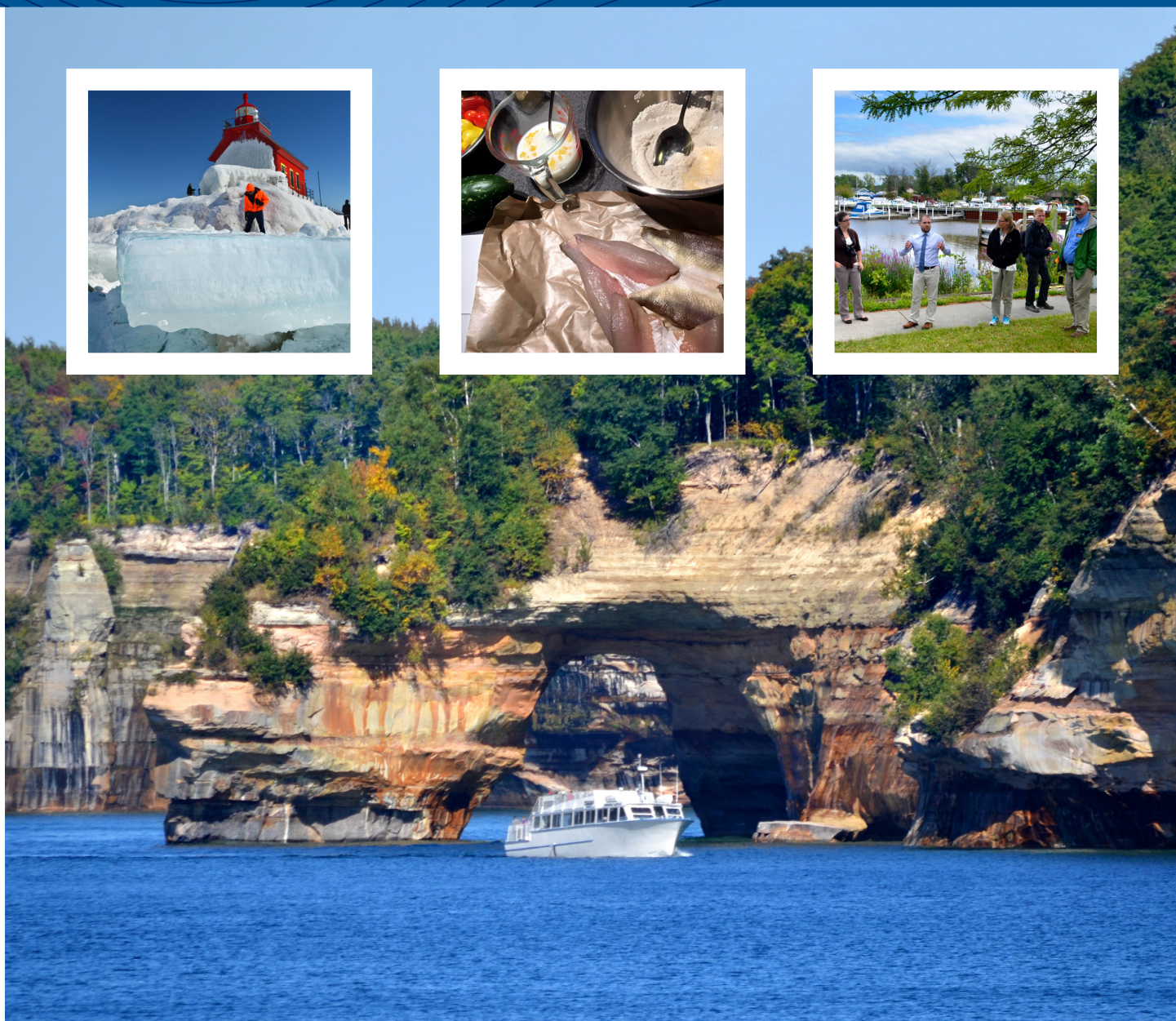




MICHIGAN SEA GRANT
UNIVERSITY OF MICHIGAN + MICHIGAN STATE UNIVERSITY

ANNUAL REPORT

FEBRUARY 1, 2017 - JANUARY 31, 2018



michiganseagrant.org

Michigan Sea Grant 2017 Annual Report

2/1/2017 – 1/31/2018

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Impact and Accomplishment Statements

Michigan Sea Grant Annual Report (FY 2017-18)

Focus Area: Healthy Coastal Ecosystems

Goal 1: Ecosystem sustainability is improved by better understanding of ecosystem services.

IMPACT: Student stewardship partnership helps restore sensitive wetland habitat, protect native species on Michigan islands.

Relevance: Michigan's Charity Islands in Lake Huron, managed by the U.S. Fish and Wildlife Service (USFWS) as part of the Michigan Islands National Wildlife Refuge system, provide important habitat for resident and migratory birds, reptiles, and amphibians, as well as native plant species, including Pitcher's thistle — a federally and state-listed threatened species. Many native plant and wildlife species rely on these coastal habitats but are threatened by the presence of non-native *Phragmites australis*, a rapidly spreading grass that displaces native plant species and degrades wildlife habitat.

Response: Michigan Sea Grant helped coordinate efforts with partners to engage local students in place-based outdoor education and environmental-STEM opportunities related to managing invasive *Phragmites*. This partnership aims to restore sensitive coastal wetland and dune habitats. Other objectives include supporting university research, raising public awareness about invasive species, and preserving the natural features and ecological function of the islands. Students collect data to monitor Pitcher's thistle populations and calculate densities of invasive *Phragmites* stands to evaluate success of treatments applied to manage this plant.

Results: The project has resulted in long-term monitoring of Pitcher's thistle and establishment of coastal habitat improvement efforts. By conducting surveys every spring and fall since 2016, students have documented 476 Pitcher's thistle plants, while surveying close to 500 yards of coastal dune areas. Students also planted nearly 100 Pitcher's thistle seedlings in 2016. The school is installing a greenhouse, where high school students will take charge of rearing plants from seeds collected on the islands as part of this restoration effort.

Recap: Michigan students team up with scientists to better understand ecosystem services by monitoring federally threatened Pitcher's thistle and assessing treatments to reduce invasive *Phragmites* populations on Charity Island.

Partners: Huron Pines, Northeast Michigan Great Lakes Stewardship Initiative, U.S. Fish and Wildlife Service, The Nature Conservancy, Saginaw Bay Cooperative Invasive Species Management Area, Saginaw Valley State University, Au Gres-Sims School District, Michigan Natural Features Inventory, Michigan Department of Natural Resources, Brown's Landing (charter boat service)

Projects: Extension A/AS-5

Goal 2: Ecosystems and their habitats are protected, enhanced, or restored.

IMPACT: Michigan Sea Grant projects restore habitat and assist communities in implementing green infrastructure initiatives.

Relevance: Healthy coastal and Great Lakes ecosystems are critical for Michigan. Coastal development and other activities can lead to water quality degradation, decline of fisheries, wetland loss, and other challenges. Restoring habitats and encouraging green infrastructure are ways Michigan Sea Grant helps improve water and ecosystem quality.

Response: Michigan Sea Grant has partnered on several multi-year projects assisting with habitat restoration and green infrastructure implementation.

