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TWINE LINE

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

Lights...Wetland...Action!

Nitrates and Sunlight are Keys to Pesticide Degradation in Lake Erie

by Jill Jentes Banicki, Ohio Sea Grant Communications

Wetlands have for years been known for their importance to flood control, shoreline stabilization, nutrient retention, and wildlife habitat. But new Ohio Sea Grant research conducted by Ohio State University's Yu-Ping Chin is documenting how sunlight on Lake Erie's coastal wetlands can play a key role in pesticide degradation.

Modern agriculture practices have relied heavily on fertilizers and agricultural synthetic organic compounds (ASOCs) for pest control. These chemicals enter the tributaries as runoff from crop applications, persist in waterways, and are resistant to degradation. As agricultural production and the reliance on pesticides have increased, so has the pesticides' ability to persist in these waterways. Lake Erie's tributaries are more likely to carry larger pesticide loads than tributaries entering other Great Lakes.

Wetlands, however, may provide a way to manage this nonpoint source pollution. Not only do wetlands allow water to collect from various sources before a final discharge into the Lake, but they also have been observed to improve water quality by eliminating suspended solids and some pesticides. Unfortunately, little is known about the chemistry behind their ability to remove pesticides.

Continued on Page 2

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Inside: North Coast News & Friends of Stone Laboratory

Sea Grant Ohio Sea Grant College Program

THE OHIO STATE UNIVERSITY

www.sg.ohio-state.edu

For Your Information

February Water Levels
Lake Erie's level declined during February. The mean level was 570.01 feet which is 0.30 foot lower than last month's mean level and 0.82 foot below normal. The 2003 level is 0.79 foot lower than the February 2002 level and .81 feet above the Low Water Datum elevation reference system. *TL*

2003 Kodak American Greenways Awards Program
The Conservation Fund, Eastman Kodak Company and the National Geographic Society are accepting applications for the 2003 Kodak American Greenways Awards Program. This small grants program provides seed money to stimulate greenway, blueway and trail planning and design. Applications are due June 1st. For information, go to ***www.conservation fund.org***. *TL*

Study Shows Fish Cannot Feel Pain
A large-scale study conducted by James D. Rose, a professor of zoology and physiology at the University of Wyoming, has concluded that fish do not feel pain. Awareness of pain depends on functions of specific regions of the cerebral cortex that fish do not possess. Previous studies that indicated fish can feel pain had confused "nociception" — responding to a threatening stimulus — with feeling pain. For more information, refer to the complete article *The Neurobehavioral Nature of Fishes and the Question of Awareness and Pain* from the journal *Reviews in Fisheries Science*, 2002, vol. 10, no. 1, pp. 1-38. *TL*

Stone Laboratory Courses are Still Open
It's not too late to register for Stone Laboratory 2003 summer courses. There are still openings in several classes, so plan now to attend this summer. For application materials and course information go to ***www.sg.ohio-state.edu*** , or call our Columbus office at 614.292.8949. *TL*

Fishing Licenses
Just a reminder to all Ohio anglers that since March 1st you are required to have a 2003-2004 fishing license. *TL*

Web Site of Interest
The Center for Environmental Science, Technology and Policy at Cleveland State University announces the posting of an analysis and presentation of the Lake Erie Commission's Lake Erie Quality Index at: ***www.csuohio.edu/cestp/sol/index.html***. The Lake Erie Quality Index is a composite of 10 indicators that reflect the quality of more specific aspects of the Lake, its environment and use. Four indicators directly assess the environment: Water Quality, Pollution Sources, Habitat, and Biological Diversity; and four others examine recreational use: Coastal Recreation, Fishing, Boating, and Beach Quality. The final two indicators examine economic impacts: Tourism and Shipping, which are two major industries of northern Ohio. A new expanded and updated Lake Erie Quality Index is being prepared for 2004 release by the Lake Erie Commission. *TL*

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WETLANDS *Continued from Page 1*

