2010-2013 Ohio Sea Grant College Program Performance Review Panel Report Program Summary

For over 35 years, Ohio Sea Grant has worked to restore Lake Erie and rejuvenate the economy. Through a combination of research, education, and outreach, Ohio Sea Grant works with stakeholders and partners to solve Lake Erie's most pressing environmental and economic issues. At its Stone Lab field station, Ohio Sea Grant annually offers about 25 college courses to high school students, teachers, and college students from over 110 colleges and over 360 high schools and has provided over 900 students with $710,000 in scholarships. To strengthen STEM education, Stone Lab field trips have provided 200,000 students of all ages with a hands-on opportunity to be Lake Erie scientists for a day. Using three of its 22 endowments, Stone Lab's Research Experience for Undergraduates Scholarship Program annually supports 10 students on research projects supervised by leading scientists.

Investment Per Focus Area

Focus Area	Percentage	Federal (+ Match + pass thru)	Leveraged
Healthy Ecosystems	37%	$2.85 Million	$3.89 Million
Sustainable Coastal Development	21%	$2.00 Million	$1.70 Million
Hazard Resilience	27%	$2.94 Million	$2.07 Million
Safe and Sustainable Seafood	15%	$1.25 Million	$1.56 Million

Addressing Lake Erie issues is most effective with coordination throughout the Great Lakes. Ohio Sea Grant led the creation of the Great Lakes Research and Outreach Consortium (GLROC), which allows Great Lakes Sea Grant Network programs to accept subcontracts from other programs without charging indirect costs. Ohio Sea Grant also hosted Sea Grant Extension Program Leaders and Communicators for their biannual conference in 2011.

Ohio Sea Grant has funded over 600 projects with over 600 graduate students and 420 researchers from 20 universities working on critical issues, including assessing the impact of birding on Lake Erie tourism, modeling sediment movements and shoreline erosion, techniques to track fish movements, increasing growth of cultured fish, and tracking a potentially devastating fish virus (VHS). Ohio Sea Grant also leads the way in addressing excessive nutrient loading, harmful algal blooms, and the Dead Zone. This leadership has resulted in funding of 40 projects valued at $10 million in the past four years, the results of which are being used by three state agencies.

Because engagement with the public is equally as important as research and education, Ohio Sea Grant's communicators continue to find innovative ways to inform stakeholders. The program's award-winning magazine, *Twine Line*, reaches more than 25,000 people every issue and partnerships within one of the largest universities in the country have helped Ohio Sea Grant expand its campus outreach through unique venues such as ticker boards at Ohio State's football stadium.

To ensure Lake Erie messages are consistent throughout education and communications, Ohio Sea Grant led development of Lake Erie Literacy Principles. Finalized in 2011, the Principles are consistent with NOAA Ocean Literacy Principles and were used as the model for COSEE's Great Lakes Literacy Principles. These resulted in teacher education courses at 10 universities and were used as a foundation for exhibit and program development at multiple museums and parks.

One of Sea Grant's greatest strengths is its ability to continually broaden its reach to more Ohio citizens. Through initiatives like the Tourism Leadership Academy, Ohio Sea Grant has armed tourism industry leaders with tools, contacts, and knowledge to be more effective and successful. Ohio Sea Grant's programs at the Aquatic Visitors Center, South Bass Island Lighthouse, and Stone Lab annually convey the complexities and importance of Great Lakes issues to more than 30,000. The ultimate goal is to instill a desire to be Lake Erie stewards. Further, partners like the Lake Erie Nature and Science Center have continued to relay Ohio Sea Grant's messages through displays and programming to over 100,000 annually. Ohio Sea Grant was named the top outreach program at Ohio State University in 2009.

Safe and Sustainable Seafood Supply

Ohio Sea Grant Safe and Sustainable Seafood Goals

- Healthy Lake Erie fisheries that harvest, produce, process and/or market fish products responsibly and efficiently.
- Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of Lake Erie fisheries, who appreciate the health benefits of fish consumption and who understand how to evaluate the safety of the fish they catch.
- Sustainable fisheries that meet public demand.

Safe and Sustainable Seafood represents 15% of Ohio Sea Grant's efforts. Most seafood activity within the Ohio portion of Lake Erie is generated by the lake's fishery, including its abundant sport fishing and limited commercial activity. In recent years, emerging threats to the lake's overall vitality, which also impact the fishery, have increased in importance. Ohio Sea Grant has made substantial impacts to create an enhanced and healthy fishery, generating leaders aware of fishery issues, increasing fishery productivity and profitability, mitigating aquatic invasive species, educating the public about fishery issues, and increasing aquaculture productivity and profitability.

Lake Erie's fishery is part of the fabric of Ohio's coastal communities, affecting community businesses, cultural traditions and local pride. Sport fishing in particular is a major component of Lake Erie tourism, contributing more than $1 billion annually to local economies. Generations of residents have earned a living through the fishery and Friday night fish fries are a common venue for bringing communities together. Protecting this cultural tradition and economic force is important for preserving jobs, income and tax revenues.

The last few years have introduced new threats to a healthy fishery and have led to increased media and public awareness of emerging issues and long-term pressures to a healthy fishery and ecosystem. The increased saliency of Lake Erie issues has created greater demand for Ohio Sea Grant research, education and information. Combined with the continued operation of the Aquatic Visitors Center (a former fish hatchery at the popular Put-in-Bay tourism destination), Ohio Sea Grant has far exceeded projections for reaching the public with fisheries information. The following sections will highlight our efforts to promote and support safe and sustainable seafood: (1) enhanced, healthy wild fishery, (2) boosting businesses, (3) mitigation of aquatic invasive species and (4) new ways to educate visitors. These sections will also highlight numerous research endeavors, outreach opportunities and partnerships Ohio Sea Grant has used to reach its safe and sustainable seafood goals.

Due to report constraints, Ohio Sea Grant accomplishments and impacts related to aquatic invasive species are presented in this section, those most associated with climate change are included in the PRP report for Hazard Resilient Communities, and those targeting sustainable coastal development are included in the PRP report for Sustainable Coastal Communities.

Enhanced, Healthy Wild Fishery

Walleye and yellow perch are the two most economically important fish species in the lower Great Lakes. To successfully conserve these species, the Great Lakes Fishery Commission prioritized the identification of impediments to population growth and options for rehabilitating fish stocks. Ohio Sea Grant funded research from 2007 through 2012 that explored (1) genetic variation in the two species, particularly related to their tendencies to return to spawning grounds and (2) travel patterns so that fisheries managers can direct conservation efforts to the most important areas. Genetic analysis of walleye and yellow perch populations in the Great Lakes has shown that fish coming from different areas of the lake are remarkably diverse, considering the potential for stock mixing in the open lake. Walleye, which tend to return to their "home stream" to spawn, are more genetically diverse than yellow perch, which are more flexible in where they spawn and therefore intermingle with different breed stocks more. Greater understanding of these behaviors has led to improved regional management and better-informed researchers and fisheries professionals.

Lake Erie steelhead fishing has grown in popularity and economic importance, and the state's roughly $600,000 stocking program produces $35 million annually in gains related to increased angler spending. At around 300,000 hours per year of participation, steelhead fishing has expanded tremendously, making them the third most popular fish species in Lake Erie. Ohio and Pennsylvania hatchery managers and state fish biologists have begun modifying their stocking strategies due to Ohio Sea Grant-funded research that has helped track steelhead returns to their spawning sites. Using these data, biologists have now started to stock further upstream to maximize time for steelhead to imprint on their native tributaries, increasing the probability of return.

Ohio Sea Grant has also led efforts to restore habitat that supports healthy fisheries. The lower two miles of the Ashtabula River were designated as one of 43 Areas of Concern (AOC) by the International Joint Commission (IJC) in 1987. Since 1988, Ohio Sea Grant has worked with the local community to remediate the environmental damage. The construction of over 2,500 feet of fish habitat and reclamation of about ten acres of wetlands on the lower Ashtabula River is complete, and has led to an increase of more than 100% in fish populations in one part of the AOC.

Approximately 10% of the historic wetlands that existed along the Ohio portion of Lake Erie currently remain. Because this habitat has been removed, many beneficial wetland services are no longer occurring. Ohio Sea Grant partnered with The Nature Conservancy and Ducks Unlimited to provide fish population data on a restoration project that will transform 230 acres of farmland back into wetland habitat on the northwest Ohio shores of Lake Erie.

Threats to the Great Lakes fishery continue to require monitoring. For example, Viral Hemorrhagic Septicemia (VHSv), which causes massive fish die-offs, threatens Great Lakes fisheries and the economy. A monitoring program using electro-shocking equipment was conducted by Ohio Sea Grant in collaboration with the Ohio Department of Agriculture and the US Fish and Wildlife Service to help refine the regulatory proclamation on interstate fish movement and to prevent the spread of the disease inland from Lake Erie. Ohio Sea Grant research led to greater understanding of the timing and ecological impacts of VHSv, essential

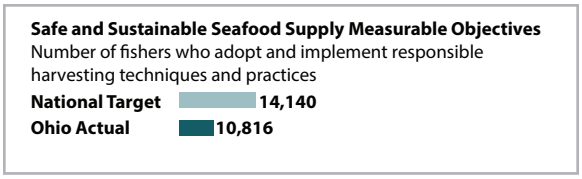
for developing management controls. In addition, working with several state and federal partners, Ohio Sea Grant researchers have developed a new rapid StaRT-PCR test that is VHSv specific, rapid and inexpensive and has significantly greater accuracy than other published diagnostics. Further work will implement this procedure at the Ohio Department of Agriculture and help develop a commercially available kit. This will create Ohio jobs and help protect the state's fisheries, aquaculture and tourism.

Boosting Businesses

Ohio has the largest charter fleet in the Great Lakes, yet the fleet's vibrancy and value is at risk from socioeconomic and environmental changes. Ohio Sea Grant works directly with captains and their networks to help charter captains adapt to a constantly changing environment. An annual charter captains conference reaches up to 25% of licensed captains in the state with updates on fishery resource management, business practices, laws and regulations, and marine technology. Evaluations show that 40% of attendees increase their business's profitability after attending the conference, attracting more money to Ohio's coastal economy and providing a better product for Lake Erie visitors.