- The Belle Isle Reef construction project added four acres of fish spawning habitat in the upper Detroit River.
- The Stony Island Restoration Project restored 17 acres of wetland habitat. The island's existing shoals were improved and rebuilt, which has helped protect and improve wetland habitat.
- Michigan Sea Grant helped the Southeast Michigan Council of Governments create a Green Infrastructure Vision. Workshops with communities, watershed groups, and others initiated implementation of the vision. Workshop evaluations showed a need for additional work to remove barriers within existing codes and ordinances. A pilot audit project was completed for the cities of Southfield and Canton, as well as Wayne and Oakland counties.

Results: Post-construction monitoring of the Belle Isle Reef project in 2017 showed use by 17 fish species, including the state threatened lake sturgeon and endangered northern madtom. Restoration at Stony Island has resulted in the protection of 100 acres of coastal wetlands from erosion. As a result of green infrastructure workshops and audits, the cities of Southfield and Canton successfully updated codes and ordinances in 2017 and six more communities have completed code audits to remove barriers to green infrastructure implementation.

Recap: Michigan Sea Grant helped communities complete habitat restoration projects and update community ordinances and codes to encourage green infrastructure implementation.

Partners: University of Michigan Water Center, Friends of the Detroit River, Michigan Department of Natural Resources, Detroit River Public Advisory Council, Great Lakes Restoration Initiative, Southeast Michigan Council of Governments, Wisconsin Sea Grant, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration

Projects: Extension A/AS-5, M/PM-54, C/CC-10

Goal 3: Ecosystem-based approaches are used to manage land, water, and living resources.

ACCOMPLISHMENT: Graduate student fellow works with federal researchers to understand drivers of harmful algal blooms in Lake Erie.

Relevance: Recurring harmful algal blooms (HABs) in western Lake Erie consist of cyanobacteria that can produce toxins that harm wildlife and domestic animals, threaten municipal drinking water supplies, reduce tourism and quality of life for coastal communities, and, if ingested, damage human health. Researchers are working to better understand how a major tributary to Lake Erie — the Detroit River — influences the distribution of HABs in the western basin. River flow volume, wind speed and direction, and water quality could all influence HABs distribution. Better understanding of the influence of the Detroit River on HABs distribution will help state and federal agencies predict the extent of HABs and develop tools to support decision making in coastal communities.

Response: Michigan Sea Grant funded a graduate student, Angela Yu, to collaborate with researchers at the NOAA Great Lakes Environmental Research Laboratory to develop a model to predict the Detroit River's impact on HABs distribution. The research team combined a variety of data to identify the location of the Detroit River plume and how it affects HABs over time and space.

Results: Researchers found that the Detroit River flow is not highly variable, but the river plume changes shape and location throughout the season due to multiple factors. Results suggest that the Detroit River discharge itself has some impact on HAB surface area, but statistical analyses indicate that its combined effects with other physical drivers, such as wind, have a more significant influence. Research findings were shared at several major conferences in Michigan and Oregon.

Recap: Michigan Sea Grant-funded graduate student fellow collaborated with federal researchers to understand the effects of the Detroit River flow on distribution of harmful algal blooms (HABs) in western Lake Erie. The research has found that the Detroit River impacts the surface area of HABs, but other physical drivers, such as wind, also have a significant influence.

Partners: Michigan Technological University, National Oceanic and Atmospheric Administration-Great Lakes Environmental Research Laboratory, U.S. Geological Survey Great Lakes Science Center, Cooperative Institute for Great Lakes Research

Projects: R/WQ-6

Focus Area: Resilient Communities and Economies

Goal 4: Coastal economies are vibrant and resilient.

ACCOMPLISHMENT: Sustainable Small Harbors program continues coastal community visioning with support from state partnerships.

Relevance: Vulnerable coastal communities must include a diverse set of viewpoints to create a consensus vision for a sustainable, vibrant, and resilient waterfront. Many communities lack the capacity and resources to conduct community visioning to plan for their waterfront's future.

Response: Michigan Sea Grant and a research team developed a tool to assist water-dependent communities in becoming more resilient. In 2017, Michigan Sea Grant and researchers hosted a webinar with state partners to share the Sustainable Small Harbors (SSH) *Tools and Tactics Guidebook*. More than 75 people from states across the Great Lakes participated in the webinar. Michigan Sea Grant acquired state funding to print and distribute the guidebook to several stakeholder groups. Michigan Sea Grant also expanded partnerships with state agencies and recreational harbormasters to further develop the SSH program and reach additional coastal communities.

Results: Michigan Sea Grant worked with state agencies to prioritize coastal communities in need of future visioning, then engaged with two new communities through the SSH program. The webinar and guidebook have led at least one large coastal community to use the SSH visioning process to develop plans for a river greenway. The greenway project will bring together coastal towns, farm communities, and a city to visualize how a greenway can connect communities to the river and Great Lakes coastal resources. The Michigan Sea Grant team was recognized with a regional outreach award from the Great Lakes Sea Grant Network in June 2017 for its successful work on this project.

Recap: Michigan Sea Grant has used additional funding to expand the Sustainable Small Harbors program partnerships, provide funding for community visioning support, and conduct outreach through a webinar and guidebook to reach a large network of coastal communities.

Partners: Lawrence Technological University, Environmental Consulting & Technology Inc., David L. Knight LLC, Michigan State Housing Development Authority, Michigan Department of Natural Resources – Michigan State Waterways Funds, and Office of the Great Lakes

Projects: R/CCD-33, M/PM-54, C/CC-10, Extension A/AS-5

Goal 5: Communities and water-dependent businesses use comprehensive planning to make informed strategic decisions.

ACCOMPLISHMENT: EnviroWeather Tool now includes National Weather Service Risk Runoff Forecasting for Michigan

Relevance: Agriculture producers must manage when to apply nutrients to Michigan's farms. In some areas of the Great Lakes, excessive nutrient applications have contributed to nuisance levels of harmful algal blooms, such as those occurring annually in western Lake Erie.

Response: Michigan Sea Grant and partners produced Michigan EnviroImpact (www.enviroimpact.iwr.msu.edu), an online tool that provides users with regularly updated forecasts for surface runoff risk. The tool allows users to create email and text message alerts that notify them of significant predicted runoff risk events. Additionally, the tool provides a seven-day forecast for runoff risk at any location in Michigan. It was developed as part of a multi-state regional effort to improve runoff risk decision support tools. Specific stakeholder engagement included:

- Michigan Association of Conservation Districts
- 2018 International Association of Great Lakes Research Conference – Lake Erie Session
- Manure Safety Day and Thumb Dairy group meetings
- Great Lakes Cattle Feeding and Marketing Short course

Results: Since the tool's release date (June 20, 2017), Google Analytics has collected the following data on users accessing the tool:

- 1,190 sessions
- 586 unique users
- 3,202 page views
- 2.69 pages visited per session, on average
- 3:44 minutes spent per session, on average
- 100 text messages sent indicating a runoff alert
- 31 user accounts created

Recap: New risk runoff forecasting tool helps agricultural producers determine if the time is right to apply nutrients to landscapes, reducing runoff into the Great Lakes.

Partners: National Oceanic and Atmospheric Administration, National Weather Service, Michigan Department of Agriculture and Rural Development, Michigan Agriculture Environmental Assurance Program, Michigan Department of Environmental Quality, Michigan State University Institute of Water Research, Michigan State University Extension, Great Lakes Restoration Initiative, Environmental Protection Agency

Projects: R/AS-24

Goal 6: Improvements in coastal water resources sustain human health and ecosystem services.