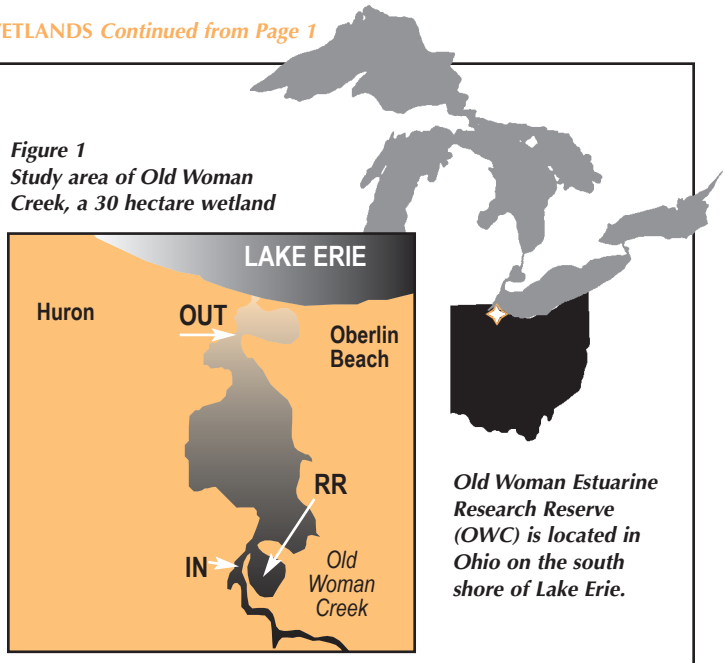


Figure 1
Study area of Old Woman Creek, a 30 hectare wetland

Old Woman Estuarine Research Reserve (OWC) is located in Ohio on the south shore of Lake Erie.

Figure 2
Relationship of Nitrate Levels (moles/liter) to the Indirect Photolytic Rate in pH-adjusted OWC Water Samples

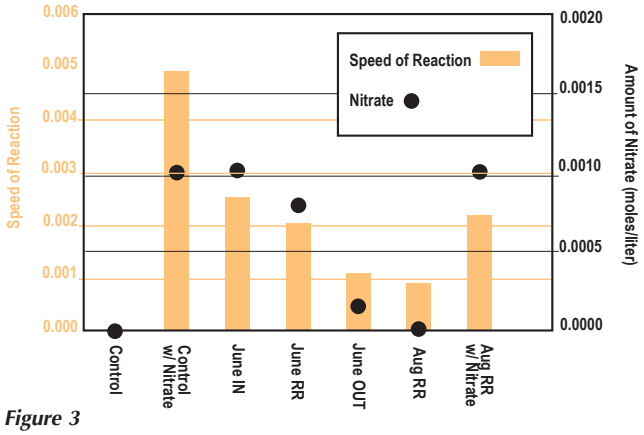
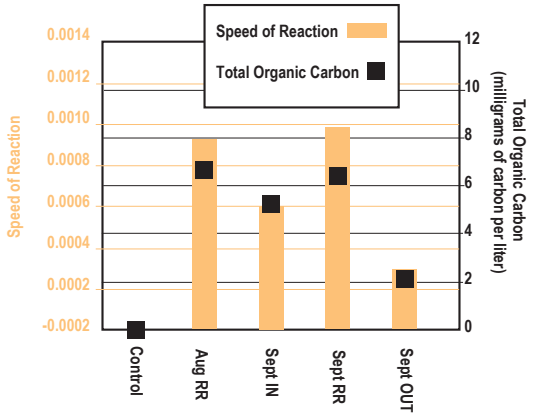


Figure 3
Comparison of the Indirect Photolytic Rate for the Degradation of Carbaryl by Natural Dissolved Organic Matter (milligrams/liter) in Low Nitrate pH-adjusted OWC Water Samples



Ohio Sea Grant research found that nitrate is a naturally occurring photosensitizer that degrades pesticides in Lake Erie's wetlands. When spring runoff occurred and nitrates were high in the water samples (June IN), the speed of the reaction was high. When nitrate levels were low, the speed of the pesticide degradation slowed.

Photo:
Old Woman Creek, Huron, Ohio – Courtesy of Gene Wright

Sunlight-induced reactions or photolysis may play a significant role in the break down of pesticides in wetlands, says Dr. Yu-Ping Chin, an associate professor in Ohio State's Geological Sciences department. While some contaminants have been found to degrade by directly reacting with sunlight (direct photolysis), there are many that cannot. Dr. Chin's team investigated the use of indirect photolysis, the process by which contaminants can degrade in the presence of a photosensitizer.

Because many compounds do not have the chemical structure to absorb light, they need a catalyst or photosensitizer to absorb the sunlight. When that photosensitizer takes up the sunlight, the energy is trapped and transferred to neighboring molecules to create reactive chemical radicals. These highly reactive chemicals react with and transform ASOCs to form other compounds. Dr. Chin's team investigated the role of natural dissolved organic matter (NDOM) and nitrates as potential photosensitizers in wetlands.

