's reputation quickly changed from North America's Dead Sea to the Walleye Capital of the World.



› CLEANING UP THE CUYAHOGA

The Cuyahoga River has come a long way from that famous 1969 fire. Today, the waterfront is home to rowing clubs, restaurants and new real estate developments, all taking advantage of the improved aesthetics the Cuyahoga River Area of Concern Advisory Committee has been able to help create.

Photo (above left):
Cleveland State University Library



Cleaning Up The Ashtabula

Further east, another river was also in desperate need of some help. The Ashtabula River, which flows into Lake Erie just 15 miles from the Pennsylvania border, was also declared an Area of Concern by the U.S. Environmental Protection Agency (EPA) in 1987. Unregulated industry on the riverbanks had led to beneficial use impairments like restrictions on fish consumption and loss of wildlife habitat, and the surrounding community was feeling those impacts.

Now-retired Ohio Sea Grant Extension Program Leader Frank Lichtkoppler was a major player in the 30-year, \$85 million cleanup project that restored the Ashtabula River and led to the removal of three BULs in 2014. Lichtkoppler focused on gathering information – both scientific facts and public opinion – and presenting it to public officials and the Ashtabula River Partnership managing the cleanup effort, informing their decision making with knowledge about potential economic and environmental impacts.

“None of this would have happened without a really long-term commitment by the Ashtabula River Partnership.”

DR. JEFF REUTTER

In 2008, a [major dredging project](#) removed contaminated sediments from Ashtabula Harbor, making it one of the cleanest, deepest harbors in Lake Erie.





► MOVING IN THE RIGHT DIRECTION

Today, the Ashtabula Harbor is a thriving place, combining industry and shipping terminals with waterfront parks that draw visitors to local businesses. Ohio Sea Grant continues to work with the AOC committee on removing the last three beneficial use impairments.

"None of this would have happened without a really long-term commitment by the Ashtabula River Partnership, and there were very few people who were with it the whole time," Reutter said. "Frank was one of those key people, always trying to deflect recognition, but often serving as the glue to hold everything together and keep it moving."

In 2008, a major dredging project removed 635,000 cubic yards of contaminated sediments – more than 190 Olympic-sized swimming pools' worth – from Ashtabula harbor, making it one of the cleanest, deepest harbors in Lake Erie. Along with fish habitat restoration a little upriver, the dredging project represented a major step towards removal of the last three beneficial use impairments and the area's removal from the list of Areas of Concern.

"A lot of people worked very long and very hard to see the dredging completed," said Lichtkoppler. "It was all the Ashtabula River Partnership members working together that made this happen, and Ohio Sea Grant was one of the founding partners of the Ashtabula River Partnership."

Ohio Sea Grant also helped develop a baseline to measure the economic activity resulting from the delisting. Prior to dredging of the Ashtabula harbor, staff collected data on local boaters, marinas and small businesses in the harbor area, and Extension agent Jill Bartolotta is currently working with the advisory committee to compare that data to new information from after the final restoration was completed.

Building a Home for Sportfish



portfishing is a billion-dollar industry in Ohio, and making sure it continues to thrive has always been an important concern for Ohio Sea Grant. While fishing had always attracted visitors along some parts of the lakeshore, other areas didn't have much in the way of coastal tourism, and Extension agents' advisory boards were vocal about wanting to address that issue.

Reefs tend to attract fish, and many of the already established popular fishing spots had naturally occurring underwater rock formations that gave fish shelter and a place to hunt and spawn. Research showed that just about anything sunk in a body of water would act like a reef, and artificial reefs were being built across the world. Ohio Sea Grant, lead by Extension agent Dave Kelch, decided that a collection of artificial reefs would be the best way to address a lack of fishing tourism near the Cleveland shore.

"We didn't want to sink boats, because we didn't want anything that would put additional pollution into Lake Erie," Reutter said. "We came up with a plan to construct artificial reefs from clean brick, rock and concrete rubble."

Donations of material came in from a number of places around town: the City of Lakewood was tearing out curbs as part of road construction, a stone company donated pieces that couldn't be used commercially, and when the City of Cleveland tore down the old Browns stadium, much of the brick and concrete ended up part of the project. Overall, the material donations added up to several hundred thousand dollars. To make those tax deductions possible, the permits for the reefs were issued in the name of the Ohio Department of Natural Resources, one of the major partners on the project.