IMPACT: Updates to Michigan Sea Grant Clean Marina Program result in additional state funding and newly certified marinas.

Relevance: While Michigan's coastal marinas are vital components of many Great Lakes communities and economies, pollutants generated from marina activities, such as boat washing and fuel handling, as well as stormwater runoff from parking lots, can contribute to water quality problems. Michigan Sea Grant works with the Michigan Boating Industry Association (MBIA) to administer the Michigan Clean Marina Program (CMP) to reduce the water quality impact of marinas. While the Michigan CMP is well received, less than 20 percent of coastal marinas have been certified as Clean Marinas, leading Michigan Sea Grant and state partners to wonder about barriers preventing coastal marinas from becoming Clean Marinas.

Response: Michigan Sea Grant hosts and manages the Clean Marina online classroom for marinas seeking or renewing certification. In 2017, Michigan Sea Grant worked with program partners to update Michigan CMP communication materials and administrative processes. This effort also identified the need for more hands-on outreach to marinas. In December 2017, Michigan Sea Grant and MBIA organized an in-person classroom at the Regional Boating Educational Conference. The workshop covered lessons and best practices from the online classroom. Two co-facilitators piloted the workshop with seven marinas completing classroom certification.

Results: Michigan Sea Grant received funding from the Coastal Zone Management Program to identify barriers to CMP participation, evaluate the program, and prioritize revisions to the classroom and certification process. Michigan Sea Grant worked with partners to complete three in-person Clean Marina Classroom workshops in early 2018.

Recap: Michigan Sea Grant works with state and industry partners to strengthen the Michigan Clean Marina Program through educational resources that identify best management practices for participating marinas.

Partners: Michigan Boating Industries Association, Minnesota Clean Marina Program, Wisconsin Clean Marina Program, Ohio Department of Natural Resources—Division of Parks and Watercraft, Ohio Sea Grant, Michigan Clean Marina Program, Michigan Department of Natural Resources Office of the Great Lakes

Projects: M/PM-54, C/CC-10, Extension A/AS-5

Goal 7: Resilient coastal communities adapt to the impacts of hazards and climate change.

IMPACT: Michigan Sea Grant and partners provide critical Drill Conductor Training to state and tribal commercial fishers.

Relevance: Commercial fishing is known to be one of the most dangerous professions and, in recent years, efforts have been made to reduce fatalities related to fishing. Some of the major emergencies that occur on commercial fishing vessels include person overboard, fire, and flooding. When these types of emergencies occur, the entire commercial vessel crew must know their specific emergency assignments so they can take immediate action to prevent loss of life and equipment. State and tribal licensed commercial fishers are required by the U.S. Coast Guard to practice monthly emergency drills, and those conducting these drills must pass a Drill Conductor Training course.

Response: Michigan Sea Grant coordinates Drill Conductor Training courses to help captains of state and tribal Great Lakes commercial fishing vessels fulfill regulations related to instruction, drills and safety orientations, and onboard emergency instruction. Drill Conductor Training courses have many hands-on exercises to help increase crew members' proficiency in emergency situations.

Results: In 2017, two Drill Conductor Training courses were held with 21 attendees. Those attending evaluated the training as excellent and indicated that holding emergency drills on actual vessels helped increase their ability to react properly in emergency situations on their own vessels. The courses had representation from commercial fishers from Lake Superior as well as two U.S. Coast Guard personnel requiring training for their positions. Average annual salary for captains, mates, and pilots of water vessels is \$65,550 in the state of Michigan as of May 2017. The 21 required certifications thus have nearly a \$1.4M impact. In 2016, 77 people participated in the classes.

Recap: Michigan Sea Grant provides training to help state and tribal Great Lakes commercial fishing vessel captains fulfill U.S. Coast Guard regulations related to instruction, drills and safety orientations, and onboard emergency instruction.

Partners: Great Lakes Indian Fish and Wildlife Commission, Alaska Marine Safety Education Association, Wisconsin Sea Grant, Red Cliff Band of Lake Superior Chippewa, Bay Mills Indian Community

Projects: Extension A/AS-5

Focus Area: Sustainable Fisheries and Aquaculture

Goal 8: Seafood supply meets public demand and is safe, secure, and sustainable.

ACCOMPLISHMENT: Michigan Sea Grant citizen science projects inform lake management decisions to help keep fisheries sustainable.

Relevance: Recreational and commercial fisheries are a vital part of Michigan's heritage, with Great Lakes fisheries valued at approximately \$7 billion annually. Michigan Sea Grant supports Great Lakes fisheries through education, outreach, and research. Solid resource management begins with solid science, and Michigan Sea Grant encourages citizen science projects to help inform decision making by fisheries agencies and managers.

Response: Michigan Sea Grant developed three citizen science programs to engage anglers in learning about their fishery and provide information to decision makers. The Salmon Ambassadors program and Great Lakes Angler Diary app enable anglers to submit observations on harvest of wild and stocked salmon and other species. The Huron-Michigan Diet Study encourages anglers to collect fish stomachs needed for research on the Great Lakes' changing food web. Michigan Sea Grant's how-to videos, signs, and demonstrations promote and teach volunteers proper collection procedures.

Results: In 2017, Salmon Ambassadors and Great Lakes Angler Diary users recorded data on 1,305 Chinook salmon to determine the percent of fish that are wild or hatchery raised. App users also submitted complete data for an additional 363 fish of other species and collected 59 stomachs for the fish diet study. Volunteers with both programs collected a combined total of 146 Chinook salmon snouts that contained coded wire tags. Additional volunteers also collected more than 1,000 fish stomachs. These results help fisheries scientists and managers understand what — and how much — each gamefish species is eating. All of the data will lead to better management and fish-stocking decisions.

Recap: Citizen science programs developed by Michigan Sea Grant provide important data needed by scientists, fishery agencies, and lake managers to inform their decision making.

Partners: Michigan State University; Michigan, Wisconsin, Illinois, and Indiana Departments of Natural Resources; U.S. Fish and Wildlife Service; Michigan Steelhead and Salmon Fishermen's Association; Michigan Charter Boat Association; Detroit Area Steelheaders; Wisconsin Sea Grant; U.S. Geological Survey; and Little Traverse Bay Bands of Odawa Indian

Projects: Extension A/AS-5, M/PM-54, C/CC-10

Goal 9: Informed consumers understand the health benefits of seafood consumption and how to evaluate the safety and sustainability of the seafood they buy.

ACCOMPLISHMENT: Michigan Sea Grant raises awareness of Michigan and Great Lakes aquaculture.

Relevance: Despite being surrounded by water, Michigan imports most of its commercially available seafood. The White House and Congress have expressed interest in using aquaculture to diversify American food systems and bolster wild freshwater and marine fisheries. Many federal and state agencies agree that nationwide investments in aquaculture research and technology can revitalize local economies, relieve pressure on wild fisheries, ensure a safer food-supply chain, and stem the tide of farm-raised seafood being imported from other parts of the world.

Response: Michigan Sea Grant raises the profile of sustainable aquaculture operations in Michigan and continues to assess the future of aquaculture production in the state. Michigan Sea Grant has formed a close relationship with Owen Ballow, a member of the Michigan Aquaculture Association Board and owner of Indian Brook Trout Farm in Jackson County. Several undergraduate interns have been funded by Michigan Sea Grant to work with Owen's company and learn about sustainable methods for fish production. Indian Brook and its new processing plant are the nation's first fresh-pack aquaculture facility to receive third-party certification for Best Aquaculture Practices.