To test whether nitrates and/or NDOM can influence the indirect photolytic fate of ASOCs in wetlands, Chin conducted his research at Old Woman Creek Estuarine Research Reserve (OWC), a 30-hectare wetland located on the south shore of Lake Erie (see Figure 1). Water samples were taken from the inlet, the interior (railroad RR), and the outlet of the OWC wetland. Samples were collected in June when spring runoff occurs (shortly after fertilizers are applied), in August and September of 1998 (when fertilizer loads are presumably lower). The wetland water samples were analyzed for total organic carbon (TOC), nitrate, chloride, NDOM, and sulfate before being spiked with alachor, a common agricultural pesticide. With the use of artificial light to simulate sunlight, the samples were subjected to different periods of time, and compounds remaining in the sample tubes were analyzed and calculated.

What Chin found was that during high nitrate levels (June IN), the speed of the pesticide degradation increased (see Figure 2). When nitrates were low, as in Aug RR's sample, the rate of the reaction was proportionally slower. However, when that same sample was spiked with nitrate (Aug RR w/ nitrate) to a level similar to the June IN sample, the speed of the reaction increased to previously seen levels.

NDOM was also found to play an important role in pesticide degradation in wetlands (see Figure 3). When samples contained low amounts of nitrate as in the August and September samples, NDOM became the principal photosensitizer, and can account for up to 73 percent of the degradation.

As the Lake Erie region continues to be a dominant resource for agriculture, resource managers will need to find a cost efficient solution to its growing nonpoint source pollution problem. Chin says using its coastal wetlands may be a way to battle the problem.

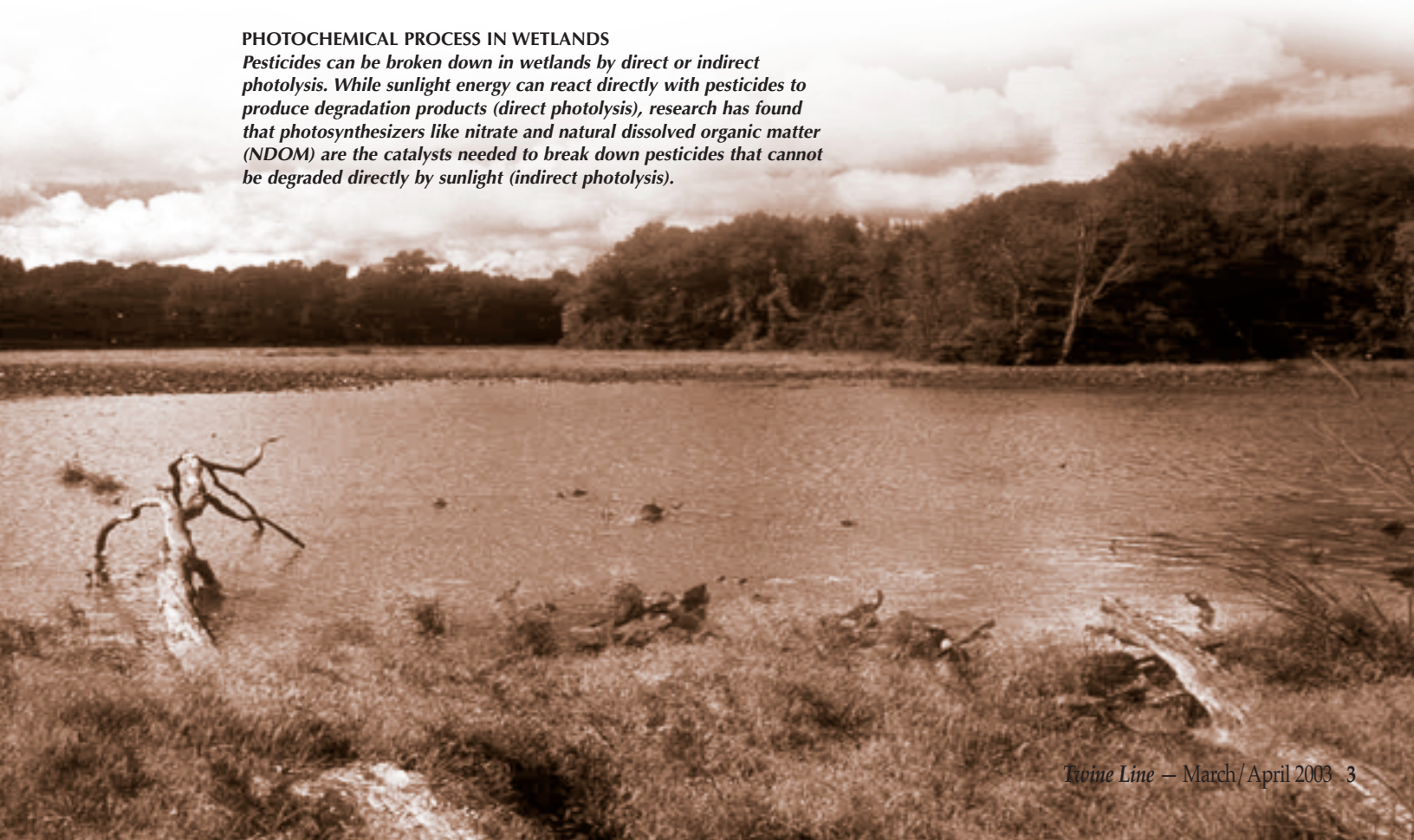
"The preservation of existing and the construction of new coastal wetlands around Lake Erie may provide a means of management needed for our nonpoint source problem. Understanding the photochemical mechanisms that control the changes of ASOCs is key to determining their effectiveness as natural "photochemical reactors" and ultimately whether wetlands can be used to remediate runoff prior to entering the Great Lakes," emphasizes Chin.