After some experiments to determine the best reef construction type and location, between 1984 and 2000, Ohio Sea Grant and a wide range of partners constructed ten artificial reefs near the Cleveland shore, between Lorain and Euclid. The reefs increase fishing opportunities in an area that's easy to access from marinas throughout the city, while avoiding problem areas like shipping lanes or too-deep waters that don't provide ideal fish habitat.

Subsequent studies showed that the reefs attract 12-66 times as many fish as the surrounding areas, and are paying for themselves 2.75 times over every year. It's an impact that will continue for as long as there are fish in Lake Erie, and anglers who want to catch them.



► BUILDING BLOCKS

Large pieces of concrete from the old Browns stadium were used to build new reefs for fish in Lake Erie.



In 2011, the goals laid out in the recovery plan were met, making **LEWS** the 23rd species to ever be removed from the Federal List of Threatened and Endangered Species.



► RESPECT THE SNAKE

An extensive education campaign to help island residents peacefully coexist with the native Lake Erie Watersnake – people often thought the snakes were venomous – played a large role in helping LEWS populations rebound to stable levels.

Native Snakes Make Themselves at Home

Lake Erie Watersnakes (LEWS) are native to the Lake Erie islands, mostly living on bottom-dwelling fishes and the occasional mudpuppy, a large aquatic salamander. An increase in the islands' human population, and human persecution because the snakes were confused with venomous snakes – it doesn't help that they're often ill-tempered and quick to bite when cornered – led to the snakes being listed as federally threatened and state endangered in 1999.

Dr. Kristin Stanford, now Stone Lab's education and outreach coordinator, first came to the lab as a graduate student and quickly became instrumental in the Lake Erie Watersnake recovery plan. Developed in 2003, the plan focused on habitat protection and restoration, as well as an extensive education campaign to teach island residents and visitors to "Respect the Snake" and encouraging peaceful coexistence.

"Our outreach and education program was probably the most challenging but also the most fun, especially for me since I got to do a lot of it," Stanford said. "Through our conservation program, through doing interactive programs with snakes of all species here on the islands, we were able to change people's minds and attitudes to the point where we determined that they were no longer a threat."

The snakes also got some support from an unexpected place: a new food source. In the 1990s, round gobies invaded Lake Erie from the Black and Caspian Seas, and quickly began showing up in the Lake Erie Watersnake's diet, to the point where the snakes' diet consists of about 90 percent round gobies now.

"Normally, when you think about how an invasive species might affect a threatened species, you would think that interaction might be really harmful," Stanford explained. "What we've been able to show with our research is that since the watersnakes have been consuming round gobies, they've increased their maximum body size and their reproductive rate as well as their survival and population growth rates."



► INFORMING THE PUBLIC

Stone Lab's Dr. Kristin Stanford takes advantage of many education opportunities to help people better understand how they can help protect Lake Erie Watersnakes.

In 2011, the goals laid out in the recovery plan were met, making LEWS the 23rd species to ever be removed from the Federal List of Threatened and Endangered Species. Stanford, her Stone Lab students and a group of dedicated partners and volunteers continue to monitor the snake's population on the islands, including an annual snake census called Nerodio in June that often brings back Stone Lab alumni for a week of collecting, measuring and tagging snakes.

Stanford also always takes advantage of outreach opportunities that allow her to introduce more people to the species, including a 2006 appearance on the Discovery Channel's *Dirty Jobs* that has since aired to more than 15 million people and was voted one of the audience's Top Ten favorite episodes for a special celebrating the show's 150th episode.



More information about Lake Erie Watersnakes is available at respectthesnake.com.



Keeping Ohio Waters Healthy

The Ohio Clean Marinas Program is a proactive partnership among Ohio Sea Grant, the Ohio Department of Natural Resources (ODNR) and the Lake Erie Marine Trades Association (LEMTA) designed to encourage marinas and boaters to use simple solutions to keep Ohio's waterways clean. The program, along with a companion Clean Boater program, promotes environmental stewardship and assists in protecting clean water and fresh air for future boaters.

Started in 2003, the program focuses on actions marinas and boaters can take to protect the waterways they use. While the original program only covered the Lake Erie watershed, an expansion in 2015 brought it to the whole state.