While most Lake Erie fishing is done from boats, a small but significant portion of anglers fish from docks, jetties and piers along the shoreline. A survey performed by Ohio Sea Grant, ODNR Division of Wildlife and OSU Extension shows that shoreline anglers spend about $1.13 million locally. This information will allow managers and policy makers to improve shoreline access, water quality and the development of amenities for shoreline anglers.

Ohio Sea Grant is also involved in the enhancement of aquaculture. Demand for yellow perch, the traditional fish used in local restaurants and by consumers in many Great Lakes states, is high. Aquaculture sales in Ohio tripled from $1.8 million to $6.6 million in 2010, with much of those sales being farmed yellow perch. As with all agriculture products, selective breeding to enhance desired traits has improved production. Now, researchers at The Ohio State University's South Centers are continuing to improve on a strain of yellow perch that grows 30% faster on less food than unimproved fish. These genetically-improved perch have been distributed to fish farmers statewide for field-testing, creating added revenues and markets.



Budget cuts at the state level have impaired the ability of Ohio Environmental Protection Agency and Ohio Division of Wildlife fisheries managers to train new staff in fisheries management techniques. Stone Lab offers a workshop on the agencies' fish sampling techniques each fall, not only training potential new staff in valuable skills, but also saving state agencies money by allowing new hires to start work more quickly. As of 2010, 10 participants have taken on positions with the collaborating agencies and two have returned to help teach the workshop along with senior agency staff.

Mitigation of Aquatic Invasive Species

Aquatic Invasive Species (AIS) threaten the nation's lakes, rivers, wetlands, estuaries and oceans. As many as 136 invasive species inhabited Lake Erie in 2012, greatly outnumbering the ones present when Ohio's last AIS management plan was created. Ohio Sea Grant worked with the Ohio Division of Wildlife to create the new Ohio AIS Management and Rapid Response Plan, taking into account the latest science

available and providing a template for state agency actions against AIS. Ohio Sea Grant continued its work in preventing AIS by focusing on Asian carps, which could have a devastating impact on the Lake Erie ecosystem. Ohio Sea Grant led a Great Lakes Sea Grant Network effort to collaborate with invasive species experts and compile currently available education materials on Asian carps, identify gaps in the materials, and filling those gaps in future work.

In addition, Ohio Sea Grant has collaborated with the Great Lakes Sea Grant Network on multiple region-wide outreach campaigns on AIS management and prevention. This education includes Ohio Sea Grant teaching "Best Management Practices" devised to prevent the spread of AIS to more than 57,500 people, with most contacts reporting that they had learned new information from the campaign and would put that information to use. Evaluation results have led to additional information strategies, including reaching participants in the Ohio Clean Marinas and Ohio Clean Boater programs.

Safe and Sustainable Seafood Supply Measurable Objectives
Number of stakeholders who modified their practices using knowledge gained in fisheries sustainability, seafood safety, and the health benefits of seafood

National Target	**205,612**
Ohio Actual	**52,680**

New Ways to Educate Visitors

When people experience fishing and learn about Lake Erie, they gain a deeper understanding of the importance of stewardship. In 2007, state budget cuts necessitated the closing of a former Put-in-Bay fish hatchery that had been operated by the Ohio Division of Wildlife as a museum. In 2009, Ohio Sea Grant entered into a management agreement to reopen and improve the site. Staffed by Ohio Sea Grant, Stone Lab student workers and volunteers, the Aquatic Visitors Center allows visitors to view Lake Erie under a microscope and participate in hands-on activities to learn about food webs, sustainable fisheries, and aquatic science. Between 2010 and 2013, 55,989 people visited the center, and 80% of those surveyed report being more likely to pay attention to Lake Erie issues. New exhibits and program development follow current issues and include aquatic invasive species, Asian carps, unwanted medication disposal and harmful algal blooms.

Sport fishing provides a unique opportunity to experience the outdoors and is a major economic driver in Ohio valued at near $1 billion. To address waning angling activities, Ohio Sea Grant and partners offered over 50 fishing programs in 2010-2013, ranging from youth camps to college courses, and reaching over 1,000 people with fishing and environmental information. One example is the annual 4-H Sea Camp on Kelley's Island. This five-day event is designed to instill a sense of Lake Erie stewardship and intertwines science and recreational activities, such as lure making, aquatic biology and fishing techniques. Between 2010 and 2013, 296 teens attended Sea Camp on Kelley's Island. Over 50% of participants caught their first fish, and over 75% tied their first fishing lure, cleaned their first fish and had their first experience using scientific equipment to collect aquatic organisms.

Ohio Sea Grant has also developed a fishery-oriented curriculum through its Stone Lab educational program, offering nine fishery-focused courses and research programs to an average of 74 high school students, college students and teachers each summer during the 2010-2013 reporting period. The courses and research curriculum continue to emphasize how the fishery is an intricate part of a sustainable Lake Erie ecosystem.

PIER PRP Program Focus Area Report

Ohio Sea Grant College Program

Safe and Sustainable Seafood Supply

Program Focus Area: SAFE AND SUSTAINABLE SEAFOOD SUPPLY

Program Goals

1. Sustainable fisheries to meet public demand.
2. A healthy Lake Erie fisheries that harvest, produce, process, and/or market fish products responsibly and efficiently.
3. Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of our Lake Erie fisheries, who appreciate the health benefits of fish consumption, and who understand how to evaluate the safety of the fish they catch.

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Full Text of Impacts
Program Performance Measures
Objectives

Impacts and Accomplishments toward Program Goals

1. **Program Goal: Sustainable fisheries to meet public demand.**
   Impact(s)
   - 19791 - Charter Captains Gain Business Tools to Lure New Customers and Profits through Partnered Conference
   - 19787 - Community Partnerships Lead to Ashtabula River Fish Population and Habitat Improvement
   - 19786 - Ashtabula Area of Concern Delisting Process Moves Forward
   - 18058 - Ohio Sea Grant Partners with Ohio Division of Wildlife to Revise and Improve Ohio's Aquatic Invasive Species Comprehensive Management Plan (A/EP - 001)
   - 15414 - Otolith Microchemistry as a Natural Tag for Mixed Stock Analysis of Hatchery Reared Steelhead (R/LR-014)
   - 15151 - A Comprehensive Regional Public Outreach Campaign on Aquatic Invasive Species (A/EP-001)

   Accomplishment(s)
   - 19858 - Fish monitoring via trap and fyke netting, and water quality monitoring at the Ottawa National Wildlife Refuge and Cedar Point National Wildlife Refuge
   - 19816 - Maximizing the Benefit of Ohio GLRI Projects on Lake Erie (Cooperative Science and Monitoring Initiative)
   - 19518 - Creating a rapid and accurate molecular test for active VHS infection in fish
   - 19502 - Creating the fourth generation of fast-growing yellow perch to support aquaculture
   - 18104 - Asian Carp Regional Outreach (M/R-003)
   - 15007 - Temporal and Spatial Analyses of Walleye and Yellow Perch Genetic Stock Structure (R/LR-007)
   - 6428 - Fate of Inorganic Nanoparticles in Surface Water Environments (R/PS-041)

2. **Program Goal: A healthy Lake Erie fisheries that harvest, produce, process, and/or market fish products responsibly and efficiently.**
   Impact(s)
   - 19791 - Charter Captains Gain Business Tools to Lure New Customers and Profits through Partnered Conference
   - 19787 - Community Partnerships Lead to Ashtabula River Fish Population and Habitat Improvement
   - 19786 - Ashtabula Area of Concern Delisting Process Moves Forward
   - 18058 - Ohio Sea Grant Partners with Ohio Division of Wildlife to Revise and Improve Ohio's Aquatic Invasive Species Comprehensive Management Plan (A/EP - 001)
   - 15414 - Otolith Microchemistry as a Natural Tag for Mixed Stock Analysis of Hatchery Reared Steelhead (R/LR-014)
   - 15151 - A Comprehensive Regional Public Outreach Campaign on Aquatic Invasive Species (A/EP-001)
   - 14482 - Stone Lab programs shape fisheries management (M/P-001)

   Accomplishment(s)
   - 19816 - Maximizing the Benefit of Ohio GLRI Projects on Lake Erie (Cooperative Science and Monitoring Initiative)
   - 19540 - Program Prepares Students for future careers in the sciences
   - 19518 - Creating a rapid and accurate molecular test for active VHS infection in fish

- 19502 - Creating the fourth generation of fast-growing yellow perch to support aquaculture
- 18104 - Asian Carp Regional Outreach (M/R-003)
- 18092 - Impacts of Climate Change on Public Health in the Great Lakes due to Harmful Algae Blooms -- Ohio Sea Grant Minibus FY2012/2013 (R/ES-012)
- 15007 - Temporal and Spatial Analyses of Walleye and Yellow Perch Genetic Stock Structure (R/LR-007)

3. **Program Goal: Informed consumers who understand the importance of ecosystem health and sustainable harvesting practices to the future of our Lake Erie fisheries, who appreciate the health benefits of fish consumption, and who understand how to evaluate the safety of the fish they catch.**

Impact(s)

- 21825 - Sea Camp Provides Hundreds of Ohio Teens a Lake Erie Recreation Experience
- 21797 - Sea Grant shapes future aquatic professionals (program prepares students for future careers in the sciences)
- 19823 - Ohio Sea Grant Hosts Special Events to Improve Ecosystem Management and Solve Problems
- 18051 - Aquatic Visitors Center Teaches Casual Visitors About Lake Erie (A/EP - 001)
- 15151 - A Comprehensive Regional Public Outreach Campaign on Aquatic Invasive Species (A/EP-001)
- 15146 - Lake Erie Literacy Principles and Concepts (A/EP-001)

Accomplishment(s)

- 19857 - iEvolve with STEM: Inquiry and engagement to invigorate and optimize learning for everyone
- 19842 - Charter Fishing Boat Captains Collect Water Samples and Provide Hands-on Science Experience to Fisherman.
- 19832 - Ohio Sea Grantâ€™s Stone Laboratory provides STEM education to thousands of students each year
- 19792 - Introduction to Sport Fishing Connects Hundreds of Ohioans to their Lake Erie Resource
- 18092 - Impacts of Climate Change on Public Health in the Great Lakes due to Harmful Algae Blooms -- Ohio Sea Grant Minibus FY2012/2013 (R/ES-012)
- 18047 - Shoreline Anglers Value Lake Erie Fishing (A/EP â€" 001)
- 16049 - Increasing Program Awareness through University Partnering (M/P-002)
- 15994 - Communications: Bringing Program Achievements to Public's Attention through Media (M/P-002)
- 6636 - Benefits of Ohio Charter Industry surveys (R/ME-035-PD)

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Full Text of Impacts and Accomplishments

21825 - Sea Camp Provides Hundreds of Ohio Teens a Lake Erie Recreation Experience
Relevance: Of the 88 counties in Ohio, only eight of them border Lake Erie. As a result, many Ohio youth may be familiar with their Great Lake but never had the opportunity to experience it in person. Sea Camp aims to familiarize teens from all over the state with their Lake Erie resource, and instill a personal connection with that resource by providing hands-on experience with a variety of recreational opportunities. These experiences should also help them grow in to Lake Erie literate adults.