Dr. Chin plans to continue his research, examining pesticide degradation by sunlight as a function of depth in the water column, along with identifying the final degradation products resulting from his indirect photolysis experiments. *TL*

For more information about this Ohio Sea Grant funded project, call Dr. Chin at 614.292.6953 or email at *yo@geology.ohio-state.edu*

PHOTOCHEMICAL PROCESS IN WETLANDS

Pesticides can be broken down in wetlands by direct or indirect photolysis. While sunlight energy can react directly with pesticides to produce degradation products (direct photolysis), research has found that photosynthesizers like nitrate and natural dissolved organic matter (NDOM) are the catalysts needed to break down pesticides that cannot be degraded directly by sunlight (indirect photolysis).



ASK Your Agent

Sponsored by Ohio Sea Grant Extension

For answers to Lake Erie -related questions, visit the Lake Erie Information Discussion Board at ***www.sg.ohio-state.edu/discus***

Walter Williams, Cleveland

What are African-American fishing clubs doing to increase the participation of minorities in fishing?

by Walter Williams, Cleveland

On June 1, 2002 the North Coast Black Bass Anglers Association (NCBBAA), hosted its first annual "Hooked on Fishing Not on Drugs" event. Over 160 youths along with some parents were treated to a wonderful experience at Forest Hills Park in East Cleveland. These youths were able to catch catfish, bass, and bluegill that were stocked in the lake as a direct result of efforts from members of NCBBAA. This effort was repeated in September. The club expects to hold this event annually.

This unique club is dedicated to wiping out gang violence and teaching others about drug prevention and the dangers of using drugs. According to NCBBAA's Mark Pullen, "This event is one of several events that have introduced the fun and excitement of fishing to youths who would not have exposure to this activity without the efforts of NCBBAA."

Dave Kelch, District Specialist for the Ohio Sea Grant provided expert advice and consultation for stocking Forest Hills Park Lake. Since this lake is shallow, it will need to be restocked annually for this event.

The program innovatively blends its history as one of the first widely recognized African- American fishing organizations with an activity that is healthy and exciting. According to Herb Wilborn from NCBBAA, "We meet the challenges of increasing participation of African-American adults and youth in the sport of bass fishing, through fellowship, friendly competition, on-going cultivation of expert fishing techniques, and conservation education. We encourage cross-cultural partnerships with other sport fishing organizations, thereby becoming a vehicle in which anglers of all skill-levels, backgrounds and cultures can comfortably participate, compete and grow."

In addition, the club has partnered with the Ohio Department of Natural Resources and the East Cleveland Public School District's, *School Days Activities* event. About 400 children were able to get information about fishing from club members. Members commented that there was nothing like sharing their knowledge and time with our children.

For more information, go to *www.black-bass-anglers.com* or e mail *NCBBAA@Black-bass-anglers.com*. TL

Publications

Selected Titles from Ohio Sea Grant

Ohio Sea Grant produces a wide range of publications ranging from fact sheets and brochures to more technical publications such as journal reprints (based on Ohio Sea Grant funded research) and technical reports. A list of selected publications is included here in addition to other titles on the back page. Publications are free unless noted otherwise; prices include shipping. Prepayment is required by **check or money order made payable to The Ohio State University.**

Send requests to **Ohio Sea Grant Publications** at 1314 Kinnear Rd., Columbus, OH 43212-1194, or e-mail orders not requiring payment to *cruickshank.3@osu.edu*. Include your name, address, and daytime phone, along with publication title(s) and reference number(s).