Partners were essential to the Clean Marinas Program from the very beginning, starting with a meeting between Ohio Sea Grant, ODNR and LEMTA at the Lake Erie Nature and Science Center in Cleveland in late 2002.

"We were very pleased to be asked to lead the program, but it was really a partnership between ODNR, LEMTA and us, and that partnership continues to this day," Reutter added. Much of the initial program funding came from ODNR, NOAA and LEMTA, with matching support from The Ohio State University and Ohio Sea Grant.

To continue recruiting marinas to the program – and to keep things interesting for the marinas that have been around for a while – the Clean Marinas team is developing a new tiered certification system that will recognize marinas going above and beyond the baseline requirements and giving currently certified marinas new goals to work towards.

The Clean Boater Program works with boaters who may not dock at marinas, or who may simply want to do their part to keep their recreation environment clean for their kids. Their pledge focuses on small actions they can take, such as not littering, keeping fuel from polluting water at fueling stations, and preventing invasive species from hitching a ride by cleaning, draining and drying their boats before moving from one body of water to another.



Read more about the Ohio Clean Marinas and Clean Boater Programs on page 14 of this issue.



> INVASIVE ZEBRA MUSSELS

Zebra mussels grow quickly, covering any surface they come in contact with. Top: in 1989, an intake at a Detroit Edison plant became so clogged with zebra mussels that the city it served completely lost their water supply. Right: Dr. Susan Fisher at Ohio State helped develop the first treatment protocols to inhibit zebra mussel growth in water plants.





Stemming the Tide of Invasion

In 1988, some routine maintenance on the floating docks at Stone Lab revealed something odd: some mussels that hadn't been seen in Lake Erie before. It pretty quickly turned out that those mussels were historic, in the most urgent sense of the word: they were the first recorded instance of zebra mussels found in the lake.

Ohio Sea Grant wasted no time in responding. Within a month, Ohio State researcher Dr. David Garton had received funding to study the invasive species and document its spread from those first few mussels to reaching densities of 30,000 individuals per square meter just a year later.

Because zebra mussels tend to grow on just about any hard surface, they quickly became an issue for water treatment plants as well. "In 1989, the city of Monroe, Michigan totally lost their water supply several times during the winter because the zebra mussels would clog the water intake enough to create frazil ice," said Reutter. That ice forms when very cold water flows quickly through a narrow opening – in this case, zebra mussels had colonized the trash racks meant to keep large debris out of the water intake, blocking most of the opening and causing it to freeze up completely.

A grant from the U.S. Fish and Wildlife Service helped Ohio Sea Grant and Stone Lab establish a zebra mussel testing center, with the goal of identifying substances that could be used to control the invasive mussels. "Dr. Susan Fisher, an aquatic toxicologist in Ohio State's entomology department, did some absolutely fabulous work finding out that chlorine and potassium could be used to kill zebra mussels," Reutter said. "This was incredibly important because almost all water intakes already had permits to use chlorine to prevent algae and things from growing in their system, so they simply had to modify their existing permits."

Working with their congressional delegation, Ohio Sea Grant staff were also instrumental to the passing of the first Nonindigenous Species Control Act, which began to regulate when and where ocean-going freight vessels could release ballast water and establishes funding for invasive species research, education and technical assistance programs to prevent spread of current invasives and introduction of new non-native species to the United States.



“Dr. Susan Fisher did some absolutely fabulous work finding out that chlorine and potassium could be used to kill zebra mussels.”

DR. JEFF REUTTER



Field Trips Provide Real-World Connections

Stone Lab's Lake Erie Science Field Trip program gives students in grades 5-12, as well as college students and adult groups, the chance to be Lake Erie scientists for a day, taking water quality measurements and trawling for fish on a research boat and examining their finds back in the laboratory. The field trip program actually started with college courses from Ohio State departments like engineering and biological sciences, led by Reutter, to supplement courses designed for power plant engineers.

"I offered the first one of those in 1973, and the program sort of limped along until we hired Fred Snyder as our Extension agent," said Reutter. "I gave him the responsibility of expanding that workshop program, and it got a lot bigger under Fred's leadership and guidance."

So big, in fact, that it interfered with Snyder's Extension duties. "Fred simply didn't have time to do all these field trips at Stone Lab and still maintain a Sea Grant Extension program, so we hired John Hageman in 1987," said Reutter.