Response: Ohio Sea Grant partners with OSU Extension, Cleveland Metroparks, and ODNR-Division of Watercraft staff to put on the five day Sea Camp on Kelley's Island in Lake Erie. All campers get to experience a variety of Lake Erie recreation opportunities. Activities include making their own fishing lures, sport fishing basics, sun safety, use of GPS units, aquatic biology and sampling methods, kayaking, snorkeling, charter fishing, filleting fish, and operating power boats and personal watercrafts.

Results: Between 2010 and 2013, hundreds of teens attended Sea Camp on Kelley's Island. Many of those teens left camp with their Ohio license to operate power boats. Over 50% of participants caught their first fish from Lake Erie, and over 75% tied their first fishing lure, cleaned their first fish, and had their first experience using scientific equipment to collect aquatic organisms.

RECAP: Recap: Sea Camp on Kelley's Island has fostered personal connections and a sense of responsibility to Lake Erie for hundreds of Ohio teens, and helped them grow in to Lake Erie literate people, by providing hands on experience to a variety of recreational opportunities. Back to Goals

21797 - Sea Grant shapes future aquatic professionals (program prepares students for future careers in the sciences)
RELEVANCE: The mission of Ohio Sea Grant's Stone Laboratory at The Ohio State University is to serve Ohio Sea Grant and the people of Ohio as their research, education, and outreach facility on Lake Erie. Programming should address needs of students in grades 5-12, undergraduate and graduate students, K-12 teachers, research scientists, and the general public.

RESPONSE: In 2014, Ohio Sea Grant offered 23 college-credit courses at Stone Laboratory for high school, college and graduate students and professionals. We also offered workshops for college students and aquatic science professionals that provided professional development and resume building opportunities.

RESULTS: A total of 201 students participated in our courses and workshops in 2014. A survey of students that took courses and workshops at Stone Lab since 2010 highlight the success of the program: Of the 105 individuals that responded to our survey asking how Stone Lab influenced their academic career, 66.7% had graduated (70 of 105). Of these 70 individuals, 42 now hold a STEM-related job, 10 are enrolled in a MS program, 10 are either in a Ph.D. program or are post-docs, and 5 are in professional schools (dental or medical).

RECAP: RECAP: Ohio Sea Grant's formal education programs at Stone Lab reached 201 students in 2014 and surveys indicate that many of these individuals get STEM-related jobs, graduate with an undergraduate degree, go on for an MS or Ph.D, and/or earn a fellowship. Back to Goals

19858 - Fish monitoring via trap and fyke netting, and water quality monitoring at the Ottawa National Wildlife Refuge and Cedar Point National Wildlife Refuge

Relevance: Approximately 10% of the historic wetlands that existed along the Ohio portion of Lake Erie currently remain. Because this habitat has been removed, many of the beneficial wetland services are no longer occurring: improving water quality by removing pollutants and excess nutrients, increasing water supply, controlling erosion and providing fish and wildlife habitat. In line with Ohio Sea Grants Strategic Plan, we have sought grants to restore this critical habitat.

Response: Ohio Sea Grant was approached by the Nature Conservancy and Ducks Unlimited to provide fish monitoring on a NOAA Great Lakes Research Initiative (GLRI) grant to restore 230 acres of wetland along the Lake Erie Coast.

Results: Ohio Sea Grant was contracted to conduct intensive netting and electrofishing surveys to assess the fish community near proposed wetland restoration sites at both Cedar Point and Ottawa National Wildlife refuges. Three sampling events occurred in both the spring and fall at six sites. Data was collected such that analyses required to track restoration success could be performed.

RECAP: Recap: Ohio Sea Grant has and continues to receive funding to conduct the wetland sampling required by state and federal agencies to determine if a restoration project initiated by the Nature Conservancy and Ducks Unlimited is successful. Back to Goals

19857 - iEvolve with STEM: Inquiry and engagement to invigorate and optimize learning for everyone

Relevance: Research shows a declining state of STEM education in the United States and Ohio. Research out of Bowling Green State University has suggested that classroom participation in citizen science research projects/exercises might improve motivation, engagement and achievement in students and therefore increase student success in STEM disciplines.

Response: Ohio Sea Grant was approached by Bowling Green State University to be one of its citizen science leaders on a National Science Foundation grant. We were subcontracted to design two different sampling exercises that would teach STEM students how to collect relevant scientific data. In addition we were asked to highlight how and why science professionals collect certain data.

Results: Ohio Sea Grant designed a citizen science stream assessment exercise and a limnology sampling exercise to teach STEM students what data professional scientist collect, how to collect it, how to analyze it and what the data means. In 2014 Ohio Sea Grant researchers will teach 17 middle school teachers how to collect the data on their own and how to guide their students through the collection process/protocol. In 2014 Ohio Sea Grant researchers will assist the teachers in training their students and will be available to students for questions throughout the school year.

RECAP: Recap: On a National Science Foundation Grant, Ohio Sea Grant designed two "citizen science" sampling exercises to teach STEM students what data professional scientists collect, how to collect it, how to analyze it and what the data means. The goal is to increase student success in STEM disciplines. Back to Goals

19842 - Charter Fishing Boat Captains Collect Water Samples and Provide Hands-on Science Experience to Fisherman.

Relevance: Harmful cyanobacterial blooms in Lake Erie are an annual summer occurrence . Cyanobacterial blooms can foul beaches, contribute to low dissolved oxygen concentrations, and produce toxins that have harmful effects on the liver, skin, and nervous system. More science is needed to understand the environmental factors that promote bloom development and toxicity. Furthermore, more public education and outreach is needed to teach people the dangers of blooms and how they can help to mitigate the problem.

Response: During 2013, Stone Laboratory partnered with the Ohio EPA to train fishing charter boat captains how to collect water samples. Those samples were collected on Mondays from July 15 to October 21, 2013 and then delivered to Stone Laboratory for analysis of cyanobacterial toxins, algae

biomass, and nutrient concentration. The captains also attended workshops at Stone Lab and received a Lake Erie cyanobacterial bloom fact sheet to allow them to educate their clients about the problem.

Results: Seven captains participated in the sampling during 2013. A total of 56 samples were collected by the captains, and the data from those samples is being used by scientists from NOAA to validate satellite image data and by modelers from the University of Toledo. A total of 336 clients observed the captains collecting those water samples.

RECAP: Recap: Stone Laboratory coordinated a volunteer charter boat captain water sampling program that generated scientific information and also provided a valuable education experience for anglers. Back to Goals

19832 - Ohio Sea Grant's Stone Laboratory provides STEM education to thousands of students each year

Relevance: In order to remain competitive in a global economy, the U.S. requires a population trained in science, technology, engineering and math (STEM) disciplines. A recent study found that K-12 curriculum standards from across the U.S. may not adequately address the needs of this future workforce. While some states are able to incorporate necessary STEM components, they have yet to fully embrace them.

Response: Since 1973, Ohio Sea Grant's Stone Laboratory has provided hands-on science learning opportunities for students across Ohio and beyond unavailable to them in traditional classroom settings. Stone Laboratory has developed an informal education curriculum focusing on Lake Erie science that provides students with hands-on opportunities to be a scientist for a day, participating in activities such as fish trawling and seining, fish identification and dissection, plankton identification and water quality monitoring; all demonstrating real-world science applications outside the classroom but still achieving many of the mandated state standards.

Results: In 2013, over 4,400 youth and adult learners (248 groups) participated in place-based field trip programs and tours at Stone Laboratory that introduced elementary (1,777) and adult (1,240) learners to large-lake coastal ecology and current Lake Erie issues. Participants gained awareness and understanding of Lake Erie's natural, cultural, environmental and economic importance to Ohio and the USA.

RECAP: Recap: For over 40 years, OHSG's Stone Laboratory has administered a STEM program that offers a unique immersion experience for thousands of students (both young and old), stimulates future interest in science, and instills a lifetime stewardship ethic for the Lake Erie ecosystem.
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19823 - Ohio Sea Grant Hosts Special Events to Improve Ecosystem Management and Solve Problems

Relevance: Lake Erie, one of the world's most important lakes and "Walleye Capital of the World," is declining back toward the dead lake conditions of the 1960s and 70s. This will adversely impact the economy, ecosystem and human health. Sea Grant must explain issues, develop solutions and provide information to elected officials, decision makers and the general public in ways they can use to make informed decisions.

Response: In 2013, Sea Grant hosted: 1) the 6th Coastal County Commissioners, Mayors, and Decision Makers Day; 2) a 2-day workshop for science writers; 3) the 2013 Lake Erie Legislative Day; 4) multiple workshops for agriculture leaders; 5) a press conference and webinar with NOAA to forecast the 2013 HAB; 6) a workshop for charter captains; and 7) OHSG Director Dr. Jeff Reutter spoke at a Congressional Algal Briefing in Washington and a national agriculture legislative leaders conference in Oklahoma.