Brochures

B-056a Ohio Sea Grant Publications brochure (revised 2002)

Fact Sheets

FS-025a Lake Erie's Water Levels (revised 2001)

Guide Series

GS-001 Guide to Fishing Reefs in Western Lake Erie ($3.00, includes map)

GS-008 Guide to Fshing Reefs in Central Lake Erie ($3.00, includes map)

GS-019 2003 Western Lake Erie Guide to Public Waterfront Access, Marinas and Events

Journal Reprints

RS-268 Changes in Genetic Structure of North American *Bythotrephes* Populations following Invasion from Lake Ladoga, Russia (2002)

RS-269 Great Lakes Educational Needs Assessment: Teachers' Priorities for Topics, Materials, and Training (2002)

RS-270 Dynamics of a Pioneer Population of Eurasian watermilfoil (*Myriophylum spicatum L.*) in a Shallow Lake Erie wetland (2001)

RS-271 Genetic Variability and Phylogeographical Patterns of a Nonindigenous Species Invasion: A Comparison of Exotic vs. Native Zebra and Quagga Mussel Populations (2002)

Technical Bulletins

TB-060 2001 Tourism Customer Survey: Cedar Point/ Lake Erie Islands Region (2002; $1.80; 18 pp)

TB-061 The Future of Curbside Recycling in Lake County, Ohio: A Report on Residents Views (2002; $2.00; 20 pp)

TB-062 Soil and Water Issues in Cuyahoga County, Ohio: Survey results (2002; $1.60; 16 pp)

TB-063 Land Use Issues and Concerns in Lake County, Ohio: Survey Results (2002. $1.70; 17 pp)

Shrimp in Ohio's Ponds?

by Christina Leighfield, Ohio State University South Centers

Freshwater shrimp, or more correctly, freshwater prawn, is a hot topic in Ohio. Ohio Sea Grant, the Ohio Agricultural Research and Development Center, Ohio State Extension, and the Ohio State University South Centers Aquaculture Program collaborated on an on-farm demonstration of freshwater shrimp culture this past summer. This project was designed to determine the applicability of freshwater prawn production research conducted in Kentucky to Ohio small farms. It was also intended to evaluate the potential of freshwater shrimp as a sustainable cash crop for southern Ohio farmers by determining production potential and market opportunities.

The on-farm demonstration was conducted in nine ponds during the summer of 2002. Participants were required to own or build a pond and have access to electricity to run an aerator. Staff from Ohio State's South Centers Aquaculture Program and county agents provided support, aerators, and data collection throughout the summer as part of the demonstration. Each pond was randomly assigned a treatment based on previous research results: 16,000 shrimp per acre no substrate, 24,000 shrimp per acre no substrate, or 24,000 shrimp per acre with substrate. The prawns were delivered and stocked on June 13. Soil and water samples were taken at stocking, midway through the production cycle, and at harvest. Feed was delivered monthly from a feed mill in Pennsylvania and harvest occurred throughout the month of September.

On-farm demonstrations at Ohio State's South Centers Aquaculture Program evaluated the potential of freshwater shrimp as a sustainable cash crop for southern Ohio farms.

Production varied from 0 to 1000 pounds per acre. Older more established ponds had higher production than the newly built ponds. This may be due to supplemental feeding by the shrimp on aquatic insects in the established ponds. Information gathered from the soil and water samples should aid future production of the ponds, and determine the best applications that can be used on ponds (such as liming the ponds in the spring and fertilization). The samples are presently being analyzed and results will appear on the web site as soon as they are available.

Each of the shrimp growers successfully marketed his product. One grower placed advertisements in the local Community Common newspaper, approximately a month before harvest, and took preorders. Another grower had smaller shrimp and sold his shrimp as bait. Hocking College sold its shrimp at the local farmers' market and the last grower sold his to friends and family. Further study is needed to determine additional markets for freshwater prawn. In addition, researchers plan to explore how far north in Ohio the prawns can be grown. *TL*

For more information about the Sea Grant funded research, log onto the Freshwater Shrimp On-Farm Demonstration web site at: ***http://south centers.osu.edu/aqua/OSUSII.htm*** or contact Laura Tiu (*tiu.2@osu.edu*) or Christina Leighfield (*leighfield.1@osu.edu*) at the Ohio State University South Centers, 1864 Shyville Rd., Piketon, OH 45661-9749; 740.289.2071, or 800.297.2072 (in Ohio only).

Matt Thomas

Dear Friends,

Already this year, hundreds of middle school and high school students will have experienced hands-on learning at Stone Laboratory. Many of these students have never been on a boat, let alone pulled in a trawl net by hand. This is where many of the future students of Stone Lab get their start.