At the time, about 1,100 people were going through the program each year, an eclectic mix of students, workshop participants and legislative staffers, all interested in learning more about Lake Erie. Today, the Lake Erie Science Field Trip Program has grown to 8,000 participants a year, with the majority coming from elementary, middle and high schools across Ohio and eastern Michigan.

"The field trip was an outstanding experience," said Jackie Conry, who teaches science, technology, engineering and math (STEM) classes at St. Mary Catholic School in Vermilion and took her fifth-graders on a Stone Lab field trip earlier this spring. "A lot of times teachers are trying to find that real-world connection and I feel like Stone Lab really offers that. For the students to take the knowledge they gained in the classroom and see it happening in a real-world scenario, that was a great connection for them to see."

However, the field trip program continues to include elected and appointed government officials through events like Legislature Day and Decision Makers Day,

➤ HANDS-ON LEARNING

Field trips give students a chance to see science in action and relate it to their own experiences. This can help solidify classroom concepts, add new information and get students excited about learning more.



which help officials better understand critical problems and opportunities impacting Lake Erie. The events have resulted in new and modified legislation to protect the lake, a ban on algae-fueling phosphorus in detergent, new state agency offices, continued state budget support for Ohio Sea Grant, and recognition that Sea Grant staff are a resource for elected officials to understand and solve issues of critical importance to their constituents.

One of those issues is tourism: travel is a \$35 billion industry in Ohio, and the eight counties bordering Lake Erie account for about one-third of that business. That's a big impact on both local economies and the environment, and Ohio Sea Grant research and outreach helps businesses and local governments to balance a thriving economy with protecting the landscape that visitors come to enjoy.

Ohio Sea Grant also manages visitor experiences that create demand for travel themselves. The Aquatic Visitors Center (AVC) on South Bass Island, run by Ohio Sea Grant in partnership with the ODNR Division of Wildlife, educates almost 15,000 guests annually on the ecology and history of the lake, and Stone Lab and the South Bass Island Lighthouse offer periodic science and history tours during the summer months, when more than 800,000 guests visit South Bass Island and Put-in-Bay.



Read more about Stone Lab education and field trips on **page 8** of this issue.



Today, the Lake Erie Science Field Trip Program has grown to **8,000 participants a year**, with the majority coming from elementary, middle and high schools across Ohio and eastern Michigan.



› VISITING THE ISLAND

In addition to courses and field trips, Stone Lab and the Aquatic Visitors Center also host tours and interactive exhibits that introduce visitors to Put-in-Bay to Lake Erie science and history. Many kids use the free gear the AVC provides to catch their first fish, and families can meet native species like Lake Erie Watersnakes during Gibraltar Island tours.





*Dr. Rosanne Fortner developed Ohio Sea Grant's **first climate change curriculum** in the late 1990s, before climate change even became a concern for educators.*



Stone Lab Education Benefits Students and Educators Alike

Stone Lab's summer college courses continue the tradition of hands-on education by immersing students in Lake Erie science, often quite literally. All classes include at least some field trips, where students go out in the field to collect samples and experience the ecosystems they're studying first-hand.

Education has been at the heart of Ohio Sea Grant and Stone Lab since the beginning. Remember that very first research funding? It went to Dr. Vic Mayer in Ohio State's College of Education, and brought on Dr. Rosanne Fortner as a post-doctoral researcher, kicking off a decades-long career that established Ohio Sea Grant and Stone Lab as a leader in Great Lakes education.

"In terms of Great Lakes education, she's definitely known as the Queen of the Great Lakes," said Lyndsey Manzo, Ohio Sea Grant's education specialist, who completed her master's program under Fortner and now teaches educator courses at Stone Lab herself. "Rosanne is always on the cutting edge of what's coming in education, and always was."

Fortner developed Ohio Sea Grant's first climate change curriculum in the late 1990s, before climate change even became a concern for educators. That climate change curriculum was updated in 2013 with new data, updated science education standards and a new look, and is still available for teachers to use. Ohio Sea Grant's Global Change, Local Impact webinar series on the effects of climate change in the Great Lakes, and an associated iTunes U learning program that reached more than 70,000 people, also brought those lessons to an international audience.

"Through all the years that she has been doing Great Lakes and marine and aquatic education, even though she's been in the informal world, she's always stayed on top of what was



► EDUCATING EDUCATORS

Teacher courses and workshops during the summer offer professional development hours or graduate course credit. Educators learn about Lake Erie science and how they can bring that knowledge back to their classroom in engaging and creative ways.

happening in K-12 formal education to make sure that the professional development that she was providing was top-notch for teachers," Manzo added.