Results: The State Legislature restored Sea Grant's line item in the state budget, appropriated $3 million to address Lake Erie problems and introduced a bill to curb fertilizer runoff, and U.S. Senator Portman sponsored legislation to address HABs. Sea Grant information was featured in 403 newspaper, magazine, and television stories in 158 venues in 2013.

RECAP: Recap: Ohio Sea Grant hosted hands-on workshops to help elected officials, decision makers, the media and the public understand the problems facing Lake Erie and their solutions. The State Legislature appropriated $3 million for Lake Erie, and the Legislature and Congress both introduced and passed legislation to address HABs. Back to Goals

19816 - Maximizing the Benefit of Ohio GLRI Projects on Lake Erie (Cooperative Science and Monitoring Initiative)

Relevance: Sea Grant has a history of successfully bringing together groups of scientists and coordinating their activities to maximize the impact of their work. Agency leaders in Ohio and across the region asked Sea Grant to assist in coordinating and developing proposals for a Cooperative Science and Monitoring Initiative (CSMI) on Lake Erie.

Response: Sea Grant called together over a dozen scientists from 10 universities and businesses and partnered with the Ohio Lake Erie Commission as Co-Principal Investigators on a successful CSMI proposal to the Great Lakes Restoration Initiative (GLRI) to coordinate research on Lake Erie during the

intensive year on the Lake.

Results: The three major initiatives proposed by the cooperating scientists received $500,000 from the GLRI. The projects will begin in 2014. Sea Grant will also collaborate with the Lake Erie Commission to coordinate the projects and synthesize and summarize the results.

RECAP: Recap: Sea Grant has collaborated with the Lake Erie Commission, state agencies and the private sector to assist in the development of proposals and the synthesis and summary of results on GLRI projects on Lake Erie. Three collaborating projects with multiple investigators received a total of $500,000. Back to Goals

19792 - Introduction to Sport Fishing Connects Hundreds of Ohioans to their Lake Erie Resource

Relevance: Sport fishing provides a unique opportunity to experience the outdoors. It is a major economic driver in Ohio valued at near $1 billion, provides dietary health benefits when the fish are consumed, and is a great way to help broaden environmental stewardship. Yet participation in outdoor activities has decreased in recent years.

Response: To help increase angling, Ohio Sea Grant in partnership with Stone Laboratory, Lake Erie Nature and Science Center, Girl Scouts of the USA, and the Ohio State University Extension conducted a variety of learn-to-fish programs to create fishing opportunities, make lifelong anglers and address the disconnect of Ohioans to Lake Erie. Programming includes information on basic fishing gear, fishing skills, organism identification, regulations and healthy seafood consumption. Programming is broadly based so lessons learned are applicable outside of sport fishing to other outdoor activities.

Results: 495 adults and youths participated in 17 Ohio Sea Grant sport fishing programs in 2013, including youth 4-H camps, family fishing days and a college-credit course. These programs often result in providing children their very first fishing experience. Conservative estimates based on observation and verbal feedback show that 75% of participants had a positive outdoor experience and learned new skills applicable to sport fishing.

RECAP: Recap: Ohio Sea Grant provides hands-on sport fishing experiences to hundreds of Ohioans with an end goal of enhancing their Lake Erie knowledge, stewardship and encouraging further outdoor activities that improve health and well-being of Lake Erie residents. Back to Goals

19791 - Charter Captains Gain Business Tools to Lure New Customers and Profits through Partnered Conference

Relevance: With over 600 captains, Ohio has the largest charter fishing fleet on the Great Lakes. In 2010, charter captains earned an estimated $9.7 million in revenue and attracted thousands of paying customers to local harbor communities. There is a recent trend of decreasing numbers of charter captains in part due to rising fuel costs, declining participation and environmental issues such as Harmful Algal Blooms and decreasing sport fish populations. There is a need to keep these businesses viable so that local economies can continue to benefit from the charter industry.

Response: For 32 years Ohio Sea Grant has organized the annual Ohio Charter Captains Conference. This conference educates and empowers captains on Lake Erie issues and improves their success, thereby continuing to benefit local economies. Education topics vary, but include marketing, business tips, marine electronics, marine laws and regulations, with training needs primarily identified via surveys received from captains at the conclusion of the previous conference.

Results: The Ohio Charter Captain Conference typically reaches 20-25% of licensed captains statewide. In 2013 there were 168 attendees. Surveys show that 88% of captains improved their operation, 75% modified a practice, and 40% increased profitability based on information received at the conference. This has attracted more money to Ohio's coastal economy and provided a better product for visitors to Lake Erie.

RECAP: Recap: Lake Erie charter captains strengthen their bottom line, improve their ability to serve their clientele, and better protect the Lake Erie environment because of the annual Ohio Charter Captains Conference. Back to Goals

19787 - Community Partnerships Lead to Ashtabula River Fish Population and Habitat Improvement

Relevance: The lower two miles of the Ashtabula River was designated as one of 43 Areas of Concern (AOC) by the International Joint Commission (IJC) in 1987. A total of six beneficial uses of the Ashtabula River Area of Concern have been impaired, significantly deteriorating the ecosystem and negatively impacting the economy.

Response: Since 1988, Ohio Sea Grant has worked with the local community to remediate the environmental damage to the Ashtabula River. Ohio Sea Grant helped to reorganize the Ashtabula Remedial Action Plan (RAP) in 2009. Ohio Sea Grant research, information transfer and staff have supported community and governmental efforts to implement remedial actions to restore the local ecosystem and the beneficial uses of the river.

Results: Four habitat restoration projects at the 5 1/2 slip on the Ashtabula River have been initiated or completed resulting in fish population indices at 131% (score of 50 where target was 38) to 140% (score of 11.5 where target was 8.2) of target levels and the fish habitat index at 104% (score of 57.3 where target was 55) of target level in 2013. The construction of over 2,500 feet of fish habitat and reclamation of about ten acres of wetlands on the lower Ashtabula River is complete. Additional restoration actions valued at almost $1 million are ongoing or planned.

RECAP: Recap: Ohio Sea Grant efforts helped one local community significantly improve the aquatic habitat and increase fish population quality and quantity in the lower 2.5 miles of the Ashtabula River and Harbor. Back to Goals

19786 - Ashtabula Area of Concern Delisting Process Moves Forward
Relevance: For decades six beneficial uses of the Ashtabula River have been impaired by past pollution. Beneficial uses include such things as healthy fish habitat and diverse fish populations. Migration of polluted sediments out into the harbor threatened to pollute the open waters of Lake Erie.

Response: Since 1988 Ohio Sea Grant has worked with the Ashtabula River Remedial Action Plan (RAP) Council, the Ashtabula River Partnership and dozens of local, state and federal cooperators to clean up the Ashtabula River. Since 2008, over 700,000 cubic yards of contaminated sediments have been removed from the River at a cost of over $75 million. An additional $6 million in habitat restoration actions have been or are being implemented. Intensive monitoring of the river and harbor provided the data necessary for further action.

Results: Based on scientific data collected in the past few years, the Ashtabula River RAP Council asked the Ohio Environmental Protection Agency to initiated the process to remove: 1) Restrictions on Fish and Wildlife Consumption, 2) Degradation of Fish and Wildlife Populations and 3) Loss of Fish and Wildlife Habitat from the list of impaired beneficial uses of the Ashtabula River. This action was required to start the delisting process.

RECAP: Recap: At the request of the Ashtabula River Remedial Action Plan Council, the U.S. EPA has removed three beneficial use impairments from the Ashtabula River Area of Concern. The Ashtabula River is used as a model partnership approach to environmental cleanup. Back to Goals

19540 - Program Prepares Students for future careers in the sciences
Relevance: Providing hands-on training to college students gives them the experience they need to begin a career in science.

Response: In order to train young scientists, in 2005 Stone Lab initiated a research experience for undergraduates scholarship program (REU) that allows undergraduate students to conduct a research project under the guidance of a university or government agency scientist. In 2013, advisers came from seven different institutions to work with students on projects related to the advisers' expertise and the students' interests. The program also allows students to gain experience in networking, public speaking, and preparing research for publication.

Results: Since the program's inception in 2005, Stone Lab has trained 86 REU students, with 10 students in 2013. Of the 86 REU students, 77% of those who kept in touch with the program have pursued graduate degrees and 12% began a career in a science-based field. In 2013, research projects addressed many critical issues facing Lake Erie, such as nutrient loading and cyanobacterial blooms, invasive species and recovery of threatened native species.

RECAP: Recap: By providing hands-on training to students, Stone Lab's research experience for undergraduates scholarship program is training the nation's next generation of scientists. Back to Goals

19518 - Creating a rapid and accurate molecular test for active VHS infection in fish
RELEVANCE- VHSv has caused massive fish die-offs in the Great Lakes region that threaten fisheries, economic development and tourism, and negatively affect public health perception. The current approved cell culture technique to detect VHSv infection is labor intensive, time consuming (up to four weeks), less sensitive than detection at the genetic level and has a high false negative rate. In order to speed detection time, other laboratories have developed DNA-based tests that are more sensitive than cell culture, but still lack the quality control necessary to detect false negative results.

RESPONSE- The researchers have developed, tested and published a new assay with unique built-in controls that is inexpensive, rapid, accurate and easy to use. They have collaborated with a number of agencies to evaluate VHSv infected and non-infected fish tissues with this new test, which incorporates internal standards to control for false negative results.

RESULTS- The assay is VHSv specific, rapid, inexpensive and has significantly greater accuracy than other published diagnostics. Further work will implement this new procedure at the Ohio Department of Agriculture and help develop its potential for export to other states' labs, with the ultimate goal of a commercially available kit. This will create Ohio jobs and help protect the state's fisheries, aquaculture and tourism industries.