I want to also thank all of you who attended the Winter Lecture event last March at the Fawcett Center. I was happy to see many familiar faces of students, staff, and researchers representing several decades at Stone Laboratory. Many thanks to the sponsors for making our silent auction an ever-increasing success. We doubled our donations from last year to more than $1,200. This money will be put toward our sustaining fund.

Thanks Dave and Fred for the excellent advice on fishing in the central and western basins of Lake Erie. I will be sure to put the advice on catching steelhead in some of the central basin's tributaries to good use before it's too late. And thank you, Jeff, for bringing us up to date with the concerns of a possible link between increasing phosphorus and exotic species.

Sincerely,
Matt Thomas
FOSL President
thomas.347@osu.edu

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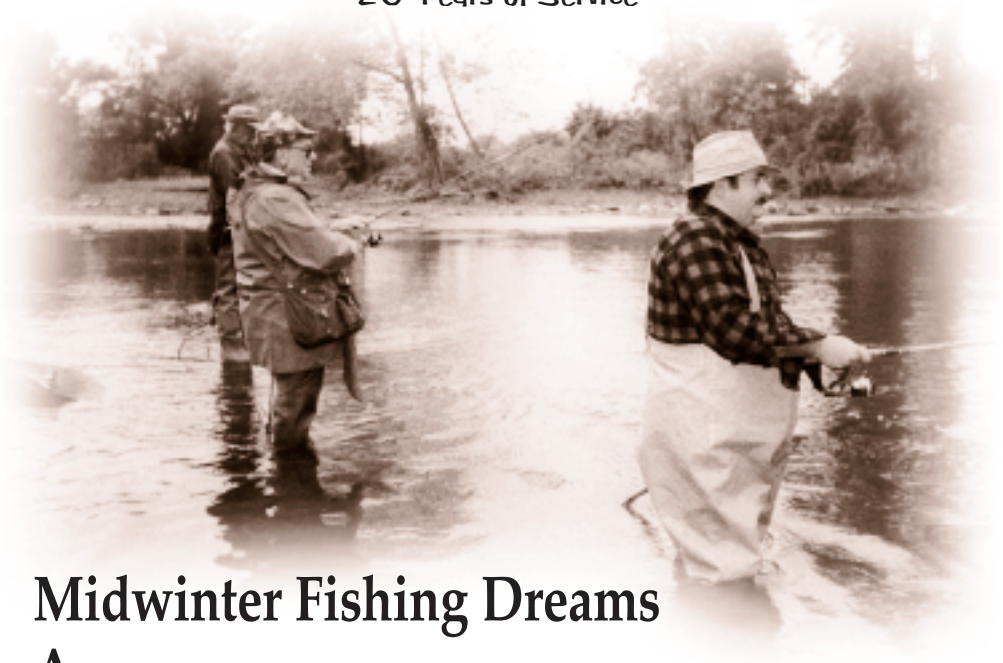
20 Years of Service



Midwinter Fishing Dreams

After a winter of many cold days and plenty of snow, the first relatively warm day in a long time started people thinking of their favorite spring activities. The timing was good. The 5th annual Ohio Sea Grant College Program/ Friends of Stone Laboratory Winter Lecture was held that night, March 4, 2003 and was centered on the topic of sport fishing in Lake Erie. A turnout of approximately 100 people came to the Fawcett Center to view the displays from the allied Lake Erie programs and to hear about Lake Erie sport fishing, with a little science mixed in. To wet everyone's appetite, there was even a cooler on display which contained two large steelhead trout caught just the previous day from a stream along Lake Erie.

Jeff Reutter and Matt Thomas welcomed all the attendees to the lecture. While Reutter gave a brief overview of the Ohio Sea Grant Programs, Thomas spoke about some of the many volunteer activities of FOSL and emphasized that monetary contributions made to Stone Laboratory allowed the Lab to purchase items such as row boats, computers, video projectors, and supported student scholarships. He summed up the activities of FOSL as "The students of the past, helping the students of the present and future."

Dr. Reutter brought science to the lecture by discussing the Lake Erie ecosystem, the Dead Zone, and invasive species. He described how Lake Erie is the shallowest, warmest, most southern, and most productive of all of the Great Lakes. The shallow nature of the lake makes it much more susceptible to the effects of outside influences like run-off (silt), nutrient (phosphorus) inputs, toxic chemicals, and invasive species like the zebra and quagga mussels. There is no doubt that Lake Erie made a dramatic turn around over the past three decades. However, with the re-emergence of an anoxic hypolimnion (dead zone) in the central basin over the past several years, it is evident that more investigation needs to be done to understand this problem. Keeping with the theme of the Lake Erie fishery, it is important to remember that in spite of all of the challenges to the ecosystem of Lake Erie, it produces more fish than the other four Great Lakes combined.