Results: Ballow serves on Michigan Sea Grant's Advisory Committee and provides advice on the aquaculture industry. Michigan Sea Grant recommended him as a panelist for a Capitol Hill aquaculture event organized by the Sea Grant Association in 2017. At the event, Ballow spoke to an audience representing more than 100 Sea Grant programs, aquaculture practitioners, and members of Congress. In early 2018, Midwest retail chain Meijer finalized an agreement to carry Indian Brook products in all 235 of its stores and to promote Michigan aquaculture. These steps have all raised the profile of Michigan and Great Lakes aquaculture on the national stage.

Recap: Michigan Sea Grant raises awareness of aquaculture in Michigan through relationships with innovative aquaculture operators.

Partners: Indian Brook Trout Farm, U.S. Fish and Wildlife Service – Jordan River National Fish Hatchery, Department of Natural Resources – Platte River State Fish Hatchery

Projects: M/PM-54, C/CC-10

Focus Area: Environmental Literacy and Workforce Development

Goal 10: An environmentally literate public that is supported and informed by a continuum of lifelong formal and informal engagement opportunities.

IMPACT: Michigan Sea Grant provides schools and communities with learning opportunities through place-based education partnerships.

Relevance: Hands-on, place-based education is a proven strategy for fostering knowledgeable and active stewards of the environment. The Northeast Michigan Great Lakes Stewardship Initiative (NEMIGLSI) is a network and partnership that seeks to protect the Great Lakes and other natural resources through hands-on learning in — and with — communities. In addition, sustained training and professional development for teachers helps maximize the effectiveness of place-based education. School and community connections can enhance educational experiences and offer community development opportunities, resulting in partnerships beneficial to all.

Response: Michigan Sea Grant provides educational programming and facilitative support for the regional NEMIGLSI place-based education network. Since 2009, this network has engaged more than 23,000 students as Great Lakes stewards. In 2017, this initiative supported more than 30 schools, 167 educators, and more than 100 community partner organizations. These school-community partnerships engaged nearly 4,500 youth in Great Lakes and natural resource stewardship projects.

Results: In 2017, Michigan Sea Grant sponsored development of six regional training opportunities. A new partnership began with Huron Pines to pilot a networking meeting that targeted inland schools and partners within Lake Huron watersheds. With the National American Association for Environmental Education and Underwriters Laboratories (UL) Innovative Education program, NEMIGLSI launched an Environmental-STEM challenge with local schools to explore ways place-based education can enhance STEM learning and how students might apply STEM learning to accomplish place-based stewardship projects. Michigan Sea Grant educator Brandon Schroeder led efforts among NEMIGLSI leadership to secure nearly \$220,000 in new funds invested in the NEMIGLSI partnership and programming.

Recap: Place-based stewardship education projects showcase how teachers and students develop and lead environmental stewardship projects in partnership with their communities.

Partners: Community Foundation for Northeast Michigan, NOAA Thunder Bay National Marine Sanctuary, Alpena-Montmorency-Alcona Educational Service District, AMA/Iosco Math Science Center, Cheboygan-Otsego-Presque Isle Educational Service District, Northeast Michigan Council of Governments, Huron Pines, U.S. Fish and Wildlife Service, Michigan State University Extension 4-H, Michigan Department of Natural Resources, Great Lakes Fishery Trust, North American Association for Environmental Education, Underwriters Laboratories (UL) Innovative Education program, Great Lakes NOAA B-WET program, and school representatives

Projects: Extension A/AS-5

Goal 11: A diverse workforce skilled in science, technology, engineering, mathematics, and other disciplines critical to local, regional, and national needs.

IMPACT: Michigan Sea Grant hosts annual student marine and freshwater science bowl competitions.

Relevance: Today's high school students will become tomorrow's scientists, educators, policy makers, and public officials. It is important to equip them with information and skills to make complicated decisions about shared environmental resources. But presenting environmental information in the classroom may not always leave a lasting impact; tapping into students' competitive spirits can help them engage with information in new ways.

Response: Michigan Sea Grant annually hosts the Great Lakes Bowl, a regional competition of the National Ocean Sciences Bowl. The National Ocean Sciences Bowl is an annual national academic competition in which teams of high school students compete for the regional and national title. The matches feature quiz bowl-style rounds and challenge questions that test a team's knowledge of math and science related to ocean and Great Lakes biology, chemistry, geology, physics, technology, history, and economics.

Results: On February 4, 2017, Michigan Sea Grant hosted 16 teams from southeast Michigan schools for a day-long Great Lakes Bowl tournament at the University of Michigan. Although only one team could advance to the national competition, all teams spent weeks in preparation and were engaged in a day-long event devoted to marine and freshwater knowledge. Many of the students claimed they plan to pursue a career in one or more STEM fields. In addition to hosting the competition, Michigan Sea Grant loans textbooks, practice buzzers, and other preparatory materials to aid teams before the competition.

Recap: Michigan Sea Grant hosts a regional science bowl competition to help Michigan high school students engage with marine and freshwater information in a lasting way.

Partners: Grand Valley State University, Great Lakes Commission, University of Michigan Department of Ecology and Evolutionary Biology, Domino's, Little Caesar's, Cooperative Institute for Great Lakes Research, University of Michigan School for Environment and Sustainability, Leave Only Bubbles, Barry Bagels, Chipotle, NOAA Great Lakes Environmental Research Laboratory, U.S. Geological Survey, Great Lakes Fishery Commission

Projects: R/EU-15, M/PM-54, C/CC-10

National Performance Measures

Focus Area	Performance Measures		National Target 2014-2017	MISG 2017 Actual (#/\$) 2/1/2017-1/31/2018
ALL	Economic (market and non-market) benefits derived from Sea Grant activities	Economic benefit	81,590,500	2,443,859
		Businesses created	40	0
		Businesses sustained	620	25
		Jobs created	259	0
		Jobs sustained	3,080	41
		Patents/Licenses	10	0
SFA	Number of fishers, seafood processing, and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities		6,295	91
RCE	Number of communities that implemented sustainable economic and environmental development practices and policies as a result of Sea Grant activities		335	14
HCE	Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities		497,445	27
ELWD	Number of people engaged in Sea Grant-supported informal education programs		1,160,959	3,042
ELWD	Number of Sea Grant-supported graduates who became employed in a job related to their degree within two years of graduation		177	4
HCE	Number of resource managers who use ecosystem-based approaches in the management of land, water, and living resources in ocean, coastal, and Great Lakes areas as a result of Sea Grant activities		N/A	97
Cross-cutting	Number of coastal communities that have adopted or implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events	See page 15 for details	205	14
Cross-cutting	Number of Sea Grant products developed and used (i.e., tools, technologies, and information services)	See page 16 for details	250	10
Cross-cutting	Number of Sea Grant products used to advance environmental literacy and workforce development	See page 20 for details	406	8

Economic (market and non-market; jobs and businesses created or sustained) impacts derived from Sea Grant activities