RECAP: Recap: A new VHSv test yields superior results to other diagnostics using a readily available and cost effective technology available to most labs. It will significantly advance the ability of management agencies and the fishing industry to diagnose VHSv disease outbreaks and help prevent their spread. Back to Goals

19502 - Creating the fourth generation of fast-growing yellow perch to support aquaculture
Relevance: Yellow perch aquaculture has become highly popular in the Midwest over the past 20 years, due to high market demands and the decline of wild yellow perch populations in the Great Lakes. Genetic enhancement of broodstock for growth will improve yellow perch aquaculture production and increase profit margins for fish farmers.

Response: The Ohio State University has created several genetically improved lines of yellow perch, using genetic markers to reduce inbreeding and enhance desired traits, and conducted field station and fish farm tests at three different geographic latitudes to compare growth of improved strains to local unimproved fish.

Results: Results showed that the genetically improved fish exhibited 27.6% - 42.1% higher production, 25.5% - 37.5% higher growth rates, and 12.3% - 27.8% higher survival rates than local fish. The higher survival rates also resulted in less feed received by each individual fish, further improving the potential profit margin for fish farmers. Using genetic markers to select breeding stock not only worked well for enhancing desired traits like stress resilience and fast growth, but also maintained genetic diversity in the yellow perch breeding program.

RECAP: Recap: Our genetically improved fish exhibit significantly higher growth rate, survival rate and production than unimproved fish and will have a tremendous positive impact on the yellow perch aquaculture industry by increasing productivity and reducing feed costs. Back to Goals

18104 - Asian Carp Regional Outreach (M/R-003)
RELEVANCE: Asian Carp have the potential to devastate the Great Lakes food web if they are introduced into the system. Ohio Sea Grant's goal was to inform Great Lakes user groups of the danger posed by Asian Carp and what stakeholders could do to keep this fish from invading.

RESPONSE: OHSG's objective was to, in conjunction with the other six Great Lakes Sea Grant Programs (MI, PA, IN/IL, WI, MN, and NY): (1) develop a comprehensive and coordinated regional education and outreach plan to address Asian Carp, (2) Prepare a bibliography of already prepared education and outreach materials on Asian Carp from the Mississippi and Great Lakes basins, (3) place all of the outreach materials on a central website, (4) conduct an analysis of Sea Grant outreach experts to determine a common message, and (5) develop outreach and communication materials that can be localized to specific states and lakes, if needed, to fill the information needs and gaps.

RESULTS: Correspondence has been sent to check on progress developing a bibliography of education and outreach materials that currently exist related to Asian carp. Once this list is completed we will determine what outreach/education materials should be developed to fill gaps. A PowerPoint (PPT) has been created for use by a network of Great Lakes speakers to convey a common message that includes factual information about invasion and current research projects. The PPT also includes information on (1) what can be done by general public to stop spread and (2) contact information for state agencies, federal agencies, and Sea Grant Programs to get additional information. The content of this PowerPoint is being reviewed by individuals from each Great Lakes Sea Grant Program, invasion biology researchers, and State/Federal agency employees.

RECAP: RECAP: In collaboration with the six other Great Lakes Sea Grant Programs (MI, NY, IN/IL, MN, WI and PA), Ohio has compiled a list of currently available Asian carp outreach materials, identified education gaps, and generated outreach materials. Back to Goals

18092 - Impacts of Climate Change on Public Health in the Great Lakes due to Harmful Algae Blooms -- Ohio Sea Grant Minibus FY2012/2013 (R/ES-012)
Relevance: Determining the concentrations and causes for microcystin concentrations in Lake Erie sportfish is important to protect public health and maintaining economic income from sportfishing.

Response: More than 130 samples of Yellow Perch, White Perch and Walleye were analyzed for microcystin content. Results were compared to consumption thresholds recommended by the World Health Organization and the U.S. EPA.

Results: While trace levels of mircocystin were found in these fish, they were below levels threatening to public health. As long as the public continues to follow Ohio Department of Natural Resources Division of Wildlife guidelines of one fish meal per week, no adverse health impacts should be realized.

RECAP: Recap: Preliminary data indicate that consuming typical amounts of gamefish from Lake Erie will not result in microcystin intake above recommended thresholds. Back to Goals

18058 - Ohio Sea Grant Partners with Ohio Division of Wildlife to Revise and Improve Ohio's Aquatic Invasive Species Comprehensive Management Plan (A/EP - 001)

RELEVANCE: Aquatic invasive species (AIS) pose substantial threats to Ohio's environment, industries and economy. Ohio's current Comprehensive Management Plan (OCMP) for AIS was drafted in 1995. Since that time, spread of AIS have increased to as many as 136 species in Lake Erie alone. Proactive approaches need to be developed to address AIS, including not only threats from Lake Erie, but also from Asian carp which now inhabit the Ohio River.

RESPONSE: Ohio Sea Grant (OSG) developed a partnership with the Ohio Department of Natural Resources' Division of Wildlife (ODNR-DOW) and Ohio State University Extension (OSUE) to co-chair the state's AIS advisory committee and provide public, academic, industry and interagency input to AIS policies and the OCMP. The ODNR-DOW administrator charged with AIS management requested OHSG rewrite the OCMP, issuing grants totaling $41,000 (February 2008-June 2012) for those purposes.

RESULTS: A draft revised OCMP was submitted to ODNR-DOW by OSUE and OHSG in October 2012. That revision has circulated within ODNR-DOW for internal review. ODNR-DOW engaged a federal contractor to add a Rapid Response Plan - following templates developed by panels of the national Aquatic Nuisance Species Task Force (ANSTF) - to coordinate interagency management actions upon detection of new AIS. Following ANSTF approval, state implementation is expected within 2013.

RECAP: RECAP: In 2012, in response to growing ecological and economic threats of aquatic invasive species, Ohio Sea Grant partnered to co-chair the state advisory committee and revise the state's Comprehensive Management Plan used to coordinate interagency management under the leadership of the Ohio Department of Natural Resources. Back to Goals

18051 - Aquatic Visitors Center Teaches Casual Visitors About Lake Erie (A/EP - 001)
Relevance: The Lake Erie island region, and specifically South Bass Island, is a flourishing tourism hot spot within Ohio, attracting more than 10,000 visitors per day during the summer. Budget cuts at the state level had forced the Ohio Department of Natural Resources to close their historic fish hatchery and museum - one of the only free public educational activities on the island.

Response: Ohio Sea Grant and the ODNR Ohio Division of Wildlife partnered to reopen the facility, located next to the Ohio State University research facility at Stone Laboratory, to the public. The newly named Aquatic Visitors Center provides a hands-on fishing experience for children under 16 as well as free tours of the facility, which provide information on the historic hatchery, Lake Erie fishes and food webs, aquatic invasive species, sustainable sport fishing practices and other current issues facing Lake Erie.

Results: In 2012, over 11,700 people visited the AVC and participated in our programming. According to survey data with 1 being very unlikely and 5 being very likely, visitors indicated that they were very likely to pay more attention to Lake Erie issues (M=4.19), support efforts to clean up Lake Erie (M=4.25), and share information they learned with others (M=4.32) as a result of visiting the AVC.

RECAP: RECAP: OHSG and the ODNR-DOW have partnered to teach Lake Erie island regional visitors about sport fishing, Lake Erie issues and Lake Erie fisheries and about things they can do to protect these vital Ohio resources. Back to Goals

18047 - Shoreline Anglers Value Lake Erie Fishing (A/EP - 001)
RELEVANCE: There is little information on the economic value of Lake Erie shoreline angling. This data could be used to help policy makers make informed decisions about shoreline access and the development of amenities for shoreline anglers.

RESPONSE: Ohio Sea Grant partnered with the Ohio Department of Natural Resources - Division of Wildlife (ODNR-DOW) and Ohio State University Extension to add questions to planned ODNR-DOW shoreline fishing creel surveys in 2006 and 2007. A small grant from the Ohio Lake Erie Commission and the Ohio Lake Erie Protection Fund helped Sea Grant analyze the data and estimate the economic value of the fishery.

RESULTS: For the first time in over two decades, the economic value of Lake Erie shoreline angling has been estimated. The typical shoreline angler is of modest income, comes from an urban area and likely has only limited opportunities to fish. Total local spending per angler trip excluding travel costs was estimated to be $8.22 per day, equating to average annual spending of $1.13 million. Lake Erie shoreline anglers fishing from docks, jetties and piers value their fishing at $13.5 million annually.

RECAP: RECAP: In 2012, the survey data collected by Ohio Sea Grant will help guide managers and policy makers in decision making about the allocation of resources to enhance Lake Erie public access, improve shoreline water quality and develop amenities for shoreline anglers. Back to Goals

16049 - Increasing Program Awareness through University Partnering (M/P-002)
RELEVANCE: As a small department within one of the largest universities in the country, it can be challenging to compete with larger departments when it comes to promoting a program's achievements and recruiting students for its educational programs. Ohio Sea Grant has over the years partnered with many Ohio State departments, but more university partners could help broaden the program's reach across the university and state.

RESPONSE: To extend its reach and hopefully increase program awareness university-wide, Ohio Sea Grant Communications partnered with all eight of the university colleges and University Relations to create an annual Ohio State Communicators Conference. The two-day conference held at Ohio Sea Grant's Stone Laboratory, is coordinated and overseen by Ohio Sea Grant Communications, including online registration, programming logistics and agenda planning. Sea Grant and Stone Lab programs are highlighted throughout the Ohio State University communications-focused agenda to ensure that university staff sees Sea Grant's impacts, achievements and potential collaboration opportunities for the university.

RESULTS: Now with two conferences completed (2010 and 2011) and each representing communicators from more than 20 units within the university and five OSU regional campuses, Ohio Sea Grant has seen a direct impact of having communicators become more aware of the Sea Grant and Stone Lab programs. Sea Grant has received three new free display cases within three departments and two regional campuses. Sea Grant tourism director and Stone Lab have spoken to departmental representatives to discuss new programming opportunities and partnerships within departments and four departments have generated articles within their departmental magazines to promote Stone Lab programs to their students.