Fred Snyder, Ohio Sea Grant Extension Specialist, gave a very balanced and positive outlook for sport fishing in the western basin of Lake Erie this year. There

Silent Auction

With the help of many fine businesses and patrons, a silent auction was held during the evening program. Items ranged from gift certificates to fine restaurants, grocery stores, and sporting goods stores; gift baskets; entertainment discount books; and of course a variety of fishing equipment, rods, and reels. A total of $1,280 was generated from donations and auction bids. Many thanks to all who attended the lecture and bid on auction items. Your contributions will help support many students at Stone Laboratory.

The businesses and patrons listed to the right donated items for the auction. Be sure to support these businesses and thank them for their generosity. *FOSL*

Boathouse Bar & Grill, Put-in-Bay, OH
Bob Evans Farms
Cameron Mitchell Restaurants
Bonita and Vince Cordi
Entertainment Publications
Frog Ranch Foods, Glouster, OH
Gander Mountain, Hilliard, OH
Jones Potato Chips, Mansfield, OH
Kroger Inc.
Larson's Toys & Games, Columbus, OH
Lazy Daisy Gifts, Grove City, OH
Miller Ferry, Put-in-Bay, OH
Mohican Resorts & Conference Center
Ohio State Univ. Athletic Department
Pheasants Forever, Erie-Ottawa-Sandusky Counties Chapter
Charlene and Bill Prochazka
Pure Fishing, Spirit Lake, IA
R & R Sports, Columbus, OH
Darla Stacy Family, Green Springs, OH
U.S. Sportsmen's Alliance

will be ample stocks of the prime sport species walleye, perch, and smallmouth bass. Anglers may not have limit catches of trophy fish everyday they are out, but there are plenty of fish to catch.

With a good forecast of fish stocks, Fred went on to ask, "Are you fishing harder, or fishing smarter?" The ecosystem of Lake Erie has changed dramatically over the past decade. The fishing techniques that worked every time in the late 80s do not continually produce boatloads of fish in today's lake. Fred stressed, "that versatility and mobility have replaced predictability". Today, the successful Lake Erie angler must be willing to move to where the fish are and try new or alternative techniques. Some of the techniques that were discussed were the use of diving planes, planer boards, bottom bouncers, and fishing earlier or later in the day. He urged anglers to "think outside the box" and try new ideas when the old ones aren't producing. His best advice for catching fish consistently had nothing to do with bait, poles, or fish finders. He advised that anglers do their research and use the Internet. There are numerous bulletin boards and posted fishing reports that a computer savvy angler can use to prepare for his or her next trip out on the lake.

Dave Kelch, Ohio Sea Grant Extension Specialist, followed with his outlook on fishing in the central basin of Lake Erie. He too echoed many of the same comments that Fred had emphasized. The fishery in the central basin requires that anglers be mobile. The central basin is not only larger, but also deeper. Successful anglers must be able to reach down to where the fish are by utilizing deep trolling techniques.

While walleye, perch, and smallmouth bass are still sought after sport fish, the steelhead trout are now a major attraction for central basin anglers. This is a stocked fishery, but the fish survive well in the lake and provide a year round fishery for the hardy angler. During the late fall and winter, the steelhead migrate to virtually all of the streams and rivers that drain into Lake Erie. Using basic techniques, winter anglers can satisfy their need for casting by wading into a nearby stream.

Both Fred and Dave emphasized that an important part of fishing is to take your children. The future of all outdoor sports is to interest and involve the youth of today. Fishing can be a great family activity! *FOSL*

FOSL Events

Ohio Academy of Science's State Science Day
May 3

Stone Lab Open House
September 6 (Open to Public)

FOSL Weekend
September 6-7 (FOSL Members Only)