That emphasis on relevant education continues to permeate every form of teaching at Stone Lab and Ohio Sea Grant; whether it's a professional development course for educators or a talk at a fishing club, the focus is on showing people how Lake Erie science applies to their lives, how their actions can impact the lake, and how a healthy Lake Erie makes for better living all across Ohio.

WHERE
DO WE
GO FROM
HERE?



Ohio Sea Grant and Stone Lab have been a pillar of Lake Erie science, education and outreach for a long time, but the program has no plans to slow down anytime soon. With problems like harmful algal blooms and climate change impacts on the region an ongoing concern, and potential issues like plastics and pharmaceuticals pollution and new invasive species always on the horizon, staff will continue to work hard to make sure Lake Erie, its inhabitants and the surrounding communities are healthy and thriving for decades to come.

"Thirty years ago, the threat posed by zebra mussels showed that innovative, collaborative approaches are needed to help solve the critical issues Lake Erie faces. Ohio Sea Grant and Stone Lab were able to lead the charge then, and continued to do so whenever new problems emerged," said Dr. Christopher Winslow, director of Ohio Sea Grant and Stone Lab. "Today, we're addressing the problem of harmful algal blooms through partnered funding efforts like the Harmful Algal Bloom Research Initiative, funded through the Ohio Department of Higher Education, that continues our tradition of bringing together scientists and agencies throughout Ohio to help solve an issue. That's what Ohio Sea Grant has always been about." ●



Student

SPOTLIGHT >>

Marissa Ganzfried

Forging a Career, and a Lifetime of Memories

By Joy Snow

Marissa Ganzfried first visited Stone Lab in 2006 as a middle-schooler when her brother took a summer course there. Despite her only tagging along, Gibraltar Island fascinated her in a way she'd never before experienced. The beautiful view of the lake along with the smell of mist filling the air captured her imagination. She had always loved biology and the outdoors, but Stone Lab transformed appreciation of nature into fascination. Three years later, Marissa returned to the island for a one-week Introduction to Aquatic Biology course.

Stone Lab made Marissa the scientist and put her in the field to collect data. She experienced first-hand how aquatic environments influenced the animals that live in them and how those animals in turn influence their environments. Like a leaf on a river, Marissa was swept away. "After taking courses at Stone Lab," she said, "I knew I wanted to study environmental science."

And study she did. Marissa would return to Stone Lab twice more, once just after high school and again in college, this time for a five-week course and as a recipient of a Research Experience for Undergraduates (REU) Scholarship, where she worked closely with a professional researcher to study the preservation and cataloging of Lake Erie fish and aquatic samples. While the work was challenging, Marissa found she couldn't get enough of it. "It was easy to be inspired to learn in such a unique and beautiful place," she said.

Class wasn't the only aspect that she enjoyed though. "My favorite part was the relationships I formed with my professors and other students," she said. Late night insect-pinning parties with music and laughter formed a camaraderie like no other. Learning and working together with students who had similar interests not only created friendships; those same friends are now contacts in Marissa's professional network.

It's been a few years since Marissa last visited Stone Lab, but the science came ashore with her. Marissa is now an environmental specialist with the Ohio Environmental Protection Agency, where she works in the Division of Drinking and Ground Water to make sure public water is safe for consumption. Looking back, it's almost funny to her that it all started with a short boat trip, but that trip turned into a passion that she still has. And it's important to her that others have the same opportunities.

"It is so important to keep these experiences available," she said, "so those interested in science can be inspired." ♦

ENVIRONMENTAL SCIENCE

Environmental Specialist,
Ohio Environmental
Protection Agency



Marissa works to ensure public water is safe for consumption in the Division of Drinking and Ground Water.

"It was easy to be inspired to learn in such a unique and beautiful place."

MARISSA GANZFRIED



DONOR SPOTLIGHT

OPENING DOORS FOR FUTURE GENERATIONS

By Delfina Delisle, The Ohio State University Foundation



› LARRY CAPITINI

BS, Biological Sciences
and Anthropology;
MS, Veterinary Medicine

Larry Capitini's career has spanned over 40 years and 4 different continents. No matter where his education or career took him, he always remained grateful for the experiences and opportunities he received from The Ohio State University. Larry graduated from Ohio State with a BS in Biological Sciences and Anthropology and an MS in Veterinary Medicine.