RECAP: RECAP: Ohio Sea Grant Communications created the two-day OSU Communicators Conference, which has annually brought 60 communicators from more than 20 OSU departments and five regional campuses to Ohio Sea Grant's Stone Laboratory. The conference has helped generate awareness and partnerships for the program. Back to Goals

15994 - Communications: Bringing Program Achievements to Public's Attention through Media (M/P-002)

RELEVANCE: Understanding the media's importance to efficiently disseminate Sea Grant's research, education and outreach information to stakeholders and the general public, Ohio Sea Grant has worked to develop relationships with the media, including involving media representatives in program events, creating environmental journalism retreats, and inviting media members to serve on Sea Grant advisory boards. In recent years, however, media coverage for the program had either decreased or stayed stagnant.

RESPONSE: To increase media coverage for the program, Ohio Sea Grant Communications broadened its media interaction efforts by nearly tripling its press releases (from 15 in 2010 to 44 in 2011); adding a monthly e-newsletter; supplementing with social media platforms; improving magazine content to spotlight program achievements; and increasing the number of university partners to broaden program's exposure university-wide.

RESULTS: As a result of these combined efforts, Ohio Sea Grant has seen an increase in its overall media coverage in 2011 with 398 articles covering Sea Grant programming, a 20+% jump from 2010 (327 articles). Nearly 60% of those articles were linked to Communications' efforts.

RECAP: RECAP: Media is an important means to get Sea Grant's programming and educational efforts out to its stakeholders and general public. With more press releases and new outlets like social media and a monthly e-newsletter, Sea Grant Communications has helped generate 20% more in media coverage for the program since 2010. Back to Goals

15414 - Otolith Microchemistry as a Natural Tag for Mixed Stock Analysis of Hatchery Reared Steelhead (R/LR-014)

RELEVANCE: Sport fishing is a major component of Lake Erie recreational tourism. More than 119,000 northern Ohio jobs are directly linked to Lake Erie-region visitors who spend more than $10.7 billion annually, generating $430 million in state taxes and $320 million in local taxes. In a recent assessment, the value of sport fishing in Lake Erie and its tributaries was estimated to exceed $850 million annually. To sustain the steelhead trout fishery, 2 million smolts (young fish) are stocked into Lake Erie tributaries annually. A 2006 study estimated the value of Lake Erie tributary steelhead fishing in Ohio at $12-14 million annually, with a $600,000 cost for the stocking program that releases approximately 450,000 smolts each year into Ohio rivers and streams. An important consideration of any state stocking program is that the fish return to tributaries in the state in which they were released and to sites where there is good stream access to maximize fishing opportunities.

RESPONSE: Using otolith microchemistry, we determined with each otolith a natural tag that is unique for different state hatchery stocks and used that tag to identify the state hatchery source of spawning adult steelhead collected in major spawning streams from MI to NY. This allowed us to determine the degree to which adults returned to their respective release sites (fidelity) versus straying to some other state. In one stream (Conneaut) stocked by both OH (2 km from the lake) and PA (61 km from the lake), we were able to show that only PA stocked fish returned to the upstream release site and that both OH and PA stocked fish returned to the OH release site in both spring and fall runs.

RESULTS: The data have been presented to hatchery managers and state fish biologists who have begun modifying their stocking strategies (e.g., PA is stocking further upstream to maximize the time fish have to imprint on their specific stream before they reach Lake Erie).

RECAP: RECAP: We have provided sound scientific data on release-site fidelity to allow fisheries managers to make well-informed decisions to maximize the value of steelhead trout fishing in Lake Erie tributaries. Back to Goals

15151 - A Comprehensive Regional Public Outreach Campaign on Aquatic Invasive Species (A/EP-001)
RELEVANCE: Aquatic Invasive Species (AIS) threaten our nation's inland lakes, rivers, wetlands, estuaries and oceans. The Great Lakes Sea Grant Network, led by Minnesota, developed a two-year, comprehensive AIS public outreach initiative as one strategy to help stop new AIS introductions.

RESPONSE: In 2011, a $147,702 subcontract from the University of Minnesota helped Ohio Sea Grant reach an estimated 26,554 individuals including professional tournament anglers with information on AIS, Asian carp, AIS impacts and methods to stop the transport of AIS. OHSG also began the process of collaborating with the Ohio Department of Natural Resources Division of Wildlife to update and rewrite the Ohio AIS Management and Rapid Response Plan.

RESULTS: As a result of OHSG education and outreach efforts, participants reached with AIS information and responding to post-program surveys reported that they learned new information, intend to use the information in future decision making and intend to share the information they learned. Most anglers participating in fishing tournaments claimed to "always" or "usually" take at least some preventative actions, ranging from greater than 92% (~ 80% always and greater than 12% usually) "Drain water from boat, motor, bilge, live well, and bait buckets" to only ~ 15% (~ 10% always and greater than 5% usually) "Flush motor's cooling system with tap water."

RECAP: RECAP: The educational efforts of OHSG on AIS resulted in a significant number of individuals intending to use what they learned about AIS in future decision making, and influential professional tournament anglers were more aware of AIS as a result of OHSG outreach efforts. Back to Goals

15146 - Lake Erie Literacy Principles and Concepts (A/EP-001)
RELEVANCE: Unifying core messages and ensuring information accuracy creates an opportunity for stronger lifelong learning about Lake Erie. Ensuring that these messages were consistent through K-12, as well as through place-based settings and regional communications strategies, was identified as a priority for four Lake Erie partner agencies and organizations. Place-based educational venues, such as museums and natural area interpretive centers, reach thousands of Lake Erie residents and visitors each year. Through the use of literacy principles, accurate and important messages about Lake Erie can be linked to formal education instruction.

RESPONSE: Ohio Sea Grant, Ohio Lake Erie Commission, the Ohio Department of Natural Resources (ODNR) Office of Coastal Management and ODNR Division of Wildlife - Old Woman Creek National Estuarine Research Reserve created a partnership strategy for unifying Lake Erie messages in education and outreach activities. As part of this effort, the agencies identified a need for a place-based and formal environmental literacy framework for Lake Erie. A project team initiated the development of this framework by adapting NOAA's Ocean Literacy Principles to Lake Erie Literacy Principles and Concepts. These principles were further aligned to state education standards.

RESULTS: In 2010, Lake Erie Literacy Principles were presented for scientific and public review. Principles were finalized in 2011.

RECAP: RECAP: These principles motivated development of and were used as a model for Great Lakes Literacy Principles which resulted in teacher education courses at Ohio State, Stone Lab, Eastern Michigan, University of Illinois, Niagara University and the College of Exploration. Bay Watershed Education and Training Program required alignment with Great Lakes Literacy Principles, and the Lake Erie Literacy Principles served as the basis for Lake Erie Legacy Videos and curriculum through Toledo-based public television WGTE. Great Lakes Literacy Principles were used as foundation for exhibit and program development at John G. Shedd Aquarium, Great Lakes Science Center, Great Lakes Research and Education Center and Great Lakes Aquarium. Lake Erie Literacy Principles form the focus of programming for fifth graders during ODNR conservation events and are being used by Ohio Coastal Management to explain purposes of regulatory actions. Principles became the foundation for Alliance of the Great Lakes strategic planning for Great Lakes Education Collaborative. Lake Erie Literacy Principles are the focus of an ongoing article series for K-6 students in 35 coastal community schools in Ohio, and they launched efforts in developing principles for other Great Lakes. Back to Goals

15007 - Temporal and Spatial Analyses of Walleye and Yellow Perch Genetic Stock Structure (R/LR-007)
RELEVANCE: Walleye and yellow perch are the two most important exploited fish species in the lower Great Lakes, and understanding their stock structure is critically important for fisheries management. Results of this work will be important to the public in helping to preserve the native fishes of the Great Lakes for the future.

RESPONSE: This research addresses the "Basinwide Priorities" specified by the Great Lakes Fishery Commission, "What are the primary impediments to and options for rehabilitating indigenous species, such as walleye and yellow perch?" Quantifying the stock structures of walleye and yellow perch is a Lake Erie research priority and fish community objective, essential for the successful identification,

rehabilitation, conservation and protection of locally adapted stocks. This research also addresses GLFC Priorities for Lake Huron in "Determining walleye origins for Saginaw Bay and St. Mary's River", for Lake Michigan in "Maintaining self-sustaining stocks of walleye" and "Role of spawning stock abundance in determining yellow perch recruitment", for Lake Ontario's "Maintenance of existing walleye and yellow perch populations", and for Lake Superior in "Rehabilitation of walleye".

RESULTS: As a result of this project, research found that most spawning groups of walleye in Lake Erie and Great Lakes (GL) populations genetically differ due to spawning site philopatry (a tendency to return to natal sites) by both males and females. Our results for yellow perch also reveal significant population genetic structure among sites in Lake Erie, as well as throughout the Great Lakes. We also tested whether walleye spawning population groups are temporally consistent from year to year in the Maumee River, Sandusky River and Van Buren Bay reefs. Results showed overall year-to-year genetic consistency of walleye spawning groups, with no significant differences among collection dates within an annual run, between the sexes or among age cohorts. Walleye spawning at the Van Buren Bay reefs were genetically different from those spawning in the Maumee and Sandusky Rivers, reflecting geographic distance; the latter were genetically closer yet slightly different, suggesting more recent divergence and/or higher gene flow. Project results demonstrate the importance of sampling over several years of spawning runs to understand overall patterns of genetic stock structure, which show remarkable genetic consistency across an open lake system.

RECAP: RECAP: Walleye spawning groups comprise unique genetic stocks that need to be preserved in the face of intense exploitation, invasive species introductions, and climate change. Yellow perch spawning groups likewise are very divergent but show less site to site consistency than do walleye. Findings highlight that the Great Lakes house genetically unique and diverse fisheries stocks of walleye and yellow perch. Back to Goals

14482 - Stone Lab programs shape fisheries management (M/P-001)
Relevance: Each year, natural resource agencies within Ohio, especially the Environmental Protection Agency (OEPA) and Department of Natural Resources Division of Wildlife (ODW), hire dozens of technicians and seasonal employees. Competition for these positions is stiff, and new entry-level staff requires a fair amount of on-the-job training to familiarize them with highly specialized equipment and methodologies.