Economic Benefit of Michigan Sea Grant	2017 Actual (02/01/2017 - 01/31/2018)					
	Economic impact	Businesses created	Businesses sustained	Jobs created	Jobs sustained	Patents/Licenses
A Seafood Hazard Analysis and Critical Control Points training, facilitated by Michigan Sea Grant Extension educators in Baraga, Michigan, sustained 20 jobs, with a mean annual wage of \$44,240 per job in the state of Michigan as of May 2017 (source: first-line supervisors of fisheries workers, job code = 45-1011 www.bls.gov/oes/current/oes451011.htm) This training provided skills necessary to execute the most efficient methods of seafood production while abiding by food safety standards. An HACCP certification is required for seafood processing.	\$884,800.00				20	
20 jobs * \$44,240 mean annual salary per job = \$884,800						
Michigan Sea Grant facilitates the certification and re-certification of Clean Marina facilities. MISG staff serve on the Michigan Clean Marina Foundation Board and Operations Committee. Some certified Clean Marina facilities have received an annual insurance discount of up to \$1,500 as a result of their certification as a Clean Marina. 5 certifications and 9 re-certifications were awarded in 2017 resulting in a combined \$21,000 insurance savings.	\$21,000.00		14			
14 total certifications and re-certifications * \$1500 savings/marina = \$21,000						
Michigan Sea Grant co-facilitated the development of the "Michigan Catch and Cook" program in 2012 and had 3 new charter businesses and 4 new restaurants register in 2017, giving us a total of 94 charters and 64 restaurants currently involved in the Catch and Cook program. The program brings together charter fisherman and local restaurants to allow anglers the opportunity to be served their own fresh-caught fish at participating restaurants. Surveys of participating charter captains indicate that they have about 1.4 new charter trips a year as a result.						
Economic benefits were calculated using Michigan Sea Grant's charter impact calculator (http://www.miseagrant.umich.edu/explore/fisheries/economic-impacts-of-charter-fishing-in-michigan/), along with an inflation calculator (https://data.bls.gov/cgi-bin/cpi/calc.pl), to estimate the economic impact in 2017. The number of participating charter fishing businesses that operate on each of the Great Lakes were determined from the Catch and Cook website (http://www.michigancatchandcook.com/charter-boats/?wpbdp_view=search). See http://www.miseagrant.umich.edu/wp-content/blogs.dir/1/files/2018/05/Calculating-Economic-Impact-from-Catch-and-Cook-Program.pdf for a detailed explanation of how this calculation was completed, as well as links to any relevant resources.	\$73,509.23					
Michigan Sea Grant Extension educators provided Drill Conductor Training to 21 tribal fishers in Michigan, including members of the Bay Mills Indian Community and the Red Cliff Indian Reservation. Commercial fishers are required to practice monthly emergency drills that cover 10 contingencies spelled out in the U.S. Coast Guard regulations. Persons conducting the drills (the vessel operator or captain) are required to have passed a Drill Conductor Training. Attendees rated the Michigan Sea Grant trainings as "excellent" and indicated that the emergency drills increased their proficiency in being able to respond to an emergency. Average annual salary for captains, mates, and pilots of water vessels is \$65,550 in the state of Michigan as of May 2017, with 21 certifications given in Michigan (source: job code = 53-5021, www.bls.gov/oes/current/oes535021.htm)	\$1,376,550.00				21	
21 certifications * \$65,550 annual salary per job = \$1,376,550						
An MISG Extension agent provided technical assistance to 4 fish processors (including 2 Native American fish processors), an Ohio fish farmer/fish processor, a fish farmer, a seafood company in Grand Rapids, Premiere Food Services, and a Bay Mills tribal fisher about regulations associated with the Seafood HACCP and/or the Michigan Smoked Fish Regulation. This assistance allowed compliance with regulations thus saving violations which can result in costly fines. Economic impact calculated from Michigan fines information from the Michigan Food Law of 2000 (www.michigan.gov/documents/mdard/FOOD_LAW_Eff_10-1-12_8-14-12_396680_7.pdf), maximum \$8,000 fines per year, per business.	\$72,000.00		9			
Total Economic Impact: 9 businesses x \$8,000 = \$72,000						
An MISG Extension agent provided technical assistance to a Native American fish processor. The MISG Extension agent provided supporting information on Great Lakes fish contaminant research that showed that the fish species the processor used passed all FDA standards for safety, as well as information on how to deal with the potential of metal fragments contaminating the fish from automated fish processing equipment the processor used. This assistance allowed compliance with regulations thus saving violations which can result in costly fines. Economic impact calculated from Michigan fines information from the Michigan Food Law of 2000 (https://www.michigan.gov/documents/mdard/FOOD_LAW_Eff_10-1-12_8-14-12_396680_7.pdf), maximum \$8,000 fines per year, per business.	\$8,000.00		1			
Total Economic Impact: 1 business x \$8,000 = \$8,000						
An MISG Extension agent provided technical assistance to a representative of the Little Traverse Bay Band of Odawa Indians on retail fish licensing requirements through the Michigan Department of Agriculture and Rural Development and on Seafood HACCP. This assistance allowed compliance with regulations thus saving violations which can result in costly fines. Economic impact calculated from Michigan fines information from the Michigan Food Law of 2000 (https://www.michigan.gov/documents/mdard/FOOD_LAW_Eff_10-1-12_8-14-12_396680_7.pdf), maximum \$8,000 fines per year, per business.	\$8,000.00		1			
Total Economic Impact: 1 business x \$8,000 = \$8,000						
TOTAL	2,443,859	0	25	0	41	0

Hazard Resiliency Training: Number of coastal communities that have adopted or implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events

County of the Coastal Community	Name of Coastal Community	Number of Resiliency Training/Tech Assistance Provided	Community Hazard Resiliency Improved?
Antrim	Elk Rapids	1	Yes
Berrien	Benton Harbor	1	Yes
Cheboygan	Cheboygan	1	Yes
Cheboygan	Indian River	1	Yes
Delta	Garden	1	Yes
Emmet/Cheboygan	Mackinaw City	2	Yes
Iosco	East Tawas	1	Yes
Menominee	Cedar River	1	Yes
Monroe	La Salle	1	Yes
Sanilac	Lexington	1	Yes
St. Clair	Algonac	1	Yes
St. Clair	Fair Haven	1	Yes
Wayne	Detroit	1	Yes
Total	13 communities	14 trainings	

Sea Grant Products Developed and Used (tool, technology, or informational services)

Name of Product	Developed (Yes/No)	Used (Yes/No)
<p>Michigan Sea Grant Extension Educators created a two-page factsheet, <i>Extreme Storms in the Saginaw Bay Watershed Impact Public Health, Community Safety, and Economic Stability</i>, in conjunction with the Michigan Sea Grant Communications Team to raise awareness about the negative impacts of extreme storms and to share how communities and local officials can take action to mitigate those negative impacts. Due to an employment gap for MSU Extension in the Saginaw Bay region, the factsheets have not yet been distributed to the community, but there are plans for future distribution of these factsheets.</p> <p>End users: local government officials and other decision makers in the Saginaw Bay Watershed.</p>	Yes	No
<p><i>Tools to Increase Awareness of Storm Water During Extreme Storms</i>: This two-page factsheet was designed by Michigan Sea Grant Extension Educators in conjunction with the Michigan Sea Grant Communications Team to describe tools to deal with excess storm water runoff through planning and development. Due to an employment gap for MSU Extension in the Saginaw Bay region, the factsheets have not yet been distributed to the community, but there are plans for future distribution of these factsheets.</p> <p>End users: local government officials and other decision makers in the Saginaw Bay Watershed.</p>	Yes	No
<p>This two-page factsheet, <i>Tools to Assess Risks from Extreme Storms in the Saginaw Bay Region</i>, was designed by Michigan Sea Grant Extension Educators in conjunction with the Michigan Sea Grant Communications Team to explore tools available to communities that can help them assess risks from extreme storms in order to better prepare for them. Due to an employment gap for MSU Extension in the Saginaw Bay region, the factsheets have not yet been distributed to the community, but there are plans for future distribution of these factsheets.</p> <p>End users: local government officials and other decision makers in the Saginaw Bay Watershed.</p>	Yes	No
<p><i>Grand Challenges in the Management and Conservation of North American Inland Fish and Fisheries</i> was published in February 2017 in the journal <i>Fisheries</i>. Numerous authors, including a Michigan Sea Grant-supported graduate student, wrote the article. It explores the grand challenges (significant roadblocks to progress in a particular field that, if removed, could provide a solution to a particular problem) in the conservation and management of North American inland fish and fisheries.</p>	Yes	Yes