"I continually reached new heights in my career and was able to embrace a vast array of roles—from teaching to practice to research and so much more," Larry said. "I did everything I could possibly want to do and achieve in my career, and Ohio State played a significant part in making that possible."

While attending Ohio State, his advisor, Paul Colinvax, helped him secure a research position with the World Health Organization in Perugia, Italy. He then moved to South Africa, did research at Rhodes University through a sponsorship from Bayer Pharmaceuticals and was awarded a degree from Rhodes for his work. After spending 12 years in South Africa doing research and in private practice, he was elected to the Royal College of Veterinary Surgeons in London and awarded a fellowship there. He later opened his own veterinary practice in London before moving back to Ohio to work for Ohio State.

Upon starting his career at Ohio State, Larry was impressed with the many advances in veterinary medicine that occurred since his student days, especially in areas of imaging and oncology and went to the College of Veterinary Medicine to catch-up. Before his retirement two years ago after 23 years of service, he was a faculty member in preventative medicine at the College of Veterinary Medicine and the Assistant Director of University Laboratory Animal Resources, winner of several teaching awards and served on several advisory boards throughout the university.

Larry strongly believes that teachers and universities open doors of endless opportunities for students. Today, Larry is showing his gratitude for the many opportunities he received with a gift to Ohio State in his will. Larry's gift will benefit both Stone Laboratory and the Chadwick Arboretum and Learning Garden by promoting research into the study and control of invasive species on land and water.

"I designated my gift to natural resources because it will open up doors for future students while also funding important research about the environment that will ultimately benefit everyone," Larry said.

STONE LAB

Introductory Courses (2 credits)

Monday-Sunday, open to advanced high school students and current college students.

June 3–9

KNSFHP 1140.05 Lake Erie Sport Fishing

EARTHSC 1107 Field-Based Intro to Oceanography

EEOB 1930 Intro to Biological Studies – Aquatic Biology

June 10–16

EEOB 1930 Intro to Biological Studies – Aquatic Biology

July 8–14

EEOB 1910 Intro to Biological Studies – Local Plants

July 29–August 4

ENR 2360 Ecology and Conservation of Birds

EEOB 1930 Intro to Biological Studies – Aquatic Biology

ENTMLGY 1260 Intro Insect Field Biology

REU Program

Stone Lab's six-week Research Experience for Undergraduates (REU) Scholarship Program must be paired with one of the six-week upper level courses. Students spend non-class days working with research supervisors, collecting data, analyzing discoveries and preparing a final presentation.

- › Invasive species and forest composition of the Lake Erie Islands (Botany)
- › Visual ecology of walleye and emerald shiners (Ichthyology)
- › Exploration of Lake Erie nutrient loading, hypoxic events (the "dead zone") and harmful algal blooms (Limnology)
- › Survival of birds inhabiting the Lake Erie Islands (Ornithology)



Upper Level Courses

Open to college students who are studying biological sciences, education and natural resources as well as science teachers.

SIX-WEEK COURSES – 4 CREDITS

Monday, Wednesday and Friday OR Tuesday, Thursday and Saturday

June 17–July 26

EEOB 3310 Evolution

EEOB 3410 Ecology

EEOB 5420 Aquatic Ecosystems – Ecology of Inland Waters

FOUR-WEEK COURSES – 3 CREDITS

Monday-Friday

June 3–28

ENR 4611 Environmental Interpretation and Visitor Services

ENR 5350.01 Taxonomy and Behavior of Aquatic Invertebrates

July 1–26

ENR 3700 Intro to Spatial Information for Environment and Natural Resources

ENR 5350.02 Taxonomy and Behavior of Fishes

ONE-WEEK COURSES – 2 CREDITS

Sunday-Saturday

May 19–25

EEOB 5910 Field Herpetology

Monday-Sunday

June 10–16

ENR 3280 Water Quality Management

July 29–August 4

EEOB 4950 Field Ecology

Non-Credit Workshops

- › **May 17–19** Lake Erie Sport Fishing
- › **May 22–24** Intro to Bird ID and Banding
- › **August 5–6** Algae Identification
- › **August 7–8** Dealing with Cyanobacteria, Algal Toxins and Taste and Odor Compounds
- › **August 13–15** Lake Erie Island Wetland Plant Field Identification and VIBI
- › **August 26–27** Planning to Prevent the Spread of Aquatic Invasive Species: AIS/HACCP
- › **September 21–22** Fish-Sampling Techniques
- › **TBD** Fish Aging

Tuition Assistance and Jobs

All students taking for-credit courses are eligible for scholarship funds. The average award for high school students in 2018 was \$600, while undergraduate students were awarded an average of \$800. Students enrolled in four- or six-week courses can also apply for part-time jobs at Stone Lab to cover the cost of room and meals.