Response: Since 2007, Stone Lab staff has collaborated with Ohio EPA and Ohio Division of Wildlife biologists each autumn to offer a workshop on the agencies' specialized fish sampling techniques. The objectives of the workshop are to both make potential applicants to entry-level agency jobs more competitive and to provide Ohio's state agencies with a better-trained workforce from the time they start. Investing less time in staff training allows the state to more efficiently manage our aquatic resources.

Results: As of 2010, at least five past participants had returned as Ohio EPA interns and two as Ohio Division of Wildlife technicians. In addition, the two technicians have returned to help Ohio Division of Wildlife biologists teach the workshop, one in October 2010 and the second in 2011.

RECAP: Recap: Stone Lab programming, in collaboration with Ohio agency biologists, trains the state's entry-level fisheries management staff to more efficiently manage the state's aquatic resources. Back to Goals

6636 - Benefits of Ohio Charter Industry surveys (R/ME-035-PD)
RELEVANCE: The charter fishing industry has changed a lot in the past few years. The Ohio Sea Grant College Program is coordinating the seventh Ohio Charter Captains survey to better assist the Ohio charter fishing industry. This research will document the status of the Ohio charter fishing industry in 2010. Our last survey of the charter industry was in 2006. Ohio Sea Grant Extension has conducted Ohio Great Lakes charter industry surveys in 2006, 2002, 1998, 1994, 1990 and 1985. We need to update our data on the Ohio Lake Erie charter industry in order to provide up-to-date information to charter captains, resource managers and citizens. Ohio has the largest charter fleet in the Great Lakes and has one of the most extensive information datasets on this industry in the USA.

RESPONSE: We will use a questionnaire similar to the 2008 and previous Ohio Charter industry surveys to continue the ongoing time series data collection on this significant Lake Erie fishery enterprise. We will continue to utilize a mail survey as previously administered successfully to Ohio Lake Erie charter captains. The results of this research will be made available to Ohio Charter Associations, charter captains, key decision makers, researchers and interested citizens. We will randomly select up to 600 captains to participate in the 2010 Ohio Charter Captains Survey from the Ohio Department of Natural Resources list of licensed Ohio Charter Captains. Their participation in this research is completely voluntary and will help to provide an accurate and credible assessment of the Ohio Charter Industry's development. All responses will remain strictly confidential and will in no way be associated with any individual captain or business.

RESULTS: We successfully surveyed the Ohio Charter Industry with 239 usable returns for a 49.9% rate of return. We are in the process of analyzing the data and writing up a paper to submit to Fisheries. The US Army Corps of Engineers has contacted us to explore the possibility of Ohio Sea Grant and the Great Lakes Sea Grant Network surveying the Great Lakes Charter industry for potential Asian carps impacts on the industry. We have published our charter survey results in Fisheries, a peer

reviewed magazine of the American Fisheries Society. Others have utilized this information to document the economic impacts of charter angling on the Great Lakes. BENEFITS: (1) Results of Sea Grant and other research are disseminated to users so that maximum benefits from the research results will be obtained, (2) increased optimization of Lake Erie resource use, (3) new jobs and businesses in the Lake Erie area brought about by responding to new opportunities, and (4) this work will be used to help estimate economic impacts of AIS on the Great Lakes charter industry for the US Army Corps of Engineers.

RECAP: RECAP: Results of Ohio Charter Industry surveys were analyzed, submitted to Fisheries and will be used to benefit the Lake Erie area. Back to Goals

6428 - Fate of Inorganic Nanoparticles in Surface Water Environments (R/PS-041)
RELEVANCE: Defined as having diameters between 1 and 100 nm, nanoparticles have unique properties based on surface area and quantum effects that distinguish them from identical material of larger size. Gold, for example, is inert at the macroscale, yet highly reactive when prepared as nano-sized particles. These new and unique material properties, while exciting from a commercial standpoint, could prove troublesome in the environment as these materials may exhibit unforeseen behavior. The proposed research will examine the path of engineered nanoparticles in fresh water systems, focusing on the behavior of three inorganic nanoparticles representative of metallic (nano-silver), quantum dot (CdSe) and metal oxide (ZnO) classes of materials in surface water environments. These materials were chosen for study based upon both their potential for widespread use and proven ability to produce adverse or toxic effects. Experiments will be conducted using water collected from important regional surface waters (e.g., Lake Erie) as well as water with known components and additives synthesized in the laboratory. This will provide fundamental information relevant to the Great Lakes as well as to the basic processes on nanoparticle/freshwater interactions.

RESPONSE: We intend to systematically investigate the influence of nanoparticle properties (e.g., size, morphology and structure) and solution composition (e.g., electrolyte composition, solution pH and presence of natural organic matter) on the subsequent fate of the nanomaterial in surface waters. The systems will be evaluated under well-controlled conditions over a range of time scales because it is currently not known how the properties of nanoparticles may change in natural systems over long time-scales or whether such changes influence the potential for adverse effects. The three materials to be examined (nano-silver, CdSe and ZnO) are currently used or being proposed for use in more than 100 applications, including medicine, electronics, energy, chemicals, manufacturing, agriculture and consumer goods (see www. nanotechproject.org). We have two objectives in this research:
1. Determine how the physical and chemical properties of the manufactured nanoparticles affect their transport and fate in aquatic systems. Nano-silver and CdSe particles are prepared with a capping layer, which we expect will enhance stability compared to that of the uncapped ZnO. The integrity of the capping layer when exposed to environmental conditions over time is poorly understood.
2. Evaluate how solution composition controls nanoparticle stability and fate in surface water systems. Natural organic matter is expected to be an important factor in stability of the target nanoparticles. For ZnO we anticipate results should follow those observed for other nano-sized metal oxides. In the case of nano-silver and CdSe, however, interactions between the capping layer and organic matter will dictate stability, and details of these interactions are at this time unknown.

RESULTS: By investigating the mechanisms that control the fate of metallic nanoparticles in aquatic systems this study will provide a means for evaluating the impact of these materials on surface waters. Such waters are an important source of drinking water, support freshwater aquaculture and fisheries, and provide a crucial habitat for a variety of organisms, so maintaining their integrity is of huge importance to the health of Lake Erie and its tributaries.

RECAP: RECAP: The proposed research examines how engineered nanoparticles interact with other materials in fresh water ecosystems. Back to Goals

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Program Performance Measures (2010 - 2013)

Program Performance Measure	Program Plan Target (2010-2013)	Reported	Program Comments
By 2013, Ohio Sea Grant will work with the Ohio Department of Natural Resources and other partners to	1	3	2010 - The first draft of the Ohio Aquatic Invasive Species Management Plan will be released June 2012. 2011 - The first draft of the Ohio Aquatic Invasive Species Management Plan will be released June 2012. 2012 - The initial draft of the Ohio Aquatic Invasive Species Management Plan was finalized in 2012, with the support of Ohio Sea Grant. At this time, additional efforts to finalize the document will be led entirely by the

update a statewide Ohio Aquatic Invasive Species Management Plan.			Division of Wildlife (ODNR), which will come in the form of a Rapid Action Plan. 2013 - This effort was completed in 2012.
Number of people reached with education and outreach related to the Lake Erie fishery.	5,000	87,368	2010 - Increased activity is related to communicating and educating about nonpoint pollution and aquatic invasive species impact on the lake's fishery. The increased saliency of both issues has created greater demand for all Ohio Sea Grant programming. In addition, the 2009 opening of the Aquatic Visitors Center provides greater opportunities for sharing information about the fishery. 2011 - This measure should read "By 2013." We reached 14,283 in 2009, 14,631 in 2010, and 28,017 in 2011. Increased activity is related to communicating and educating about nonpoint pollution and aquatic invasive species on the lake's fishery. The increased saliency of these issues has created greater demand for Ohio Sea Grant programming. In addition, the 2009 opening of the Aquatic Visitors Center in a former fish hatchery provides greater opportunities for sharing information about the fishery. 2012 - Ohio Sea Grant's collaboration with Division of Wildlife on the Aquatic Visitor's Center (South Bass island) has allowed us to greatly exceed our expected reach concerning the Great Lakes fishery. In 2012 alone, 11,739 coastal residents and visitors explored the facility, learning about threats to the Lake Erie fishery as well as what citizens can do to protect this valuable resource. Ohio Sea Grant agents also held a number of workshops, courses, and public presentations about the health and needs of the Lake Erie fishery in multiple coastal communities and at Stone Laboratory. Further, one of the key issues we discuss at our displays at annual boat shows is the Lake Erie fishery, as it's a key issue for most boat show visitors. 2013 - Ohio Sea Grant's collaboration with Division of Wildlife on the Aquatic Visitor's Center (South Bass island) has allowed us to greatly exceed our expected reach concerning the Great Lakes fishery. In 2013 alone, 20,124 coastal residents and visitors explored the facility, learning about threats to the Lake Erie fishery as well as what citizens can do to protect this valuable resource. Ohio Sea Grant agents also held a number of workshops, courses, and public presentations about the health and needs of the Lake Erie fishery in multiple coastal communities and at Stone Laboratory. Further, one of the key issues we discuss at our displays at annual boat shows is the Lake Erie fishery, as it's a key issue for most boat show visitors.

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Program Objectives (2010 - 2013)

Program Objective	Achieved (yes/no)	Program Comments
By 2013, Ohio Sea Grant will investigate the feasibility of developing at least two new Lake Erie or aquaculture fish products.	Yes	2010 - Ohio Sea Grant is involved with a Lake Erie underutilized fish marketing project with the Center of Innovative Food Technology (freshwater drum and white perch), Ohio commercial fish producers (spotfin shiners as baitfish), and ODNR. 2011 - Ohio Sea Grant is involved with a Lake Erie underutilized fish marketing project with the Center of Innovative Food Technology (freshwater drum and white perch), Ohio commercial fish producers (spotfin shiners as baitfish), and ODNR. 2012 - As of 2012, this feasibility study had been completed. However, the results found no successful products. 2013 - 2013: This feasibility study was completed in a previous reporting year. However, the results found no successful products.