End users: stakeholders involved with North American inland fisheries management, including researchers, managers, and policymakers.		
<p><i>The Telecoupling Framework: An Integrative Tool for Enhanced Fisheries Management:</i> Michigan Sea Grant Associate Director Bill Taylor and other Michigan State University researchers funded by Michigan Sea Grant authored this journal article, which was published in August 2017 in the journal <i>Fisheries</i>. The article looks at the telecoupling framework, which is a new scientific framework exploring socioeconomic and environmental interactions over space and time, in the context of fisheries management. This tool's intention is to help fishery professionals understand the complexities of socioeconomic and environmental interactions in fisheries, as well as illustrate the similarities and differences between different types of fisheries.</p> <p>End users: fisheries professionals, including researchers, managers, and policymakers.</p>	Yes	Yes
<p><i>Corresponding long-term shifts in stream temperature and invasive fish migration</i> was published online in August 2017 through the <i>Canadian Journal of Fisheries and Aquatic Sciences</i>. A Michigan Sea Grant-supported researcher authored this journal article. It explores the impact of stream warming on invasive sea lamprey migration upstream. Since the sea lamprey life cycle is known to be highly temperature-dependent, this species provides a useful lens through which to explore the impact of climate change on fish migration.</p> <p>End users: scientists, resource managers.</p>	Yes	Yes
<p><i>Invasive dreissenid mussels benefit invasive crayfish but not native crayfish in the Laurentian Great Lakes:</i> This peer-reviewed journal article explores how dreissenid mussels benefit invasive crayfish but not native crayfish, indicating that this invasive species facilitates the propagation of a subsequent invasive species. This discovery is applicable to management of invasive species in the Great Lakes — it enables managers to prioritize invasive species that facilitate additional invaders. Several authors, including MISG-funded researcher Kevin Pangle, published this article, which was made available online in March 2017 through the <i>Journal of Great Lakes Research</i>.</p> <p>End users: scientists, resource managers.</p>	Yes	No
<p><i>Great Lakes Aquatic Nonindigenous Species Information System (GLANSIS) Map Explorer:</i> The Map Explorer tool, created in part by Michigan Sea Grant staff, principally improves access to data about nonindigenous species in GIS formats. It was designed to support testing geospatial hypotheses about the distribution and spread patterns of nonindigenous species. This tool was soft-launched along with the overall re-design of the GLANSIS website and is integrated into the website, rather than being a separate tool a user would need to download or have distributed to them prior to use. All of the Sea Grant Extension staff throughout the region were given the direct URL (https://www.glerl.noaa.gov/glansis/mapExplorer.php) during the beta-testing phase. Brief demonstrations were included in GLANSIS Update</p>	Yes	Yes

presentations at IAGLR 2017 and the Great Lakes Panel Fall 2017 meetings. Additional distribution and marketing will be ongoing as part of GLANSIS outreach.		
End users: Sea Grant Extension staff, scientists, and managers.		
<i>Michigan Clean Marina Program Case Study:</i> MISG funded a case study using Great Lakes Restoration Initiative grant funds to support Michigan Clean Marina partners. The case study provides an overview of the Michigan Clean Marina program and may be utilized by communities to guide planning and decision making, as well as methods to increase marina participation. It was shared via webinar with the Great Lakes Clean Marina Network (GLCMN) and the case study is hosted on the Michigan Sea Grant-curated GLCMN website. It was also discussed at a summer 2017 GLCMN meeting.		
End users: marina operators, small harbor and coastal communities.	Yes	Yes
<i>Wisconsin Clean Marina Program Case Study:</i> MISG Program Coordinator worked with Clean Marina partners to develop the Wisconsin Clean Marina Program Case Study. This report provides the results of a survey of Wisconsin marinas to identify the barriers to the Clean Marina Program and identify needed outreach and education materials. The case study was shared via webinar with the Great Lakes Clean Marina Network (GLCMN) and is hosted on the Michigan Sea Grant-curated GLCMN website. It was also discussed at a summer 2017 GLCMN meeting.		
End users: marina operators, small harbor and coastal communities.	Yes	Yes
<i>Sustainable Small Harbors Tools and Tactics Guidebook:</i> Michigan Sea Grant staff worked with the Sustainable Small Harbors team to develop a guidebook for small harbor communities to assess resources and barriers and develop visions for the future. The <i>Sustainable Small Harbors Tools and Tactics Guidebook</i> is available to any community interested in developing and implementing a long-term environmental, economic, and social sustainability plan.		
End users: managers, citizens, and policymakers in coastal communities or communities with small harbors.	Yes	Yes
<i>Huron-Michigan Diet Study Instructions Video:</i> This video is an instructional tool that allows anglers to do their part to help scientists understand how economically valuable salmon, trout, walleye, and other species are adapting to shifting conditions such as changing diet, behavior, and survival of these valued fish. Anglers can help by collecting stomachs from fish and leaving them in freezers located at cleaning stations and other drop sites. The video describes steps these volunteer citizen-scientists need to take to contribute in the diet study.		
End user: Anglers volunteering to help with the Huron-Michigan Diet Study.	Yes	Yes
<i>Angler Diary: Help Your Great Lakes Fishery:</i> The Great Lakes Angler Diary project is a citizen science project that collects information from anglers to		

help paint a clearer picture of the health of Great Lakes Fisheries. This promotional poster, created and distributed by Michigan Sea Grant Extension educators, describes the project and how anglers can get involved.		
End user: Anglers volunteering to help with the Huron-Michigan Diet Study.	Yes	Yes
<i>Huron-Michigan Diet Study Posters:</i> This flyer, created by MISG Extension educators, educates anglers about how to collect fish stomachs and deposit them in freezers to be used in the Huron-Michigan Diet Study. This study, as the name suggests, explores fish diets in an effort to help scientists understand how economically valuable salmon, trout, walleye, and other species are adapting to shifting conditions such as changing diet and behavior.		
End user: Anglers volunteering to help with the Huron-Michigan Diet Study.	Yes	Yes
Total	14	10

Number of Sea Grant products used to advance environmental literacy and workforce development