Course credits are based on The Ohio State University semester credit system and are transferrable to most colleges.



OTHER COURSES – 1 DAY / 0.5 CREDIT

July 14

EEOB 5970 Larval Fish Identification

Educator Course (2 credits)

Open to both formal and informal educators and college students studying education.

July 20–26

EARTHSC 5189.05 Field Geology for Educators: Geologic Setting of Lake Erie

Educator Workshop (non-credit)

June 20–22

Enhancing Earth Science Education with Educational Technology



On the Island



VIEW VISIT
DETAILS ONLINE
ohioseagrant.osu.edu/visit



ISLAND FIELD TRIPS

Field trips are available
next spring and fall.

Learn more:
go.osu.edu/fieldtrips



SCIENCE CRUISE

Lake Erie

*On this 2-hour cruise,
students measure
current environmental
conditions, sample
algae and plankton
and collect and
identify Lake Erie fish.*



INSECT COLLECTING

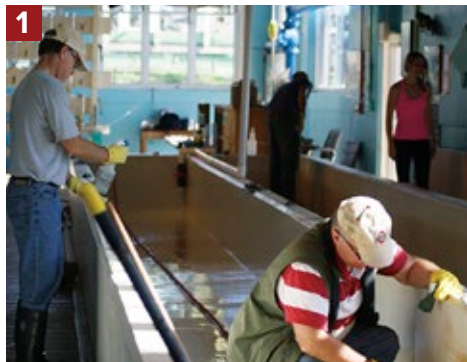
Gibraltar Island

*Students learn about
insects using diagrams
and specimens, then take
a peek at live subjects up
close and personal using
aerial nets and other
capturing techniques.*

HANDS-ON ECOLOGY

Aquatic Visitors Center (AVC)

*Students inspect Lake
Erie's complex ecosystem
through hands-on
displays, identify live fish
in aquaria, and discover
research that helps
protect the lake.*



STONE LAB / EVENTS

1 > BUCKEYE ISLAND HOP 2018

Save the date for the
2018 Buckeye Island Hop
on October 19-21.

Spend time with other
Stone Lab supporters,
complete a service
project on the Lake Erie
Islands, and re-live some
Stone Lab memories (or
make new ones) with
a stay in the dormitory.
Registration for the event
will open soon.

Learn more:
go.osu.edu/islandhop

2 > STONE LAB OPEN HOUSE 2018

Have you ever been curious about the Lake
Erie science that takes place at Stone Lab? Do
you want to take a peek inside Cooke Castle or
peer down from Perry's Lookout? Well, grab the
opportunity at the 19th Annual Friends of Stone
Lab (FOSL) Open House from 11 a.m. to 4 p.m.
Saturday, September 8, 2018.

Talks and laboratory sessions bring Lake Erie
science to life, and tours of the South Bass Island
Lighthouse introduce visitors to a piece of island
history. Guests can also stock up on Stone Lab
merchandise, with all proceeds benefiting future
Stone Lab scholarships.

Learn more: go.osu.edu/slopenhouse



> **STONE LAB MERCH**
*New Stone Lab merchandise
will be available for purchase
at the Open House.*



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Ohio Sea Grant and Stone Laboratory

The Ohio State University

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HALEY YEOMANS

DISCOVERING NEW PASSIONS

As a business major, Haley Yeomans wasn't the typical Stone Lab student. But for the recent graduate from The Ohio State University, who took classes on Gibraltar Island in both high school and college, expanding her horizons beyond classes in her major made learning a richer experience. "My experience at Stone Lab keeps me curious with my education," Haley said. "Stone Lab is a great opportunity to educate yourself about the world around you, have fun, and discover new passions!"

Read more about
education on

page > **8**