Former Sea Grant Fellow Chosen NOAA Employee of the Year

Dr. Mark E. Monaco, an alumnus of The Ohio State University and former manager of the Franz Theodore Stone Laboratory (1981-1983), was recently selected as the 2002 NOAA-National Ocean Service (NOS) Supervisory Manager Employee of the Year. The award recognizes outstanding achievements in the management of NOS's Marine Biogeography Program under the direction of Dr. Monaco. Dr. Monaco obtained his degrees at Ohio State in Fisheries Management in 1981 (B.S.) and a M.S. in Environmental Biology in 1984. In addition, in 1984 Dr. Monaco represented The Ohio Sea Grant College Program as a Sea Grant Fellow in Washington, D.C. and spent his fellowship year in NOAA's National Marine Pollution Program Office. After obtaining his Ph.D. in Marine Biology from the University of Maryland in 1995, Dr. Monaco became the director of NOS's Biogeography Program. This program conducts research, monitoring, and assessments on the distribution and quality of habitats in marine and estuarine environments and defines the strength of coupling between those habitats and the distribution and abundance of living marine resources. His current research focuses on defining and assessing the effectiveness of marine protected areas (MPAs) and the mapping and monitoring of coral reef ecosystems in the US Caribbean and Pacific. Most these field-based investigations are conducted Jan-Aug during the year as Dr. Monaco can be found most fall Saturday afternoons in Ohio Stadium rooting for our National Champion Buckeyes. *FOSL*

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Ohio Sea Grant Staff

Dr. Jeffrey M. Reutter, *Director* .....reutter.1@osu.edu
Karen T. Ricker, *Assistant Director/Communications* .....ricker.15@osu.edu
Dr. Rosanne W. Fortner, *Education Coordinator* .....fortner.2@osu.edu
Bonita Cordi, *Office Associate*.....cordi.2@osu.edu
Nancy Cruickshank, *Publications Manager*.....cruickshank.3@osu.edu
Cindy Hayter Allison, *Graphic Designer* .....hayter.2@osu.edu
Jill Jentes Banicki, *Editor & Science Writer* .....jentes.1@osu.edu
John Tripp, *Fiscal Manager* .....tripp.3@osu.edu

Ohio Sea Grant Extension

Frank R. Lichtkoppler*.....lichtkoppler.1@osu.edu
Lake County Extension Office, 99 E. Erie Street, Painesville, OH 44077
440.350.2582, Fax 440.350.5928

Fred L. Snyder* .....snyder.8@osu.edu
Camp Perry, Building 3, Room 12, Port Clinton, OH 43452
419.635.1022 (Phone & Fax)

John R. Hageman, Jr. .....hageman.2@osu.edu
F. T. Stone Laboratory , P. O. 119, Put-in-Bay OH 43456
419.285.2341 or 614.247.6502, Fax 614.247.6578

David O. Kelch.....kelch.3@osu.edu
Lorain County Extension Office, 42110 Russia Road, Elyria, OH 44035
440.326.5851, Fax 440.326.5878

Joe Lucente .....lucente.6@osu.edu
Lucas County Extension Office, One Gov. Ctr, Suite 550, Toledo, OH 43604
419.213.4254, Fax 419.213.4241

Walter D. Williams.....wwilliams@clevegrowth.com
Greater Cleveland Growth Association, 200 Tower City Center, 50 Public Square
Cleveland, OH 44113-2291, 216.621.3300, Fax 216.621.6013

**Extension Program Co-Coordinators*

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__Guide for Put-in-Bay.....$4.00
__Technical Publications Brochure .....free
__Artificial Reef Fact Sheets (FS-072).....free
__Guide to Lake Erie Western Basin Fishing Reefs (GS-001).....$3.00
__Guide to Fishing Central Lake Erie (GS-008) .$3.00
__Beaches Fact Sheet (FS-078).....free
__Lake Erie Cookbook (GS-005) $4.00
__FOSL T-Shirt $13.00
__Water Levels Fact Sheet (FS-025).....free
__Shipwreck Dive Slates (GS-020).....$15.00

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Field Station Address
F.T. Stone Laboratory, The Ohio State University
PO Box 119, Put-in-Bay, OH 43456
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Franz Theodore Stone Laboratory, Ohio's Lake Erie laboratory, offers intensive, hands-on university field courses from June to August in biology, geology, education, and natural resources. Workshops and group field studies are offered from mid-April through October. Research in aquatic, terrestrial, and island sciences has been conducted year round since 1895. Stone Laboratory's association with other programs based at The Ohio State University—the Ohio Sea Grant College Program, the Great Lakes Aquatic Ecosystem Research Consortium (GLAERC), and the Center for Lake Erie Area Research (CLEAR)—has made it an important research facility. Stone Laboratory is located on Gibraltar Island, across the harbor from Put-in-Bay.

Stone Laboratory Staff

Dr. Jeffrey M. Reutter, *Director* .....reutter.1@osu.edu
Dr. Rosanne W. Fortner, *Associate Director* .....fortner.2@osu.edu
John Hageman, *Laboratory Manager* .....hageman.2@osu.edu
Matt Thomas, *Assistant Laboratory Manager*.....thomas.347@osu.edu
Arleen Pineda, *Program Coordinator*.....pineda.2@osu.edu
Kelly Dress, *Office Associate*.....dress.3@osu.edu

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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