Name of Product	Developed (Yes/No)	Used (Yes/No)
<p><i>Crayfishes of Michigan:</i> This educational field guide was designed by the Michigan Sea Grant Communications Team to help users identify native and invasive crayfishes in Michigan. Originally requested by the Michigan Department of Natural Resources and Fish and Wildlife for use in their boats, this is a complement to the 2016 Crayfishes of Michigan poster.</p> <p>End users: resource management professionals in the state of Michigan.</p>	Yes	Yes
<p><i>2017 Upwellings Newsletter (four editions):</i> MISG Communications Team produced the Michigan Sea Grant publication, <i>Upwellings</i>. <i>Upwellings</i>, the e-newsletter of Michigan Sea Grant, has been reporting on Great Lakes research and education since 1976. The topics discussed have varied but have always been tied to the core of Michigan Sea Grant's mission: research, education, and outreach surrounding the Great Lakes. As of February 2018, there were 1,839 email subscribers and 2,479 page views on the website where the e-newsletter editions are housed.</p> <p>End users: newsletter subscribers, which include professionals involved in resource management, sustainable development, resiliency, and other fields, as well as the public.</p>	Yes	Yes
<p><i>Fish Notes Newsletter (four editions):</i> This is a newsletter produced by Michigan Sea Grant's Extension office and educators that targets anglers and other fisheries. Helps to increase industry knowledge of sustainable fishing practices. Sent out quarterly to over 1,000 subscribers with more than 500 opening each newsletter sent.</p> <p>End users: newsletter subscribers, which include professionals involved in fisheries and aquatic resource management and the public.</p>	Yes	Yes
<p><i>Michigan Water Trails Manual:</i> An MISG Extension Educator authored a chapter in this manual, as well as provided expertise and review for the rest of the manual. Funding for the manual was provided by the Michigan Coastal Zone Management Program, Department of Environmental Quality Office of the Great Lakes; and the National Oceanic and Atmospheric Administration, U.S. Department of Commerce. The manual is intended to provide local officials, water advocacy organizations, paddlers, and visionary citizens with the</p>	Yes	Yes

resources and tools to develop a water trail in their community. This manual will help users develop a water trail that is tailored to their community's capacity, resources, and needs.		
End users: local officials, water advocacy organizations, paddlers, and citizens.		
<i>The Rockin' River Redhorse:</i> This poster was created by students in the Lakeshore Environmental Education program (LEEP) at Walden Green Montessori School in Ferrysburg, MI, in conjunction with Michigan Sea Grant. Students Owen Bergman and Malcolm Johnson created the Rockin' River Redhorse drawing, and Todd Marsee of Michigan Sea Grant translated their idea into a cartoon. This is the second poster in Michigan Sea Grant's "Native Fish Heroes" series. The series is intended to educate people about struggling native fish populations and ways local citizens can help.		
End users: K-12 teachers and students, the public.	Yes	Yes
<i>Mudpuppies in Michigan:</i> This short YouTube video, prepared by MISG and including several MISG Extension educators and staff as speakers, teaches viewers about the mudpuppy, Michigan's largest, fully aquatic salamander. Often referred to as "indicators," because they are sensitive to pollutants and water quality, these salamanders act as an early warning system for environmental problems but are often misunderstood. This video explains their importance and what to do with a mudpuppy if you catch one while fishing.		
End users: anglers, the public.	Yes	Yes
<i>A Tour of Belle Isle Habitat Restoration Projects Poster:</i> Michigan Sea Grant staff designed this brochure to share basic information about spawning reef restoration projects and show locations of Belle Isle habitat restoration projects. This brochure was originally printed for a media event and has since been shared with the Belle Isle Nature Center, as well as the Friends of the Detroit River. The brochure enables Belle Isle visitors to go on a self-guided tour of the nature area. The Nature Center has requested numerous additional copies, indicating that people have been using the brochures in the nature area.		
End users: the public, educators.	Yes	Yes
<i>Detroit River Reef Restoration Educational Sign:</i> This publication is a panel designed by Michigan Sea Grant that will be mounted on a sign and put up on Belle Isle to educate people about the reef restoration projects in the area, as well as the different types of partners required for each project.		
	Yes	No

End users: the public, educators, students.		
<i>Michigan Sea Grant Extension News Articles:</i> This entry refers to a series of 57 science, program, and environmental literacy-related informational articles written by Michigan Sea Grant Extension educators for posting to the MSU Extension website. All of the 2017 articles (including an additional 24 event-related articles), were viewed by more than 32,383 unique visitors to the MSU Extension website. The articles had an average viewing time of 3:09 per page.		
End users: the public, educators, students.	Yes	Yes
Total	9	8

Program Metrics

The Metrics page is used to report National Metrics Data.

These data are used to explain the scope and work of the National Sea Grant College Program.

Annual Report Year: February 1, 2017-January 31, 2018

Sea Grant Staffing	Number of Individuals	Number of FTE's	Number of FTE's
		(Funded by Federal Sea Grant \$)	(Funded by Match and non-Sea Grant \$)
Administrative	6.00	1.45	3.55
Communications	3.00	2.18	0.82
Extension	30.00	9.00	9.80
Education	0.0	0.0	0.0
Research	14.00	20.51	9.31
Individuals Staffing the Program in all areas	0.00		

Core Funding (not NSI's)	Number of Proposals	Number of Institutions Involved	Number from Home Institution
Pre-proposals Submitted	16	8	3
Full Proposals Submitted	10	6	3
Proposals Funded	4	3	1

	Number
Volunteer Hours	3,137.00

	Number of New Students	Number of Continuing Students	Number of Degrees Awarded
Sea Grant-Supported Undergraduate Students	4	1	1
Sea Grant-Supported MS/MA Graduate Students	1	4	0
Sea Grant-Supported PhD Graduate Students	0	3	3
Other Sea Grant-Supported Professional Degree Graduate Students	0	14	0

	Number
Number of P-12 Students Reached through Sea Grant-Trained Educators or Directly through Sea Grant Education Programs	13,102
Number of P-12 Educators Who Participated in Sea Grant Education Programs	1,111
SG-Sponsored/Organized Events	53
Attendees in SG Meetings/Workshops	3,684
Public or Professional Presentations	115
Attendees at Public or Professional Presentations	9,976
Clean Marina Program Certifications	14
HACCP Certifications	20

Leveraged Funding

02/01/2017 – 01/31/2018

Managed by Michigan Sea Grant			
Title	Leveraged Amount	Fund Start Date	Fund End date
BWET- Our Fisheries, Our Future in Northeast Michigan	\$70,000	01/1/2018	06/30/2019
GLANIS Project Manager	\$90,496	11/01/2017	10/31/2018
Coastal Hazards Assistantship	\$25,000	10/1/2017	12/31/2018
Anthropogenic Contribution of Contaminants of Emerging Concern and their Food web Implications in Waishkey Bay, Michigan: With an Investigation of Freshwater Mussels as a Sentinel (RC107754)	\$9,000	09/1/2017	08/31/2020
Empowering Communities with Online Action Planning Tools: Tipping Points and Indicators for Improving Water Quality across the Great Lakes	\$9,998	05/01/2017	08/31/2018
Northeast Michigan Great Lakes Stewardship Initiative (RC107962)	\$10,000	07/1/2017	06/30/2019
Center for Great Lakes Literacy (CGLL) – Year 2 (RC107123)	\$62,885	12/1/2016	11/30/2018
Stewardship Motivations and a Collaborative Governance Model for Great Lakes Coastal-Based Wildlife Management Areas for Waterfowl Hunting, Bird Watching, and Community Development (RG100693)	\$67,426	10/1/2016	09/30/2017
MISG SEMCOG Green Infrastructure Community Audit Project	\$5,000	04/1/2016	06/30/2017
Evaluation of the MI Clean Marina Program	\$30,000	01/1/2018	12/31/2018
National Ocean Science Bowl Hosting 2018 R/EU-16	\$9,000	11/1/2017	6/30/2018
NOSB Sponsorship (2018): Grand Valley State U, The Nature Conservancy, CIGLR, Ecology & Evolutionary Biology	\$1,250	11/1/2017	6/30/2018
International Joint Commission-Sea Grant Fellowship 2017 Mezzacapo IJC-MISG/EF-04	\$56,500	06/1/2017	5/31/2018
Total	\$446,555		