By 2013, 1,000 have participated in hand-on training to learn more about efficient fishing techniques.	Yes	2010 - Since July 2009, Ohio Sea Grant has provided hands-on training to 3,025 individuals on fishing techniques. Training occurs during adult and youth workshops and hands-on assistance with visitors to the Aquatic Visitors Center. By 2010, Ohio Sea Grant had reached 1,283. In 2011, Ohio Sea Grant reached 1,742. 2011 - Since July 2009, Ohio Sea Grant has provided hands-on training to 3,025 individuals on fishing techniques. Training occurs during adult and youth workshops and hands-on assistance with visitors to the Aquatic Visitors Center. By 2010, Ohio Sea Grant had reached 1,283. In 2011, Ohio Sea Grant reached 1,742. 2012 - Although this measure was already completed in previous reporting years, Ohio Sea Grant continued its efforts by reaching an additional 1,499 individuals in 2012 through youth lure tying events, learn-to-fish programs, and Aquatic Visitor's Center attendance. 2013 - 2013: Although this measure was already completed in previous reporting years, Ohio Sea Grant continued its efforts by reaching an additional 4545 individuals in 2013 through youth lure tying events, learn-to-fish programs, AVC adventure camps, boat shows, and the AVC open house. This number does not include those impacted by the AVC (20,124 individuals) since we did not track the number of individuals who learned to fish more effectively from hands-on training provided at the Aquatic Visitor's Center dock.
By 2013, 1,000 stakeholders attended education programs that identify causes and control measures for minimizing the stresses to Lake Erie fisheries.	Yes	2010 - Increased activity is related to communicating and educating information about the impacts of nonpoint pollution and aquatic invasive species on the lake's fishery. The increased saliency of these issues has created greater demand for Ohio Sea Grant programming. In addition, the 2009 opening of the Aquatic Visitors Center in a former fish hatchery provides greater opportunities for sharing information about the fishery. Aquatic Visitors Center reach was 13,316 and 13,340 in 2011. Annual numbers include 14,283 in 2009, 14631 in 2010, and 28,017. Total reach thus far is 56,931. 2011 - Increased activity is related to communicating and educating information about the impacts of nonpoint pollution and aquatic invasive species on the lake's fishery. The increased saliency of these issues has created greater demand for Ohio Sea Grant programming. In addition, the 2009 opening of the Aquatic Visitors Center in a former fish hatchery provides greater opportunities for sharing information about the fishery. Aquatic Visitors Center reach was 13,316 and 13,340 in 2011. Annual numbers include 14,283 in 2009, 14631 in 2010, and 28,017. Total reach thus far is 56,931. 2012 - Ohio Sea Grant's collaboration with Division of Wildlife on the Aquatic Visitor's Center (South Bass island) has allowed us to greatly exceed our expected reach concerning the Great Lakes fishery. In 2012 alone, 11,739 coastal residents and visitors explored the facility, learning about threats to the Lake Erie fishery as well as what citizens can do to protect this valuable resource. Ohio Sea Grant agents also held a number of workshops, courses, and public presentations about the health and needs of the Lake Erie fishery in multiple coastal communities and at Stone Laboratory. Further, one of the key issues we discuss at our displays at annual boat shows is the Lake Erie fishery, as it's a key issue for most boat show visitors. All combined, a total of 14,834 stakeholders attended education programs that identify causes and control measures for minimizing the stresses to Lake Erie fisheries in 2012. Our total reach since 2009 is 71,765 stakeholders. 2013 - 2013: Ohio Sea Grant's collaboration with Division of Wildlife on the Aquatic Visitor's Center (South Bass island) has allowed us to greatly exceed our expected reach concerning the Great Lakes fishery. In 2013 alone, 20,124 coastal residents and visitors explored the facility, learning about threats to the Lake Erie fishery as well as what citizens can do to protect this valuable resource. Ohio Sea Grant agents also held a number of workshops, courses, and public presentations about the health and needs of the Lake Erie fishery in multiple coastal communities and at Stone Laboratory. Further, one of the key issues we discuss at our displays at annual boat shows is the Lake Erie fishery, as it's a key issue for most boat show visitors. All combined, a total of 30,017 stakeholders attended education programs that identify causes and control measures for minimizing the stresses to Lake Erie fisheries in 2013. Our total reach since 2009

		is 101,782 stakeholders.
By 2013, 1,500 have been reached with information on preserving and preparing freshly caught Lake Erie fish.	Yes	2010 - To date, 5,392 individuals have been reached with information on preserving and preparing freshly caught Lake Erie fish. In 2009, 337 were reached. In 2010, 4,023 were reached, and in 2011, 1,032 were reached. 2011 - To date, 5,392 individuals have been reached with information on preserving and preparing freshly caught Lake Erie fish. In 2009, 337 were reached. In 2010, 4,023 were reached, and in 2011, 1,032 were reached. 2012 - Although this measure had been completed in previous annual reporting years, Ohio Sea Grant reached an additional 434 individuals in 2012 through sportfishing workshops, the annual Charter Captains Conference, Ohio Boat Shows, and Aquatic Visitor's Center tours, which all provided information on preserving and preparing freshly caught Lake Erie fish. 2013 - 2013: Although this measure had been completed in previous annual reporting years, Ohio Sea Grant reached an additional 378 individuals in 2013 through the following: individual instruction, Cedar Point during Lake Erie Education Day, 4-H Sea Camp, Lake Erie Sportfishing class at Stone Lab, Sportfishing for Girl Scouts event by the Lake Erie Nature and Science Center, Lake Erie Nature and Science Center's Family Fishing Day and the 2013 Charter Captain's conference.
By 2013, ODNR will have an updated Ohio Aquatic Invasive Species Management Plan.	Yes	2010 - Eugene Braig and David Kelch were appointed by the Ohio Department of Natural Resources, Division of Wildlife to the Ohio Aquatic Invasive Species committee in 2009 to assist with revision of a state management plan for aquatic invasive species and development of a rapid response plan for Ohio. The first draft of the Ohio Aquatic Invasive Species Management Plan will be released June 2012. 2011 - Eugene Braig and David Kelch were appointed by the Ohio Department of Natural Resources, Division of Wildlife to the Ohio Aquatic Invasive Species committee in 2009 to assist with revision of a state management plan for aquatic invasive species and development of a rapid response plan for Ohio. The first draft of the Ohio Aquatic Invasive Species Management Plan will be released June 2012. 2012 - The initial draft of the Ohio Aquatic Invasive Species Management Plan was finalized in 2012, with the support of Ohio Sea Grant. At this time, additional efforts to finalize the document will be led entirely by the Division of Wildlife (ODNR), which will come in the form of a Rapid Action Plan. 2013 - 2013: The initial draft of the Ohio Aquatic Invasive Species Management Plan was finalized in 2012, with the support of Ohio Sea Grant. At this time, additional efforts to finalize the document will be led entirely by the Division of Wildlife (ODNR), which will come in the form of a Rapid Action Plan.
By 2013, the Ohio Lake Erie Discussion Board has informed 90,000 individuals reading posts and has 400 registered users.	Yes	2010 - Since July 2009, 1,374,375 posts have been read on the Lake Erie Discussion Board and there are 407 registered users. Please note that the relevancy of the Discussion Board is diminishing as social media opportunities provide increased opportunities. In 2012, the Discussion Board will be re-evaluated and this measure may change based on our ability to reach more users with greater frequency. 2011 - Since July 2009, 1,374,375 posts have been read on the Lake Erie Discussion Board and there are 407 registered users. Please note that the relevancy of the Discussion Board is diminishing as social media opportunities provide increased opportunities. In 2012, the Discussion Board will be re-evaluated and this measure may change based on our ability to reach more users with greater frequency. 2012 - Since July 2009, 1,735,932 posts have been read on the Lake Erie Discussion Board and there are 407 registered users. An overhaul of the Discussion Board will be completed in 2013 in a blog format with old Discussion board to serve as searchable archive. 2013 - 2013: As stated in 2011, the Discussion Board measure is no longer relevant due to changes in communications technology. Also, due to changes in Discussion Board analytics, we are no longer able to assess unique views. To measure and monitor relative use of the Discussion Board, the following measures are provided instead: In 2013, there were 406 page views to the Discussion Board. 1366 likes

		on Facebook (352 for Ohio Sea Grant, 896 for Stone Laboratory, and 118 for the AVC), 2145 followers on Twitter (1356 for Ohio Sea Grant and 789 for Stone Laboratory), and have 2716 eNews subscribers. Additionally in 2013, we had 192 Twine Line online subscribers and 3,000 paper Twine Line recipients (with over 20,000 currently in circulation).
By 2013,Ohio Sea Grant will assist in the development oa comprehensive education and outreach strategy with the aquaculture industry.	Yes	2010 - An education and outreach strategy is being developed to address the pressing AIS threat on Lake Erie's fishery. Targeted audiences include participants in the Ohio Clean Marina and Ohio Clean Boater programs, as well as launch ramp users and others who can use best practices to reduce fishery risks. 2011 - An education and outreach strategy is being developed to address the pressing AIS threat on Lake Erie's fishery. Targeted audiences include participants in the Ohio Clean Marina and Ohio Clean Boater programs, as well as launch ramp users and others who can use best practices to reduce fishery risks. 2012 - This project has moved away from the development of a comprehensive education and outreach strategy and instead has evaluated a number of new products and, through research sponsored by Ohio Sea Grant, attempted to make yellow perch aquaculture more successful. All product lines evaluated were unsuccessful, but we have through selective breeding, succeeded in producing a strain of Yellow Perch that grows about 40% faster that previous strains. 2013 - 2013: This project has moved away from the development of a comprehensive education and outreach strategy and instead has evaluated a number of new products and, through research sponsored by Ohio Sea Grant, attempted to make yellow perch aquaculture more successful. All product lines evaluated were unsuccessful, but there has been success in producing a strain of Yellow Perch that grows about 40% faster that previous strains via selective breeding.