Influenced by Michigan Sea Grant			
Title	Leveraged Amount	Fund Start Date	Fund End date
Great Lakes Fishery Trust, Great Lakes Stewardship Funds	\$10,000	01/1/2018	12/31/2018
NOAA DEQ Coastal Management Program	\$26,900	10/1/2017	12/31/2018
Great Lakes Fishery Trust, Great Lakes Stewardship Initiative	\$89,996	10/1/2017	09/30/2018

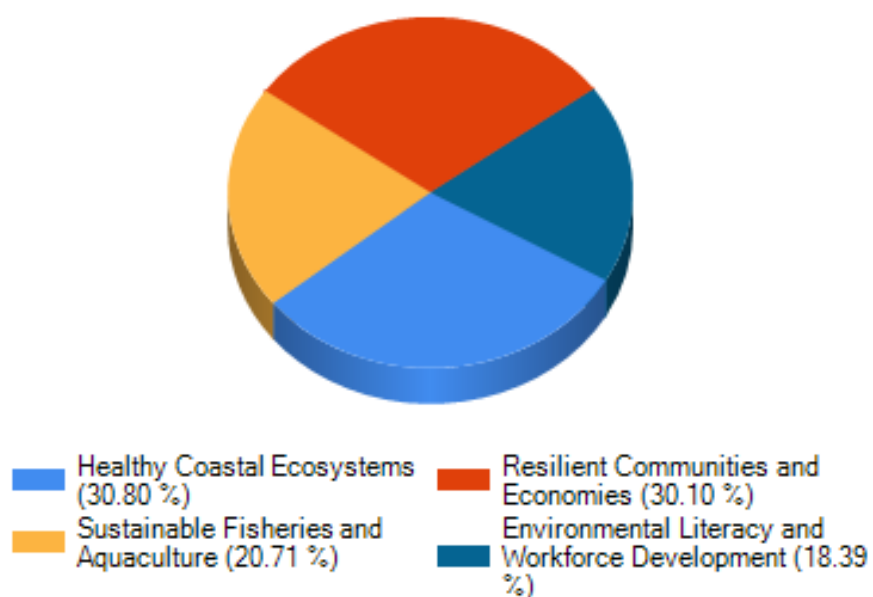
Community Foundation of Northeast Michigan	\$1,000	10/1/2017	09/30/2018
NAAEE UL Innovative Education Award	\$25,000	10/01/2016	06/30/2018
NE MI GLSI Great Lakes Stewardship Initiative, Great Lakes Fishery Trust Funding	\$155,986	07/1/2016	06/30/2017
Great Lakes Angler Diary donation to Brenton Consulting, LLC for web-based app development	\$1,000	2017	2017
Vietnam Trade Capacity Building Program Focusing on Food Safety, Aquaculture, and Fisheries	\$377,243	09/30/2016	09/30/2018
Promoting Healthy Watershed and Communities by Integrating Ecosystem Science, Transportation Networks, and Stewardship	\$75,000	01/1/2017	06/30/2018
Friends of the Detroit River Partnership Grant (phase 1) - Great Lakes Restoration Initiative Detroit River Areas of Concern Habitat Projects	\$831,916	10/1/2016	09/30/2021
Stony Island Habitat Restoration Construction	\$7,500,000	04/1/2016	09/30/2017
Lake Okonoka Feasibility Hydrologic Study	\$319,692	04/1/2016	09/30/2017
Friends of the Detroit River PAC Support Grant	\$25,572	06/15/2016	06/30/2017
Total	\$9,439,305		

Estimated Level of Effort by Focus Area

02/01/2017 – 01/31/2018

National Focus Area Name	SG Federal	Match	Pass Through	Federal + Match + Pass Through	LOE without Leverage (%)	Leveraged (Managed)	LOE with Leverage (%)
Healthy Coastal Ecosystems	\$635,274	\$332,182	\$0	\$967,456	32%	\$84,061	31%
Sustainable Fisheries and Aquaculture	\$433,440	\$195,429	\$0	\$628,869	21%	\$77,974	21%
Resilient Communities and Economies	\$610,248	\$333,189	\$0	\$943,437	31%	\$84,061	30%
Environmental Literacy and Workforce Development	\$343,906	\$193,763	\$0	\$537,668	18%	\$90,149	18%
Unclassified	\$0	\$0	\$0	\$0	0%	\$0	0%
Total	\$2,022,868	\$1,054,562	\$0	\$3,077,430	100%	\$336,244	100%

Pie Chart of Level of Effort by Focus Area (%)



Distribution of Effort across Focus Areas by Project

02/01/2017 – 01/31/2018

Project Title	Program Project ID	Federal + Match + Pass Through	Leveraged (Managed)	HCE	SFA	ELWD	RCE
Assessing the spatial distribution and physical drivers of cyanobacterial blooms in Western Lake Erie	R/WQ-6	\$62,829	\$0	100%	0%	0%	0%
Using an IA for Green Infrastructure Implementation: Planning for a Sustainable Future	R/CCD-37	\$112,390	\$0	25%	0%	0%	75%
Restoration Economics: Investigating the Effect of Area-of-Concern Remediation on Residential Housing Prices and Neighborhood Demographic Characteristics	R/WQ-5	\$190,798	\$0	25%	0%	25%	50%
Use of Dual-Frequency Identification Sonar (DIDSON) Cameras to Estimate Migration Timing and Abundance of Fishes in Medium and Large Streams in Michigan	R/CGLH-4	\$19,695	\$0	\$0	100%	0%	0%
Omnibus FY14-18: Climate Adaptation	R/CA-1	\$45,000	\$0	50%	0%	0%	50%
Minibus- Program Development	M/PM-56	\$18,459	\$0	25%	25%	25%	25%
An Integrated Assessment of Cisco Restoration in Lake Michigan	R/SS-4	\$105,733	\$0	25%	75%	0%	0%
Omnibus FY14-18: UM Administration	M/PM-54	\$307,757	\$121,750	25%	20%	30%	25%
Omnibus FY14-18: Extension	A/AS-5	\$982,861	\$114,000	25%	25%	25%	25%
Omnibus FY14-18: Communications	C/CC-10	\$266,545	\$0	30%	25%	20%	25%
Sea Grant/GLERL Great Lakes Sea Grant Network Agent	A/AS-22	\$154,132	\$0	65%	0%	0%	35%
Placeholder – Future competed small grants research projects	P/PM-60	\$49,000	\$0	25%	25%	25%	25%
Coastal Community Development	R/CCD-29	\$75,000	\$0	0%	0%	0%	100%
2017 Network Visioning	R/PM-67	\$45,000	\$0	25%	25%	25%	25%
A 3-dimensional model for understanding bigheaded carp habitat sustainability in Lake Michigan	R/CGLH-6	\$64,896	\$0	100%	0%	0%	0%